IBM i
7.2

Electronic business and Web serving IBM HTTP Server for i

IBM

Note

Before using this information and the product it supports, read the information in "Notices" on page 661.

This edition applies to IBM i 7.2 (product number 5770-SS1) and to all subsequent releases and modifications until otherwise indicated in new editions. This version does not run on all reduced instruction set computer (RISC) models nor does it run on CISC models.

Contents

IBM HTTP Server for i

The IBM® HTTP Server for i is a Web server implementation that is based on the open-source server code provided by the Apache Software Foundation and that is optimized for the IBM i environment. With the IBM HTTP Server for i, you have everything you need to quickly and easily establish a Web presence.

The IBM HTTP Server for i documentation contains getting started, task oriented, and scenario-based information, supporting reference material, and conceptual information. Information for the IBM Web Administration for i interface is also included. See the IBM HTTP Server for i Web site for additional product information.

Important: Information for this topic supports the latest PTF levels for IBM HTTP Server for i. It is recommended that you install the latest PTFs to upgrade to the latest level of the IBM HTTP Server for i. See the IBM HTTP Server for i Support Web page for more information.

What's new for IBM i 7.3

Read about new or significantly changed information for the IBM HTTP Server for i topic collection.

Important: Information for this topic supports the latest PTF levels for IBM HTTP Server for i. It is recommended that you install the latest PTFs to upgrade to the latest level of the IBM HTTP Server for i. See the IBM HTTP Server for i Support Web page for more information.

See the HTTP Server: What's New topic for a list of recent enhancements made to the IBM HTTP Server for i.

The following changes have been made to IBM HTTP Server for i in IBM i 7.3:

- HTTP Server for i has been updated to Apache 2.4.20 which brings in core enhancements, new modules and module enhancements to the previous HTTP Server available on the IBM i.

How to see what's new or changed

To help you see where technical changes have been made, the information center uses:

- The » image to mark where new or changed information begins.
- The « image to mark where new or changed information ends.

To find other information about what's new or changed this release, see the Memo to users.

PDF file for IBM HTTP Server for i

You can view and print a PDF file of this information.

To view or download the PDF version of this document, select IBM HTTP Server for i (about 2300 KB).

Saving PDF files

To save a PDF on your workstation for viewing or printing:

1. Right-click the PDF link in your browser.
2. Click the option that saves the PDF locally.
3. Navigate to the directory in which you want to save the PDF.
4. Click **Save**.

Downloading Adobe Reader

You need Adobe Reader installed on your system to view or print these PDFs. You can download a free copy from the Adobe Web site (www.adobe.com/products/acrobat/readstep.html).

Installing HTTP Server

This topic provides information about how to install the IBM HTTP Server for i, which includes the support for the IBM Web Administration for i interface.

Compatibility considerations

This topic describes considerations when you are moving from an earlier release of IBM i to the most current release, or you are moving from an earlier HTTP Server version of IBM HTTP Server for i to a newer version.

You should read about any compatibility issues by reading HTTP Server compatibility information on the HTTP Server home page. Before reading the information, you will need to determine the HTTP Server version you are currently using. Use one of the following methods to determine the HTTP Server version:

- Use the "-V" option on the Start TCP/IP Server (STRTCPSVR) command. For example, if HTTP Server (Apache 2.4.20) is installed, `STRTCPSVR SERVER(*HTTP) HTTPSVR(APACHEDFT '-V')` displays:

  ```
  Server version: Apache/2.4.20 (IBM i)
  Server built:   Oct  7 2016 11:10:46
  ```

- From the IBM Web Administration for i, select **Manage an HTTP server**. In the server introduction, the Apache version level is included in the header. For example:

  ```
  Manage Apache server "WEBSERVER" - Apache/2.4.20
  ```

Verify the prerequisites

Before you begin your installation, use this information to ensure that you meet all the hardware, software, and system requirements for installing IBM HTTP Server for i.

Hardware requirements

You need a communication hardware adapter that is supported by the TCP/IP protocol stack.

Software requirements

The following licensed programs must be installed on your system:

- Extended Base Directory Support (5770-SS1 Option 3)
- Host Servers (5770-SS1 Option 12)
- Qshell (5770-SS1 Option 30)
- IBM Portable Application Solutions Environment for i (5770-SS1 Option 33)
- IBM TCP/IP Connectivity Utilities for i (5770-TC1)
- IBM Developer Kit for Java™ (5770-JV1 Option 14 and 15).

The following software products may need to be installed depending on your needs:

- **WebSphere® Application Server**

  If you plan to use WebSphere Application Server with the HTTP Server, install a version of the WebSphere Application Server Apache plug-in that is compatible with your current level of HTTP Server. If the proper WebSphere Application Server PTFs are not loaded, the mismatch will prevent the HTTP Server from starting. See the WebSphere Application Server for IBM i product Web page for information about the latest WebSphere Application Server and WebSphere Application Server Apache plug-in PTFs.

- **Digital Certificate Manager**

  In order to provide the required support for handling digital server certificates used by Secure Sockets Layer (SSL) for secure Web serving, you must install IBM i Digital Certificate Manager (5770-SS1 Option 34).
- **HA Switchable Resources**

  If you want to configure a high availability Web server cluster, then you need to install HA Switchable Resources (5770-SS1 Option 41), or use a business partner tool to manage clusters.
- **Zend Server for IBM i**

  If you want to run PHP scripts, you will need the PHP Zend Server runtime and any software that is required by the Zend Server for IBM i product. See the Zend and IBM i product Web page for information about Zend Server for IBM i.

System configuration settings

Perform or verify the following configuration settings:

- Ensure at least one TCP/IP interface is available and active. You can use the Work with TCP/IP Network Status (NETSTAT) command to see a list of TCP/IP interfaces. For example:

  ```
  NETSTAT OPTION(*IFC)
  ```

  Note: You can add TCP/IP interfaces using the Add TCP/IP Interface (ADDTCPIFC). You can start TCP/IP interfaces using the Start TCP/IP Interface (STRTCPIFC) command.
- Ensure the system TCP/IP host and domain name information is set. You can use the Change TCP/IP Domain (CHGTCPDMN) command to set TCP/IP domain information.
- Ensure that LOCALHOST is in the TCP/IP host table. You can use the Configure TCP/IP (CFGTCP) command to display a menu that allows a user to define or change TCP/IP configuration settings.
- Ensure that the Share Memory Control (QSHRMEMCTL) system value is set to 1.

Install HTTP Server on your server

Follow these steps to install IBM HTTP Server for i on your IBM i server.

Before installing IBM HTTP Server for i, you need to ensure that your server meets all the hardware and software prerequisites. In addition, you should be aware of any compatibility issues.

To install IBM HTTP Server for i (5770-DG1) on your IBM i server, complete the following steps:

1. Insert the installation media for HTTP Server into your system.
2. At the IBM i command line, type `GO LICPGM` and press **Enter**.
3. Select option **11** (Install licensed programs) on the Work with Licensed Programs display to see a list of licensed programs.
4. Select and install IBM HTTP Server for i (5770-DG1). See the Software installation process for help with licensed program installation.
5. Load and apply the latest HTTP Server group PTF.

The IBM HTTP Server for i licensed program is now installed with the latest fixes. You are now ready to verify the installation.

Verify the HTTP Server installation

To verify that you have successfully completed the IBM HTTP Server for i installation, follow these steps.

Before you can verify the IBM HTTP Server for i installation it is assumed you have installed the licensed program. For more information about installing the product, see "Install HTTP Server on your server" on page 3.

The HTTP Server is installed with a default server called APACHEDFT. To test your installation, do the following:

1. Access the IBM Web Administration for i from your browser. For information about how to access the Web Administration for i interface, see "Starting Web Administration for i" on page 7.
2. Click the **Manage** tab.
3. Click the **HTTP Servers** subtab.
4. Select the APACHEDFT server from the **Server list**.
5. Click the **Start icon** next to the **Server list**.
6. Click the Refresh icon and check if the server status is still shown as "Running". If your HTTP Server does not start, see "Troubleshooting" on page 199.
7. Open another Web browser and go to `http://`*`your.server.name`* where *your.server.name* is the host name of your IBM i server to view the default Welcome page. The default Welcome page is a Web page that is returned by the APACHEDFT Web server.

Upon successful completion of these steps you will have verified the installation of IBM HTTP Server for i.

Overview of IBM Web Administration for i

The HTTP Server and other Web applications can be managed through the IBM Web Administration for i interface. The Web Administration for i is an application that is loaded in the HTTP Administration server, and accessed from a Web browser.

One of the key differences between IBM HTTP Server for i and other Web server products is the graphical user interface (GUI) provided for setting up and managing your servers. The Web Administration for i interface combines forms, tools, and wizards to create a simplified environment to set up and manage many different servers on your system. The Web Administration for i interface is rich in function, examples, error-checking, and ease-of-use.

Using the Web Administration for i interface, it is no longer necessary to memorize directive names and their proper usage or syntax. Directives are represented in the interface by descriptive field names, along with help text for every field. For Apache users, it is no longer necessary to memorize the supported context of directives. The Web Administration for i enforces supported context for the directives.

The Web Administration for i supports several wizards that guide you through a series of advanced steps to accomplish a task. With a few clicks of a button, you can have a Web server or application server running in no time at all. The Web Administration for i supports the creation of many types of servers, including Web servers, and application servers such as WebSphere Application Server for System i®, WebSphere Portal Server, IBM Integrated Web Application Server for i, and IBM Integrated Web Services Server for i.

Web browser requirements

To use the IBM Web Administration for i interface you need a Web browser that supports the HTTP 1.0 or 1.1 protocol, frames, and JavaScript.

Suggested Web browsers include Microsoft Internet Explorer V6.0 or higher and Firefox V3.0 or higher.

Note: Consult your Web browser documentation for more information.

User profile requirements to use the Web Administration for i interface

By default, only users with *ALLOBJ and *IOSYSCFG special authorities can manage and create Web-related servers on the system through the use of the IBM Web Administration for i interface. Web-related servers include instances of IBM HTTP Server, WebSphere Application Server, Integrated Application Server, and Integrated Web Services Server. A user without the necessary IBM i special authorities to manage or create Web-related servers requires an administrator to grant that user permission to a server or group of servers.

To be able to access the Web Administration for i interface, the IBM i user profile used to sign on must meet at least one of the following conditions:

- The user profile has *ALLOBJ and *IOSYSCFG special authorities.
- The user profile has been granted permission to an entire class of servers, or a specific server.
- The user profile has been granted permission to create servers.

For example, if a user wants to create an HTTP server using the Web Administration for i interface, the user profile must either have *ALLOBJ and *IOSYSCFG special authorities, or have permission to create HTTP servers.

Only users with *ALLOBJ and *IOSYSCFG special authority are allowed to grant, revoke, or manage user permissions. The granting of permissions to a user profile is done through the Web Administration for i interface by giving user profiles that need to access the Web Administration for i interface roles to specific servers or a class of servers.

Note: Granting *ALLOBJ authority to a user profile or using the QSECOFR user profile to access the Web Administration for i interface is not recommended.

Roles

Roles define a set of permissions that define what operations a user is allowed to perform on a server. The Web Administration for i interface defines the following roles:

Administrator
Any IBM i user profile with *ALLOBJ and *IOSYSCFG special authority is identified with the role of Administrator. An Administrator has unrestricted use of every feature in the Web Administration for i interface, including the ability to manage user permissions. An Administrator cannot be assigned any other role.

Note: A user profile cannot be assigned this role.

Developer
Is allowed to view and modify a server, including the ability to delete a server. A Developer can use Web Performance Monitor and Web Performance Advisor, but cannot change system-wide settings, such as memory pool allocations.

Operator
Is allowed to view a server, including the capability to start and stop a server. In addition, an Operator is allowed to modify trace settings for a server.

If a user with a role of Developer or Operator has no role assigned to them for a server, they are not allowed to view the server or any of its attributes.

Permissions

A *permission* is the ability to perform an operation on a server. The ability for a user to perform operations on a server is determined by the role they have been assigned for the server. The Web Administration for i roles are defined with the following permissions:

Table 1. Permissions corresponding to each role.

Permissions	Roles		
	Administrator	**Developer**	**Operator**
Start/Stop server	x	x	x
Delete server	x	x	
Install/Remove applications	x	x	
Install/Remove Web services[Note 1]	x	x	
Start/Stop applications	x	x	x
Start/Stop Web services[Note 1]	x	x	x
Modify server attributes	x	x	
Modify application attributes	x	x	
Create database connections	x	x	
Delete database connections	x	x	
Modify server tracing	x	x	
Use Web Performance Advisor	x	x	
Use Web Performance Monitor	x	x	
Use Web Log Monitor	x	x	
Create server[Note 2]	x		

Notes:

1. Web services deployed within integrated Web services servers.
2. An administrator granting permissions to a user profile needs to explicitly grant the create-server permission.

Only an Administrator can grant permissions. The granting of permissions to a user profile is done through the Web Administration for i interface by giving user profiles that need to access the Web Administration for i interface roles to specific servers or a class of servers.

Note: If a user creates a server, they are automatically assigned the role of Developer to the newly created server.

Permissions can be granted to a specific server or to all servers of a certain type. The Web Administration for i interface supports granting permissions to the following types of servers:

- Integrated Web Application Servers
- Integrated Web Services Servers
- WebSphere Application Servers
- HTTP Servers

When granting permissions, you should be aware of the following points:

- If you grant a user permission to create an application server or Web services server, then you must also grant the user permission to create HTTP Servers. This is due to the association between an HTTP Server and the application server or Web services server.
- If you grant a user permissions to an application server or Web services server, and you do not explicitly grant the user permissions to the associated HTTP Server(s), the user is automatically granted the same permissions to the associated HTTP Servers(s). This is also true in reverse. If you grant a user permissions to an HTTP Server, and you do not explicitly grant the user permissions to the associated

application server or Web services server, the user is automatically granted the same permissions to the associated application server or Web services server.

Note: A warning message is displayed on the Web Administration for i interface when permissions are implicitly granted to a user.

- If you attempt to grant a user different permissions to an HTTP Server and the associated application server or Web services server, the user is granted the higher permission and both servers get assigned that permission.

  Note: A warning message is displayed on the Web Administration for i interface when permissions to servers are upgraded.

If a user has no permissions to any servers, and no permission to create any type of server, then the user is not allowed to access the Web Administration for i interface.

Starting Web Administration for i

The Web Administration for i allows you to create and manage different types of servers, including Web servers and application servers. Complete the following steps to start the Web Administration for i interface.

It is assumed that you have met the user profile requirements to access the Web Administration for i interface.

To start the Web Administration for i interface, complete the following steps:

Note: Enter your user profile name and password when prompted.

1. Start the HTTP Administration server.
   a) In System i Navigator, expand **your_system** > **Network** > **Servers**, and select **TCP/IP**.
   b) Right-click **HTTP Administration**, and select **Start**.

   Note: The administration server can also be started using the `STRTCPSVR SERVER(*HTTP) HTTPSVR(*ADMIN)` command at an IBM i command prompt.
2. Bring up the IBM Navigator for i by accessing the following URL from a Web browser where *`your_system`* is your IBM i server host name:

   ```
   http://your_system:2001
   ```
3. From the IBM Navigator for i welcome page click the **IBM i Tasks Page** link.
4. Click the **IBM Web Administration for i** link.

From here, you can create different types of servers or work with existing servers, depending on your needs.

Note: If the Web Administration for i interface does not start, see “Troubleshooting” on page 199.

User interface conventions

This topic describes the conventions used by the IBM Web Administration for i interface when displaying information to a user.

Header images

The Web Administration for i interface has several images in the header, or top most portion, of the GUI. These images are hyperlinks to helpful information.

Table 2. Header images	
Header Image	**Description**
i	Image hyperlink to the IBM i Information Center entry page.
WebSphere	Image hyperlink to the WebSphere Application Server Family Web page. This Web page contains information on WebSphere products, including support and service information.
IBM	Image hyperlink to the IBM Web page where you can find information on all of IBM's products.
IBM Web Administration for i5/OS	Image hyperlink to the IBM HTTP Server for i Web page. This Web page contains additional information on PTFs and support, developer documentation, and other topics.

Tabs and subtabs

Navigation of the Web Administration for i interface is done through tabs. There are two types of tabs, the main task tabs on the top (referred to in the documentation as *tabs*) and more specific subtabs underneath (referred to in the documentation as *subtabs*).

Table 3. Main task tabs	
Tab Name	**Description**
Setup	The *Setup* tab contains the setup tasks for your servers. Setup tasks include the common tasks and wizards for the Web Administration for i interface.
Manage	The *Manage* tab contains tasks to manage your servers. The All Servers, HTTP Server, Application Servers and Installations subtabs are available under the Manage tab. You can manage all servers, or choose a specific server to manage on your IBM i server.
Advanced	The *Advanced* tab contains advanced tasks that you can perform on your servers. The advanced tasks include global settings for your IBM i server, Internet Users and Groups management, and the management of permissions to servers.
Related Links	The *Related Links* tab contains hyperlinks to useful information related to features, functions, and uses of the Web Administration for i interface and all products supported by the interface. From here, you can find general and support documentation.

Use the subtabs to quickly manage your servers or to set up advanced tasks.

Table 4. Manage subtabs	
Subtab Name	**Description**
All Servers	The *All Servers* subtab opens a form to view all the currently configured servers on your system. This form also provides you the ability to start, stop, restart, and configure your servers, as well as monitor and manage details. Select the server that you want to work with by clicking the button to the left of the server name. Clicking on the server name will also take you directly to managing the details for the selected server.

Table 4. Manage subtabs (continued)

Subtab Name	**Description**
HTTP Servers	The *HTTP Servers* subtab opens forms for managing HTTP Servers currently configured on your system. Use these forms to set up and manage your HTTP Server quickly and easily.
Application Servers	The *Application Servers* subtab opens forms for managing application server currently configured on your system including: WebSphere Application Servers, WebSphere Portal servers, integrated Web application server, and Web services servers.
Installations	The *Installations* subtab opens forms for managing WebSphere Application Server installations on the system. Use these forms to install and manage your WebSphere Application Server product easily on IBM i platform.

Table 5. Advanced subtabs

Subtab Name	**Description**
Settings	The *Settings* subtab displays a Web page containing links to forms for managing your global server settings. Global server settings are values that apply to each IBM HTTP Server for i configuration. The values provided here can be overridden individually within each HTTP Server configuration file.
Internet Users and Groups	The *Internet Users and Groups* subtab displays a Web page containing links to forms for managing validation lists, group files, and digital certificates. *Validation lists* are used in conjunction with other resources to limit access to server resources. Each validation list contains a list of Internet users and passwords. Use the Internet users and groups form to list and manage digital certificates associated with validation lists. Validation list entries also require you to identify an authentication protocol type to associate with the user id and password. Validation lists are case-sensitive and reside in IBM i libraries. A validation list is used to store user ID and password information about remote users. You can use existing validation lists or create your own. A *group file* identifies a group of users with a common security profile. A group file contains IBM i user profiles. A user profile is an object with a unique name that contains the user's password, the list of special authorities assigned to a user, and the objects the user owns or has access to. A *digital certificate* is a form of personal identification that can be verified electronically. Only the certificate owner who holds the corresponding private key can present a certificate for authentication through a Web browser session. The key can be validated through any readily available public key. Use the Digital Certificate Manager to create, distribute, and manage digital certificates.

Table 5. Advanced subtabs (continued)

Subtab Name	Description
Permissions	The *Permissions* subtab displays a Web page containing links to forms for managing and adding permissions. A permission is the ability to perform an operation on a server. The ability for a user to perform operations on a server is determined by the role they have been assigned for the server by a Web administrator. For more information, see "User profile requirements to use the Web Administration for i interface" on page 5.

Note: Common Tasks and Wizards are available on all tabs of the interface.

Lists

The Web Administration for i interface organizes large groupings of servers and configuration files into different lists. Click the list and select the server or server area you want to work with.

Table 6. Lists

List Name	Description
Server	The *Server list* contains the name of every server currently configured on your system. This includes HTTP Servers, integrated Web application server, Web services server, WebSphere Application Servers, WebSphere Application Servers - Express, and WebSphere Portal servers. The server list only shows the servers for the selected type. For example, if the subtab **HTTP Servers** is selected, the servers list will show only HTTP Servers, not WebSphere Application Servers.
Server area	The *Server area* allows you to work with the individual containers within your HTTP configuration.

Tasks, wizards, property forms, and tools

Each subtab opens specific tasks, wizards, property forms, and tools that provide you the ability to configure and manage your server.

Table 7. Tasks, Wizards, and Property Forms

Name	Description
Task	*Tasks* are property forms that guide you through advanced configuration steps. Individual tasks are sometimes grouped together to form advanced configuration tasks.
Wizards	*Wizards* guide you through a series of advanced steps to accomplish a task. Wizards cannot save your progress and must be completed to successfully update or create a server.

Table 7. Tasks, Wizards, and Property Forms (continued)	
Name	**Description**
Property forms	*Property forms* are forms with field values that may be set for specific configuration requirements. Each property form has help text to assist you in managing your servers.
Tools	*Tools* provide easy access to log files, the server configuration file, directive index, and real time HTTP server statistics. Tools are useful for problem solving and server maintenance.

Note: The Web Administration for i checks any changes you make for errors. A message will be displayed below the forms (in the error window) detailing any errors.

Server status

The Web Administration for i interface shows you the current status of your servers. The status of the server is displayed with the following icons.

Table 8. Server states	
Server State	**Description**
🔴 Stopped	**Stopped**. The server is currently stopped. The server is no longer available. The IP address and port number are not in use.
🟢 Running	**Running**. The server is currently running. The IP address and port number are in use.
🟡 Stopping	**Stopping**. The server is attempting to stop. the IP address and port number are still in use.
🟡 Creating	**Creating**. The server is being configured and created. The IP address and port number are not in use.
○○○○○○ Loading...	**Loading**. The Web Administration for i interface is loading the selected form, wizard, or Web browser frame.

Server buttons

The Web Administration for i interface uses server stop, start, and restart buttons to manage your server's status. Use the following buttons to change your server's status at anytime.

Table 9. Buttons	
Button	**Description**
▶ ▷	**Start**. Click this button to start the server you are currently working with. The button is gray and unavailable when the server is running.

Table 9. Buttons (continued)

Button	Description
⏹ ⏹	**Stop**. Click this button to stop the server you are currently working with. The button is gray and unavailable when the server has stopped.
▶	**Restart**. Click this button to restart the server you are currently working with. The restart button stops the server and then attempts to restart it. **Note:** This option is not available on all subtabs.
🔄	**Refresh**. Click this button to refresh the Web Administration for i interface display. Some changes made by property forms may not be readily displayed. The refresh button clears the Web Administration for i interface display and updates the current server status.

Configuring SSL for ADMIN wizard

The IBM Web Administration for i interface provides the Configure SSL for ADMIN wizard to configure Secure Sockets Layer (SSL) for the ADMIN server. SSL has become an industry standard for enabling applications for secure communication sessions over an unprotected network, such as the Internet.

The ADMIN server runs all of the programs listed on the IBM i Tasks page (http://[your_isystem]:2001) including the Web Administration for i and the Digital Certificate Manager (DCM). By default, the ADMIN server listens on a non-SSL (non-secure) connection over port 2001. If you want to configure the ADMIN server to use secure communications over SSL, but lack experience with DCM and SSL, the wizard simplifies the process and removes the need to manually configure the ADMIN server configuration.

The Configure SSL for Admin wizard updates the ADMIN server configuration file to enable SSL on port 2010; optionally port 2001 may be left enabled for non-SSL traffic. The wizard uses the Digital Certificate Manager to issue a digital certificate, connects the certificate and the ADMIN server, and restarts the ADMIN server. The restart of the ADMIN server usually takes one minute or so. While the restart is being performed, the Web Administration for i interface is unavailable.

Secure Sockets Layer and digital certificates

SSL is actually two protocols. The protocols are the record protocol and the handshake protocol. The record protocol controls the flow of the data between the two endpoints of an SSL session.

The handshake protocol authenticates one or both endpoints of the SSL session and establishes a unique symmetric key used to generate keys to encrypt and decrypt data for that SSL session. SSL uses asymmetric cryptography, digital certificates, and SSL handshake flows, to authenticate one or both endpoints of an SSL session. Typically, SSL authenticates the server. Optionally, SSL authenticates the client; however, this wizard only authenticates the server, not the client. A digital certificate, issued by a Certificate Authority, can be assigned to each of the endpoints or to the applications using SSL on each endpoint of the connection.

A digital certificate is an electronic credential that you can use to establish proof of identity in an electronic transaction. IBM i provides extensive digital certificate support that allows you to use digital certificates as credentials in a number of security applications. In addition to using certificates to configure SSL, you can use them as credentials for client authentication in both SSL and virtual private network (VPN) transactions. Also, you can use digital certificates and their associated security keys to sign objects. Signing objects allows you to detect changes or possible tampering to object contents by verifying signatures on the objects to ensure their integrity.

Capitalizing on the IBM i support for certificates is easy when you use Digital Certificate Manager (DCM), a free feature, to centrally manage certificates for your applications. DCM allows you to manage certificates that you obtain from any Certificate Authority (CA). Also, you can use DCM to create and operate your own Local CA to issue private certificates to applications and users in your organization.

The digital certificate is comprised of a public key and some identifying information that a trusted Certificate Authority (CA) has digitally signed. Each public key has an associated private key. The private key is not stored with or as part of the certificate. In both server and client authentication, the endpoint which is being authenticated must prove that it has access to the private key associated with the public key contained within the digital certificate.

Prerequisites and assumptions

The Configure SSL for ADMIN wizard requires a user profile with *ALLOBJ and *SECADM special authorities and Digital Certificate Manager installed on your system.

Start the Configure SSL for Admin wizard

The Configure SSL for ADMIN wizard can be started from the Web Administration for i interface:

1. Access the IBM Web Administration for i from your browser. For information about how to access the Web Administration for i interface, see "Starting Web Administration for i" on page 7.
2. From the IBM Web Administration for i interface, select the **ADMIN-Apache** server.
3. In the navigation pane, expand **HTTP Tasks and Wizards** , and select **Configure SSL for ADMIN**.

   Note: If **Configure SSL for ADMIN** is not displayed in the navigation pane, either the latest IBM HTTP Server for i (5770-DG1) PTF group has not been properly installed, or the ADMIN server has not been selected.

The Configure SSL for ADMIN welcome page displays. Click **Next** to begin the wizard. After the updates are made, the wizard restarts the ADMIN server. The ADMIN server can be accessed securely at `(https://[your_isystem]:2010/HTTPAdmin)`.

Related information

Secure Sockets Layer (SSL)

Digital Certificate Manager

HTTP Server Concepts

This topic provides conceptual information of the various functions and features of IBM HTTP Server for i.

Fundamental directive, context, and server area concepts on HTTP Server

The IBM HTTP Server for i is configured using directives. A directive is used to define an attribute of the HTTP Server or how the HTTP Server operates. For example, the Listen directive defines what port the HTTP Server should wait on to handle incoming requests.

HTTP Server directives are extensive, functional, and built around the concept of context.

Directive categories of HTTP Server

The HTTP Server directives may be categorized into two main groups. These are Assignment directives and Container directives.

Assignment directives
: Used to configure the function or characteristics of the HTTP Server. For example, the Listen directive assigns the port the HTTP Server should use to handle incoming requests.

Container directives
: Used to group directives together within the HTTP Server. The container directives group one or more assignment directives which are used to control the function intended specifically within the context of the container. For example, the <Directory> directive is used to enclose a group of assignment directives that only apply to the directory and subdirectory context.

When dealing with container directives, individual assignment directives may not be valid within one or more container directives due to improper context. See “Directives for HTTP Server” on page 210 for more information on the specific context a directive may or may not be used.

HTTP Server directive contexts

Understanding the context concept is necessary to increase the productivity and usefulness of your HTTP Server. The IBM Web Administration for i interface assists in managing context areas of your server. By selecting a different area of the server area, you are changing the context you are managing.

These types of directive contexts are supported:

server config
Also called "Server Area", "Global Level" or "Global Context". The attributes set by directives in the server config context can and most likely will be inherited by the container directives and assignment directives used in the configuration.

directory
Also called "Container Context", the directory context should not be confused with <Directory> containers. If the directive supports this context, the directive can be used in most containers (<Directory>, <File>, <Proxy>, and <Location> for example). This context support does not apply to virtual hosts. There are limited exceptions where directives are not supported in all of the containers associated with this context. See “Directives for HTTP Server” on page 210 for specific directive exceptions.

virtual host
The virtual host context refers to directives that are allowed to be configured, or assigned, in the <Virtual Host> container directive.

.htaccess
Also called ".htaccess files", the .htaccess context refers to directives supported in per-directory configuration files. Per-directory configuration files are read by the server from the physical directory where they reside. The directives within this file are applied to any objects that are to be served from the directory where the file exists, and may also be carried forward to sub-directories. Note that the use of .htaccess files is not recommended due to the additional overhead incurred by the server.

HTTP Server container types

The directives used to configure HTTP Server containers are encased in greater than (>) and lesser than (<) brackets. For example, <Directory> is a container directive. Each container is comprised of an opening directive, such as <Directory>, and closed with the same context directive prefixed with a slash (/). For example, </Directory>.

There are six different types of container directives. Five of the six container directives listed below have variants which results in a total of eleven different container directives (shown below with the opening and closing tags).

Directory and DirectoryMatch
<Directory *directory*>...</Directory>

<DirectoryMatch *regex*>...</DirectoryMatch>

Files and FilesMatch
<Files *filename*>...</Files>

<FilesMatch *regex*>...</FilesMatch>

Location and LocationMatch
<Location *URL*>...</Location>

<LocationMatch *regex*>...</LocationMatch>

Proxy and ProxyMatch
<Proxy *criteria*>...</Proxy>

<ProxyMatch *regex*>...</ProxyMatch>

VirtualHost

<VirtualHost *addr[:port]* >...</VirtualHost>

Limit and LimitExcept

<Limit *method method*>...</Limit>

<LimitExcept *method method*>...</LimitExcept>

Version

<IfVersion> *[[!]operator] version> ...* </IfVersion>

If , Else and ElseIf

<Else> ... </Else>

<If> *or* <ElseIf>

<If expression> ... </If>

Require

<RequireAll> ... </RequireAll>

<RequireAny> ... </RequireAny>

<RequireNone> ... </RequireNone>

Note: Not all directives enclosed by brackets (<>) are container directives. For example, directives <IfModule> ,<IfDefine> and "<Macro>" on page 626 are used to define parts of the HTTP Server configuration that are conditional and are ignored once the server has started; however, they are not directive containers.

Context and server area relationship

The following table shows server area and context relationship.

Server area	Context
Global configuration	server config
Directory container	directory (<Directory>; or <DirectoryMatch>;)
File container	directory (<File>; or <FileMatch>;)
Location container	directory (<Location>; or <LocationMatch>)
Proxy container	directory (<Proxy>; or <ProxyMatch>;)
Virtual host container	virtual host (<VirtualHost>)
Limit except container	<Limit> or <LimitExcept> **Note:** The context depends on the location of the <Limit> and <LimitExcept> container. It will inherit the context of the area it is in. For example, if the <Limit> and <LimitExcept) are within a directory container, the <Limit> or <LimitExcept> will be assigned the same values as the directory container.
Version containe	<IfVersion>

See "Directives for HTTP Server" on page 210 for more information on all the supported HTTP Server directives and the context in which the directives may be used.

Directives within containers

The container directives <Directory>, <Location> and <Files> can contain directives which only apply to specified directories, URLs or files respectively. This also includes .htaccess files that can be used inside a directory container to apply directives to that directory.

Files that are included in the configuration file are processed by the HTTP Server at start time. Changes to files that are included in the configuration file (such as include files and group files, but not .htaccess files) do not take effect until the server is restarted.

Everything that is syntactically allowed in <Directory> is also allowed in <Location> (except a sub-<Files> section). Semantically however some things, and the most notable are AllowOverride and the two options FollowSymLinks and SymLinksIfOwnerMatch, make no sense in <Location>, <LocationMatch> or <DirectoryMatch>. The same for <Files> -- while syntactically correct, they are semantically incorrect.

Directive inheritance

Directives inherit first from the top most (or "parent") directive container, then from more specific directive containers within.

In the following example, *Directory A* is the parent container to *Directory B*. *Directive b* first inherits its parameters from *Directory A* and *directive a* by default. If the parameters for *directive b* are defined, then *directive b* does not inherit, but uses its own parameter settings. Note that *directive a* does not inherit any parameter settings from *directive b*, since *directive a* is the parent to *directive b*. Inheritance only goes from parent to child.

```
<Directory A>
 directive a
 <Directory B>
   directive b
 </Directory>
</Directory>
```

Note: Best practice for security of your HTTP Server is to put all security directives into each container to ensure that each directory or file is secured.

How the directives are merged

The order of merging is:

1. <Directory> (except regular expressions) and .htaccess done simultaneously (with .htaccess overriding <Directory>)
2. <DirectoryMatch>, and <Directory> with regular expressions
3. <Files> and <FilesMatch> done simultaneously
4. <Location> and <LocationMatch> done simultaneously

Apart from <Directory>, each directive group (directives within container directives) is processed in the order that they appear in the configuration files. <Directory> (directive group 1 above) is processed in the order shortest directory component to longest. If multiple <Directory> sections apply to the same directory they are processed in the configuration file order. Configurations included through the Include directive will be treated as if they were inside the including file at the location of the Include directive.

Container directives inside a <VirtualHost> container directive are applied after the corresponding directives outside of the virtual host definition. This allows virtual hosts to override the main server configuration.

Using container directives

General guidelines:

- If you are attempting to match objects at the file system level then you must use the <Directory> and <Files> container directives.
- If you are attempting to match objects at the URL level then you must use the <Location> container directive.

Notable exception:

- Proxy control is done via <Proxy> containers. Directives which are valid in a <Directory> container are also valid in a <Proxy> container. A <Proxy> container is very similar to a <Location> container, since it deals with virtual paths and locations rather than with physical paths. The directives in <Proxy> containers are processed after the directives in <Location> containers are processed, but before directives in <Directory> containers are processed. The directives in <Proxy> containers are also inherited into more specific <Proxy> containers in the same way as the directives in a <Directory> container.

.htaccess parsing:

- Modifying .htaccess parsing within a <Location> container directive has no affect. The .htaccess parsing has already occurred.

<Location> and symbolic links:

- It is not possible to use Options FollowSymLinks or Options SymLinksIfOwnerMatch inside a <Location>, <LocationMatch> or <DirectoryMatch> container directives (the Options are simply ignored). Using the Options in question is only possible inside a <Directory> container directive (or a .htaccess file).

<Files> and Options:

- Using an Options directive inside a <Files> container directive has no effect.

Note: A <Location>/<LocationMatch> sequence is performed just before the name translation phase (where Aliases and DocumentRoots are used to map URLs to filenames). The results of this sequence are removed after the translation has completed.

Related information
"Directives for HTTP Server" on page 210
This topic provides information about the supported directives for IBM HTTP Server for i.

Content negotiation for HTTP Server

The IBM HTTP Server for i supports content negotiation, type-map files, MultiViews, negotiation methods, dimensions of negotiation,, negotiation algorithm, media types, and wildcards.

A resource may be available in several different representations. For example, it might be available in different languages or different media types, or a combination. One way of selecting the most appropriate choice is to give the user an index page, and let them select; however it is often possible for the server to choose automatically. This works because browsers can send as part of each request information about what representations it prefers. For example, a browser could indicate that it would like to see information in French, if possible, else English will do. Browsers indicate their preferences by headers in the request. To request only French representations, the browser would send:

```
Accept-Language: fr
```

Note that this preference will only be applied when there is a choice of representations and they vary by language.

As an example of a more complex request, this browser has been configured to accept French and English, but prefers French, and to accept various media types, preferring HTML over plain text or other text types, and preferring GIF or JPEG over other media types, but also allowing any other media type as a last resort:

```
Accept-Language: fr; q=1.0, en; q=0.5
Accept: text/html; q=1.0, text/*; q=0.8, image/gif; q=0.6,
   image/jpeg; q=0.6, image/*; q=0.5, */*; q=0.1
```

The HTTP Server supports 'server driven' content negotiation, as defined in the HTTP/1.1 specification. It fully supports the Accept, Accept-Language, Accept-Charset and Accept-Encoding request headers. The HTTP Server also supports 'transparent' content negotiation, which is an experimental negotiation protocol defined in RFC 2295 and RFC 2296. It does not offer support for 'feature negotiation' as defined in these RFCs.

A **resource** is a conceptual entity identified by a URI (RFC 2396). The HTTP Server provides access to **representations** of the resource(s) within its namespace, with each representation in the form of a sequence of bytes with a defined media type, character set, encoding, or other. Each resource may be associated with zero, one, or more than one representation at any given time. If multiple representations are available, the resource is referred to as **negotiable** and each of its representations is termed a **variant**. The ways in which the variants for a negotiable resource vary are called the dimensions of negotiation.

Content negotiation

In order to negotiate a resource, the server needs to be given information about each of the variants. This is done in one of two ways:

- Using a type -map (for example, a *.var file) which names the files containing the variants explicitly.
- Using a 'MultiViews' search, where the server does an implicit filename pattern match and chooses from among the results.

Using a type-map file

A type map is a document which is associated with the handler named type-map (or, for backwards-compatibility with older HTTP Server configurations, the mime type application/x-type-map). Note that to use this feature, you must have a handler set in the configuration that defines a file suffix as type-map; this is best done with an AddHandler in the server configuration file, as shown below.

```
AddHandler type-map var
```

Type map files have an entry for each available variant; these entries consist of contiguous HTTP-format header lines. Entries for different variants are separated by blank lines. Blank lines are illegal within an entry. It is conventional to begin a map file with an entry for the combined entity as a whole (although this is not required, and if present will be ignored). An example map file is:

```
URI: jkl

URI: jkl.en.html
Content-type: text/html
Content-language: en

URI: jkl.fr.de.html
Content-type: text/html;charset=iso-8859-2
Content-language: fr, de
```

If the variants have different source qualities, that may be indicated by the "qs" parameter to the media type, as in this picture (available as jpeg, gif, or ASCII-art):

```
URI: jkl

URI: jkl.jpeg
Content-type: image/jpeg; Qs=0.8

URI: jkl.gif
Content-type: image/gif; Qs=0.5

URI: jkl.txt
Content-type: text/plain; Qs=0.01
```

The "Qs" value can vary in the range 0.000 to 1.000. Note that any variant with a "Qs" value of 0.000 will never be chosen. Variants with no "Qs" parameter value are given a "Qs" factor of 1.0. The "Qs" parameter indicates the relative 'quality' of this variant compared to the other available variants, independent of the client's capabilities. For example, a jpeg file is usually of higher source quality than an ASCII file if its attempting to represent a photograph; however, if the resource being represented is an original ASCII art, then an ASCII representation would have a higher source quality than a jpeg representation. A "Qs" value is therefore specific to a given variant depending on the nature of the resource it represents.

The full list of headers recognized are:

URI
The uri of the file containing the variant (of the given media type, encoded with the given content encoding). These are interpreted as URLs relative to the map file; they must be on the same server, and they must refer to files to which the client would be granted access if they were to be requested directly.

Content-Type
The media type --- charset, level and "Qs" parameters may be given. These are often referred to as MIME types; typical media types are image/gif, text/plain, or text/html; level=3.

Content-Language
The languages of the variant, specified as an Internet standard language tag from RFC 1766 (for example, en for English, or kr for Korean).

Content-Encoding
If the file is compressed, or otherwise encoded, rather than containing the actual raw data, this states how it was done. The HTTP Server only recognizes encodings that are defined by an AddEncoding directive. This normally includes the encodings x-compress for compressed files, and x-gzip for gzip'd files. The x- prefix is ignored for encoding comparisons.

Content-Length
The size of the file. Specifying content lengths in the type-map allows the server to compare file sizes without checking the actual files.

Description
A human-readable textual description of the variant. If the HTTP Server cannot find any appropriate variant to return, it will return an error response which lists all available variants instead. Such a variant list will include the human-readable variant descriptions.

MultiViews

MultiViews is a per-directory option, meaning it can be set with an Options directive within a <Directory>, <Location> or <Files> container in the configuration file, or (if AllowOverride is properly set) in .htaccess files. Note that Options All does not set MultiViews; you have to ask for it by name.

The effect of MultiViews is as follows: if the server receives a request for /some/dir/jkl, if /some/dir has MultiViews enabled, and /some/dir/jkl does not exist, then the server reads the directory looking for files named jkl.*, and effectively fakes up a type map which names all those files, assigning them the same media types and content-encodings it would have if the client had asked for one of them by name. It then chooses the best match to the client's requirements.

MultiViews may also apply to searches for the file named by the DirectoryIndex directive, if the server is trying to index a directory. If the configuration files specify:

```
DirectoryIndex index
```

The server will arbitrate between index.html and index.html3 if both are present.

If one of the files found when reading the directive is a CGI script, it is not obvious what should happen. The code gives that case special treatment --- if the request was a POST, or a GET with QUERY_ARGS or PATH_INFO, the script is given an extremely high quality rating, and generally invoked; otherwise it is given an extremely low quality rating, which generally causes one of the other views (if any) to be retrieved.

The negotiation methods

After the HTTP Server has obtained a list of the variants for a given resource, either from a type-map file or from the filenames in the directory, it invokes one of two methods to decide on the 'best' variant to return, if any. It is not necessary to know any of the details of how negotiation actually takes place in order to use the HTTP Server content negotiation features. However the rest of this document explains the methods used for those interested.

There are two negotiation methods:

1. **Server driven negotiation with the HTTP Server algorithm** is used in the normal case. The HTTP Server algorithm is explained in more detail below. When this algorithm is used, the HTTP Server can sometimes 'fiddle' the quality factor of a particular dimension to achieve a better result. The ways the HTTP Server can fiddle quality factors is explained in more detail below.
2. **Transparent content negotiation** is used when the browser specifically requests this through the mechanism defined in RFC 2295. This negotiation method gives the browser full control over deciding on the 'best' variant, the result is therefore dependent on the specific algorithms used by the browser. As part of the transparent negotiation process, the browser can ask the HTTP Server to run the 'remote variant selection algorithm' defined in RFC 2296.

Dimensions of negotiation

Media Type
: Browser indicates preferences with the Accept header field. Each item can have an associated quality factor. Variant description can also have a quality factor (the "Qs" parameter).

Language
: Browser indicates preferences with the Accept-Language header field. Each item can have a quality factor. Variants can be associated with none, one or more than one language.

Encoding
: Browser indicates preference with the Accept-Encoding header field. Each item can have a quality factor.

Charset
: Browser indicates preference with the Accept-Charset header field. Each item can have a quality factor. Variants can indicate a charset as a parameter of the media type.

Client (Browser)
: The User-Agent HTTP header is used to determine browser type.

The negotiation algorithm

The HTTP Server can use the following algorithm to select the 'best' variant (if any) to return to the browser. This algorithm is not further configurable. It operates as follows:

1. First, for each dimension of the negotiation, check the appropriate Accept* header field and assign a quality to each variant. If the Accept* header for any dimension implies that this variant is not acceptable, eliminate it. If no variants remain, go to step 4.
2. Select the 'best' variant by a process of elimination. Each of the following tests is applied in order. Any variants not selected at each test are eliminated. After each test, if only one variant remains, select it as the best match and proceed to step 3. If more than one variant remains, move on to the next test.
   a. Multiply the quality factor from the Accept header with the quality-of-source factor for this variant's media type, and select the variants with the highest value.
   b. Select the variants with the highest language quality factor.
   c. Select the variants with the best language match, using either the order of languages in the Accept-Language header (if present), or else the order of languages in the LanguagePriority directive (if present).
   d. Select the variants with the highest 'level' media parameter (used to give the version of text/html media types).
   e. Select variants with the best charset media parameters, as given on the Accept-Charset header line. Charset ISO-8859-1 is acceptable unless explicitly excluded. Variants with a text/* media type but not explicitly associated with a particular charset are assumed to be in ISO-8859-1.
   f. Select those variants which have associated charset media parameters that are not ISO-8859-1. If there are no such variants, select all variants instead.
   g. Select the variants with the best encoding. If there are variants with an encoding that is acceptable to the user-agent, select only these variants. Otherwise if there is a mix of encoded

and non-encoded variants, select only the non-encoded variants. If either all variants are encoded or all variants are not encoded, select all variants.

   h. Select the variants that correspond to the User-Agent header received on the HTTP Request.
   i. Select the variants with the smallest content length.
   j. Select the first variant of those remaining. This will be either the first listed in the type-map file, or when variants are read from the directory, the one whose file name comes first when sorted using ASCII code order.

3. The algorithm has now selected one 'best' variant, so return it as the response. The HTTP response header Vary is set to indicate the dimensions of negotiation (browsers and caches can use this information when caching the resource).
4. To get here means no variant was selected (because none are acceptable to the browser). Return a 406 status (meaning "No acceptable representation") with a response body consisting of an HTML document listing the available variants. Also set the HTTP Vary header to indicate the dimensions of variance.

Editing quality values

The HTTP Server sometimes changes the quality values from what would be expected by a strict interpretation of the HTTP Server negotiation algorithm above. This is to get a better result from the algorithm for browsers which do not send full or accurate information. Some of the most popular browsers send Accept header information which would otherwise result in the selection of the wrong variant in many cases. If a browser sends full and correct information these fiddles will not be applied.

Media types and wildcards

The Accept: request header indicates preferences for media types. It can also include 'wildcard' media types, such as "image/*" or "*/*" where the * matches any string. So a request including `Accept: image/*, */*` would indicate that any type starting "image/" is acceptable, as is any other type (so the first "image/*" is redundant). Some browsers routinely send wildcards in addition to explicit types they can handle. For example, `Accept: text/html, text/plain, image/gif, image/jpeg, */*`.

The intention of this is to indicate that the explicitly listed types are preferred, but if a different representation is available, that is OK too. However under the basic algorithm, as given above, the */* wildcard has exactly equal preference to all the other types, so they are not being preferred. The browser should really have sent a request with a lower quality (preference) value for *.*, such as: `Accept: text/html, text/plain, image/gif, image/jpeg, */*; q=0.01`.

The explicit types have no quality factor, so they default to a preference of 1.0 (the highest). The wildcard */* is given a low preference of 0.01, so other types will only be returned if no variant matches an explicitly listed type.

If the Accept: header contains *no* "q" factors at all, the HTTP Server sets the "q" value of "*/*", if present, to 0.01 to emulate the desired behavior. It also sets the "q" value of wildcards of the format "type/*" to 0.02 (so these are preferred over matches against "*/*"). If any media type on the Accept: header contains a "q" factor, these special values are *not* applied, so requests from browsers which send the correct information to start with work as expected.

Variants with no language

If some of the variants for a particular resource have a language attribute, and some do not, those variants with no language are given a very low language quality factor of 0.001.

The reason for setting this language quality factor for variant with no language to a very low value is to allow for a default variant which can be supplied if none of the other variants match the browser's language preferences. For example, consider the situation with three variants:

- jkl.en.html, language en
- jkl.fr.html, language fr

- jkl.html, no language

The meaning of a variant with no language is that it is always acceptable to the browser. If the request Accept-Language header includes either en or fr (or both) one of jkl.en.html or jkl.fr.html will be returned. If the browser does not list either en or fr as acceptable, jkl.html will be returned instead.

Extensions to transparent content negotiation

The HTTP Server extends the transparent content negotiation protocol (RFC 2295) as follows. A new {encoding ..} element is used in variant lists to label variants which are available with a specific content-encoding only. The implementation of the RVSA/1.0 algorithm (RFC 2296) is extended to recognize encoded variants in the list, and to use them as candidate variants whenever their encodings are acceptable according to the Accept-Encoding request header. The RVSA/1.0 implementation does not round computed quality factors to 5 decimal places before choosing the best variant.

Hyperlinks and naming conventions

If you are using language negotiation you can choose between different naming conventions, because files can have more than one extension, and the order of the extensions is normally irrelevant (see mod_mime for details).

A typical file has a MIME-type extension (for example, html), maybe an encoding extension (for example, gz), and of course a language extension (for example, en) when we have different language variants of this file.

Examples:

- jkl.en.html
- jkl.html.en
- jkl.en.html.gz

Examples of filenames together with valid and invalid hyperlinks:

Filename	**Valid hyperlink**	**Invalid hyperlink**
jkl.html.en	jkl jkl.html	-
jkl.en.html	jkl	jkl.html
jkl.html.en.gz	jkl jkl.html	jkl.gz jkl.html.gz
jkl.en.html.gz	jkl	jkl.html jkl.html.gz jkl.gz
jkl.gz.html.en	jkl jkl.gz jkl.gz.html	jkl.html
jkl.html.gz.en	jkl jkl.html jkl.html.gz	jkl.gz

Looking at the table above you will notice that it is always possible to use the name without any extensions in an hyperlink (for example, jkl). The advantage is that you can hide the actual type of a document rsp. file and can change it later, for example, from html to shtml or cgi without changing any hyperlink references.

If you want to continue to use a MIME-type in your hyperlinks (for example `jkl.html`) the language extension (including an encoding extension if there is one) must be on the right hand side of the MIME-type extension (for example, `jkl.html.en`).

Caching

When a cache stores a representation, it associates it with the request URL. The next time that URL is requested, the cache can use the stored representation. But, if the resource is negotiable at the server, this might result in only the first requested variant being cached and subsequent cache hits might return the wrong response. To prevent this, the HTTP Server normally marks all responses that are returned after content negotiation as non-cacheable by HTTP/1.0 clients. The HTTP Server also supports the HTTP/1.1 protocol features to allow caching of negotiated responses.

For requests which come from an HTTP/1.0 compliant client (either a browser or a cache), the directive CacheNegotiatedDocs can be used to allow caching of responses which were subject to negotiation. This directive can be given in the server config or virtual host, and takes no arguments. It has no effect on requests from HTTP/1.1 clients.

Related information

“Setting up content and language negotiation for HTTP Server” on page 94
Content negotiation for an HTTP Server instance can be set up using the IBM Web Administration for i interface. Content negotiation is defined as the process where the client provides a set of preferences (such as language) to the server, and the server finds the best resource match to those the client prefers.

Virtual hosts on HTTP Server

This topic provides information about virtual host types on the IBM HTTP Server for i Web server.

The concept of virtual hosts allows more than one Web site on one system or Web server. The servers are differentiated by their host name. Visitors to the Web site are routed by host name or IP address to the correct virtual host. Virtual hosting allows companies sharing one server to each have their own domain names. For example *www.company1.com* and *www.company2.com* can both be hosted on the same server.

HTTP Server virtual host types

There are three variations of virtual hosts on HTTP Server:

IP address-based virtual host
The IP address-based virtual host requires one IP address per Web site (host name). This approach works very well, but requires a dedicated IP address for every virtual host. For more information on virtual hosts refer to the <VirtualHost> directive.

Name-based virtual host
The name-based virtual host allows one IP address to host more than one Web site (host name). This approach allows practically an unlimited number of servers, ease of configuration and use, and requires no additional hardware or software. The main disadvantage to this approach is that the client must support HTTP 1.1 (or HTTP 1.0 with 1.1 extensions) that include the host name information inside the HTTP document requests. The latest versions of most browsers support HTTP 1.1 (or HTTP 1.0 with 1.1 extensions), but there are still old browsers that only support HTTP 1.0. For more information on virtual hosts refer to the <VirtualHost> directive.

Dynamic virtual host
The dynamic virtual host allows you to dynamically add Web sites (host names) by adding directories of content. This approach is based on automatically inserting the IP address and the contents of the Host: header into the pathname of the file that is used to satisfy the request.

The advantages of a dynamic virtual host are:

- A smaller configuration file so that the server starts faster and uses less memory.
- Adding virtual hosts does not require the configuration to be changed or the server to be restarted.

The disadvantage of a dynamic virtual host is that you cannot have a different log file for each virtual host. For more information on dynamic virtual hosts refer to mod_vhost_alias.

Related information

"Virtual host tasks" on page 128
This topic provides step-by-step tasks for configuring virtual hosts in the IBM HTTP Server for i Web server.

"JKL Toy Company creates virtual hosts on HTTP Server" on page 59
This scenario discusses how to create virtual hosts in an IBM HTTP Server for i Web server.

Proxy server types and uses for HTTP Server

This topic provides information about proxy server types and uses for the IBM HTTP Server for i Web server.

Proxy servers receive requests intended for other servers and then act to fulfill, forward, redirect, or reject the requests. Exactly which service is carried out for a particular request is based on a number of factors which include: the proxy server's capabilities, what is requested, information contained in the request, where the request came from, the intended destination, and in some cases, who sent the request.

The two most attractive reasons to use a proxy server are its ability to enhance network security and lessen network traffic. A proxy server enhances network security by providing controls for receiving and forwarding (or rejecting) requests between isolated networks, for example, forwarding requests across a firewall. A proxy server lessens network traffic by rejecting unwanted requests, forwarding requests to balance and optimize server workload, and fulfilling requests by serving data from cache rather than unnecessarily contacting the true destination server.

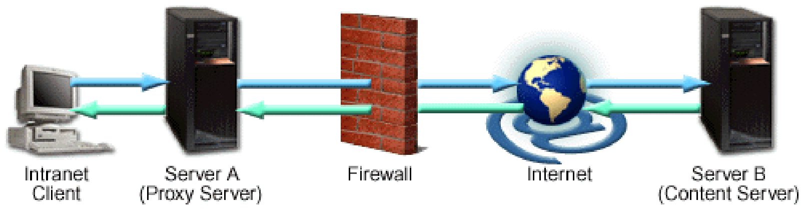
HTTP Server has proxy server capabilities built in. Activating these services is simply a matter of configuration. This topic explains three common proxy concepts: forward proxy, reverse proxy, and proxy chaining.

Forward proxy

A forward proxy is the most common form of a proxy server and is generally used to pass requests from an isolated, private network to the Internet through a firewall. Using a forward proxy, requests from an isolated network, or intranet, can be rejected or allowed to pass through a firewall. Requests may also be fulfilled by serving from cache rather than passing through the Internet. This allows a level of network security and lessens network traffic.

A forward proxy server will first check to make sure a request is valid. If a request is not valid, or not allowed (blocked by the proxy), it will reject the request resulting in the client receiving an error or a redirect. If a request is valid, a forward proxy may check if the requested information is cached. If it is, the forward proxy serves the cached information. If it is not, the request is sent through a firewall to an actual content server which serves the information to the forward proxy. The proxy, in turn, relays this information to the client and may also cache it, for future requests.

The following image shows a forward proxy configuration. An intranet client initiates a request that is valid but is not cached on Server A (Proxy Server). The request is sent through the firewall to the Internet server, Server B (Content Server), which has the information the client is requesting. The information is sent back through the firewall where it is cached on Server A and served to the client. Future requests for the same information will be fulfilled by the cache, lessening network traffic (proxy caching is optional and not necessary for forward proxy to function on your HTTP Server).

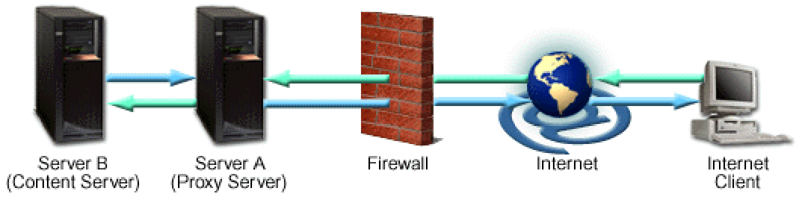


For information on how to configure a forward proxy, see "Setting up forward proxy for HTTP Server" on page 113.

Reverse proxy

A reverse proxy is another common form of a proxy server and is generally used to pass requests from the Internet, through a firewall to isolated, private networks. It is used to prevent Internet clients from having direct, unmonitored access to sensitive data residing on content servers on an isolated network, or intranet. If caching is enabled, a reverse proxy can also lessen network traffic by serving cached information rather than passing all requests to actual content servers. Reverse proxy servers may also balance workload by spreading requests across a number of content servers. One advantage of using a reverse proxy is that Internet clients do not know their requests are being sent to and handled by a reverse proxy server. This allows a reverse proxy to redirect or reject requests without making Internet clients aware of the actual content server (or servers) on a protected network.

A reverse proxy server will first check to make sure a request is valid. If a request is not valid, or not allowed (blocked by the proxy), it will not continue to process the request resulting in the client receiving an error or a redirect. If a request is valid, a reverse proxy may check if the requested information is cached. If it is, the reverse proxy serves the cached information. If it is not, the reverse proxy will request the information from the content server and serve it to the requesting client. It also caches the information for future requests.



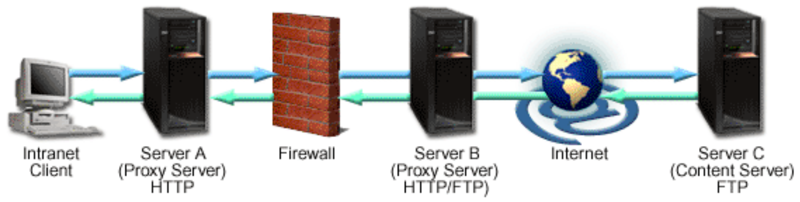
The above image shows a reverse proxy configuration. An Internet client initiates a request to Server A (Proxy Server) which, unknown to the client, is actually a reverse proxy server. The request is allowed to pass through the firewall and is valid but is not cached on Server A. The reverse proxy (Server A) requests the information from Server B (Content Server), which has the information the Internet client is requesting. The information is served to the reverse proxy, where it is cached, and relayed through the firewall to the client. Future requests for the same information will be fulfilled by the cache, lessening network traffic and load on the content server (proxy caching is optional and not necessary for proxy to function on your HTTP Server). In this example, all information originates from one content server (Server B).

For information on how to configure a reverse proxy, see "Setting up reverse proxy for HTTP Server" on page 114.

Proxy chaining

A proxy chain uses two or more proxy servers to assist in server and protocol performance and network security. Proxy chaining is not a type of proxy, but a use of reverse and forward proxy servers across multiple networks. In addition to the benefits to security and performance, proxy chaining allows requests from different protocols to be fulfilled in cases where, without chaining, such requests would not be possible or permitted. For example, a request using HTTP is sent to a server that can only handle FTP requests. In order for the request to be processed, it must pass through a server that can handle both protocols. This can be accomplished by making use of proxy chaining which allows the request to be passed from a server that is not able to fulfill such a request (perhaps due to security or networking issues, or its own limited capabilities) to a server that can fulfill such a request.

The first proxy server in a chain will check to make sure a request is valid. If a request is not valid, or not allowed (blocked by the proxy), it will reject the request resulting in the client receiving an error or a redirect. If a request is valid, the proxy may check if the requested information is cached and simply serve it from there. If the requested information is not in cache, the proxy will pass the request on to the next proxy server in the chain. This server also has the ability to fulfill, forward, redirect, or reject the request. If it acts to forward the request then it too passes the request on to yet another proxy server. This process is repeated until the request reaches the last proxy server in the chain. The last server in the chain is required to handle the request by contacting the content server, using whatever protocol is required, to obtain the information. The information is then relayed back through the chain until it reaches the requesting client.


Intranet Client
Server A (Proxy Server) HTTP
Firewall
Server B (Proxy Server) HTTP/FTP)
Internet
Server C (Content Server) FTP

The above image shows a proxy chaining configuration. The intranet client makes a request to Server C (Content Server FTP). Server A (Proxy Server HTTP) does not contain the requested information in cache, so the request is passed through the firewall to Server B (proxy server HTTP/FTP). Server B has both HTTP and FTP protocols and is able to change the HTTP request to an FTP request. Server C receives the FTP request and passes back the requested information to Server B. Server B, in turn, passes the fulfilled request back to the intranet client using the HTTP protocol. The request is sent through the firewall and Server A where the request is cached and given to the intranet client.

For information on how to configure proxy chaining, see "Set up proxy chaining for HTTP Server" on page 115.

Reasons for passing requests through a proxy chain vary. For example, you may use proxy chaining to pass information through multiple networks where a client on one network cannot communicate directly with a proxy server on a different network, and it needs a second proxy to relay its requests. You may also use it to cache information in multiple locations or to allow certain protocols to be used outside a firewall which are not allowed through a firewall.

Related information

"Proxy tasks" on page 113
The IBM HTTP Server for i supports proxy tasks.

Supported file systems for Web content served by HTTP Server

This topic provides information about supported file systems for Web content by the HTTP Server.

The HTTP Server can serve content from any of the following file systems:

- Root (/)
- QSYS.LIB
- QOpenSys
- QDLS
- NFS
- QFileSvr.400
- QNTC
- QOPT
- UDFS

A file system provides the support that allows users and applications to access specific segments of storage that are organized as logical units. These logical units are files, directories, libraries, and objects.

Each file system has a set of logical structures and rules for interacting with information in storage. These structures and rules may be different from one file system to another. From the perspective of structures and rules, the support for accessing database files and various other object types through libraries can be thought of as a file system. Similarly, you can think of the support for accessing documents (which are really stream files) through the folders structure as a separate file system.

As you decide from which file system to serve files, you might want to consider the following:

- Serving from the root (or /) directory gives you the fastest response times.
- Will the tools you use to maintain your site be compatible with the file system you choose?
- How easy must it be to move content from platform to platform?

Remember that any individual server can serve content (CGI scripts; HTML files; graphics such as .jpegs, GIFs, and image maps; and so on) from many file systems at once. You can configure your server to serve content from whatever file systems suit your needs.

Before you start serving your content from the Integrated File System, you must ensure that the world can access the files that you want to serve. You must grant the QTMHHTTP user profile or *PUBLIC the following authorities and permissions to enable Web serving with the HTTP Server:

- QTMHHTTP or *PUBLIC must have *USE authority to all library system objects that you intend to serve.
- If you use any of the log directives with any Integrated File System directory name, the directory must exist, and QTMHHTTP or *PUBLIC must have *RWX authority.
- The QTMHHTTP user profile or *PUBLIC must be granted *RX authority to all objects (HTML pages, graphics, and so on) that you intend to serve.
- To use CGI programs to access any of the objects you serve, the QTMHHTP1 user profile or *PUBLIC needs the same authority to the objects as QTMHHTTP.

Note: When considering from which file system to serve files, keep in mind that AllowOverride should be None for QDLS. Also, file serving and manipulation from QSYS and other EBCDIC file systems might result in performance bottlenecks.

Related information

File systems

Server Name Indication(SNI)

The IBM HTTP Server for i supports Server Name Indication. Server Name Indication is an extension to the SSL and TLS protocols that indicates what hostname the client is attempting to connect to at the start of the handshaking process.

Server Name Indication is an extension to the SSL and TLS protocols that indicates what hostname the client is attempting to connect to at the start of the handshaking process. This allows a server to present multiple certificates on the same IP address and port number and hence allows multiple secure (HTTPS) websites to be served off the same IP address without requiring all those sites to use the same certificate. It is the conceptual equivalent to HTTP/1.1 virtual hosting for HTTPS.

Name-Based Virtual Hosting is a very popular method of identifying different virtual hosts. It allows you to use the same IP address and the same port number for many different sites. When people move on to SSL, it seems natural to assume that the same method can be used to have lots of different SSL virtual hosts on the same server. But in fact, it's not generally possible without the SNI support. The reason is that the SSL protocol is a separate layer which encapsulates the HTTP protocol. So the SSL session is a separate transaction, that takes place before the HTTP session has begun. The server receives an SSL request on IP address X and port Y (usually 443). Since the SSL request did not contain any Host: field, the server had no way to decide which SSL virtual host to use. Usually, it just used the first one it found which matched the port and IP address specified.

The solution is an extension to the SSL protocol called Server Name Indication (RFC 4366), which allows the client to include the requested hostname in the first message of its SSL handshake (connection setup). This allows the server to determine the correct named virtual host for the request and set the connection up accordingly from the start.

With SNI, you can have many virtual hosts sharing the same IP address and port, and each one can have its own unique certificate (and the rest of the configuration). If both Apache Server and browser support SNI, then the hostname is included in the original SSL request, and the web server can select the correct SSL virtual host.

The client browser must also support SNI. Here are some browsers that do:

- Mozilla Firefox 2.0 or later
- Opera 8.0 or later (with TLS 1.1 enabled)
- Internet Explorer 7.0 or later (on Vista or higher, does not work on XP)
- Google Chrome (Vista or higher. XP on Chrome 6 or newer. Mac OS X 10.5.7 or higher on Chrome 5.0.342.1 or newer)
- Safari 3.2.1 or later (on Mac OS X 10.5.6 and Windows Vista or higher)

The first (default) virtual host for SSL name-based virtual hosts must include TLSv1 as a permitted protocol, otherwise Apache will not accept the SNI information from the client and it will be as if the client did not support SNI at all.

Since the first (default) virtual host will be used for any request where the provided server name doesn't match another virtual host, it is important that the first virtual host have the most restrictive access control, otherwise clients can access restricted resources by sending a request for any unknown hostname. (This isn't actually any different from using virtual hosts without SSL.)

Specify both “SSLServerCert” on page 469 and “ServerName ” on page 355 directives to set the server certificate and fully qualified domain name(FQDN) for those specific name-based virtual hosts to have the SNI support.

Example:

```
<VirtualHost *:443>
    SSLEngine On
    SSLAppName QIBM_HTTP_SERVER_APACHE1
    DocumentRoot /www/webserver/example1
    ServerName www.example1.com
    SSLServerCert QIBM_HTTP_SERVER_CERT1
</VirtualHost>
<VirtualHost *:443>
    SSLEngine On
    SSLAppName QIBM_HTTP_SERVER_APACHE2
    DocumentRoot /www/webserver/example2
    ServerName www.example2.com
    SSLServerCert QIBM_HTTP_SERVER_CERT2
</VirtualHost>
```

Related information

“Virtual host tasks” on page 128
This topic provides step-by-step tasks for configuring virtual hosts in the IBM HTTP Server for i Web server.

“JKL Toy Company creates virtual hosts on HTTP Server” on page 59

This scenario discusses how to create virtual hosts in an IBM HTTP Server for i Web server.

Logging

The HTTP Server provides many logging features.

Log formats for HTTP Server

This topic provides information about log formats and log files.

Log files contain one line for each request. A line is composed of several tokens separated by spaces. If a token does not have a value then it is represented by a hyphen (-). A line in a log file might look like the following:

```
192.168.1.3 - - [18/Feb/2000:13:33:37 -0600] "GET / HTTP/1.0" 200 5073
```

The following log file types are supported:

Common (Access)

This format is the common log file format defined by the W3C working group. This format is compatible with many industry standard log tools. For more information see Logging Control In W3C httpd.

The common log format is defined by the following string:

```
"%h %l %u %t \"%r\" %>s %b"
```

Extended (Access, Referer, and Agent)

This format has two types: NCSA extended log format and the W3C extended log format. The NCSA extended log format is the common log format appended with the agent and referer information. The W3C extended log format is defined by the W3C working group and allows you to determine the format of the log entry. For more information see Extended Log File Format.

NCSA's extended format is defined by the following string:

```
"%h %l %u %t \"%r\" %>s %b \"%{Referer}i\"\%{User-agent}i\"
```

Data Description Specification (DDS)

This format is an IBM i database (physical) file in QSYS.LIB. This format allows you to write a database query program to generate reports. This format contains the same information as the common log format.

Related information

"Log file format tokens" on page 627
This topic provides information about tokens used to define log file formats.

"Setting up logs on HTTP Server" on page 110
Set up logs to record events and other information for your IBM HTTP Server for i instance using the IBM Web Administration for i interface.

Web Log Monitor

The Web Log Monitor provides users the ability to monitor the contents of log files for HTTP and application servers. Rules can be defined to describe what contents in a log file are to be monitored for. When a defined rule is matched in the specified log file, a notification is sent to the configured notification channel.

The Web Log Monitor inspects specified log files of any Web-related server, such as Integrated Web Application Server, Integrated Web Services Server, WebSphere Application Server, and IBM HTTP Server. The log files are inspected for each keyword that is specified in the rule. If a match is encountered, a notification is sent to the configured notification channel, which can be one of the following channels:

- The *QSYSOPR system message queue.

- One or more e-mail addresses.
- Both the *QSYSOPR system message queue and e-mail addresses.

You can monitor log files for multiple servers under a single monitor.

Use the IBM Web Administration for i interface to configure the Web Log Monitor to monitor logs of your Web environment.

Related information

"Log formats for HTTP Server" on page 29
This topic provides information about log formats and log files.

"Setting up logs on HTTP Server" on page 110
Set up logs to record events and other information for your IBM HTTP Server for i instance using the IBM Web Administration for i interface.

Security

The HTTP Server provides many security features that help you control access to data and files.

Security tips for HTTP Server

This topic provides tips to secure your IBM HTTP Server for i Web server.

Some hints and tips on security issues in setting up the HTTP Server.

- "Permissions on HTTP Server directories" on page 30
- "Stopping users from overriding system wide settings for HTTP Server" on page 30
- "Protecting server files by default for HTTP Server" on page 30
- "Server Side Includes for HTTP Server" on page 31

Permissions on HTTP Server directories

In typical operation, the HTTP Server is started under the IBM i user profile QTMHHTTP and requests coming into the server are run under that user profile. It is possible to start the server and serve requests under different profiles. Refer to the ServerUserID and UserID directives for more information. You must also ensure that all of the resources that can be accessed by a Web client are properly protected. See "User profiles and required authorities for HTTP Server" on page 31 for additional information.

Stopping users from overriding system wide settings for HTTP Server

You will want to stop users from setting up .htaccess files which can override security features. Here is one example:

```
<Directory />
   AllowOverride None
   AllowOverrideList None
   Options None
</Directory>
```

This stops all overrides, Includes, and accesses in all directories. You also need to set up directory containers to allow access for specific directories.

Protecting server files by default for HTTP Server

HTTP Server has a default access feature. To prevent clients from seeing the entire file system, add the following block to the configuration:

```
<Directory />
   Require all denied
</Directory>
```

This forbids default access to file system locations. Add appropriate <Directory> blocks to allow access. For example,

```
<Directory /users/public_html>
    Require all granted
</Directory>
```

Pay particular attention to the interactions of <Location> and <Directory> directives. For example, even if <Directory /> denies access, a <Location /> directive might override it.

Server Side Includes for HTTP Server

Server side includes (SSI) can be configured so that users can execute programs on the server. To disable that part of SSI use the IncludesNOEXEC option to the Options directive.

User profiles and required authorities for HTTP Server

This topic provides information about user profiles and required authorities for the IBM HTTP Server for i Web server.

The QTMHHTTP user profile is the default user profile of HTTP Server. This user profile is referred to as the server user profile. The server user profile must have read and execute authority to the directory path of the server root directory. If you are using the **Create New HTTP Server wizard**, the default server root path is `/www/`*`server_name`*`/`, where *server_name* is the name of the HTTP Server.

The server user profile must have read, write, and execute authority to the directory path where the log files are stored. If you are using the **Create New HTTP Server wizard**, the default path is `/www/server_name/logs/`, where server_name is the name of the HTTP Server. The log files could include any access, script, or rewrite logs. These logs may or may not be configured to be stored in the `/www/server_name/logs/` directory. Since log files could potentially contain sensitive information, the security of the configuration and log files should be fully considered. The path of the configuration and log files should only be accessible by the appropriate user profiles.

The QTMHTTP1 user profile is the default user profile that HTTP Server uses when running CGI programs. This user profile must have read and execute authority to the location of any CGI program. User QTMHHTTP requires *RWX (write) authority to directory '*/tmp*'.

You can optionally specify that the QTMHHTTP or QTMHHTP1 user profile swap to another user profile as long as that user profile has the required authorities. For more information, see "UserID" on page 234.

- *RX authority for root directory ("/ ") and directory "`/www`", including all subdirectories in the path
- *RWX authority for directory "`/www/server_name/`"

Note: Granting *ALLOBJ authority to any server user profile is not recommended.

Related tasks
"Starting Web Administration for i" on page 7
The Web Administration for i allows you to create and manage different types of servers, including Web servers and application servers. Complete the following steps to start the Web Administration for i interface.

Validation list on HTTP Server

This topic provides information about validation lists for limiting access to your IBM HTTP Server for i Web server.

Your system uses validation lists in conjunction with other resources to limit access to your server resources. Each validation list contains a list of Internet users and their passwords. Each Internet user has one valid password defined for it. An IBM i user profile is never created for the internet users.

A validation list is an IBM i object of type *VLDL that stores user names and passwords or SSL certificates for use in access control. Validation lists are case-sensitive. Validation lists reside in IBM i libraries and are required when adding a user unless you are adding the user to a group file. If you enter a validation list that does not exist, the system will create it for you.

To create and delete validation lists, you can use the CL commands Create Validation List (CRTVLDL) and the Delete Validation List (DLTVLDL). Validation List APIs are also provided to allow applications to add, change, remove, verify (authenticate), and find entries in a validation list.

Validation list objects are available for all applications to use. For example, if an application requires a password, the application passwords can be stored in a validation list object rather than a database file. The application can use the validation list APIs to verify a user's password, which is encrypted, rather than the application performing the verification itself.

Kerberos for HTTP Server

Kerberos for network authentication can be used for an IBM HTTP Server for i instance.

Kerberos is a network authentication protocol designed to provide authentication for client or server applications with secret-key cryptography. Kerberos is a ticket-based authentication system that provides an alternative to user and password or X.509 certificate authentication. With the HTTP Server, you can use Kerberos on its own or in conjunction with Enterprise Identity Mapping (EIM) to authenticate Web users to the Web server.

For more information on EIM, see EIM concepts.

Kerberos requirements

- Supported for IBM i 5.3, or later.
- Check your browser information to ensure it supports Kerberos. Not all browsers support Kerberos and some only support it in their more recent versions.

See the "JKL Toy Company enables single signon for HTTP Server" on page 74 scenario for a complete step-by-step instructions on how to enable Kerberos for your IBM i server.

Performance

Performance in a Web server environment is influenced by many components. Understanding the components can help you ensure that the HTTP Server is functioning at the highest performance levels.

File compression for HTTP Server

Information is compressed by the HTTP Server before being sent to the client over the network.

Compressed output is transferred to requesting client browsers at a higher rate of speed than output that is not compressed. This decreases the amount of data that the server needs to send over the network and improves network performance and response times.

Compression and decompression is implemented by the DEFLATE filter, located in "Module mod_deflate" on page 370. The DEFLATE filter is always inserted after RESOURCE filters like PHP or SSI. It never touches internal sub-requests. See Apache HTTP Server Version 2.4 Documentation for additional information and examples on configuring the Apache server to use compression.

When the DEFLATE filter is used, a LoadModule is required in order to recognize the associated directives.

```
LoadModule deflate_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Output compression

Files can be compressed by the server before output to the client. The server can be configured to only compress files which are located in specific containers or globally. Directive SetOutputFilter enables compression for files in the container where it is placed. For example:

```
SetOutputFilter DEFLATE
```

Files being compressed can also be restricted to specific MIME types. In order to configure the server to restrict compression based on MIME types, the AddOutputFilterByType directive should be used. For example, to enable compression only for the HTML files located in a specific directory:

```
<Directory "/your-server-root/htdocs">
     AddOutputFilterByType DEFLATE text/html
</Directory>
```

Input compression

Compressed files require decompression before they can be used. A filter is necessary for decompressing a GZIP compressed request body. The DEFLATE filter is required in the input filter chain and is set by using the SetInputFilter or the AddInputFilter. For example:

```
<Location /dav-area>
SetInputFilter DEFLATE
</Location>
```

Requests containing a Content-Encoding: GZIP header are automatically decompressed. The Content-Length header specifies the length of incoming data from the client, not the byte count of the decompressed data stream. The actual length of the data will be greater than the Content-Length header indicates after the decompression has been done.

Note: Check your browser to ensure it supports GZIP request bodies.

Proxy servers

Proxy servers receive a Vary: Accept-Encoding HTTP response header to identify that a cached response should be sent only to clients that send the appropriate Accept-Encoding request header. The response header prevents compressed content from being sent to a client that cannot support it.

Dependencies on special exclusions, for example, the User-Agent header, can be specified with an addition to the Vary header. The Vary header must be manually configured in order to alert proxies of the additional restrictions. For example, where the addition of the DEFLATE filter depends on the User-Agent, the following Very header should be added:

```
Header append Vary User-Agent
```

If compression depends on information other than request headers, set the Vary header with a value of "*". The "*" prevents compliant proxies from caching entirely. For example:

```
Header set Vary *
```

Related information

"Compression tasks" on page 106
The IBM HTTP Server for i supports the configuration and management of compression files.

Fast Response Cache Accelerator (FRCA) for HTTP Server

The Fast Response Cache Accelerator (FRCA) improves the performance and scale of Web and TCP server applications by storing both static and dynamic content in a memory-based cache located in the Licensed Internal Code.

FRCA improves efficiency, scale, and performance by implementing two concepts:

- **Use of a memory-based cache that filters what is stored and what is dismissed**. Requests can process much more quickly when the majority of the requested content is cached within the Licensed Internal Code. The memory-based cache delegates stored information to the Network File Cache which is located in the Licensed Internal Code.

- **Caching functions from within the Licensed Internal Code to reduce request processing time**. Storing cached files within the Licensed Internal Code eliminates overhead and reduces request processing time by reducing task-switching between the Licensed Internal Code and user application layers. This conserves system resources allowing them to be reallocated towards hosting dynamic content.

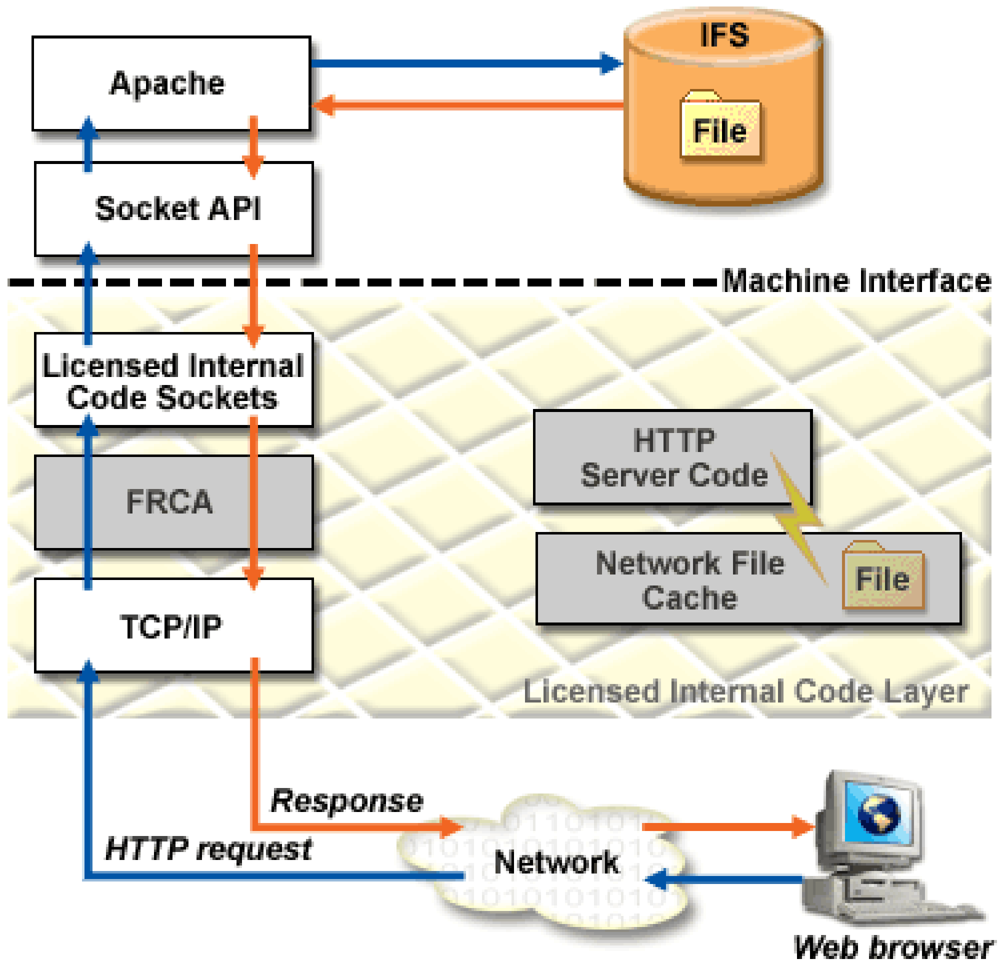
Note: The HTTP Server does not check for authorization on content served from FRCA. Use FRCA to cache content that does not need to be secured or accessed through specific validation.

FRCA improves HTTP Server performance for both static and dynamic content.

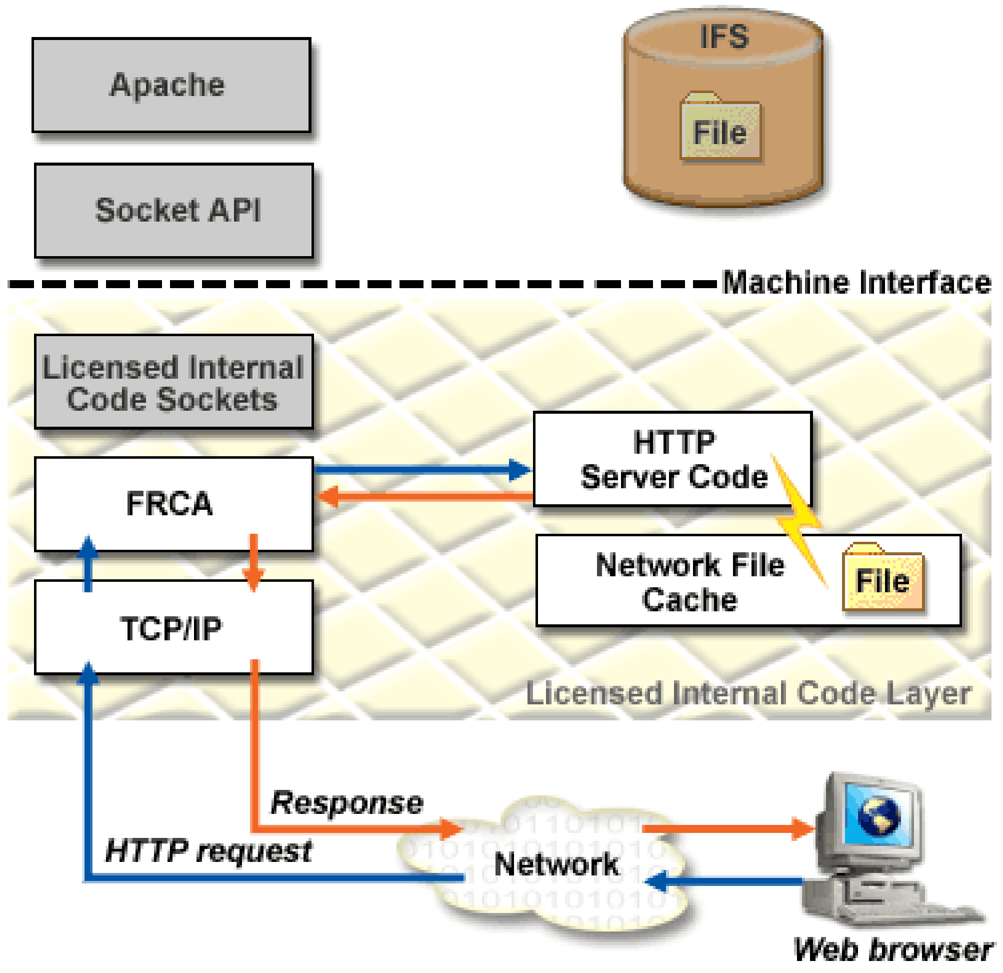
Static content, or content that comes from a file, is stored in Network File Cache and is then served to Licensed Internal Code of HTTP Server which essentially 'short circuits' the normal request processing path so the requested information will reach the user faster.

Dynamic content can be served from a Licensed Internal Code proxy cache or distributed by the Licensed Internal Code reverse proxy to one or more remote servers. A layer-7 router looks at the URL paths to route dynamic requests to the appropriate remote server.

Static content request and response process <u>without</u> FRCA



Static content request and response process <u>with</u> FRCA



Related information

"Fast Response Cache Accelerator tasks" on page 107

The IBM HTTP Server for i supports the Fast Response Cache Accelerator (FRCA).

Real time server statistics

Real time server statistics provide information on IBM HTTP Server for i performance.

Server statistics can be viewed with the **Real Time Server Statistics** tool available through the IBM Web Administration for i interface. Only statistics for running HTTP Servers can be viewed. Data is collected from the primary server job only.

The header information for the active server displays the following:

Server name
: Displays the name of the active server. The user-defined name was specified during the creation of the server.

Job
: Displays the job name for the active server.

Server started
: Displays the date and time the server was started.

Current time
: Displays the date and time of the last manual or automatic refresh of the statistical information.

Statistical information can be refreshed manually by clicking **Refresh** or can be automatically refreshed by selecting a refresh rate from the **Refresh Interval** drop-down menu.

Note: Statistical information is cumulative. If a value is greater than 2^{64}-1 in any column, the value will reset to 0. All values will reset to 0 if the server is stopped and then started. The type of information displayed is dependent on the activity of the HTTP Server and what functions are enabled. Only statistical information for enabled or active functions are displayed. Each column heading identifies what enabled function or associated server is being surveyed for statistical information.

Each column heading identifies what enabled function or associated server is being surveyed for statistical information. Statistical information is obtained for the following functions:

Server handled
This column displays the number of completed server transactions by the HTTP Server since the server was started. For example, completed transactions for static HTML pages, HTML pages containing Server Side Include (SSI), and images.

Proxy
This column displays the number of completed server transactions that used proxy since the server was started. Proxy statistics are only available if proxy is enabled. See "Proxy server types and uses for HTTP Server" on page 24 for more information.

CGI
This column displays the number of completed server transactions that were handled as Common Gateway Interface (CGI) since the server was started. CGI statistics are only available if CGI is enabled. See "Setting up CGI jobs" on page 131 for more information.

Using SSL
This column displays the number of completed server transactions that used Secure Sockets Layer (SSL) since the server was started. SSL statistics are only available if SSL is enabled. See "JKL Toy company enables Secure Sockets Layer (SSL) protection on HTTP Server" on page 69 for more information.

WebSphere
This column displays the number of completed server transactions that used an associated application server since HTTP Server was started. If the associated application server is not running, the information will still be displayed but will equal '0'. WebSphere statistics are only available if a WebSphere Application Server is associated with an HTTP Server.

Customer module
This column displays the number of completed server transactions that used a customer or third-party module. A customer module is a user module incorporated as a service program into the HTTP Server. See "Apache module programming" on page 194 for more information.

FRCA Stats
This column displays the number of completed server transactions that used Fast Response Cache Accelerator (FRCA) since the server was started. FRCA statistics are only available if FRCA is enabled. See "Fast Response Cache Accelerator (FRCA) for HTTP Server" on page 33 for more information.

FRCA Proxy
This column displays the number of completed server transactions that used Fast Response Cache Accelerator (FRCA) proxy since the server was started. FRCA statistics are only available if FRCA is enabled. See "Fast Response Cache Accelerator (FRCA) for HTTP Server" on page 33 for more information.

General

The general statistical information displays basic information about the active server since the server was started. Statistical information displayed includes the following:

Active threads
Displays the number of currently active threads on the server. A thread is an independent unit of work within a job that uses many of the jobs resources to complete work. The difference between jobs and threads is that threads run within the job helping it to finish its work. Every active job has at least one thread, which is called an *initial thread*. The initial thread is created as part of starting the job. The use

of threads within a job allows many things to be done at once. For example, while a job is processing, a thread may retrieve and calculate data needed by the job to finish processing.

Idle threads
Displays the number of currently idle threads active on the server. An idle thread is a portion of a program that is waiting for either a response or a request before it can continue. Idle threads are most often waiting for an HTTP request to process.

Normal connections
Displays the number of total normal (non-secure) connections currently active.

SSL connections
Displays the number of total SSL (secure) connections currently active.

Requests
Displays the number of total requests to the server since the server was started.

Responses
Displays the number of total responses from the server since the server was started.

Requests rejected
Displays the number of total rejected requests issued by the server since the server was started.

Absolute and Delta

The absolute and delta information displays statistical information about currently enabled functions or associated servers. The *absolute value* is a measurement of the total transactions since the server was started. The *delta value* is a measurement of the total transactions since the server statistics were refreshed. The absolute and delta statistical information may be displayed separately or side by side for comparison. Connections are not the same thing as a request or response transaction. Connection are only recorded for new inbound connections to the server. Each column heading identifies what enabled function or associated server is being surveyed for statistical information. Each row identifies what statistical information is being retrieved. Statistical information displayed for each column includes:

Requests
Displays the number of requests to the enabled function or associated server identified at the top of the column.

Responses
Displays the number of responses sent by the enabled function or associated server identified at the top of the column.

Error responses
Displays the number of error responses sent by the enabled function or associated server identified at the top of the column. An error response example is the 404 "Page Not Found" response.

Non-cache responses
Displays the number of non-cached responses sent by the enabled function or associated server identified at the top of the column.

Cache responses
Displays the number of local memory cached responses sent by the enabled function or associated server identified at the top of the column.

Bytes received
Displays the number of bytes received by the enabled function or associated server identified at the top of the column.

Bytes sent
Displays the number of bytes sent by the enabled function or associated server identified at the top of the column.

Non-cache Processing (seconds)
Displays the number of seconds of non-cached processing activity completed by the enabled function or associated server identified at the top of the column.

Cache Processing (seconds)
: Displays the number of seconds of cached processing activity completed by the enabled function or associated server identified at the top of the column.

Averages

The server averages information displays the average length of activity, in seconds, completed by the enabled function or associated server identified at the top of the column. Each column heading identifies what enabled function or associated server is being surveyed for statistical information. Each row identifies what statistical information is being retrieved. Averages are not affected by end user response times. Factors such as internet and intranet traffic, firewalls, and connection speeds are not determined. Statistical information displayed for each column includes:

Total (seconds)
: Displays the total time of activity completed by the enabled function or associated server identified at the top of the column.

Non-cached (seconds)
: Displays the average length of time of non-cached activity completed by the enabled function or associated server identified at the top of the column.

Cached (seconds)
: Displays the average length of time of cached activity completed by the enabled function or associated server identified at the top of the column.

Web Performance Advisor

The Web Performance Advisor provides a way to view, evaluate and modify the attributes that affect the performance of your Web environment. Clear definitions of the attributes are provided along with recommended values. The tool also provides rating for each attribute to help guide the user to acceptable settings.

A Web environment is a grouping of related Web and application servers that form a Web solution. A Web environment is typically made up of a single WebSphere Application Server instance or profile and all the application servers contained within, its corresponding IBM HTTP Server, and any system attributes that could have a direct effect on the performance of the Web environment.

The Web Performance Advisor is made up of multiple components to help you tune the performance of your system and Web environment. These components include an advisor and an export function. These can be launched from the Web Performance Advisor introduction page. On this introduction page, the user is provided a quick, easy-to-read, high-level view of their system and Web environment performance.

The Advisor function allows you to manage system attributes and to manage Web environment attributes. From the manage system and manage Web environment panels, you can view, evaluate, and change each performance attribute. While evaluating each performance attribute, click the attribute's Advise link to learn about the attribute and find the recommended setting. The Web Performance Advisor gathers ratings and recommendations for each of the performance attributes being tuned. From these ratings, icons are displayed to convey whether the attribute is tuned well (green), may need some additional tuning (yellow), or needs immediate attention (red). The ratings that are displayed may vary based on the risk level (conservative or aggressive) you have configured in the General Settings. Conservative means that you do not want to be alerted to those performance attributes that are on the fringe. By using the conservative approach, fewer attributes are changed and drastic performance updates are not made. Of course, performance may not be tuned as well, but there is much less risk of degrading your machine as a whole. Using the aggressive approach, any attribute that is on the fringe is flagged as needing to be changed. In addition, attributes that would be flagged as good in a conservative mode, might actually be flagged as needing improvement. By doing this, more drastic performance updates are made which may dramatically improve performance. On the downside, the possibility exists that unexpected, unwanted consequences may result from these drastic performance changes.

The export function allows you to save existing performance settings in a performance profile. This profile can be evaluated, compared, or sent to a performance expert for analysis and modification.

When the Web Performance Advisor tool is used to examine a Web related server, a flight recorder performance profile is created to save what all performance attributes are set to prior to any changes being made. Whenever changes are made through the Web Performance Advisor, all the performance attributes are saved (including the new changes) to another flight recorder performance profile file. This is necessary so that you can keep track of all changes made to a Web environment. All flight recorder performance profile files are located in the `'/QIBM/UserData/HTTPA/admin/WPA'` directory. The Web Performance Advisor tool does not clean up these files; they remain until someone deletes them manually.

Because the attributes affecting performance in a Web environment are located in many places, the Web Performance Advisor combines all of the performance attributes into a performance profile. The profile contains:

- System attribute information made up of the physical and logical resources that have been allocated to the system and partition and selected system values that can have a direct effect on Web performance, TCP/IP settings, and PTF information including the PTF Groups and the individual product PTFs for the products that are used in a Web environment.
- Web attribute information for the WebSphere Application Server instance or profile configured for this Web environment, including all the application servers configured for this particular instance or profile.
- Web performance attributes for each application server being tuned including the WebSphere Application Server JVM settings, system and server resource settings, server JDBC providers and data source resources, and other additional server settings.
- Web attribute information related to your external HTTP server associated with WebSphere Application Server instance or profile.

Related information

"Web Performance Advisor" on page 124
The Web Performance Advisor provides a way to view, evaluate and modify the attributes that affect the performance of your Web environment. Clear definitions of the attributes are provided along with recommended values. The tool also provides rating for each attribute to help guide the user to acceptable settings.

Extending HTTP Server functionality

Maintaining static Hypertext Markup Language (HTML) pages can be easy and inexpensive, but static pages cannot cover all of your Web serving needs. Any time the published content needs to be tailored on data received from a client, the Web page has to be generated on the fly. Serving dynamic data from your IBM HTTP Server for i Web server can be accomplished in several different ways, depending on your needs, your programming skills, and the complexity of the task at hand.

The core functionality of the HTTP Server can be extended to serve dynamic data by Common Gateway Interface (CGI) programs, Apache modules, and server-side includes (SSI). In addition, products available that can be used in the generation of dynamic Web data include applications servers such as WebSphere Application Server, and Integrated Web Application Server; and server-side scripting languages such as Net.Data and PHP.

CGI

The Common Gateway Interface (CGI) specification was introduced to enable and standardize the interface between Web servers and external programs. The CGI is a relatively simple, platform and language independent, industry-standard interface for Web application development. Programs that implement the CGI standard are commonly called *CGI programs*.

The purpose of CGI is to extend the capability of an HTTP server by providing framework in which an HTTP server can interface with a program that is specified on a URL. The format of the URL allows parameters to be passed to the CGI program. On the server side, the interface describes how the program is started by the HTTP server and how parameters for the program are passed using a combination of standard-input and environment variables. It also describes how output information (such as HTML elements) are passed back to the HTTP server using standard output. Thus, in its simplest form, a CGI program can be defined as a program that:

1. Can be called as an executable program and run as a child process of the HTTP server.
2. Is able to read from the standard input.
3. Is able to access environment variables.
4. Is able to write to the standard output.
5. Is able to access command- line arguments passed to the program.

The administrator controls which CGI programs the system can run by using the server directives. The server recognizes a URL that contains a request for a CGI program, commonly called a *CGI script*. (Throughout the documentation, we use the terms CGI program and CGI script to mean the same thing.) Depending on the server directives, the server calls that program on behalf of the client.

The server supports CGI programs that are written in C++, REXX, ILE C, ILE RPG, and ILE COBOL. It also supports multiple thread capable CGI programs in all languages that support multiple threads.

CGI programs that are created by compiling source code typically run faster than programs that are written in interpreted languages such as the Net.Data® and PHP scripting languages. However, programs that are written in scripting languages tend to be easier to write, maintain, and debug.

The support for CGI by IBM HTTP Server for i includes support for IBM i-unique features that improve the CGI programming model in the areas of performance, high-availability, and support for transactions. The following sections discuss the various features.

HTTP Server CGI processes

A major concern with CGI performance on other platforms is the fact that a CGI program is started on each Web client request. This includes additional disk and operating system activity to create the new process (job). Quite often, CGI program initialization, such as connecting to a database management system, also takes some time that adds to the response time users experience with such applications.

The IBM HTTP Server for i takes a different approach. The HTTP Server keeps a pool of HTTP server child processes that is used to run CGI programs. The child processes are not ended after a CGI program is run within the process. In addition, child processes are associated with a user profile and only requests for CGI programs that run under the same user profile associated with an existing child process will be run in the process.

Some of the additional features related to CGI processes include:

- The ability to specify how many child processes, and under what user profile, should be pre-started when the Web server starts so that Web clients do not incur the performance hit of starting a new CGI child process.
- The ability to run a CGI request in a pre-started CGI process, enabling the CGI program to be loaded and initialized at server startup. This support is beneficial for programs running in named activation groups. A CGI program running in a named activation group is loaded and initialized one time within a CGI process.

Persistent CGI programs

Persistent CGI is an extension to the CGI interface that allows a CGI program to maintain a session with a browser client across multiple browser requests. This allows files to be left open, the state to be maintained, and long running database transactions to be committed or rolled-back based on end-user actions.

High availability CGI programs

High availability CGI programs use APIs to preserve state information. The state information can be accessed by different IBM i servers that are participating as cluster nodes in a clustered environment, even after a failure or switchover of the HTTP Server or IBM i server.

Note: Although maintaining CGI program state information across multiple requests is a concept used by both persistent CGI and high availability CGI programs, the mechanisms used by the two types of programs are different and a high availability CGI program should not be confused with a persistent CGI program.

Running AIX CGI programs

The IBM HTTP Server for i is able to run AIX® CGI programs by running the CGI program in the IBM Portable Application Solutions Environment for i.

In addition to running AIX CGI programs, the IBM HTTP Server for i is able to run AIX programs that implement the FastCGI protocol. FastCGI is an interface between Web servers and applications which combines some of the performance characteristics of native Web server modules with the Web server independence of the CGI programming interface. Like AIX CGI programs, AIX FastCGI applications are run in the PASE for i environment.

Related information

"CGI programming" on page 179
The IBM HTTP Server for i supports the extension of the functionality of the HTTP Server through the use of Common Gateway Interface (CGI) programs.

"Writing persistent CGI programs" on page 188
Persistent CGI is an extension to the CGI interface that allows a CGI program to remain active across multiple browser requests and maintain a session with that browser client. This allows files to be left open, the state to be maintained, and long running database transactions to be committed or rolled-back based on end-user input.

"Writing high availability CGI programs" on page 186
High availability CGI programs use APIs to preserve state information. The state information can be accessed by different IBM i servers that are participating as cluster nodes in a clustered environment, even after a failure or switchover of the HTTP Server or IBM i server.

"Highly available HTTP Server" on page 43
The IBM HTTP Server for i supports Web server clusters, which ensures high availability of your Web site.

"Running CGI programs in IBM PASE for i" on page 193
The IBM HTTP Server for i Web server can run CGI programs created to run in the IBM Portable Application Solutions Environment for i. In addition, the HTTP Server can also run programs that follow the FastCGI protocol.

FastCGI Web site

Apache modules

Modules are service programs that can be dynamically linked and loaded to extend the nature of the HTTP Server.

In this way, the Apache modules provide a way to extend the function of a Web server. Functions commonly added by optional modules include:

- Authentication
- Encryption
- Application support
- Logging
- Support for different content types
- Diagnostic support

A good example of a module that is shipped with the HTTP Server that extends the reach of the core Apache server is:

```
LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM
```

This service program is only loaded, linked, and used when you configure the `LoadModule` directive because you decided to encrypt your data using Secure Sockets Layer (SSL). The advantage of this is that the core Apache program can stay relatively small and tight until a particular function (as provided by a plug-in module) is needed. Then, with just a `LoadModule` directive and optionally some configuration directives, you can increase the functionality of your Web server with a corresponding increase in the working set size.

Apache core functions are those functions available in a standard Apache installation with no nonstandard modules. The HTTP Server supports more than a 250 directives. About 30 percent of those directives are in the core functions. The remainder of the directives are in separate modules. The `LoadModule` directive must be used to activate the directives in these modules.

IBM provides Apache modules, typically called plug-ins, in order to extend the functionality of the Web server. The following is a list of the most commonly-used plug-ins:

WebSphere Application Server plug-in
Forwards HTTP requests from the Web server to WebSphere Application Server. WebSphere Application Server is the premier application server for Java applications.

Integrated Web Application Server plug-in
Forwards HTTP requests from the Web server to Integrated Web Application Server. Integrated Web Application Server is a lightweight application server for Java applications that is integrated into the IBM i operating system.

You can also write your own module to extend the core functionality of the HTTP Server.

Related information
"Apache module programming" on page 194
The IBM HTTP Server for i supports the extension of the functionality of the HTTP Server through the use of third-party Apache modules.

Service-side includes

Server-side includes (SSI) are the simplest way to add dynamic content to a Web site. A set of directives is embedded in the HTML code and is interpreted by the server before the document is sent to a client. SSI can be used to call a CGI program or return information about documents or the value of environment variables.

In the simplest sense, SSI allows for character substitution from within an HTML document.

SSI also supports the execution of simple conditional statements.

Table 10 on page 42 lists the SSI commands supported by the HTTP Server.

Table 10. Supported SSI commands

Command	Description
config	Configure output formats
echo	Prints one of the SSI or API variables.
exec	Calls a CGI program.
fsize	Prints the size of the specified file.
flastmod	Prints the last modification date of the specified file.
global	Same as `set` command.
include	Inserts the text of another file. Included files can be nested.
printenv	Prints all existing environment variables and their values.
set	Sets the value of an environment variable.

Related information

“Server-side include commands for HTTP Server” on page 643

This topic provides information about server-side include (SSI) commands for the IBM HTTP Server for i Web server.

High availability

The IBM HTTP Server for i supports the ability for businesses to withstand Web server outages, including scheduled downtime. The HTTP Server provides high availability by using the IBM i clustering support.

Related information

IBM i Cluster technology

Highly available HTTP Server

The IBM HTTP Server for i supports Web server clusters, which ensures high availability of your Web site.

If Web serving is a critical aspect of your business, you may want high availability and scalability of your Web server environment. High availability and scalability of the Web server environment can be achieved through the use of IBM i clustering.

Note: Highly available HTTP Server IPv6 support is avaiable since IBM i 7.1

The Web server cluster solution can provide:

- **Planned downtime**: If a Web server requires planned maintenance, it is possible to transfer the work to another node without visible service interruptions to the client.
- **No unplanned downtime**: If a machine fails, the work is transferred to another node with no human involvement and without visible service interruptions to the client.
- **Scalability**: When employing multiple nodes, it is possible to distribute the Web site workload over the cluster nodes.

Clusters are a collection of complete systems that work together to provide a single, unified computing capability.

A liveness monitor checks the state of the Web server and interacts with the Web server and the clustering resource services in the event that a Web server fails (failover), or a manual switchover takes place (ensures no interruption of Web server services). The clustered hash table (part of the state replication mechanism) can be used to replicate highly available CGI program state data across the cluster nodes so that the state data is available to all nodes in the event that a Web server fails (failover) or is switched-over manually (switchover). To take advantage of this capability, an existing CGI program must be enabled in a highly available Web Server environment. CGI programs write to the CGI APIs to indicate what data is replicated.

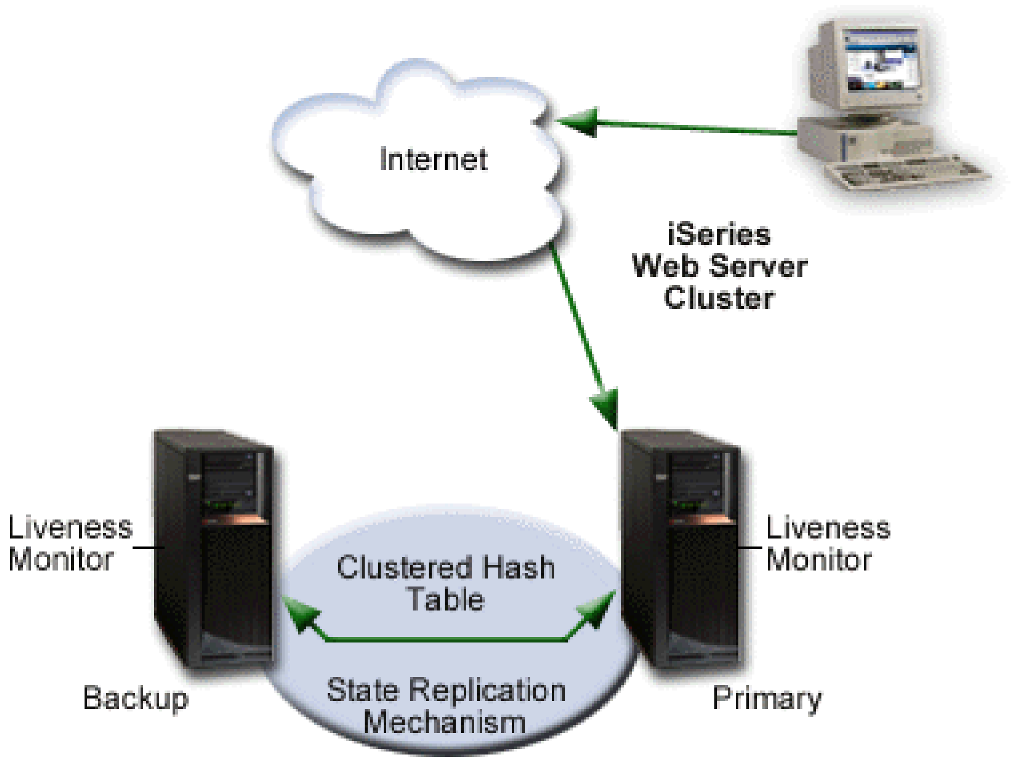
There are three Web server cluster models that are supported:

- “Primary/backup with takeover IP model” on page 43
- “Primary/backup with a network dispatcher model” on page 44
- “Peer model” on page 45

Primary/backup with takeover IP model

In this model, the Web server runs on the primary and all backup nodes. The backup node or nodes are in a idle state, ready to become the primary Web server should the primary Web server fail (failover), or a switchover takes place. All client requests are always served by the primary node.

The following diagram illustrates a Primary/backup with takeover IP model.



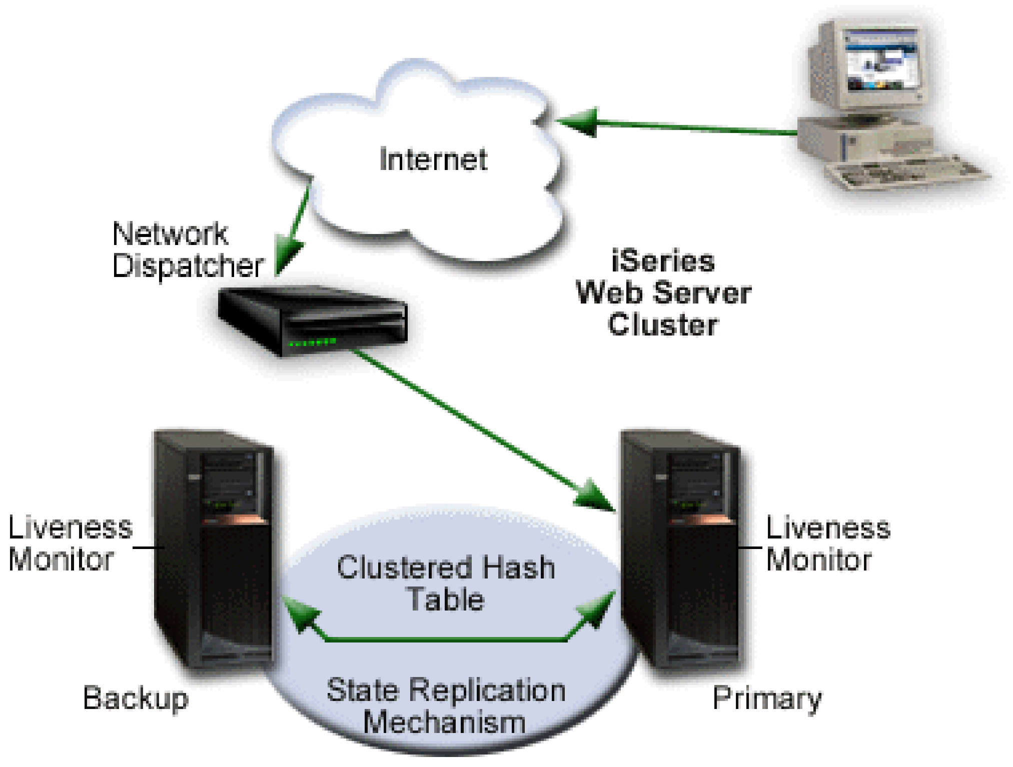
When the primary node fails (failover), or is brought down by the administrator, the failover/switchover process begins. The following steps are performed during failover/switchover:

1. One of the backup servers becomes the primary (the first backup in the switchover order).
2. The client requests are redirected to the new primary node.
3. If the new primary receives a user request that belongs to a long-running-session (a CGI program that has been updated to be a highly available CGI program), the server will restore the request's state. The new primary retrieves that highly available CGI program's state information from the clustered hash table. The clustered hash table is part of the state replication mechanism.
4. After the failed node recovers, the highly available Web server instance can be restarted and it will become the backup system. If the system administrator wants the failed node to become primary again, a manual switchover must be performed (this can be accomplished with the IBM Simple Cluster Management interface available through System i Navigator or a business partner tool).

Primary/backup with a network dispatcher model

In this model, just like the primary/backup with takeover IP model, the Web server runs on the primary and all backup nodes. The backup nodes are in an idle state and all client requests are served by the primary node. A network dispatcher (for example the IBM WebSphere Edge Server) sends client requests to the Web server.

The following diagram illustrates a Primary/backup with a network dispatcher model.



When the primary node fails (failover), or a switchover takes place, the failover/switchover process begins. The following steps are performed during failover/switchover:

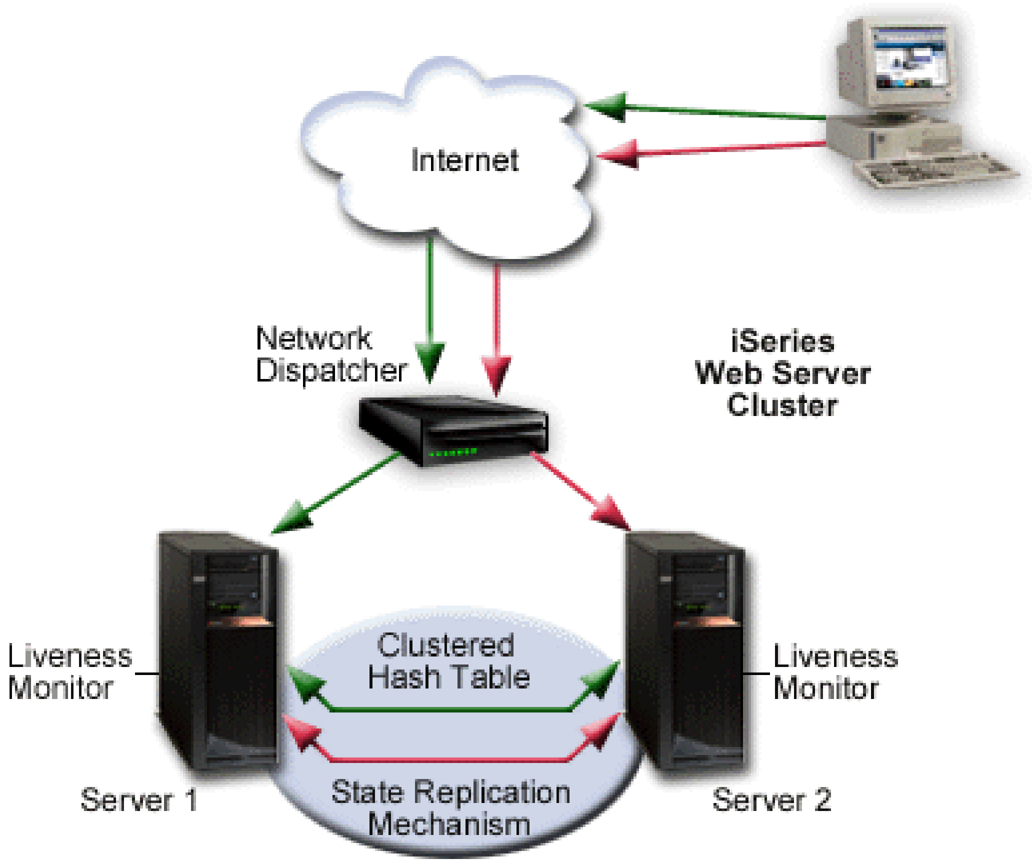
1. One of the backup servers becomes the primary (the first backup in the switchover order).
2. The client requests are sent to the new primary node by the network dispatcher.
3. If the new primary receives a user request that belongs to a long-running-session, the server needs to restore the request's state. The new primary searches for the state either locally or in the clustered hash table. The clustered hash table is part of the state replication mechanism.
4. After the failed node recovers, the system administrator can restart the Web server instance and it will become a backup Web server. If the system administrator wants the failed node to become primary again, a manual switchover must be performed.

Note: A node can join a recovery domain as primary only if the cluster resource group is in inactive mode.

Peer model

In this model, there is no declared primary node. All nodes are in an active state and serve client requests. A network dispatcher (for example the IBM WebSphere Edge Server) evenly distributes requests to different cluster nodes. This guarantees distribution of resources in case of heavy load. Linear scalability is not guaranteed beyond a small number of nodes. After some number of nodes are added, scalability can disappear, and the cluster performance can deteriorate.

The following diagram illustrates the peer model.



High availability CGI programs

High availability CGI programs use APIs to preserve state information. The state information can be accessed by different IBM i servers that are participating as cluster nodes in a clustered environment, even after a failure or switchover of the HTTP Server or IBM i server.

See "Writing high availability CGI programs" on page 186 for information about writing high availability CGI programs.

Web Publishing with the PUT Method

An IBM HTTP Server for i instance can be configured to support the PUT method for Web publishing.

The standard way of uploading files to a Web server using HTTP is through the use of the PUT method. HTTP Server supports the PUT method, but requires additional setup to tell the server how to handle incoming PUT requests. One way to accomplish this is to enable WebDAV, which is provided with HTTP Server through the module mod_dav. Another is to provide your own CGI program and configure it for use with HTTP Server. This topic discusses both options, as well as the PUT method in general.

About the PUT Method

POST and PUT are two methods in the HTTP specification that are used to permanently change files on a Web server. While the POST method is used in conjunction with preestablished content such as Web forms, the PUT method involves manipulating files that do not yet exist on the server. HTTP Server supports the POST and PUT methods in the same way -- that is, it requires a program to tell it how to handle incoming requests.

WebDAV

Most users will find that the easiest way to implement the PUT method for HTTP Server is to enable WebDAV and use a client program that supports WebDAV (such as Microsoft Web Folders) to upload files. WebDAV is a set of extensions to the HTTP protocol, and is included in HTTP Server through the module mod_dav. In addition to the WebDAV extensions, mod_dav includes a PUT handler.

For more information on WebDAV, including a list of all the methods included, see “WebDAV for HTTP Server” on page 47 and “Setting up WebDAV for HTTP Server” on page 119.

CGI programs

Alternatively, you can provide your own CGI program to handle incoming PUT requests, and configure it for use with HTTP Server. A program that handles PUT requests operates much like a program that handles POST requests, but must include additional code for writing (and overwriting) files on the server.

Because a PUT action results in a permanent change on the server, it's important to be aware of the security issues involved in providing your own PUT-handling CGI program. Some of these issues include:

- Ensuring the user making the PUT request is authorized to update files on the server
- Making sure only Web content files are updated
- Only updating content the user is authorized to update

For a more detailed discussion on providing your own PUT-handling CGI program, see the Apache Week article Publishing Pages with PUT.

Once you have a program capable of handling PUT requests, you can configure it for use with HTTP Server using the Script directive. For more information on the Script directive, see “Module mod_actions” on page 215.

WebDAV for HTTP Server

This topic provides information about Web-based distributed authoring and versioning (WebDAV) for the IBM HTTP Server for i Web server.

Web-based distributed authoring and versioning (WebDAV) is a set of extensions to the HTTP protocol that allows WebDAV clients (such as Microsoft Web Folders) to collaboratively edit and manage files on remote Web servers. Major features of WebDAV include:

- File locking so that two or more users do not overwrite the same file.
- XML data to store properties data such as author information.
- Copy and move operations so that directory structures can be modified.

WebDAV is a set of extensions to the HTTP protocol. The following table defines the HTTP methods and the WebDAV extensions. Note that two methods, DELETE and PUT, are defined in the HTTP 1.1 specification, but modified by WebDAV.

Method	Specifications	Description
COPY	WebDAV	Copies the resource.
DELETE	HTTP 1.1/ WebDAV	Deletes the resource.
GET	HTTP 1.1	Gets the contents of the resource.
HEAD	HTTP 1.1	Returns the message headers from a message sent to the server.
LOCK	WebDAV	Locks the resource.

Method	Specifications	Description
MKCOL	WebDAV	Creates the collection specified.
MOVE	WebDAV	Moves the resource.
OPTIONS	HTTP 1.1	Performs an option call to the server.
POST	HTTP 1.1	Action defined by the server.
PROPFIND	WebDAV	Performs a property find on the server.
PROPPATCH	WebDAV	Sets or removes properties on the server.
PUT	HTTP 1.1/ WebDAV	Puts the contents of the resource to the server in the specified location.
TRACE	HTTP 1.1	Does a trace call to the server.
UNLOCK	WebDAV	Unlocks the resource.

See RFC2518 for more information on WebDAV.

Related information

"WebDAV tasks" on page 119

Web-based distributed authoring and versioning (WebDAV) is provided through the IBM HTTP Server for i Web server.

Scenarios: HTTP Server

This topic provides information on how to use the IBM Web Administration for i interface to set up or manage your IBM HTTP Server for i Web server, step-by-step. Each task is specific and includes a usable HTTP Server configuration file when completed.

The JKL Toy Company (JKL), a fictitious company, scenarios will take you through the same processes employees of the JKL Toy Company followed while working with the Web Administration for i interface. Follow the scenario steps, and all prerequisites, to complete the scenario successfully.

The given examples may be used to successfully complete the scenario; however, you may enter your own information at any time. If you are not familiar with the Web Administration for i interface or Web serving, it is suggested that you use the given examples and follow the scenarios closely in the order they are given.

Replace examples in brackets, [...], with your own HTTP Server information. For example,

http://[Systemi_name]:[port]

When instructions are given in the following format, replace the words in the brackets, such as [Systemi_name], with what is being asked for. For example,

http://jklserver:2001

JKL Toy Company creates an HTTP Server

This scenario discusses how to create an IBM HTTP Server for i Web server on an IBM i server.

Scenario

The JKL Toy Company (a fictitious company) wants to run a Web site on their IBM i server. The examples used in this scenario show the **Create New HTTP Server wizard** being used to create an HTTP Server instance called **JKLTEST** which will use **all IP addresses**, port **1975** on an IBM i server designated **JKL_SERVER**.

Prerequisites

- It is assumed you have read "Scenarios: HTTP Server" on page 48.

Start the IBM Web Administration for i interface

Access the IBM Web Administration for i from your browser. For information about how to access the Web Administration for i interface, see "Starting Web Administration for i" on page 7.

Create your HTTP Server

The Web Administration for i interface allows you to create, set up, and manage multiple servers.

1. Click the **Setup** tab.
2. Expand **Common Tasks and Wizards**.
3. Click **Create HTTP Server**.
4. Enter a descriptive, unique name in the **Server name** field.

   Example: JKLTEST
5. Click **Next**.
6. Accept the default value.

   Example: /www/jkltest
7. Click **Next**.
8. Accept the default value.

   Example: /www/jkltest/htdocs
9. Click **Next**.
10. Accept the default values or replace with your own unique IP address and port.

    Example: IP address All Addresses

    Example: Port 1975
11. Click **Next**.
12. **Optional**: Select **Yes** to use an access log.

    Select **No** if you do not want to create an access log at this time. By default, the log will be created for you.
13. Click **Next**.
14. Accept the default values to specify the length of time to keep the log files or update with your preferences.
15. Click **Next**.
16. Review the displayed information. If any information is incorrect, click **Back** and correct it.
17. Click **Finish** to create your new HTTP Server.

Note: If the wizard fails and you receive an error message, check your Webmaster user profile authorities.

Restart your HTTP Server

Select one of the following methods below:

Manage one server

1. Click the **Manage** tab.

2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the Server list.
4. Click the **Stop** icon if the server is running.
5. Click the **Start** icon.

Manage all servers

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select **All Servers** from the Server list.
4. Click the **All HTTP Servers** tab.
5. Select your HTTP Server name in the table.

   Example: JKLTEST
6. Click **Stop** if the server is running.
7. Click **Start**.

Note: If your HTTP Server does not start, see "Troubleshooting" on page 199.

Test your HTTP Server

1. Open a new Web browser.
2. Enter **http://[your_hostname]:[port]** in the location or URL field .

   Example: http://jkl_server:1975

Your new HTTP Server will display a generic HTML file provided by the Web Administration for i interface.

View your HTTP Server configuration

Your configuration will look similar if you used the given example in this and previous examples.

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.

   Example: JKLTEST
4. Expand **Tools**.
5. Click **Display Configuration File**.

```
Listen *:1975
DocumentRoot /www/jkltest/htdocs
TraceEnable Off
Options -FollowSymLinks
LogFormat "%h %l %u %t \"%r\" %>s %b \"%{Referer}i\" \"%{User-Agent}i\"" combined
LogFormat "%{Cookie}n \"%r\" %t" cookie
LogFormat "%{User-agent}i" agent
LogFormat "%{Referer}i -> %U" referer
LogFormat "%h %l %u %t \"%r\" %>s %b" common
CustomLog logs/access_log combined
LogMaint logs/access_log 7 0
LogMaint logs/error_log 7 0
SetEnvIf "User-Agent" "Mozilla/2" nokeepalive
SetEnvIf "User-Agent" "JDK/1\.0" force-response-1.0
SetEnvIf "User-Agent" "Java/1\.0" force-response-1.0
SetEnvIf "User-Agent" "RealPlayer 4\.0" force-response-1.0
SetEnvIf "User-Agent" "MSIE 4\.0b2;" nokeepalive
SetEnvIf "User-Agent" "MSIE 4\.0b2;" force-response-1.0
<Directory />
    Require all denied
</Directory>
<Directory /www/jkltest/htdocs>
```

```
    Require all granted
</Directory>
```

JKL Toy Company adds a new directory to HTTP Server

This scenario discusses how to add a directory to an HTTP Server Web server.

Scenario

The JKL Toy Company (a fictitious company) has a need to add a directory to their **JKLTEST** configuration. The JKL Web administrator wants to create a directory to keep online employee profile information, such as current projects and contact information. Due to the large number of employees, a separate directory will be created to contain the employee profile information. The new directory will be called **profiles**.

Prerequisites

- It is assumed you have read "Scenarios: HTTP Server" on page 48.
- It is assumed you have read and completed "JKL Toy Company creates an HTTP Server" on page 48 or you have an existing HTTP Server configuration.

Start the IBM Web Administration for i interface

Access the IBM Web Administration for i from your browser. For information about how to access the Web Administration for i interface, see "Starting Web Administration for i" on page 7.

Create a new directory

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.

   Example: JKLTEST
4. Select **Global configuration** from the **Server area** list.
5. Expand **HTTP Tasks and Wizards**.
6. Click **Add a Directory to the Web**.
7. Click **Next**.
8. Select **Static Web pages and files**.
9. Click **Next**.
10. **Optional**: Accept the default or enter a new directory name.

    Example: /www/jkltest/profiles/
11. Click **Next**.
12. **Optional**: Accept the default or enter a new alias name.

    Example: /profiles/
13. Click **Next**.
14. Click **Finish**.

Restart your HTTP Server

Select one of the following methods below:

Manage one server

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.

3. Select your HTTP Server from the Server list.
4. Click the **Stop** icon if the server is running.
5. Click the **Start** icon.

Manage all servers

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select **All Servers** from the Server list.
4. Click the **All HTTP Servers** tab.
5. Select your HTTP Server name in the table.

   Example: JKLTEST
6. Click **Stop** if the server is running.
7. Click **Start**.

Note: If your HTTP Server does not start, see "Troubleshooting" on page 199.

Test your HTTP Server

1. Open a new Web browser.
2. Enter **http://[i_hostname]:[port]/[new_directory_alias]/** in the location or URL field.

   Example: http://jkl_server:1975/profiles/

Your new directory will display a generic HTML file provided by the IBM Web Administration for i interface.

View your HTTP Server configuration

Your configuration will look similar if you used the given example in this and previous examples.

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.

   Example: JKLTEST
4. Expand **Tools**.
5. Click **Display Configuration File**.

```
Alias /profiles/ /www/jkltest/profiles/
Listen *:1975
DocumentRoot /www/jkltest/htdocs
TraceEnable Off
Options -FollowSymLinks
LogFormat "%h %l %u %t \"%r\" %>s %b \"%{Referer}i\" \"%{User-Agent}i\"" combined
LogFormat "%{Cookie}n \"%r\" %t" cookie
LogFormat "%{User-agent}i" agent
LogFormat "%{Referer}i -> %U" referer
LogFormat "%h %l %u %t \"%r\" %>s %b" common
CustomLog logs/access_log combined
LogMaint logs/access_log 7 0
LogMaint logs/error_log 7 0
SetEnvIf "User-Agent" "Mozilla/2" nokeepalive
SetEnvIf "User-Agent" "JDK/1\.0" force-response-1.0
SetEnvIf "User-Agent" "Java/1\.0" force-response-1.0
SetEnvIf "User-Agent" "RealPlayer 4\.0" force-response-1.0
SetEnvIf "User-Agent" "MSIE 4\.0b2;" nokeepalive
SetEnvIf "User-Agent" "MSIE 4\.0b2;" force-response-1.0
<Directory />
    Require all denied
</Directory>
<Directory /www/jkltest/profiles>
    Require all granted
</Directory>
<Directory /www/jkltest/htdocs>
```

```
    Require all granted
</Directory>
```

JKL Toy Company adds user directories for HTTP Server

This scenario discusses how to add a user directory in an IBM HTTP Server for i Web server.

Scenario

The JKL Toy Company (a fictitious company) has decided to allow employees to maintain their own personal Web pages. The JKL Web administrator wants the personal Web pages to be stored in a directory of the root file system called **/home** on the **JKLTEST** HTTP Server. The directory **/home** will contain one subdirectory for each employee.

To begin, the JKL Web administrator creates a user profile and user directory for fellow employee Sharon Jones on the IBM i server. The new user profile will be called **SJONES** and the new user directory will be located at **/home/sjones**.

Prerequisites

- It is assumed you have read “Scenarios: HTTP Server” on page 48.
- It is assumed you have read and completed “JKL Toy Company creates an HTTP Server” on page 48 or you have an existing HTTP Server configuration.
- It is assumed you have read and completed “JKL Toy Company adds a new directory to HTTP Server” on page 51.
- It is assumed you have installed and are familiar with System i Navigator.
- It is assumed you have read “User profiles and required authorities for HTTP Server” on page 31.

Create a new user profile with System i Navigator

For in-depth information on how to use the System i Navigator, read the System i Navigator help installed with the product.

Note: It is not necessary to create a new user profile on your IBM i server if you want to use an existing profile. If using an existing profile, make certain the user profile has the appropriate permissions.

1. Start **System i Navigator**.
2. Expand the IBM i server the HTTP Server is installed on.

   Example: JKL_SERVER
3. Select **Users and Groups**, or click the Users and Group icon in the toolbar.
4. Click **Create a new user**, or click the Create a New Use icon in the toolbar.
5. Enter a new user name.

   Example: SJONES
6. **Optional**: Enter a description for this new profile.

   Example: This is a test profile.
7. **Optional**: Add a password if necessary for your IBM i server.
8. Click **Capabilities**.
9. Set the system privileges to allow the new user profile to use the HTTP Server.
10. Click **OK**.
11. Click **Add**.

Create a new user directory with System i Navigator

Note: The **/home** directory comes preinstalled on your IBM i server.

1. Start **System i Navigator**.
2. Expand the IBM i server the HTTP Server is installed on.

   Example: JKL_SERVER
3. Expand **File Systems > Integrated File System > Root**.
4. Right-click directory **home**.
5. Click **New Folder**.
6. Enter the name of your new user profile.

   Example: sjones
7. Click **OK**.

Copy HTML welcome page to user directory with System i Navigator

The new user directory does not contain any files. Use System i Navigator to copy **index.html**, found in **/www/[server_name]/htdocs** directory of your HTTP Server, to your new user directory.

Example: /www/jkltest/htdocs

1. Start **System i Navigator**.
2. Expand the IBM i server the HTTP Server is installed on.

   Example: JKL_SERVER
3. Expand **File Systems > Integrated File Systems > Root > www > [server_name] > htdocs**.

   Example: /www/jkltest/htdocs
4. Right-click file **index.html**.
5. Click **Copy**.
6. Right-click the new user directory.

   Example: sjones
7. Click **Paste**.

Optional: Edit file index.html in any way you choose. This is the file the HTTP Server will look for when this directory is requested by the Web browser.

Start the IBM Web Administration for i interface

Access the IBM Web Administration for i from your browser. For information about how to access the Web Administration for i interface, see "Starting Web Administration for i" on page 7.

Set up user directories for HTTP Server

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.

   Example: JKLTEST
4. Select **Global configuration** from the **Server area** list.
5. Expand **Server properties**.
6. Click **URL Mapping**.
7. Click the **User Directories** tab in the form.
8. Select **Disable all users except for the following** under **Enable or Disable user directories**.

9. Click **Add** under the **Enabled users** table.
10. Enter the name of your new user profile.

    Example: sjones
11. Click **Continue**.
12. Click **Add** under the **Current user directories** table.
13. Enter **/home** in the User directories column.

    Note: The order in which the user directories are listed determines which directory the HTTP Server will use first. If a match is not found in the first (top) user directory, the next user directory listed will be used. This continues until a match is found.
14. Click **Continue**.
15. Click **OK**.

Set up /home directory for HTTP Server

After creating the user directory, you must set up your HTTP Server to provide access to directory **/home**.

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select **Global configuration** from the **Server area** list.
4. Expand **Server Properties**.
5. Click **Container Management**.
6. Click the **Directories** tab in the form.
7. Click **Add** under **Directory/Directory Match containers** table.
8. Select **Directory** from the list in the **Type** column.
9. Enter **/home** in the **Directory path or expression** column.
10. Click **Continue**.
11. Click **OK**.
12. Select **Directory /home** from the **Server area** list.
13. Click **Security**.
14. Click the **Control Access** tab in the form.
15. Select **Deny then allow** from the **Order for evaluating access** list under **Control access based on where the request is coming from**.
16. Select **Allow access to all, except the following** under **Control access based on where the request is coming from**.

    Note: Do not add restrictions at this time. Return to this form at the end of the scenario to add restrictions.
17. Click **OK**.

Restart your HTTP Server

Select one of the following methods below:

Manage one server

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the Server list.
4. Click the **Stop** icon if the server is running.
5. Click the **Start** icon.

Manage all servers

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select **All Servers** from the Server list.
4. Click the **All HTTP Servers** tab.
5. Select your HTTP Server name in the table.

   Example: JKLTEST
6. Click **Stop** if the server is running.
7. Click **Start**.

Note: If your HTTP Server does not start, see "Troubleshooting" on page 199.

Test your HTTP Server

1. Open a new Web browser.
2. Enter **http://[i_hostname]:[port]/~[user_directory]** in the location or URL field .

   Example: http://jkl_server:1975/~sjones

Your new user directory will display the generic HTML file copied from directory /htdocs.

View your HTTP Server configuration

Your configuration will look similar if you used the given example in this and previous examples.

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.

   Example: JKLTEST
4. Expand **Tools**.
5. Click **Display Configuration File**.

```
Listen *:1975
DocumentRoot /www/jkltest/htdocs
TraceEnable Off
Options -FollowSymLinks
LogFormat "%h %l %u %t \"%r\" %>s %b \"%{Referer}i\" \"%{User-Agent}i\"" combined
LogFormat "%{Cookie}n \"%r\" %t" cookie
LogFormat "%{User-agent}i" agent
LogFormat "%{Referer}i -> %U" referer
LogFormat "%h %l %u %t \"%r\" %>s %b" common
CustomLog logs/access_log combined
LogMaint logs/access_log 7 0
LogMaint logs/error_log 7 0
SetEnvIf "User-Agent" "Mozilla/2" nokeepalive
SetEnvIf "User-Agent" "JDK/1\.0" force-response-1.0
SetEnvIf "User-Agent" "Java/1\.0" force-response-1.0
SetEnvIf "User-Agent" "RealPlayer 4\.0" force-response-1.0
SetEnvIf "User-Agent" "MSIE 4\.0b2;" nokeepalive
SetEnvIf "User-Agent" "MSIE 4\.0b2;" force-response-1.0
UserDir Disable
UserDir Enable Sjones
UserDir /home
<Directory />
    Require all denied
</Directory>
<Directory /www/jkltest/htdocs>
    Require all granted
</Directory>
<Directory /home>
    Require all granted
</Directory>
```

JKL Toy Company enables cookie tracking on HTTP Server

This scenario discusses how to enable cookie tracking for an IBM HTTP Server for i Web server.

Scenario

The JKL Toy Company (a fictitious company) wants to be able to measure Web site visitor activity and trends. The JKL Web administrator would like to try to measure how many new and unique users visit the intranet Web site. Requiring users to obtain a userid and password is the most accurate way track users; however, this method has the disadvantage of forcing the intranet Web users to register for a userid and password.

Analyzing the data in the log file by IP address could be used to track users. Two disadvantages to this method are:

- Some ISPs use dynamic IP addressing, assigning random IP addresses to all users.
- Some ISPs send all traffic through a proxy server, creating a log entry for the IP address of the proxy server only.

Setting a unique number in a cookie in the user's browser the first time that they visit the Web site combined with using a log that records cookies could be used to track users. This log can be analyzed to show how many new cookies have been set and how many old cookies have returned. In addition, the log can also be used to show the sequence of URLs that a particular cookie used to navigate through the Web site. A downside of this method is that users can shut off the browsers ability to record cookies.

The JKL Web administrator has decided to use the cookie method. The JKL Web administrator will store cookie information in a new log called **JKLCOOKIE_LOG** using a new cookie called **JKLCOOKIE**.

Prerequisites

- It is assumed you have read "Scenarios: HTTP Server" on page 48.
- It is assumed you have read and completed "JKL Toy Company creates an HTTP Server" on page 48 or you have an existing HTTP Server configuration.

Start the IBM Web Administration for i interface

Access the IBM Web Administration for i from your browser. For information about how to access the Web Administration for i interface, see "Starting Web Administration for i" on page 7.

Create a cookie for HTTP Server

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.

   Example: JKLTEST
4. Select **Global configuration** from the **Server area** list.
5. Expand **Server Properties**.
6. Click **Logging**.
7. Click the **User Tracking (Cookies)** tab in the form.
8. Select **Enabled** from the **Track user requests in a cookie** list.
9. Enter a name for the cookie in the **Cookie name** field or use the default.

   Example: JKLCOOKIE
10. Enter a value in the **Expiration period** field.

    Example: 1

11. Select a time period from the **Expiration period** list.

    Example: Years
12. Click **OK**.

Set up the cookie log for HTTP Server

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select **Global configuration** from the **Server area** list.
4. Expand **Server Properties**.
5. Click **Logging**.
6. Click the **Custom Logs** tab in the form.
7. Click **Add** under the **Custom logs** table.
8. Enter **logs/[log_name]** in the **Log** column.

    Example: logs/jklcookie_log
9. Select **cookie** from the **Log format** list.
10. Enter a value in the **Expiration** field.

    Example: 364
11. Select a time period from the **Expiration** list.

    Example: Days
12. Click **Continue**.
13. Click **OK**.

Note: The rest of the fields on this form are optional.

Restart your HTTP Server

Select one of the following methods below:

Manage one server

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the Server list.
4. Click the **Stop** icon if the server is running.
5. Click the **Start** icon.

Manage all servers

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select **All Servers** from the Server list.
4. Click the **All HTTP Servers** tab.
5. Select your HTTP Server name in the table.

    Example: JKLTEST
6. Click **Stop** if the server is running.
7. Click **Start**.

Note: If your HTTP Server does not start, see "Troubleshooting" on page 199.

Test your HTTP Server

1. Open a new Web browser.
2. Turn cookie alerts on in your browser. Consult the Web browser's help documentation for details on enabling cookie alerts.
3. Enter **http://[i_hostname]:[port]** in the location or URL field.

   Example: http://jkl_server:1975

View your HTTP Server configuration

Your configuration will look similar if you used the given example in this and previous examples.

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.

   Example: JKLTEST
4. Expand **Tools**.
5. Click **Display Configuration File**.

```
Listen *:1975
DocumentRoot /www/jkltest/htdocs
TraceEnable Off
Options -FollowSymLinks
LogMaint logs/jklcookie_log 364 0
LogFormat "%h %l %u %t \"%r\" %>s %b \"%{Referer}i\" \"%{User-Agent}i\"" combined
LogFormat "%{Cookie}n \"%r\" %t" cookie
LogFormat "%{User-agent}i" agent
LogFormat "%{Referer}i -> %U" referer
LogFormat "%h %l %u %t \"%r\" %>s %b" common
CustomLog logs/access_log combined
CustomLog logs/jklcookie_log cookie
LogMaint logs/access_log 7 0
LogMaint logs/error_log 7 0
SetEnvIf "User-Agent" "Mozilla/2" nokeepalive
SetEnvIf "User-Agent" "JDK/1\.0" force-response-1.0
SetEnvIf "User-Agent" "Java/1\.0" force-response-1.0
SetEnvIf "User-Agent" "RealPlayer 4\.0" force-response-1.0
SetEnvIf "User-Agent" "MSIE 4\.0b2;" nokeepalive
SetEnvIf "User-Agent" "MSIE 4\.0b2;" force-response-1.0
CookieTracking On
CookieName JKLCOOKIE
CookieExpires 31536000
<Directory />
    Require all denied
</Directory>
<Directory /www/jkltest/htdocs>
    Require all granted
</Directory>
```

JKL Toy Company creates virtual hosts on HTTP Server

This scenario discusses how to create virtual hosts in an IBM HTTP Server for i Web server.

Scenario

The JKL Toy Company (a fictitious company) wants to serve two domain names from one IP address. This can be done using virtual hosts.

The JKL Web administrator has decided to use the name-based virtual host for HTTP Server **JKLTEST**. The ISP has configured the Domain Name Server to route requests for **JKLINFO** to IP address **9.5.61.228**, port **78**.

Prerequisites

- It is assumed you have read "Scenarios: HTTP Server" on page 48.
- It is assumed you have read and completed "JKL Toy Company creates an HTTP Server" on page 48 or you have an existing HTTP Server configuration.
- It is assumed you are familiar with Domain Name Servers (DNS).

Start the IBM Web Administration for i interface

Access the IBM Web Administration for i from your browser. For information about how to access the Web Administration for i interface, see "Starting Web Administration for i" on page 7.

Set up a name-based virtual host

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.

   Example: JKLTEST
4. Select **Global configuration** from the **Server area** list.
5. Expand **Server Properties**.
6. Click **Virtual Hosts**.
7. Click the **Name-based** tab in the form.
8. Click **Add** under the **Named virtual hosts** table.
9. Select or enter an IP address in the **IP address** column.

   Example: 9.5.61.228

   Note: The IP address 9.5.61.288 used in this scenario is associated with JKL Toy Company's IBM i hostname **JKLINFO** and registered by a Domain Name Server (DNS). You will need to choose a different IP address and hostname. The IBM Web Administration for i interface provides the IP addresses used by your IBM i system in the IP Address list; however, you will need to provide the hostname associated with the address you choose.
10. Enter a port number in the **Port** column.

    Example: 78
11. Click **Add** under the **Virtual host containers** table in the **Named host** column.
12. Enter the fully qualified server hostname for the virtual host in the **Server name** column.

    Example: JKLINFO.com

    Note: Make sure the server hostname you enter is fully qualified and associated with the IP address you selected.
13. Enter a document root for the virtual host index file or welcome file in the **Document root** column.

    Example: /www/jkltest/companyinfo/

    Note: You are specifying a document root using a directory that will be added below in the *Set up the virtual host directories* section.
14. Click **Continue**.
15. Click **OK**.

Set up Listen directive for virtual host

1. Expand **Server Properties**.
2. Click **General Server Configuration**.

3. Click the **General Settings** tab in the form.
4. Click **Add** under the **Server IP addresses and ports to listen** on table.
5. Select the IP address you entered for the virtual host in the **IP address** column.

   Example: 9.5.61.228
6. Enter the port number you entered for the virtual host in the **Port** column.

   Example: 78
7. Accept **Disabled** default for FRCA.
8. Click **Continue**.
9. Accept the default values for the remainder of the form.
10. Click **OK**.

Set up the virtual host directories

1. Select the virtual host from the **Server area** list.
2. Expand **HTTP Tasks and Wizards**.
3. Click **Add a Directory to the Web**.
4. Click **Next**.
5. Select **Static web pages and files**.
6. Click **Next**.
7. Enter a directory name for the virtual host in the **Name** field.

   Example: /www/jkltest/companyinfo/
8. Click **Next**.
9. Enter an alias for the virtual host in the **Alias** field.

   Example: /companyinfo/
10. Click **Next**.
11. Click **Finish**.

The document root and directory for the virtual host has been created.

Restart your HTTP Server

Select one of the following methods below:

Manage one server

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the Server list.
4. Click the **Stop** icon if the server is running.
5. Click the **Start** icon.

Manage all servers

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select **All Servers** from the Server list.
4. Click the **All HTTP Servers** tab.
5. Select your HTTP Server name in the table.

   Example: JKLTEST

6. Click **Stop** if the server is running.
7. Click **Start**.

Note: If your HTTP Server does not start, see “Troubleshooting” on page 199.

Test your HTTP Server

1. Start a new Web browser.
2. Enter **http://[virtual_hostname_name]:[port]** in the location or URL field.

   Example: http://JKLINFO:78

View your HTTP Server configuration

Your configuration will look similar if you used the given example in this and previous examples.

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.

   Example: JKLTEST
4. Expand **Tools**.
5. Click **Display Configuration File**.

```
Listen *:1975
Listen 9.5.61.228:78
DocumentRoot /www/jkltest/htdocs
TraceEnable Off
Options -FollowSymLinks
LogFormat "%h %l %u %t \"%r\" %>s %b \"%{Referer}i\" \"%{User-Agent}i\"" combined
LogFormat "%{Cookie}n \"%r\" %t" cookie
LogFormat "%{User-agent}i" agent
LogFormat "%{Referer}i -> %U" referer
LogFormat "%h %l %u %t \"%r\" %>s %b" common
CustomLog logs/access_log combined
LogMaint logs/access_log 7 0
LogMaint logs/error_log 7 0
SetEnvIf "User-Agent" "Mozilla/2" nokeepalive
SetEnvIf "User-Agent" "JDK/1\.0" force-response-1.0
SetEnvIf "User-Agent" "Java/1\.0" force-response-1.0
SetEnvIf "User-Agent" "RealPlayer 4\.0" force-response-1.0
SetEnvIf "User-Agent" "MSIE 4\.0b2;" nokeepalive
SetEnvIf "User-Agent" "MSIE 4\.0b2;" force-response-1.0
<Directory />
    Require all denied
</Directory>
<Directory /www/jkltest/htdocs>
    Require all granted
</Directory>
<VirtualHost 9.5.61.228:78>
    ServerName JKLINFO.com
    DocumentRoot /www/jkltest/companyinfo/
    <Directory /www/jkltest/companyinfo>
        Require all granted
    </Directory>
    Alias /companyinfo/ /www/jkltest/companyinfo/
</VirtualHost>
```

Related information

“Virtual hosts on HTTP Server ” on page 23
This topic provides information about virtual host types on the IBM HTTP Server for i Web server.

“Virtual host tasks” on page 128

This topic provides step-by-step tasks for configuring virtual hosts in the IBM HTTP Server for i Web server.

JKL Toy Company adds password protection for HTTP Server

This scenario discusses how to add password protection to an IBM HTTP Server for i Web server.

Scenario

The JKL Toy Company (a fictitious company) wants to protect a set of Web pages on its Web site so that they can only be viewed by visitors that have a password. In order to add password protection, JKL needs to decide what type of authentication method to use:

- Internet user - requires an entry in a validation list.
- User profile - requires an IBM i server user profile.
- LDAP - requires an LDAP server.

JKL Toy Company chooses to use Internet users for the following reasons:

- User profiles are not desirable since JKL does not want to create a user profile for each authenticated visitor to the Web site.
- Since JKL only wants to implement authentication on one IBM i server, validation lists will be used. LDAP is a better solution for multiple systems.

The Web page content to be protected is in the preexisting directory **/www/jkltest/profiles/**. The visitor's user name and passwords will be stored in a new validation list called **users** in library **PROFILES**. The first user name that we will enter is **sjones** with a password of **dragon102**.

Prerequisites

- It is assumed you have read "Scenarios: HTTP Server" on page 48.
- It is assumed you have read and completed "JKL Toy Company creates an HTTP Server" on page 48 or you have an existing HTTP Server configuration.
- It is assumed you have read and completed "JKL Toy Company adds a new directory to HTTP Server" on page 51.
- It is assumed you have access to or the correct authority to create an IBM i library.

Create a library for validation lists on your IBM i server

Skip the following steps if you will be using an existing library on your IBM i server for your validation list.

1. Start a 5250 session on your system.
2. Enter `CRTLIB` on the command line.
3. Type the **F4 key** to prompt for additional parameters.
4. Enter a name for your library in the **Library** field.

   Example: PROFILES
5. **Optional**: Edit the remaining fields as necessary or accept the default values.
6. Type the **Enter key** (or equivalent) to create your library.

Make sure the proper authorities and restrictions you want on the library are active before continuing.

Start the IBM Web Administration for i interface

Access the IBM Web Administration for i from your browser. For information about how to access the Web Administration for i interface, see "Starting Web Administration for i" on page 7.

Set up password protection for a directory on HTTP Server

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.

   Example: JKLTEST
4. Select **Directory /www/[server_name]/[new_directory]/** from the **Server area** list.

   Example: /www/jkltest/profiles/

   Note: The new directory was created with the "JKL Toy Company adds a new directory to HTTP Server" on page 51 scenario.
5. Expand **Server Properties**.
6. Click **Security**.
7. Click the **Authentication** tab in the form.
8. Select **Select Internet users in validation lists**.
9. Enter a descriptive name in the **Authentication name or realm** field.

   Example: JKL Employee Profiles

   Note: When users attempt to access a password protected resource, they are challenged for a username and password. The **Authentication name or realm** value is displayed in the login window, and should provide information regarding the resource the user is attempting to access.
10. Click **Add** under **Validation lists** table.
11. Enter **[library]/[validation_list_name]**.

    Example: profiles/users

    Note: In the above example, **profiles** is the name of the IBM i library and **users** is the name of the validation list.
12. Click **Continue**.
13. Select **Default server profile** from the **IBM i user profile to process requests** list under **Related information**. When selected, the value **%%SERVER%%** will be placed in the field.
14. Click **Apply**.
15. Click the **Control Access** tab in the form.
16. Select **All authenticated users (valid user name and password)** under **Control access based on who is making the requests**.
17. Click **OK**.

Create a validation list for HTTP Server

1. Click the **Advanced** tab.
2. Click the **Internet Users and Groups** subtab.
3. Expand **Internet Users and Groups**.
4. Click **Add Internet User**.
5. Enter **[username]** into the **User name** field.

   Example: sjones
6. Enter **[password]** into the **Password** field.

   Example: dragon102
7. Enter the same password in the **Confirm password** field.
8. **Optional**: Enter comments for this Internet user.

9. Enter **[library]/[validation_list_name]** in the **Validation list** field.

   Example: profiles/users

   Note: In the above example, **profiles** is the name of the library and **users** is the name of the validation list.
10. Click **Apply**.

Restart your HTTP Server

Select one of the following methods below:

Manage one server

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the Server list.
4. Click the **Stop** icon if the server is running.
5. Click the **Start** icon.

Manage all servers

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select **All Servers** from the Server list.
4. Click the **All HTTP Servers** tab.
5. Select your HTTP Server name in the table.

   Example: JKLTEST
6. Click **Stop** if the server is running.
7. Click **Start**.

Note: If your HTTP Server does not start, see "Troubleshooting" on page 199.

Test your HTTP Server

1. Open a new Web browser.
2. Enter **http://[i_hostname]:[port]/[new_directory_alias]/** in the location or URL field.

   Example: http://jkl_server:1975/profiles/
3. Enter the username and password you created.

You will be asked to provide a valid username and password. Enter the username and password you entered in the validation list. It is suggested you limit *PUBLIC authority, but allow authority to the Web administrator user authority and QTMHHTTP.

View your HTTP Server configuration

Your configuration will look similar if you used the given example in this and previous examples.

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.

   Example: JKLTEST
4. Expand **Tools**.
5. Click **Display Configuration File**.

```
Alias /profiles/ /www/jkltest/profiles/
Listen *:1975
DocumentRoot /www/jkltest/htdocs
TraceEnable Off
Options -FollowSymLinks
LogFormat "%h %l %u %t \"%r\" %>s %b \"%{Referer}i\" \"%{User-Agent}i\"" combined
LogFormat "%{Cookie}n \"%r\" %t" cookie
LogFormat "%{User-agent}i" agent
LogFormat "%{Referer}i -> %U" referer
LogFormat "%h %l %u %t \"%r\" %>s %b" common
CustomLog logs/access_log combined
LogMaint logs/access_log 7 0
LogMaint logs/error_log 7 0
SetEnvIf "User-Agent" "Mozilla/2" nokeepalive
SetEnvIf "User-Agent" "JDK/1\.0" force-response-1.0
SetEnvIf "User-Agent" "Java/1\.0" force-response-1.0
SetEnvIf "User-Agent" "RealPlayer 4\.0" force-response-1.0
SetEnvIf "User-Agent" "MSIE 4\.0b2;" nokeepalive
SetEnvIf "User-Agent" "MSIE 4\.0b2;" force-response-1.0
<Directory />
    Require all denied
</Directory>
<Directory /www/jkltest/profiles>
    Require valid-user
    PasswdFile profiles/users
    UserID %%SERVER%%
    AuthType Basic
    AuthName "JKL Employee Profiles"
</Directory>
<Directory /www/jkltest/htdocs>
    Require all granted
</Directory>
```

JKL Toy Company adds dynamic content with server-side includes for HTTP Server

This scenario discusses how to add dynamic content to an IBM HTTP Server for i Web server using server-side includes.

Scenario

The JKL Toy company (a fictitious company) wants to add some dynamic content to their index file (or welcome page) on their Web site. The welcome Web page is located in /www/jkltest/htdocs. The JKL Web administrator will add the current server time to display on their Web page.

Note: Server-side includes (SSI) create dynamic Web pages by adding content to a Web page before it is sent to the browser. Server performance may be impacted when processing SSIs.

Prerequisites

- It is assumed you have read “Scenarios: HTTP Server” on page 48.
- It is assumed you have read and completed “JKL Toy Company creates an HTTP Server” on page 48 or you have an existing HTTP Server configuration.
- It is assumed you have installed and are familiar with System i Navigator.

Edit the index file (or welcome page) with System i Navigator

For in-depth information on how to use the System i Navigator, read the System i Navigator help installed with the product.

1. Start **System i Navigator**.
2. Expand theIBM i server the HTTP Server is installed on.

   Example: JKL_SERVER
3. Expand **File Systems > Integrated File System > Root > www > [server_name]**.

Example: File Systems > Integrated File System > Root > www > jkltest

4. Click **htdocs**.

   The directory **htdocs** is the default name of your document root provided by the Create New HTTP Server wizard.
5. Right-click **index.html**.
6. Click Rename.
7. Rename the file **index.shtml**.
8. Right-click **index.shtml**.
9. Click **Edit**.
10. Enter the following lines below the <BODY> tag and before the </BODY> tag:

```
<p>The current server time is:
<!--#config timefmt="%T" -->
<!--#echo var="DATE_LOCAL" -->
</p>
```

11. Save and close the file.

See "Server-side include commands for HTTP Server" on page 643 for more information about SSI commands.

Start the IBM Web Administration for i interface

Access the IBM Web Administration for i from your browser. For information about how to access the Web Administration for i interface, see "Starting Web Administration for i" on page 7.

Set up server-side includes for HTTP Server

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.

   Example: JKLTEST
4. Select **Global configuration** from the **Server area** list.
5. Expand **Server properties**.
6. Click **Container Management**.
7. Click the **Files** tab in the form.
8. Click **Add** under the **Files/Files Match containers** table.
9. Select **Files Match** from the list in the **Type** column.
10. Enter **\.shtml(\..+)?$** in the **File name or expression** column.
11. Click **Continue**.
12. Click **OK**.
13. Select **Files Match \.shtml(\..+)?$** from the **Server area** list.
14. Expand **Server Properties**.
15. Click **Dynamic Content and CGI**.
16. Click the **Server Side Includes** tab in the form.
17. Select **Allow server side files without CGI** under **Server side includes**.
18. Click **OK**.
19. Select **Global configuration** from the **Server area** list.
20. Expand **Server Properties**.
21. Click **General Server Configuration**.

22. Click the **Welcome Pages** tab in the form.
23. Select **index.html** in the **Welcome/index file names** table.
24. Rename the file **index.shtml** in the **File name** column.
25. Click **Continue**.
26. Click **OK**.

Restart your HTTP Server

Select one of the following methods below:

Manage one server

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the Server list.
4. Click the **Stop** icon if the server is running.
5. Click the **Start** icon.

Manage all servers

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select **All Servers** from the Server list.
4. Click the **All HTTP Servers** tab.
5. Select your HTTP Server name in the table.

   Example: JKLTEST
6. Click **Stop** if the server is running.
7. Click **Start**.

Note: If your HTTP Server does not start, see "Troubleshooting" on page 199.

Test your HTTP Server

1. Start a new Web browser.
2. Enter **http://[i_hostname]:[port]** in the location or URL field.

   Example: http://jkl_server:1975

The Web page now displays the current server time.

View your HTTP Server configuration

Your configuration will look similar if you used the given example in this and previous examples.

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.

   Example: JKLTEST
4. Expand **Tools**.
5. Click **Display Configuration File**.

```
Listen *:1975
DocumentRoot /www/jkltest/htdocs
TraceEnable Off
Options -FollowSymLinks
AccessFileName .htaccess
```

```
LogFormat "%h %l %u %t \"%r\" %|s %b \"%{Referer}i\" \"%{User-Agent}i\"" combined
LogFormat "%{Cookie}n \"%r\" %t" cookie
LogFormat "%{User-agent}i" agent
LogFormat "%{Referer}i -| %U" referer
LogFormat "%h %l %u %t \"%r\" %|s %b" common
CustomLog logs/access_log combined
LogMaint logs/access_log 7 0
LogMaint logs/error_log 7 0
SetEnvIf "User-Agent" "Mozilla/2" nokeepalive
SetEnvIf "User-Agent" "JDK/1\.0" force-response-1.0
SetEnvIf "User-Agent" "Java/1\.0" force-response-1.0
SetEnvIf "User-Agent" "RealPlayer 4\.0" force-response-1.0
SetEnvIf "User-Agent" "MSIE 4\.0b2;" nokeepalive
SetEnvIf "User-Agent" "MSIE 4\.0b2;" force-response-1.0
DirectoryIndex index.shtml
<Directory />
    Require all denied
</Directory>
<Directory /www/jkltest/htdocs>
    Require all granted
</Directory>
<FilesMatch \.shtml(\..+)?$>
    Options +IncludesNoExec
    AddOutputFilter INCLUDES .shtml
</FilesMatch>
```

JKL Toy company enables Secure Sockets Layer (SSL) protection on HTTP Server

This scenario discusses how to enable SSL protection for an IBM HTTP Server for i Web server.

Scenario

The JKL Toy company (a fictitious company) wants to enable Secure Sockets Layer (SSL) protection for a specific directory on their HTTP Server. The secured directory will contain confidential corporate earnings information that only a select group of employees and business associates will be able to access. The JKL Web administrator has decided not to create and deploy user certificates to client browsers, but rather use SSL so that all data exchanged with the browser is encrypted. The JKL Web administrator will use a server certificate, basic password protection (based upon existing IBM i user accounts), and standard SSL encryption to provide access to the secured information.

Note: Although JKL chooses not to implement digital certificates, they must still register their HTTP Server with the IBM i Digital Certificate Manager.

Prerequisites

- It is assumed you have read “Scenarios: HTTP Server” on page 48.
- It is assumed you have read and completed “JKL Toy Company creates an HTTP Server” on page 48 or you have an existing HTTP Server configuration.
- It is assumed that a certificate authority (and certificate store) is already established for the Digital Certificate Manager.
- It is assumed you are familiar with Domain Name Servers (DNS).

Start the IBM Web Administration for i interface

Access the IBM Web Administration for i from your browser. For information about how to access the Web Administration for i interface, see “Starting Web Administration for i” on page 7.

Set up a name-based virtual host

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.

Example: JKLTEST

4. Select **Global configuration** from the **Server area** list.
5. Expand **Server Properties**.
6. Click **Virtual Hosts**.
7. Click the **Name-based** tab in the form.
8. Click **Add** under the **Named virtual hosts** table.
9. Select or enter an IP address in the **IP address** column.

   Example: 9.5.61.228

   Note: The IP address 9.5.61.288 used in this scenario is associated with JKL Toy Company's IBM i hostname **JKLEARNINGS** and registered by a Domain Name Server (DNS). You will need to choose a different IP address and hostname. The IBM Web Administration for i interface provides the IP addresses used by your IBM i server in the IP Address list; however, you will need to provide the hostname associated with the address you choose.
10. Enter a port number in the **Port** column.

    Example: 443

    Note: Specify a port number other than the one currently being used for your HTTP Server to maintain an SSL and non-SSL Web site.
11. Click **Add** under the **Virtual host containers** table in the **Named host** column.

    Note: This is a table within the **Named virtual hosts** table in the **Named host** column.
12. Enter the fully qualified server hostname for the virtual host in the **Server name** column.

    Example: www.JKLEARNINGS.org

    Note: Make sure the server hostname you enter is fully qualified and associated with the IP address you selected.
13. Enter a document root for the virtual host index file or welcome file in the **Document root** column.

    Example: /www/jkltest/earnings/

    Note: You are specifying a document root that will be created below. Remember the document root you have entered; you will be asked to enter the document root again when creating a new directory.
14. Click **Continue**.
15. Click **OK**.

Set up Listen directive for virtual host

1. Expand **Server Properties**.
2. Click **General Server Configuration**.
3. Click the **General Settings** tab in the form.
4. Click **Add** under the **Server IP addresses and ports to listen** on table.
5. Select the IP address you entered for the virtual host in the **IP address** column.

   Example: 9.5.61.288
6. Enter the port number you entered for the virtual host in the **Port** column.

   Example: 443
7. Click **Continue**.
8. Click **OK**.

Set up the virtual host directories

1. Select the virtual host from the **Server area** list.

2. Expand **HTTP Tasks and Wizards**.
3. Click **Add a Directory to the Web**.
4. Click **Next**.
5. Select **Static web pages and files**.
6. Click **Next**.
7. Enter a directory name for the virtual host in the **Name** field.

   Example: /www/jkltest/earnings/
8. Click **Next**.
9. Enter an alias for the virtual host in the **Alias** field.

   Example: /earnings/
10. Click **Next**.
11. Click **Finish**.

The document root and directory for the virtual host has been created.

Set up password protection via authentication

1. Select the directory under the virtual host from the **Sever area** list.

   Example: Directory /www/jkltest/earnings
2. Expand **Server Properties**.
3. Click **Security**.
4. Click the **Authentication** tab in the form.
5. Select **IBM i user profiles** under **User authentication method**.
6. Enter **Projected Earnings** in the **Authentication name or realm** field.
7. Specify the user profile in the field **IBM i user profile to process requests** under **Related information**.
8. Click **Apply**.
9. Click the **Control Access** tab in the form.
10. Select **Control access based on specific authorization** of **Control access** field.
11. Click **Add Authorization** button under the **Authorization for control access** table.
12. Select **Require valid user** from the new row **Authorization or Container** list.
13. Click **OK**.

Enable SSL for the virtual host

1. Select the virtual host from the **Sever area** list.

   Example: Virtual Host *:443
2. Expand **Server Properties**.
3. Click **Security**.
4. Click the **SSL with Certificate Authentication** tab in the form.
5. Select **Enable SSL** under **SSL**.
6. Select **QIBM_HTTP_SERVER_[server_name]** from the **Server certificate application name** list.

   Example: QIBM_HTTP_SERVER_JKLTEST

   Note: Remember the name of the server certificate. You will need to select it again in the Digital Certificate Manager.

7. Select **Do not request client certificate for connection** under **Client certificates when establishing the connection**.
8. Click **OK**.

The HTTPS_PORT provides a specific environment variable value that is passed to CGI programs . This field is not used in this scenario.

Associate system certificate with HTTP Server

The application name (created during the SSL process) is assigned a system certificate via the Digital Certificate Manager (DCM). During the process of enabling SSL for a virtual host, an IBM i server certificate must be assigned to the application name used when configuring SSL. This task is accomplished via the Digital Certificate Manager interface (accessed from the IBM i Tasks screen). See IBM i Digital Certificate Manager for more information.

Note: The following steps will require a user profile with higher levels of authority than those documented for the Webmaster profile. Web browsers will need to be restarted using the higher authority profile to authenticate.

1. Click the **Related Links** tab.
2. Click **Digital Certificate Manager**.
3. Click **Select a Certificate Store**.
4. Select ***SYSTEM**.
5. Click **Continue**.
6. Enter a password in the Certificate store password field.
7. Click **Continue**.
8. Click **Manage Applications**.
9. Select **Update certificate assignment**.
10. Click **Continue**.
11. Select **Server**.
12. Click **Continue**.
13. Select the appropriate application name.

    Note: Select the application name created while enabling SSL for the virtual host directory.

    Example: QIBM_HTTP_SERVER_JKLTEST
14. Click **Update Certificate Assignment**.
15. Select the appropriate certificate.
16. Click **Assign New Certificate**. This assigns the certificate to the application name selected in the previous step.

Restart your HTTP Server

Select one of the following methods below:

Manage one server

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the Server list.
4. Click the **Stop** icon if the server is running.
5. Click the **Start** icon.

Manage all servers

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select **All Servers** from the Server list.
4. Click the **All HTTP Servers** tab.
5. Select your HTTP Server name in the table.

   Example: JKLTEST
6. Click **Stop** if the server is running.
7. Click **Start**.

Note: If your HTTP Server does not start, see "Troubleshooting" on page 199.

Test your HTTP Server

1. Start a new Web browser.
2. Enter **https://[virtual_hostname_name]:[port]** in the location or URL field.

   Example: https://www.JKLEARNINGS.org:443

You will be challenged for a user name and password. After entering an appropriate IBM i user name and password, you will see a sample homepage (created by the Serve New Directory wizard) with the browser's security padlock icon enabled. The padlock indicates that SSL is enabled.

View your HTTP Server configuration

Your configuration will look similar if you used the given example in this and previous examples.

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.

   Example: JKLTEST
4. Expand **Tools**.
5. Click **Display Configuration File**.

```
LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM
Listen *:1975
Listen 9.5.61.228:443
DocumentRoot /www/jkltest/htdocs
TraceEnable Off
Options -FollowSymLinks
AccessFileName .htaccess
LogFormat "%h %l %u %t \"%r\" %>s %b \"%{Referer}i\" \"%{User-Agent}i\"" combined
LogFormat "%{Cookie}n \"%r\" %t" cookie
LogFormat "%{User-agent}i" agent
LogFormat "%{Referer}i -> %U" referer
LogFormat "%h %l %u %t \"%r\" %>s %b" common
CustomLog logs/access_log combined
LogMaint logs/access_log 7 0
LogMaint logs/error_log 7 0
SetEnvIf "User-Agent" "Mozilla/2" nokeepalive
SetEnvIf "User-Agent" "JDK/1\.0" force-response-1.0
SetEnvIf "User-Agent" "Java/1\.0" force-response-1.0
SetEnvIf "User-Agent" "RealPlayer 4\.0" force-response-1.0
SetEnvIf "User-Agent" "MSIE 4\.0b2;" nokeepalive
SetEnvIf "User-Agent" "MSIE 4\.0b2;" force-response-1.0
DirectoryIndex index.html
<Directory />
    Require all denied
</Directory>
<Directory /www/jkltest/htdocs>
    Require all granted
</Directory>
<VirtualHost 9.5.61.228:443>
    ServerName www.JKLEARNINGS.org
    DocumentRoot /www/jkltest/earnings/
```

```
     SSLEnable
     SSLAppName QIBM_HTTP_SERVER_JKLTEST
     SSLClientAuth None
     <Directory /www/jkltest/earnings>
         Require valid-user
         PasswdFile %%SYSTEM%%
         UserID %%SERVER%%
         AuthType Basic
         AuthName "Projected Earnings"
     </Directory>
     Alias /earnings/ /www/jkltest/earnings/
 </VirtualHost>
```

JKL Toy Company enables single signon for HTTP Server

This scenario discusses how to enable single signon for security for an IBM HTTP Server for i Web server.

To learn more about Kerberos and network security on IBM i servers, see Network authentication service.

Scenario

The JKL Web administrator, John Day, wants to enable single signon for the JKL Toy Company network. The network consists of several IBM i systems and a Windows 2000 server, where the users are registered in Microsoft Windows Active Directory. Based on John Day's research, he knows that Microsoft Active Directory uses the Kerberos protocol to authenticate Windows users. John Day also knows that IBM i provides a single signon solution based on an implementation of Kerberos authentication, called network authentication service, in conjunction with Enterprise Identity Mapping (EIM).

While excited about the benefits of a single signon environment, John Day wants to thoroughly understand single signon configuration and usage before using it across the entire enterprise. Consequently, John Day decides to configure a test environment first.

After considering the various groups in the company, John Day decides to create the test environment for the *MYCO* Order Receiving department, a subsidiary of JKL Toys. The employees in the Order Receiving department use multiple applications, including HTTP Server, on one IBM i system to handle incoming customer orders. John Day uses the Order Receiving department as a testing area to create a single signon test environment that can be used to better understand how single signon works and how to plan a single signon implementation across the JKL enterprise.

This scenario has the following advantages:

- Allows you to see some of the benefits of single signon on a small scale to better understand how you can take full advantage of it before you create a large-scale, single signon environment.
- Provides you with a better understanding of the planning process required to successfully and quickly implement a single signon environment across your entire enterprise.

As the network administrator at JKL Toy Company, John Day wants to create a small single signon test environment that includes a small number of users and a single IBM i server, *Systemi A*. John Day wants to perform thorough testing to ensure that user identities are correctly mapped within the test environment. The first step is to enable a single signon environment for the IBM i server and applications on *Systemi A*, including the HTTP Server. After implementing the configuration successfully, John Day eventually wants to expand the test environment to include the other systems and users in the JKL enterprise.

The objectives of this scenario are as follows:

- The IBM i system, known as Systemi A, must be able to use Kerberos within the MYCO.COM realm to authenticate the users and services that are participating in this single signon test environment. To enable the system to use Kerberos, Systemi A must be configured for network authentication service.
- The directory server on Systemi A must function as the domain controller for the new EIM domain.

  Note: Two types of domains play key roles in the single signon environment: an EIM domain and a Windows 2000 domain. Although both of these terms contain the word *domain*, these entities have very different definitions.

Use the following descriptions to understand the differences between these two types of domains. For more information about these terms, see the EIM and Network authentication service topics.

EIM domain
An EIM domain is a collection of data, which includes the EIM identifiers, EIM associations, and EIM user registry definitions that are defined in that domain. This data is stored in a Lightweight Directory Access Protocol (LDAP) server, such as the IBM Tivoli® Directory Server for IBM i, which can run on any system in the network defined in that domain. Administrators can configure systems (EIM clients), such as IBM i, to participate in the domain so that systems and applications can use domain data for EIM lookup operations and identity mapping. To find out more about an EIM domain, see EIM.

Windows 2000 domain
In the context of single signon, a Windows 2000 domain is a Windows network that contains several systems that operate as clients and servers, as well as a variety of services and applications that the systems use. The following are some of the components pertinent to single signon that you may find within a Windows 2000 domain:

- **Realm**

  A realm is a collection of machines and services. The main purpose of a realm is to authenticate clients and services. Each realm uses a single Kerberos server to manage the principals for that particular realm.

- **Kerberos server**

  A Kerberos server, also known as a key distribution center (KDC), is a network service that resides on the Windows 2000 server and provides tickets and temporary session keys for network authentication service. The Kerberos server maintains a database of principals (users and services) and their associated secret keys. It is composed of the authentication server and the ticket granting server. A Kerberos server uses Microsoft Windows Active Directory to store and manage the information in a Kerberos user registry.

  Note: These servers should be in the same subnet to ensure that the tokens can be validated.

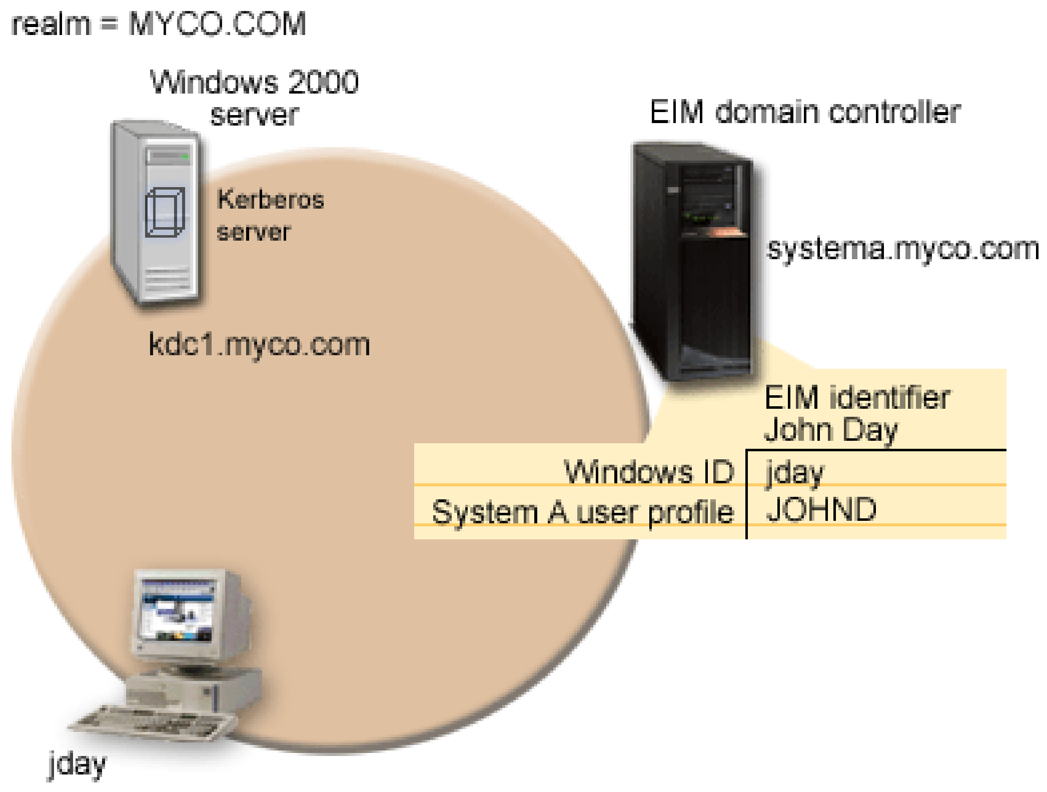
- **Microsoft Windows Active Directory**

  Microsoft Windows Active Directory is an LDAP server that resides on the Windows 2000 server along with the Kerberos server. The Active Directory is used to store and manage the information in a Kerberos user registry. Microsoft Windows Active Directory uses Kerberos authentication as its default security mechanism. Therefore, if you are using Microsoft Active Directory to manage your users, you are already using Kerberos technology.

- One user profile on *Systemi A* and one Kerberos principal must each be mapped to a single EIM identifier.
- A Kerberos service principal must be used to authenticate the user to the IBM HTTP Server for i.

Details

The following figure illustrates the network environment for this scenario:



The figure illustrates the following points relevant to this scenario.

EIM domain data defined for the enterprise

- An EIM domain called *MyCoEimDomain*.
- An EIM registry definition for *Systemi A* called *SystemiA.MYCO.COM*.
- An EIM registry definition for the Kerberos registry called *MYCO.COM*.
- An EIM identifier called John Day. This identifier uniquely identifies John Day, the administrator for *MyCo*.
- A source association for the *jday* Kerberos principal on the Windows 2000 server.
- A target association for the *JOHND* user profile on *Systemi A* to access HTTP Server.

Windows 2000 server

- Acts as the Kerberos server (*kdc1.myco.com*), also known as a key distribution center (KDC), for the network.
- The default realm for the Kerberos server is *MYCO.COM*.
- A Kerberos principal of *jday* is registered with the Kerberos server on the Windows 2000 server. This principal will be used to create a source association to the EIM identifier, John Day.

Systemi A

- Runs IBM i 5.4, or later, with the following options and licensed products installed:
  - IBM i Host Servers
  - Qshell Interpreter
  - IBM i Access for Windows
  - Network Authentication Enablement
- The IBM Tivoli Directory Server for IBM i (LDAP) on *Systemi A* will be configured to be the EIM domain controller for the new EIM domain, *MyCoEimDomain*. *Systemi A* participates in the EIM domain, *MyCoEimDomain*.

- The principal name for *Systemi A* is *krbsvr400/Systemia.myco.com@MYCO.COM*.
- The principal name for the HTTP Server on *Systemi A* is *HTTP/Systemia.myco.com@MYCO.COM*.
- The user profile of *JOHND* exists on *Systemi A*. You create a target association between this user profile and the EIM identifier, *John Day*.
- The home directory for the IBM i user profile, *JOHND*, (*/home/JOHND*) is defined on *Systemi A*.

Client PC used for single signon administration

- Runs Microsoft Windows 2000 operating system.
- Runs IBM i Access for Windows V5R4, or later.
- Runs System i Navigator with the following subcomponents installed:
  - Network
  - Security
- Serves as the primary logon system for administrator John Day.
- Configured to be part of the *MYCO.COM* realm (Windows domain).

Prerequisites

Successful implementation of this scenario requires that the following assumptions and prerequisites are met:

1. It is assumed you have read "Scenarios: HTTP Server" on page 48.
2. All system requirements, including software and operating system installation, have been verified.

   Ensure that all the necessary licensed programs are installed. To verify that the licensed programs have been installed, complete the following:

   a. In System i Navigator, expand your **system** > **Configuration and Service** > **Software** > **Installed Products**.
3. All necessary hardware planning and setup is complete.
4. TCP/IP and basic system security are configured and tested on each system.
5. The directory server and EIM are not previously configured on *Systemi A*.

   Note: Instructions in this scenario are based on the assumption that the directory server has not been previously configured on *Systemi A*. However, if you have previously configured the directory server, you can still use these instructions with only slight differences. These differences are noted in the appropriate places within the configuration steps.
6. A single DNS server is used for host name resolution for the network. Host tables are not used for host name resolution.

   Note: The use of host tables with Kerberos authentication may result in name resolution errors or other problems.

Configuration steps

Note: Before you implement this scenario, you need to thoroughly understand the concepts related to single signon, including network authentication service and Enterprise Identity Mapping (EIM). See the following information to learn about the terms and concepts related to single signon:

- Enterprise Identity Mapping (EIM)
- Network authentication service

These are the configuration steps John Day completed. Follow these configuration steps to enable a single signon environment for your IBM i system.

"Step 1: Planning work sheet" on page 78
"Step 2: Create a basic single signon configuration for Systemi A" on page 82
"Step 3: Add principal names to the KDC" on page 83

Step 1: Planning work sheet

The following planning work sheets are tailored to fit this scenario. These planning work sheets demonstrate the information that you need to gather and the decisions you need to make to prepare the single signon implementation described by this scenario. To ensure a successful implementation, you must be able to answer **Yes** to all prerequisite items in the work sheet and be able to gather all the information necessary to complete the work sheets before you perform any configuration tasks.

Table 11. Single signon prerequisite work sheet

Prerequisite work sheet	**Answers**
Are you running IBM i 5.4 or later?	Yes
Are the following options and licensed products installed on *Systemi A*? • IBM i Host Servers • Qshell Interpreter • IBM i Access for Windows • Network Authentication Enablement	Yes
Have you installed an application that is enabled for single signon on each of the PCs that will participate in the single signon environment? **Note:** For this scenario, all of the participating PCs have IBM i Access for Windows installed and *Systemis A* has the IBM HTTP Server for i installed.	Yes
Is System i Navigator installed on the administrator's PC? • Is the Security subcomponent of System i Navigator installed on the administrator's PC? • Is the Network subcomponent of System i Navigator installed on the administrator's PC?	Yes
Have you installed the latest IBM i Access for Windows service pack? See System i Access for the latest service pack.	Yes
Do you, the administrator, have *SECADM, *ALLOBJ, and *IOSYSCFG special authorities?	Yes

Table 11. Single signon prerequisite work sheet (continued)

Prerequisite work sheet	**Answers**
Do you have one of the following systems in the network acting as the Kerberos server (also known as the KDC)? If yes, specify which system. 1. Windows 2000 Server **Note:** Microsoft Windows 2000 Server uses Kerberos authentication as its default security mechanism. 2. Windows Server 2003 3. IBM Portable Application Solutions Environment for i 4. AIX server 5. System z®	Yes, Windows 2000 Server
Are all your PCs in your network configured in a Windows (R) 2000 domain?	Yes
Have you applied the latest program temporary fixes (PTFs)?	Yes
Is the IBM i system time within 5 minutes of the system time on the Kerberos server? If not see Synchronize system times.	Yes

You need this information to configure EIM and network authentication service to create a single signon test environment.

Table 12. Single signon configuration planning work sheet for Systemi A.

Use the following information to complete the EIM Configuration wizard. The information in this work sheet correlates with the information you need to supply for each page in the wizard:

Configuration planning work sheet for Systemi A	**Answers**
How do you want to configure EIM for your system? • Join an existing domain • Create and join a new domain **Note:** This option allows you to configure the current system's directory server as the EIM domain controller when the directory server is not already configured as the EIM domain controller.	Create and join a new domain **Note:** This will configure the directory server on the same system on which you are currently configuring EIM.
Do you want to configure network authentication service? **Note:** You must configure network authentication service to configure single signon.	Yes
The Network Authentication Service wizard launches from the EIM Configuration wizard. Use the following information to complete the Network Authentication Service wizard: **Note:** You can launch the Network Authentication Service wizard independently of the EIM Configuration wizard.	

Table 12. Single signon configuration planning work sheet for Systemi A.

Use the following information to complete the EIM Configuration wizard. The information in this work sheet correlates with the information you need to supply for each page in the wizard:

(continued)

Configuration planning work sheet for Systemi A	**Answers**
What is the name of the Kerberos default realm to which your system belongs? **Note:** A Windows 2000 domain is similar to a Kerberos realm. Microsoft Windows Active Directory uses Kerberos authentication as its default security mechanism.	*MYCO.COM*
Are you using Microsoft Active Directory?	Yes
What is the Kerberos server, also known as a key distribution center (KDC), for this Kerberos default realm? What is the port on which the Kerberos server listens?	**KDC**: *kdc1.myco.com* **Port**:*88* **Note:** This is the default port for the Kerberos server.
Do you want to configure a password server for this default realm? If yes, answer the following questions: What is name of the password server for this Kerberos server? What is the port on which the password server listens?	Yes **Password** server: *kdc1.myco.com* **Port**: *464* **Note:** This is the default port for the Kerberos server.
For which services do you want to create keytab entries? • IBM i Kerberos Authentication • LDAP • IBM HTTP Server for i • IBM i NetServer	IBM i Kerberos Authentication **Note:** A keytab entry for HTTP Server must be done manually as described later in the configuration steps.
What is the password for your service principal or principals?	*Systemisa123* **Note:** Any and all passwords specified in this scenario are for example purposes only. To prevent a compromise to your system or network security, never use these passwords as part of your own configuration.
Do you want to create a batch file to automate adding the service principals for Systemi A to the Kerberos registry?	Yes
Do you want to include passwords with the IBM i service principals in the batch file?	Yes
As you exit the Network Authentication Service wizard, you will return to the EIM Configuration wizard. Use the following information to complete the EIM Configuration wizard:	

Table 12. Single signon configuration planning work sheet for Systemi A.

Use the following information to complete the EIM Configuration wizard. The information in this work sheet correlates with the information you need to supply for each page in the wizard:

(continued)

Configuration planning work sheet for Systemi A	**Answers**
Specify user information for the wizard to use when configuring the directory server. This is the connection user. You must specify the port number, administrator distinguished name, and a password for the administrator. **Note:** Specify the LDAP administrator's distinguished name (DN) and password to ensure the wizard has enough authority to administer the EIM domain and the objects in it.	**Port**: *389* **Distinguished name**: *cn=administrator* **Password**: *mycopwd* **Note:** Any and all passwords specified in this scenario are for example purposes only. To prevent a compromise to your system or network security, do not use these passwords as part of your own configuration.
What is the name of the EIM domain that you want to create?	*MyCoEimDomain*
Do you want to specify a parent DN for the EIM domain?	No
Which user registries do you want to add to the EIM domain?	Local IBM i--*SystemiA.MYCO.COM* Kerberos--*MYCO.COM* **Note:** The Kerberos principals stored on the Windows 2000 server are not case sensitive; therefore do not select **Kerberos user identities are case sensitive.**
Which EIM user do you want Systemi A to use when performing EIM operations? This is the system user **Note:** If you have not configured the directory server prior to configuring single signon, the only distinguished name (DN) you can provide for the system user is the LDAP administrator's DN and password.	**User type**: Distinguished name and password **User**: *cn=administrator* **Password**: *mycopwd* **Note:** Any and all passwords specified in this scenario are for example purposes only. To prevent a compromise to your system or network security, never use these passwords as part of your own configuration.
After you complete the EIM Configuration wizard, use the following information to complete the remaining steps required for configuring single signon:	
What is the IBM i user profile name for the user?	*JOHND*
What is the name of the EIM identifier that you want to create?	*John Day*
What kinds of associations do you want to create?	**Source association**: Kerberos principal *jday* **Target association**: IBM i user profile *JOHND*
What is the name of the user registry that contains the Kerberos principal for which you are creating the source association?	*MYCO.COM*
What is the name of the user registry that contains the IBM i user profile for which you are creating the target association?	*SystemiA.MYCO.COM*

Step 2: Create a basic single signon configuration for *Systemi A*

You need to create a basic single signon configuration using the System i Navigator. The EIM configuration wizard will assist in the configuration process. Use the information from your planning work sheets to configure EIM and network authentication service on *Systemi A*.

Note: For more information about EIM, see the EIM concepts topic.

1. Start System i Navigator.
2. Expand **Systemi A** > **Network** > **Enterprise Identity Mapping**.
3. Right-click **Configuration** and select **Configure** to start the EIM Configuration wizard.
4. On the **Welcome** page, select **Create and join a new domain**. Click **Next.**
5. On the **Specify EIM Domain Location** page, select **On the local Directory server**.
6. Click **Next** and the **Network Authentication Service** wizard is displayed.

   Note: The Network Authentication Service wizard only displays when the system determines that you need to enter additional information to configure network authentication service for the single signon implementation.
7. Complete these tasks to configure network authentication service:
   a) On the **Configure Network Authentication Service** page, select **Yes**.

      Note: This launches the Network Authentication Service wizard. With this wizard, you can configure several IBM i interfaces and services to participate in the Kerberos realm.

   b) On the Specify Realm Information page, enter *MYCO.COM* in the **Default realm** field and select **Microsoft Active Directory is used for Kerberos authentication**. Click **Next**.

   c) On the **Specify KDC Information** page, enter *kdc1.myco.com* in the **KDC** field and enter *88* in the **Port** field. Click **Next**.

   d) On the **Specify Password Server Information** page, select **Yes**. Enter *kdc1.myco.com* in the **Password server** field and *464* in the **Port** field. Click **Next**.

   e) On the **Select Keytab Entries** page, select **IBM i Kerberos Authentication**. Click **Next**.

   f) On the **Create OS/400 Keytab Entry** page, enter and confirm a password, and click **Next**. For example, *Systemi A123*. This password will be used when *Systemi A* is added to the Kerberos server.

      Note: Any and all passwords specified in this scenario are for example purposes only. To prevent a compromise to your system or network security, never use these passwords as part of your own configuration

   g) On the **Create Batch File** page, select **Yes**, specify the following information, and click **Next**:

      - **Batch file**: Add the text `Systemi A` to the end of the default batch file name.
        For example, `C:\Documents` and `Settings\All Users\Documents\IBM\Client Access\NASConfigiSeries A.bat`.
      - **Select Include password**: This ensures that all passwords associated with the IBM i service principal are included in the batch file. It is important to note that passwords are displayed in clear text and can be read by anyone with read access to the batch file. Therefore, it is recommended that you delete the batch file from the Kerberos server and from your PC immediately after use.

      Note: If you do not include the password, you will be prompted for the password when the batch file is run.

      Note: You must have **ktpass** and **SETSPN** (set service principal name) installed on your Windows 2000 server before running this bat file. The **ktpass** tool is provided in the Service Tools folder on the Windows 2000 Server installation CD. The **SETSPN** tool is included in the Microsoft Windows 2000 Resource Kit and can be downloaded from the Microsoft website.

h) On the **Summary** page, review the network authentication service configuration details. Click **Finish** to complete the Network Authentication Service wizard and return to the EIM Configuration wizard.

8. On the **Configure Directory Server** page, enter the following information, and click **Next**:

   Note: If you configured the directory server before you started this scenario, you will see the **Specify User for Connection** page instead of the **Configure Directory Server** page. In that case, you must specify the distinguished name and password for the LDAP administrator.

   - Port: *389*
   - Distinguished name: *cn=administrator*
   - Password: *mycopwd*

   Note: Any and all passwords specified in this scenario are for example purposes only. To prevent a compromise to your system or network security, never use these passwords as part of your own configuration.
9. On the **Specify Domain** page, enter the name of the domain in the **Domain** field, and click **Next**. For example, *MyCoEimDomain*.
10. On the **Specify Parent DN for Domain** page, select **No**, and click **Next**.

    Note: If the directory server is active, a message is displayed that indicates you need to end and restart the directory server for the changes to take effect. Click **Yes** to restart the directory server.
11. On the **Registry Information** page, select **Local OS/400 and Kerberos**, and click **Next**.

    Note:

    - Registry names must be unique to the domain.
    - You can enter a specific registry definition name for the user registry if you want to use a specific registry definition naming plan. However, for this scenario you can accept the default values.
12. On the **Specify EIM System User** page, select the user for the operating system to use when performing EIM operations on behalf of operating system functions, and click **Next**:

    Note: Because you did not configure the directory server prior to performing the steps in this scenario, the only distinguished name (DN) that you can choose is the LDAP administrator's DN.

    - User type: *Distinguished name and password*
    - Distinguished name: `cn=administrator`
    - Password: *mycopwd*

    Note: Any and all passwords specified in this scenario are for example purposes only. To prevent a compromise to your system or network security, never use these passwords as part of your own configuration.
13. On the **Summary** page, confirm the EIM configuration information. Click **Finish**.

Step 3: Add principal names to the KDC

To add the system to the Windows 2000 KDC, use the documentation for your KDC that describes the process of adding principals. By convention, the IBM i system name can be used as the username. Add the following principal names to the KDC:

```
krbsvr400/SystemiA.ordept.myco.com@ORDEPT.MYCO.COM
HTTP/Systemia.myco.com@MYCO.COM
```

On a Windows 2000 server, follow these steps:

1. Use the Active Directory Management tool to create a user account for the IBM i system (select the **Users** folder, right-click, select **New**, then select **User**.) Specify *SystemiA* as the Active Directory user and *HTTPSystemiA* as the service principal for HTTP.

2. Access the properties on the Active Directory user *SystemiA* and the service principal *HTTPSystemiA*. From the **Account** tab, select the **Account is trusted for delegation**. This will allows the *HTTPSystemiA* service principal to access other services on behalf of a signed-in user.
3. Map the user account to the principal by using the **ktpass** command. This needs to be done twice, once for *Systemia* and once for *HTTPSystemiA*. The **ktpass** tool is provided in the Service Tools folder on the Windows 2000 Server installation CD. To map the user account, open the **ktpass** command window and enter the following:

   ```
   ktpass -princ krbsvr400/SystemiA.ordept.myco.com@ORDEPT.MYCO.COM -mapuser Systemi A -pass
   Systemia123
   ```

   Then add the HTTP Server to the KDC:

   ```
   ktpass -princ HTTP/Systemia.myco.com@MYCO.COM -mapuser Systemi A -pass Systemia123
   ```

   For HTTP, an additional step (setspn - set service principal name) is required after the **ktpass** is done:

   ```
   SETSPN -A HTTP/SystemiA.myco.com@MYCO.COM HTTPSystemiA
   ```

   Note: The **SETSPN** tool is included in the Microsoft Windows 2000 Resource Kit and can be downloaded from the Microsoft website.

   Note: The value *Systemia123* is the password that you specified when you configured network authentication service. Any and all passwords used within this scenario are for example purposes only. Do not use the passwords during an actual configuration.

Step 4: Add Kerberos keytab

You need keytab entries for authentication purposes as well as for generating the authorization identity. The network authentication service (the IBM i implementation of the Kerberos protocol) wizard creates a keytab entry for *SystemiA*, however a keytab for HTTP must be manually created. The wizard is only able to create keytab entries for the system and certain applications that the code is aware are Kerberos-enabled. The network authentication service wizard configures network authentication service (Kerberos) for you. The wizard is called by the EIM wizard if you have not already configure network authentication service on the system or if your network authentication service configuration is not complete.

The **`kinit`** command is used to initiate Kerberos authentication. A Kerberos ticket-granting ticket (TGT) is obtained and cached for the HTTP Server principal. Use **`kinit`** to perform the ticket exchange for the HTTP Server principal. The ticket is cached for reuse.

1. Start a 5250 session on *Systemi A*.
2. Type QSH.
3. Type `keytab add` *HTTP/Systemia.myco.com*.
4. Type *Systemi123* for the password.
5. Type *Systemi123* again to confirm the password.
6. Type `keytab list`.

   Note: The **`keytab list`** command lists the keytab information on your IBM i system.
7. Now test the password entered in the keytab to make sure it matches the password used for this service principal on the KDC. Do this with the following command: `kinit -k HTTP/` *Systemia.myco.com*

   The -k option tells the kinit command not to prompt for a password; only use the password that is in the keytab. If the kinit command fails, it is likely that different passwords were used on either the `ktpass` command done on the Windows Domain controller or on the keytab command entered in `QSH`.
8. Now test the IBM i Kerberos authentication to make sure the keytab password is the same as the password stored in the KDC. Do this with the following command: `kinit -k krbsvr400/` *Systemia.myco.com*

   Note: The Network Authentication Service wizard created this keytab entry.

9. Type `klist`.

   Note: If the kinit command returns without errors, then klist will show your ticket cache.

Step 5: Create home directory for *John Day* on *Systemi A*

You need to create a directory in the `/home` directory to store your Kerberos credentials cache. To create a home directory, complete the following:

1. Start a 5250 session on *Systemi A*.
2. Type `QSH`.
3. On a command line, enter: `CRTDIR` *'/home/user profile'* where *user profile* is your IBM i user profile name. For example: *CRTDIR '/home/JOHND'*.

Step 6: Test network authentication service configuration on *Systemi A*

Now that you have completed the network authentication service configuration tasks for *Systemi A*, you need to test that your configuration. You can do this by requesting a ticket-granting ticket for the HTTP principal name, *HTTP/Systemia.myco.com*.

To test the network authentication service configuration, complete these steps:

Note: Ensure that you have created a home directory for your IBM i user profile before performing this procedure.

1. On a command line, enter `QSH` to start the Qshell Interpreter.
2. Enter `keytab list` to display a list of principals registered in the keytab file. In this scenario, *HTTP/Systemia.myco.com@MYCO.COM* displays as the principal name for *Systemi A*.
3. Enter `kinit -k HTTP/`*Systemia.myco.com@MYCO.COM*. If this is successful, then the **`kinit`** command is displayed without errors.
4. Enter `klist` to verify that the default principal is *HTTP/Systemia.myco.com@MYCO.COM*.

Step 7: Create EIM identifier for *John Day*

Now that you have performed the initial steps to create a basic single signon configuration, you can begin to add information to this configuration to complete your single signon test environment. You need to create the EIM identifier that you specified in "Step 1: Planning work sheet" on page 78. In this scenario, this EIM identifier is a name that uniquely identifies *John Day* in the enterprise.

To create an EIM identifier, follow these steps:

1. Start System i Navigator.
2. Expand **Systemi A** > **Network** > **Enterprise Identity Mapping** > **Domain Management** > **MyCoEimDomain**

   Note: If the domain is not listed under Domain Management, you may need to add the domain. You may be prompted to connect to the domain controller. In that case, the **Connect to EIM Domain Controller** dialog is displayed. You must connect to the domain before you can perform actions in it. To connect to the domain controller, provide the following information and click **OK**:

   - **User type**: Distinguished name
   - **Distinguished name**: *cn=administrator*
   - **Password**: *mycopwd*

   Note: Any and all passwords specified in this scenario are for example purposes only. To prevent a compromise to your system or network security, never use these passwords as part of your own configuration.
3. Right-click **Identifiers** and select **New Identifier....**
4. On the **New EIM Identifier** dialog, enter a name for the new identifier in the **Identifier** field, and click **OK**. For example, *John Day*.

Step 8: Create a source association and target association for the new EIM identifier

You must create the appropriate associations between the EIM identifier and the user identities that the person represented by the identifier uses. These identifier associations, when properly configured, enable the user to participate in a single signon environment.

In this scenario, you need to create two identifier associations for the *John Day* identifier:

- A source association for the *jday* Kerberos principal, which is the user identity that *John Day*, the person, uses to log in to Windows and the network. The source association allows the Kerberos principal to be mapped to another user identity as defined in a corresponding target association.
- A target association for the *JOHND* IBM i user profile, which is the user identity that *John Day*, the person, uses to log in to System i Navigator and other IBM i applications on *Systemi A*. The target association specifies that a mapping lookup operation can map to this user identity from another one as defined in a source association for the same identifier.

Now that you have created the *John Day* identifier, you need to create both a source association and a target association for it.

To create a source association between the Kerberos principal *jday* identifier, follow these steps:

1. Start System i Navigator.
2. Expand **Systemi A** > **Enterprise Identity Mapping** > **Domain Management** > **MyCoEimDomain** > **Identifiers**
3. Right-click *John Day*, and select **Properties**.
4. On the **Associations** page, click **Add**.
5. In the **Add Association** dialog, specify or click **Browse...** to select the following information, and click **OK**:
   - **Registry**: *MYCO.COM*
   - **User**: *jday*
   - **Association type**: `Source`
6. Click **OK** to close the **Add Association** dialog.

   To create a target association between the IBM i user profile and the *John Day* identifier, follow these steps:
7. On the **Associations** page, click **Add**.
8. On the **Add Association** dialog, specify or **Browse...** to select the following information, and click **OK**:
   - **Registry**: *SystemiA.MYCO.COM*
   - **User**: *JOHND*
   - **Association type**: `Target`
9. Click **OK** to close the **Add Association** dialog.
10. Click **OK** to close the **Properties** dialog.

Step 9: Configure IBM i Access for Windows applications to use Kerberos authentication

You must use Kerberos to authenticate before you can use System i Navigator to access *Systemi A*. Therefore, from your PC, you need to configure IBM i Access for Windows to use Kerberos authentication. Jay Day will use IBM i Access for Windows to monitor the status of the HTTP Server and monitor the other activities on the IBM i system.

To configure IBM i Access for Windows applications to use Kerberos authentication, complete the following steps:

1. Log on to the Windows 2000 domain by logging on to your PC.

2. In System i Navigator on your PC, right-click *Systemi A* and select **Properties**.
3. On the **Connection** page, select **Use Kerberos principal name, no prompting**. This allows IBM i Access for Windows connections to use the Kerberos principal name and password for authentication.
4. A message is displayed that indicates you need to close and restart all applications that are currently running for the changes to the connection settings to take effect. Click **OK**. Then, end and restart System i Navigator.

Step 10: Add Systemi A to and existing EIM domain

The IBM i does not require mapping, per the EIM configuration, as it is not a signon-type entity. You do, however, have to add the system to an existing EIM domain.

Note: IF EIM resides on the same IBM i system as the HTTP Server, then skip this step.

1. Start System i Navigator.
2. Expand **Systemi A** > **Enterprise Identity Mapping** > **Configuration**.
3. Click **Configure system for EIM**.
4. Click **Join an existing domain**. Click **Next**.
5. Type *Systemia.myco.com* in the **Domain controller name** field.
6. Type *389* in the **Port** field. Click **Next**.
7. Select **Distinguished name and password** from the **User type** field.
8. Type *cn=administrator* in the **Distinguished name** field.
9. Type *mycopwd* in the **Password** field.
10. Type *mycopwd* in the **Confirm password** field. Click **Next**.
11. Select *MyCoEimDomain* from the **Domain** column. Click **Next**.
12. Select *Systemia.myco.com* for **Local OS/400** and *kdc1.myco.com* for **Kerberos**.
13. Select **Kerberos user identities are case sensitive**. Click **Next**.
14. Select **Distinguished name and password** from the **User type** list.
15. Type *cn=administrator* in the **Distinguished name** field.
16. Type *mycopwd* in the **Password** field.
17. Type *mycopwd* in the **Confirm password** field. Click **Next**.
18. Review the information and click **Finish**.

Step 11: Configure HTTP Server for single signon

After the basic test environment is working, John Day configures the HTTP Server to participate in the single signon environment. Once single signon is enabled, John Day can access the HTTP Server without being prompted for a user ID and password after signing on to the Windows environment

To set up Kerberos for your HTTP Server, complete the following steps:

1. Start the Web Administration for i interface.
2. Click the **Manage** tab.
3. Click the **HTTP Servers** subtab.
4. Select the HTTP Server you want to work with from the **Server** list.
5. Select the resource from the server area (a directory or a file) you want to work with from the **Server area** list.
6. Expand **Server Properties**.
7. Click **Security**.
8. Click the **Authentication** tab.
9. Select **Kerberos** under **User authentication method**.
10. Select **enable** or **disable** to match the source user identity (user ID) associated with the server ticket with an IBM i system profile defined in a target association.

If enabled when Kerberos is specified for the AuthType directive, the server will use EIM to attempt to match the user ID associated with the server ticket with an IBM i system profile. If there is no appropriate target association for an IBM i system profile, the HTTP request will fail.

11. Click **Apply**.

Restart the HTTP Server instance to use your new Kerberos settings.

Your configuration file will now include new code for the Kerberos options you selected.

Note: These examples are used as reference only. Your configuration file may differ from what is shown.

Processing requests using client's authority is **Disable**:

```
<Directory />
   Require valid-user
   PasswdFile %%KERBEROS%%
   AuthType Kerberos
</Directory>
```

Processing requests using client's authority is **Enabled**:

```
<Directory />
   Require valid-user
   PasswdFile %%KERBEROS%%
   UserID %%CLIENT%%
   AuthType Kerberos
</Directory>
```

Note: If your Directory or File server area does not contain any control access restrictions, perform the following steps:

1. Start the Web Administration for i interface.
2. Click the **Manage** tab.
3. Click the **HTTP Servers** subtab.
4. Select your HTTP Server from the **Server** list.
5. Select the server area you want to work with from the **Server area** list.
6. Expand **Server Properties**.
7. Click **Security**.
8. Click the **Control Access** tab.
9. Select **Control access based on specific authorization** of **Control access** field.
10. Click **Add Authorization** button under the **Authorization for control access** table
11. Select **Require host** from the new row **Authorization or Container** list.
12. Type **.jkl.com* in the Host name table to allow clients in the JKL domain to access the resource.

    Note: You should type the host name of your server. If you do not, no client is allowed access to the resources.
13. Click **Continue**.
14. Click **OK**.

Step 12: (Optional) Post configuration considerations

Now that you finished this scenario, the only EIM user you have defined that EIM can use is the Distinguished Name (DN) for the LDAP administrator. The LDAP administrator DN that you specified for the system user on *Systemi A* has a high level of authority to all data on the directory server. Therefore, you might consider creating one or more DNs as additional users that have more appropriate and limited access control for EIM data. The number of additional EIM users that you define depends on your security policy's emphasis on the separation of security duties and responsibilities. Typically, you might create at least the two following types of DNs:

- A user that has EIM administrator access control

This EIM administrator DN provides the appropriate level of authority for an administrator who is responsible for managing the EIM domain. This EIM administrator DN could be used to connect to the domain controller when managing all aspects of the EIM domain by means of System i Navigator.

- At least one user that has all of the following access controls:
  - Identifier administrator
  - Registry administrator
  - EIM mapping operations

  This user provides the appropriate level of access control required for the system user that performs EIM operations on behalf of the operating system.

Note: To use the new DN for the system user instead of the LDAP administrator DN, you must change the EIM configuration properties for the system user on each system.

To use Microsoft Internet Explorer to access a Kerberos protected resource, the Integrated Windows Authentication option must be enabled. To enable it, from Internet Explorer go to **Tools > Internet options > Advanced tab and Enable Integrated Windows Authentication**.

JKL Toy Company monitors Web server activity with logs on HTTP Server

This scenario discusses how to monitor IBM HTTP Server for i Web server activity with logs.

Scenario

The JKL Toy Company (a fictitious company) wants to know who is visiting their Web site. The **JKLTEST** server is already using a combined access log, but the JKL Web administrator wants to create a new access log that can be altered without affecting the data in the default access log file. By using this method, the JKL Web administrator will have two logs that can be formatted to log specific information.

The JKL Web administrator found that enabling the logging function has some advantages and some disadvantages. Enabling the logging function does cause a small performance hit on the server, but a wide range of information about who is visiting the Web site can be obtained. After reading the information on log formats, the JKL Web administrator has decided to use the Combined, or NCSA Extended, log format.

See Module mod_log_config for HTTP Server for advanced information.

Prerequisites

- It is assumed you have read “Scenarios: HTTP Server” on page 48.
- It is assumed you have read and completed “JKL Toy Company creates an HTTP Server” on page 48 or you have an existing HTTP Server configuration.

Start the IBM Web Administration for i interface

Access the IBM Web Administration for i from your browser. For information about how to access the Web Administration for i interface, see “Starting Web Administration for i” on page 7.

Set up a log file

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server instance from the **Server** list.

   Example: JKLTEST
4. Select **Global configuration** from the **Server area** list.
5. Expand **Server Properties**.
6. Click **Logging**.

7. Click the **Custom Logs** tab in the form.
8. Click **Add** under the **Custom logs** table.
9. Enter a name for the new log in the **Log** column.

   Example: logs/server_monitor

   Note: The above example creates a log file named **server_monitor** in the **/logs** directory.
10. Select **combined** from the **Log format** list in the **Attributes** column.
11. **Optional**: Accept the default Environment variable condition or enter a new value.
12. **Optional**: Accept the default expiration of the log or enter a new value.
13. **Optional**: Accept the default maximum cumulative seize or enter a new value.
14. Click **Continue**.
15. **Optional**: Click **Log identity of client. This may significantly degrade performance of the web server.** under **Client identity logging**.

    Note: The option to **Log identity of client** will impact server performance by requiring a Domain Name Server (DNS) lookup every time a new client is logged. If you do not log the identity of the client the IP address of the client will be logged instead of the domain name. Some log analysis tools can perform DNS lookup, allowing identity of clients without impacting your performance.
16. Click **OK**.

Restart your HTTP Server

Select one of the following methods below:

Manage one server

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the Server list.
4. Click the **Stop** icon if the server is running.
5. Click the **Start** icon.

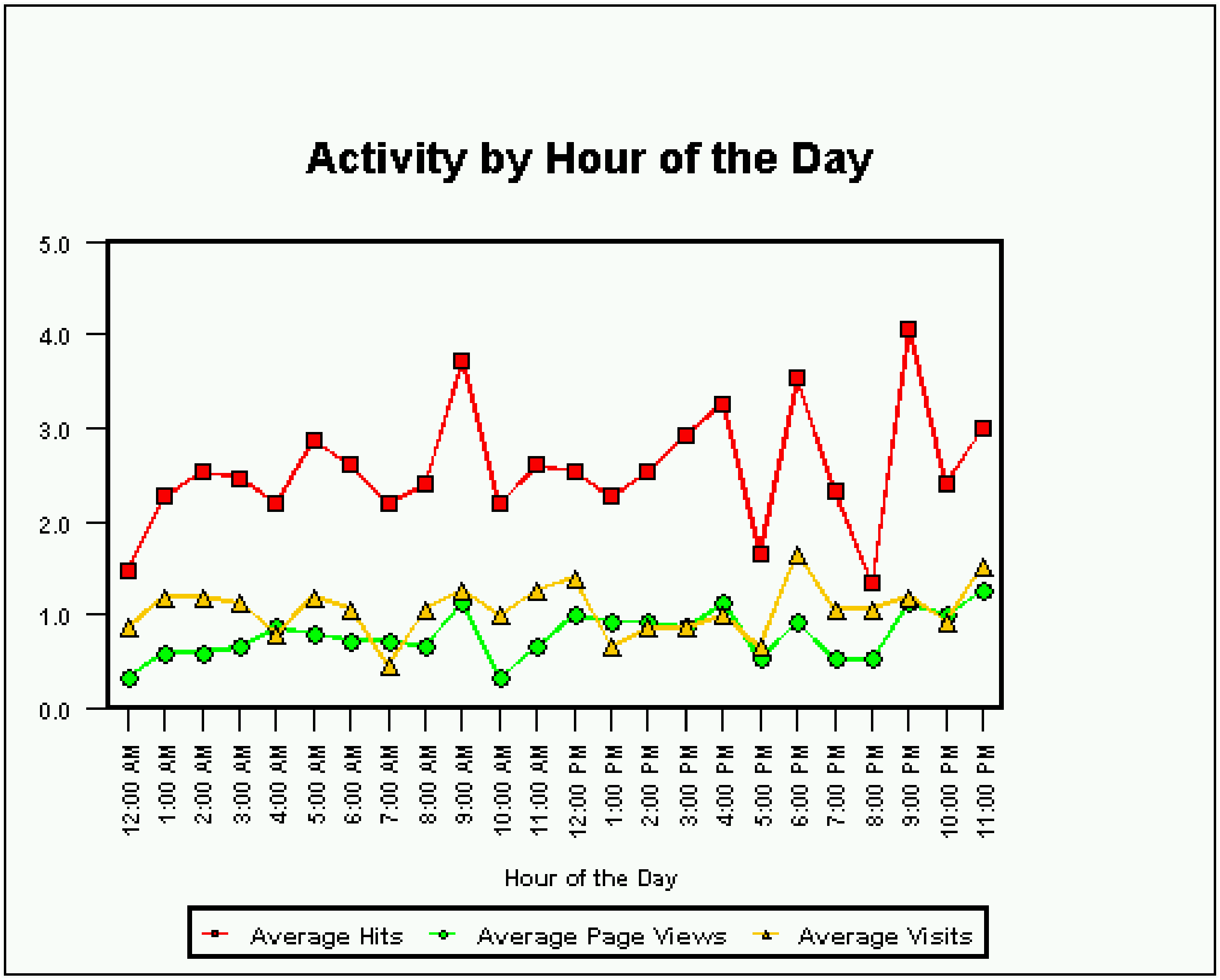
Manage all servers

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select **All Servers** from the Server list.
4. Click the **All HTTP Servers** tab.
5. Select your HTTP Server name in the table.

   Example: JKLTEST
6. Click **Stop** if the server is running.
7. Click **Start**.

Note: If your HTTP Server does not start, see "Troubleshooting" on page 199.

Logging will begin when the HTTP Server instance has started. The JKL Web administrator has decided to use the IBM Tivoli Web Response Monitor to generate usage reports. This product can read the log file and generate detailed reports that contain information such as the following:



Test your HTTP Server

1. Open a new Web browser.
2. Enter **http://[i_hostname]:[port]** in the location or URL field.

   Example: http://jkl_server:1975

Review your log for HTTP Server activity.

View your HTTP Server configuration

Your configuration will look similar if you used the given example in this and previous examples.

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.

   Example: JKLTEST
4. Expand **Tools**.
5. Click **Display Configuration File**.

```
Listen *:1975
DocumentRoot /www/jkltest/htdocs
TraceEnable Off
Options -FollowSymLinks
LogFormat "%h %l %u %t \"%r\" %>s %b \"%{Referer}i\" \"%{User-Agent}i\"" combined
LogFormat "%{Cookie}n \"%r\" %t" cookie
LogFormat "%{User-agent}i" agent
LogFormat "%{Referer}i -> %U" referer
LogFormat "%h %l %u %t \"%r\" %>s %b" common
CustomLog logs/access_log combined
CustomLog logs/server_monitor combined
LogMaint logs/access_log 7 0
LogMaint logs/error_log 7 0
SetEnvIf "User-Agent" "Mozilla/2" nokeepalive
SetEnvIf "User-Agent" "JDK/1\.0" force-response-1.0
SetEnvIf "User-Agent" "Java/1\.0" force-response-1.0
SetEnvIf "User-Agent" "RealPlayer 4\.0" force-response-1.0
SetEnvIf "User-Agent" "MSIE 4\.0b2;" nokeepalive
SetEnvIf "User-Agent" "MSIE 4\.0b2;" force-response-1.0
<Directory />
    Require all denied
</Directory>
<Directory /www/jkltest/htdocs>
    Require all granted
</Directory>
```

Tasks

This topic provides step-by-step instructions for administration and management tasks with the IBM Web Administration for i interface.

Getting started with the IBM Web Administration for i interface

The IBM Web Administration for i interface is used to create and configure IBM HTTP Server for i Web servers.

Step 1: Install

Ensure that IBM HTTP Server for i is installed on your server and is functioning correctly. For more information on installing the product, see "Installing HTTP Server" on page 2.

Step 2: Create an HTTP Server instance

Use the **Create HTTP Server wizard** to quickly create a working HTTP Server configuration.

1. Access the IBM Web Administration for i from your browser. For information about how to access the Web Administration for i interface, see "Starting Web Administration for i" on page 7.
2. Click the **Setup** tab.
3. Expand **Common Tasks and Wizards**.

   Note: By default, all lists are expanded. If you collapse any list, the Web Administration for i interface displays the list as collapsed the next time you view it.
4. Click **Create HTTP Server**.
5. Enter a name to identify your HTTP Server. This name is used later to configure and administer your server. Enter a server description to help identify your server.
6. Click **Next**.
7. Enter the server root. The server root is the base directory for your HTTP Server. Within this directory, the wizard creates subdirectories for your logs, and configuration information. If the server root does not exist, the **Create HTTP Server wizard** creates one for you.
8. Click **Next**.
9. Enter the document root. The document root is the directory from which your documents are served by your HTTP Server. If the directory root does not exist, the **Create HTTP Server wizard** creates one for you.
10. Click **Next**.
11. Leave the IP address list as **All addresses**. You may select a specific IP address if you so choose.

12. Enter a port number. By default, the port is 80. This is the port your Web site runs (or "listens on"). It is suggested you enter a different port other than 80 because a port can only be used by one server at any time.
13. Click **Next**.
14. Select **Yes** or **No** for the **Create HTTP Server wizards** to create an access log. The access log contains information about requests made to your HTTP Server. This information is useful for analyzing who is accessing your Web site and how many requests have been made during a specific period of time.
15. Click **Next**.
16. Specify how long you want to keep the error and access log files. Select **Keep, do not delete** or **Delete based upon age**.
17. Click **Next**.
18. The **Create HTTP Server wizard** displays a summary of HTTP Server configuration it creates. If you want to change an entry, simply click **Back**.
19. Click **Finish** and HTTP Server is created.

For more information on the Web Administration for i interface, see "Overview of IBM Web Administration for i" on page 4.

Step 3: Start and test your HTTP Server

After using the **Create HTTP Server wizard**, it is time to start your Web server and go live.

1. Click the **Start icon** next to the **Server list**.
2. Click the Refresh icon and check if the server status is still shown as "Running".

   If your HTTP Server does not start, see "Troubleshooting" on page 199.
3. Open another Web browser and go to `http://`*`your.server.name`*`:`*`port`*`/` where *your.server.name* is the host name of your IBM i server and *port* is the port number you entered in the **Create HTTP Server wizard**.

The supplied HTML example welcome page is displayed.

When you have finished this preliminary work with the Web Administration for i interface, expand your HTTP server capabilities. See the "Scenarios: HTTP Server" on page 48 for more information.

HTTP Server tasks

This topic provides step-by-step tasks for an IBM HTTP Server for i Web server.
Related information
"HTTP Server Concepts" on page 13
This topic provides conceptual information of the various functions and features of IBM HTTP Server for i.

Setting up MIME types on HTTP Server

Set up MIME types for your IBM HTTP Server for i instance using the IBM Web Administration for i interface.

Multipurpose Internet Mail Extensions (MIME) types associate file contents and file extensions with the way the server and the client handle files. To change the MIME settings for the server, do the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select the context you want to work with from the **Server area** list.
5. Expand **Server Properties**.
6. Click **Content Settings**.

7. Click the **MIME** tab in the form.
8. Edit the default content-type, content-language, and character set values as necessary.
9. **Optional**: If necessary, select **File extensions are case sensitive** to distinguish between uppercase and lowercase letters when comparing file extensions.
10. **Optional**: If necessary, select **Force content-type for all files** to force the mapping of all files in this context to a specified MIME type.
11. Click **Add** under the **Specify individual Meta (MIME) information for file extensions** table.
12. Enter file extensions in the **File extension** column.
13. If available, select **Add** from the list in the **Action** column.
14. Select the file type from the list in the **Type** column.
15. Enter or select additional MIME types, encoding, languages, or browser types in the **Value** column.
16. Click **Continue**.
17. Click **OK**.

Setting up content and language negotiation for HTTP Server

Content negotiation for an HTTP Server instance can be set up using the IBM Web Administration for i interface. Content negotiation is defined as the process where the client provides a set of preferences (such as language) to the server, and the server finds the best resource match to those the client prefers.

To configure content and language negotiation, do the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select the context you want to work with from the **Server area** list.
5. Expand **Server Properties**.
6. Click **Content Settings**.
7. Click the **Content Negotiation** tab in the form.
8. **Optional**: If necessary, select **Allow content-negotiated documents to be cached**.
9. Click **Add** under the **Language priority (highest to lowest priority)** table.
10. Enter or select from the list a content-language in the **Content-language** column.
11. Click **Continue**.
12. **Optional**: If necessary, select language priority to force from the **Force language priority** list.
13. Click **OK**.

Related information
"Content negotiation for HTTP Server" on page 17
The IBM HTTP Server for i supports content negotiation, type-map files, MultiViews, negotiation methods, dimensions of negotiation,, negotiation algorithm, media types, and wildcards.

Setting up customized error messages on HTTP Server

Customized error messages for an HTTP Server instance can be set up using the IBM Web Administration for i interface.

The server has default messages that are displayed to the user when an error occurs. You can change these messages to better suit your particular needs. For example, you can change a message to include more information about the cause of the problem and suggest possible solutions for it. For internal networks, you might provide a contact person for your users to call.

To customize your messages, do the following:

1. Click the **Manage** tab.

2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select the context you want to work with from the **Server area** list.
5. Expand **Server Properties**.
6. Click **HTTP Responses**.
7. Click the **Error Message Customization** tab in the form.
8. Select how you want to append the generated footer onto error messages. Depending on the server area you select, you may, optionally, select Inherit.
9. Select an error code from the **Custom messages from error codes** table or click **Add** to add a new error message.
10. Click **OK**.

If your messages are displayed in the Microsoft Internet Explorer browser, see "Symptom: Web browser problems with HTTP Server" on page 204.

Setting up directory indexing and directory listing on HTTP Server

Directory index and directory listing for an IBM HTTP Server for i instance can be set up using the IBM Web Administration for i interface.

A directory index or directory listing shows files and subdirectories that are contained in the directory. The server shows each subdirectory item or each file on a separate line along with information about each item. Use caution when configuring directory listing function, since it allows others to view your directory structure.

To enable directory listings do the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select the context you want to work with from the **Server area** list.
5. Expand **Server Properties**.
6. Click **Directory Handling**.
7. Click the **General Settings** tab in the form.
8. Select **Enabled** for your HTTP Server to always search for a welcome or index file name.
9. Select **Display directory listings for all directories**.
10. Click **Apply**.

Once directory listings are enabled, you can customize the appearance of the directory list (also called fancy indexing). Directory listing is optional.

To customize the appearance of your directory list, do the following:

1. Click the **Appearance** tab in the form.
2. Select the options for your directory listing. View the help text for specific field values.
3. Click **OK**.

Setting up environment variables on HTTP Server

Set up environment variables for CGI programs running in an HTTP Server instance using the IBM Web Administration for i interface.

When the server runs a CGI program, it uses environment variables to pass information about the request and the server. Configuring environment variables allows you to specify which variables the CGI programs inherits.

To specify environment variables, do the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select the context you want to work with from the **Server area** list.
5. Expand **Server Properties**.
6. Click **General Server Configuration**.
7. Click the **Custom Environment Variables** tab in the form.
8. The environment variables can be set up based on a conditional attribute or expression
   - Click **Add** under the **Environment variables based on a conditional attribute** table.

   Note: Select an environment variable from the table to redefine or remove an existing environment variable.

   Enter the environment variable name in the **Variable** column.

   Enter the environment variable value in the **Value** column.

   Enter the environment variable attribute in the **Attribute** column.

   Enter the environment variable attribute value in the **Attribute value** column.

   Optional: Select to make the environment variable case sensitive in the **Case sensitive** column.
   - Click **Add** under the **Environment variables based on expression** table.

   Enter the environment variable name in the **Variable** column.

   Optional: Enter the environment variable value in the Value column.

   Enter the expression in the **Expression** column.
9. Click **Continue**.
10. Click **OK**.

See "Environment variables set by HTTP Server" on page 634 for a list of environment variables.

Setting up of a highly available HTTP Server

Set up and administer highly available IBM HTTP Server for i instances using the IBM Web Administration for i interface.

All required programs (HTTP Server, WebSphere, Servlets, Net.Data, and Clustering support) must already be installed on all nodes. See "Highly available HTTP Server" on page 43 for more information.

Step 1 - Configure the IBM i Cluster

For each node, configure your cluster. See Configuring clusters for more information. Then continue to step 2.

Step 2 - Configure IP addresses

For each IBM i node in the cluster that a highly available Web server will be running on, configure the IP address that the Web server will be using. This can be done using the **CFGTCP** CL command. You should configure one IP address for each unique Web server. Each Web server is configured to a dedicated TCP/IP line interface. When using the Network Dispatcher model or comparable IP director with either HAModel IPTakeoverWithDispatcher of PurePeer model, the IP Line interface should be typed ***VIRTUALIP**. See TCP/IP for more information.

1. Start the Web Administration for i interface.
2. Click the **Manage** tab.

3. Click the **HTTP Servers** subtab.
4. Select your HTTP Server from the **Server** list.
5. Select the context you want to work with from the **Server area** list.
6. Expand **Server Properties**.
7. Click **General Server Configuration**.
8. Click the **General Settings** tab in the form.
9. Click **Add** under the **Server IP addresses and ports to listen** on table.

   Note: Directive HotBackup will be set to *off* and ignored if currently configured for your HTTP Server.

   You may want to perform the next steps on one IBM i server and copy (for example using FTP or NetServer) the HTTP Server configuration and instance files to each IBM i server where the highly available HTTP Server will be running in the cluster. The files that must be copied are:

   - `/www/server_name/conf/server_name.conf`
   - `/QSYS.LIB/QUSRSYS.LIB/QATMINSTC.FILE/instance_name.MBR`
10. Add the IP address the highly available Web server will be running on.
11. Click **OK**.
12. Continue to step 3.

Step 3- Configure the highly available HTTP Server

1. Start the Web Administration for i interface.
2. Click the **Manage** tab.
3. Click the **HTTP Servers** subtab.
4. Select your HTTP Server from the **Server** list.
5. Select the context you want to work with from the **Server area** list.
6. Expand **Server Properties**.
7. Click **System Resources**.
8. Click the **Highly Available Server** tab in the form.
9. Specify one specific server IP address to listen on.
10. Click **Enable HTTP server** to be highly available.
11. Select a highly available model.

    Note: If you are implementing the primary/backup with network dispatcher model or the peer model, configure the network dispatcher according to the existing cluster nodes and the configured Web server.
12. **Optional**: Click **Enable highly available CGI program**.
13. Enter your liveness monitor settings. The LMUrlCheck directive is required. The other LM directives have defaults.
14. Click **OK**.
15. Continue to step 4.

Step 4- Start the highly available HTTP Server

Start your highly available HTTP Server.

1. Start a 5250 session on the IBM i server that will contain a highly available HTTP Server instance.
2. Use **STRTCPSVR** CL command on the appropriate node.
3. Continue to step 5.

Note: In the case of the primary/backup model, the first highly available server to be started will automatically assume the role of the primary. The second highly available server to be started will automatically assume the role of the backup.

Step 5- Manage your highly available HTTP Server

Use the **ENDTCPSVR** CL command on the appropriate node or use the IBM Simple Cluster Management interfaces to stop or end your highly available HTTP Server. In the case of primary/backup model depending on which server you are ending this may or may not force a fail over. Ending the primary server with a backup server running will force a fail over from primary to backup to occur. Ending the backup will only affect the backup server. Ending the primary server with no backup will end the primary server. In the case of PurePeer model only the server you are ending will be affected as any other peer servers will continue to process client requests.

Note: In the case of primary/backup model, it is possible to determine which highly available Web server is the primary or backup server. The QBATCH subsystem will have a job running named **QZHBEXPG** on the primary node only. For the client data it is suggested that you set up a method to automatically publish static files to each Web server. Static files include HTML and highly available CGI programs.

Setting up a welcome or index page on HTTP Server

Set up a welcome or index page on your IBM HTTP Server for i instance using the IBM Web Administration for i interface.

You can configure your server to display a specific Web page known as a welcome page for client requests that do not include a specific file name. The server determines which file to serve by matching the list of welcome pages to the files in the directory. The first match it finds is the file it will return. To configure welcome page settings, do the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select the context you want to work with from the **Server area** list.
5. Expand **Server Properties**.
6. Click **General Server Configuration**.
7. Click the **Welcome Pages** tab in the form.
8. Select **Enabled** to have the Welcome page displayed.
9. Select the default action the server will take if the welcome file or index file does not exists.
10. Click **Add** under the **Welcome/index file names** table.

    Note: You may also use the existing file in the Welcome/index file names table.
11. Click **Browse** and select the HTML file you want to use as a Welcome page.
12. Click **Continue**.
13. Click **OK**.

Manually editing HTTP Server

Manually edit your IBM HTTP Server for i Web server configuration using the IBM Web Administration for i interface.

Attention: Improper modifications to your configuration file could make your HTTP Server unusable. Modifications to the configuration file manually should only be performed by advanced users.

The Web Administration for i interface has been designed to modify the HTTP Server configuration file by applying changes made to the various forms and wizards supplied by the Web Administration for i interface. Use of the forms and wizards greatly decreases the potential for user error and helps maintain an error-free configuration file.

Optionally, the configuration file may be edited manually. When the configuration file has been modified manually, the Web Administration for i interface does not perform the usual error checking that is done when using the Web Administration for i interface. Any changes made to the configuration file directly should be done with caution.

As a precaution, do the following before you modify the configuration file manually:

- Save a backup of your configuration file before manually editing. See "Managing backup files for HTTP Server" on page 101 for more information.
- Keep track of any changes you make to your configuration file.

In addition, after each modification, test your configuration by stopping and starting your HTTP Server. Verify the directives you manually configured have the desired effect.

To modify the HTTP Server configuration manually, do the following:

1. Start the Web Administration for i interface.
2. Click the **Manage** tab.
3. Click the **HTTP Servers** subtab.
4. Select your HTTP Server from the **Server** list.
5. Expand **Tools**.
6. Click **Edit Configuration File**.

   Note: The line mode editor functions as a simple text editor only and does not error check any changes to the configuration file.

Click **OK** when you have finished modifying the configuration file. Stop and start the server.

Managing HTTP Servers

Manage your IBM HTTP Server for i Web server using the IBM Web Administration for i interface.

As your client base grows and changes, and you add or move Web content, you need to redefine your list of servers. After successfully creating an HTTP Server there are a number of basic tasks that you will need to know in order to manage your servers successfully.

- "Starting and stopping the ADMIN server" on page 99
- "Checking status of a server" on page 100
- "Starting and stopping a server" on page 100
- "Renaming a server" on page 100
- "Deleting a server" on page 100

Starting and stopping the ADMIN server

The ADMIN server runs on port 2001 (or 2010 for a secure connection) and serves the IBM i Task Page.

You can start the ADMIN server by doing one of the following:

- In System i Navigator click **Network -> Servers -> TCP/IP** and right-click **HTTP Administration**. Then click **Start Instance -> ADMIN**.
- On an IBM i command line type **`STRTCPSVR SERVER(*HTTP) HTTPSVR(*ADMIN)`**.

You can stop the ADMIN server by doing one of the following:

- In System i Navigator click **Network -> Servers -> TCP/IP** and right-click **HTTP Administration**. Then click **Stop Instance -> ADMIN.**
- On an IBM i command line type **`ENDTCPSVR SERVER(*HTTP) HTTPSVR(*ADMIN)`**.

Checking status of a server

To determine the status of your server, do the following using the Web Administration for i interface:

1. Click the **Manage** tab.
2. Click the **All Servers** subtab.

Note: Items listed as "Unknown" are servers the Web master user profile does not have authority to.

Starting and stopping a server

Select one of the following methods below using the Web Administration for i interface:

Manage one server

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your server from the **Server** list.
4. Click the **Stop** icon if the server is running.
5. Click the **Start** icon.

Manage all servers

1. Click the **Manage** tab.
2. Click the **All Servers** subtab.
3. Click the **All HTTP Servers** tab.
4. Select your server name in the table.
5. Click **Stop** if the server is running.
6. Click **Start**.

Note: When stopping or starting a server, it may take several seconds for the jobs to end or begin. Click Refresh to view the server's current status. If your HTTP Server does not start, see "Troubleshooting" on page 199.

Renaming a server

To rename a server, do the following using the Web Administration for i interface:

1. Click the **Manage** tab.
2. Click the **All Servers** subtab.
3. Click the **All HTTP Servers** tab.
4. Select the server you want to rename.
5. Click **Rename**.
6. Enter the new name.
7. Click **OK**.

You will receive a message that indicates whether or not the task completed successfully.

Note: This does not change the document root or the server root. Only the instance name is changed.

Deleting a server

Once you delete a server, you cannot retrieve it. You must create a server to replace the deleted server. If the server you selected is running, it stops before the system deletes it. The system does not delete the server configuration that is associated with this server or the directory and its contents.

To delete a server, do the following using the Web Administration for i interface:

1. Click the **Manage** tab.

2. Click the **All Servers** subtab.
3. Click the **All HTTP Servers** tab.
4. Select the server you want to delete.
5. Click **Stop** if the server is running.
6. Click **Delete**.

You will receive a message that indicates whether or not the task completed successfully.

Managing addresses and ports for HTTP Server

This topic provides information about how to manage addresses and ports for your IBM HTTP Server for i with the IBM Web Administration for i interface.

Most browsers make HTTP requests on ports 80 and 443 by default. Typically, the default configuration option is for servers to listen on all IP addresses on port 80. Multiple servers cannot listen on the same port and IP numbers. Multiple servers may listen on the same IP address, but require a unique port, or they may listen on the same port, but require a unique IP address. If you want each server to listen on port 80, then you should configure each server to listen on a specific unique IP address. In addition, if you add another Web server product such as Lotus®Domino® on the same IBM i server, it cannot listen on the same IP address and the same port as the HTTP Server.

You can change the IP address or port for your server by doing the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server name from the **Server** list.
4. Expand **Server Properties**.
5. Click **General Server Configuration**.
6. Click the **General Settings** tab in the form.
7. Do one of the following:
   - Select an existing IP address and port from the **Server IP address and port to listen on** table to modify or delete.
   - Click **Add** under the **Server IP address and ports to listen on table** to add a new IP address and port.
8. Click **Enabled** or **Disabled** in the FRCA column. Only select **Enabled** if you are using or will be using FRCA.
9. Click **Continue**.
10. Click **OK**.

Managing backup files for HTTP Server

In the IBM HTTP Server for i, there are several files that should be backup up for later recovery.

Make sure that the following objects are included in your periodic backup activity:

Instance files

- QUSRSYS/QATMHINSTA
- QUSRSYS/QATMHINSTC

Configuration files

HTTP Server

Save the *conf* file located in the **/www/[*server_name*]/conf/** directory, where *Server_Name* is the name of your HTTP Server instance.

Note: This describes the default location of the configuration file. If your configuration files are located in another directory, you must save the configuration file in your location.

For more information about backup and recovery of files on the IBM i server, see Systems management.

Managing directories for HTTP Server

You can manage directories for a IBM HTTP Server for i instance with the IBM Web Administration for i interface.

The following explains how to add a directory and how to remove a directory from your HTTP Server configuration.

Add a directory

The HTTP Server uses directories to serve Web pages and content. The Web Administration for i interface has an Add a Directory to the Web wizard that will create a new directory to serve Web content and CGIs.

To add a new directory, do the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select **Global configuration** from the **Server area** list.
5. Expand **HTTP Tasks and Wizards**.
6. Click **Add a Directory to the Web**.

When the wizard is finished, it will display a summary of the directory you just created.

Remove a directory

When removing a directory, the Web Administration for i interface removes all references to the directory from your configuration file only. The physical directory and content within the directory are not removed from the file system.

To remove a directory and subdirectories, do the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select **Global configuration** from the **Server area** list.
5. Expand **Server Properties**.
6. Click **Container Management**.
7. Click the **Directories** tab in the form.
8. Select the directory you want to delete from the **Directory/Directory Match container** table.
9. Click **Remove**.
10. Click **OK** when the message box appears.
11. Click **OK**.

Managing HTTP Server performance

Performance in a IBM HTTP Server for i Web server environment is influenced by many components. Understanding the components can help you to react quickly when a performance problem occurs at a crucial time.

There are several things that can affect your server's performance. Consider the following performance related topics:

- “Local cache” on page 103
- “Files to cache when server has started” on page 103

- "Threads" on page 104
- "DNS lookups" on page 104
- "Server-side includes" on page 104
- "Content negotiation" on page 104
- "Document tree" on page 104
- ".htaccess files" on page 105
- "Virtual host log files" on page 105
- "KeepAlive and KeepAliveTimeout" on page 105
- "Logging" on page 105
- "CGI programs" on page 105
- "TCP/IP settings" on page 105
- "Network" on page 105

Local cache

Enabling the HTTP Server's local cache can result in better performance and system throughput by caching (in memory) frequently accessed files. You can configure several settings associated with the local cache.

To configure the local cache settings, do the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select the **Global configuration** from the **Server area** list.
5. Expand **Server Properties**.
6. Click **Cache**.

Enter or select options from this form. After you are finished, click **OK**.

Files to cache when server has started

Including file names in **Files to cache when server is started** causes the files to be loaded into the server's memory when the server is started.

- **Copy into memory** specifies the names of files that you want to load into the server's memory each time you start the server. By keeping your most frequently requested files loaded in the server's memory, you can improve your server's response time for those files. For example, if you load your server's welcome page into memory at startup, the server can handle requests for the page much more quickly than if it had to read the file from the file system.
- **Keep file descriptor open** specifies the names of ASCII stream files whose descriptors are cached at the server startup. By keeping your most frequently requested files opened at server startup, you can improve your server's response time for those files. For example, if you open your server's welcome page files at startup, the server can handle requests for the page much more quickly than if it had to open the files each time they are requested. The advantage of using this option over Copy into memory is it does not cache the content of the file and therefore does not allocate large amount of memory, yet provides similar performance. The disadvantage of using this option over Copy into memory is it only caches the file descriptors of ASCII stream files and it keeps the file open (share read) while the server is active.
- **Memory map of file** option is the same as Copy into memory except it uses memory address pointers, instead of simply using a chunk of server memory, to specify the names of files that you want to map into the server's memory each time that you start the server.

What to cache allows you to specify what information is included in the cache.

- **Dynamically cache files based on file usage** allows dynamic caching. The default value is off (or disabled).
- **Update cache when files are modified** updates the cache whenever its original file content changes. The default value is on (or enabled).

Enter or select options from this form. After you are finished, click **OK**.

Threads

Each time your server receives a client request, the server first checks to see if any threads are available and then uses available threads to process the request. If no threads are available, it holds the request until threads become available. When a request ends, the server threads become idle (at which point they are available for the server to use again).

Note: The HTTP Server performance may increase by increasing the number of threads, but not the IBM i system performance.

Setting the maximum number of active threads too high can cause a decrease in system performance. You can experiment with lowering the maximum number of active threads until you see no affect on system performance. A good starting point would be half of the previous setting. For example, if you had the maximum number of active threads set to 100, try setting it to 50. Lowering the maximum number of active threads directive might result in an increased number of rejected connections when the server reaches its capacity.

To change the number of threads to process requests, do the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select the **Global configuration** from the **Server area** list.
5. Expand **Server Properties**.
6. Click **System Resources**.
7. Click the **Advanced** tab in the form.

Enter or select options from this form. After you are finished, click **OK**.

DNS lookups

Every time the server needs to request a DNS lookup, there may be a delay while the DNS server is contacted. Limit the use of DNS lookups. Consider logging IP addresses and using a log analysis tool that does DNS lookups.

Server-side includes

Server performance can be impacted when server-side includes are processed. Limit the use of server-side includes except where needed.

Content negotiation

Restrict content negotiation to those contexts where it is needed.

Document tree

Try to organize your document tree into a flat broad tree structure rather than a narrow deep tree structure. The fewer directory levels the better.

For better performance, store static and Net.Data files in the root (or /) file system. Avoid placing static and Net.Data files in the QSYS and QDLS file systems.

.htaccess files

Server performance is impacted if the server must look for and open .htaccess files. If the AllowOverride and “AllowOverrideList” on page 307 directives are both set to None, the server does not look for .htaccess files. If AllowOverride or “AllowOverrideList” on page 307 is set to All, there is a significant performance impact as the server looks for .htaccess files in every directory.

Virtual host log files

If you create separate log files for each virtual host, you should consider that a file descriptor is opened for each log file. Opening too many file descriptors can impact system performance.

KeepAlive and KeepAliveTimeout

The connection time-out determines the number of seconds the server waits for a subsequent request before closing a persistent connection. Enabling persistent connections increases the throughput of your server. Consider decreasing the connection time-out if you have simple pages without images.

To set this value, do the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select the **Global configuration** from the **Server area** list.
5. Expand **Server Properties**.
6. Click **System Resources**.
7. Click the **HTTP Connections** tab in the form.
8. Enter a value for **Connection time-out**, or make a selection from the list.
9. Enter a value for **Maximum pending connections**, or make a selection from the list.
10. Select **Enabled** for **Allow persistent connections**.
11. Enter a value for **Time to wait between requests**, or make a selection from the list.
12. Enter a value for **Maximum requests per connection**, or make a selection from the list.
13. Click **OK**.

Logging

Logging server activity does impact server performance. Try to do as little error and access logging as required.

CGI programs

CGI programs should be run in a named activation group to get the best performance. Also determine what CGI jobs your server generally uses. Use the StartCGI and StartThreadedCGI directives to start those jobs when the server starts. Use the QTMHHTP1 user profile to run CGI requests. If you must use a different user profile, use a "dummy" user profile (a user profile that is not allowed to sign-on) instead of `%%CLIENT%%`.

TCP/IP settings

See TCP/IP applications, protocols, and services for more information on TCP/IP settings.

Network

Consider that the performance of the network that your data flows across can also affect the perception of your server's performance.

Compression tasks

The IBM HTTP Server for i supports the configuration and management of compression files.

Related information

“File compression for HTTP Server” on page 32

Information is compressed by the HTTP Server before being sent to the client over the network.

Setting up input decompression for HTTP Server

This topic provides information about how to set up input decompression for GZIP compressed input bodies for IBM HTTP Server for i Web server using the IBM Web Administration for i interface.

In order to set up input decompression, a filter must be inserted in the input filter chain. This is done using the SetInputFilter directive. WebDAV makes frequent use of compression, and as such, input decompression is used primarily with WebDAV. The range of usefulness of input decompression is also determined by Web browser support. Most Web browsers do not support compressed data or have limited support. Compressed information is only accessible with Web browsers with HTTP/1.1 support. See “File compression for HTTP Server” on page 32 for more information.

To set up input decompression, do the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select the context you want to work with from the **Server area** list.
5. Expand **Server Properties**.
6. Click **Compression**.
7. Click the **Input Filter** tab.
8. Click **Add** under the **Set input filter** table.
9. Specify DEFLATE for the filter name under the **Filter name** column.
10. Click **Apply**.

You should now have something like the below example in your configuration.

Example

```
SetInputFilter DEFLATE
```

See “Setting up output compression for HTTP Server” on page 106 for more information.

Setting up output compression for HTTP Server

This topic provides information about how to set up output compression for an IBM HTTP Server for i Web server using the IBM Web Administration for i interface.

In order to set up output compression, a filter must be inserted in the output filter chain. This is done using the SetOutputFilter directive. See “File compression for HTTP Server” on page 32 for more information.

To set up output compression, do the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select the context you want to work with from the **Server area** list.
5. Expand **Server Properties**.
6. Click **Compression**.

7. Click the **Output Filters** tab.
8. Add an output filter:

   There are two types of output filters. The first output filter type only requires a file extension and a filter name. The second output filter type requires a MIME type and filter name. For both output filter types, click **Add** under the appropriate table and specify the file extension, MIME type, and filter name.
9. Click **Continue**.
10. Click **Add** under the **Set output filter** table.
11. Specify DEFLATE for the filter name.
12. Click **Apply**.

You should now have something like the below example in your configuration.

Example

```
AddOutputFilterByType DEFLATE text/html
AddOutputFilter DEFLATE .html
SetOutputFilter DEFLATE
```

See "Setting up input decompression for HTTP Server" on page 106 for more information.

Fast Response Cache Accelerator tasks

The IBM HTTP Server for i supports the Fast Response Cache Accelerator (FRCA).
Related concepts
"Fast Response Cache Accelerator (FRCA) for HTTP Server" on page 33
The Fast Response Cache Accelerator (FRCA) improves the performance and scale of Web and TCP server applications by storing both static and dynamic content in a memory-based cache located in the Licensed Internal Code.

Setting up Fast Response Cache Accelerator (FRCA) for HTTP Server

This topic provides information about how to set up Fast Response Cache Accelerator for your IBM HTTP Server for i Web server using the IBM Web Administration for i interface.

FRCA is a Web cache architecture that is tightly integrated with the TCP/IP stack. FRCA moves performance critical TCP Application functions into a fast response cache that improves HTTP Server performance. The following explains how to enable FRCA, FRCA logging, and FRCA file caching.

- "Enabling FRCA" on page 107
- "Enabling FRCA logging" on page 108
- "Enabling FRCA file caching" on page 108
- "Enabling FRCA reverse proxy caching" on page 109

Enabling FRCA

Note: The following information may be used to enable FRCA for the first time or enable FRCA for a different Server area.

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select the context you want to work with from the **Server area** list.
5. Expand **Server Properties**.
6. Click **FRCA**.
7. Click the **General Settings** tab in the form.

8. Click **Add** under the **Server IP addresses and ports to listen on** table.
9. Enter an IP address and port number or select an existing IP address and port. FRCA will listen on the IP address and port you specify.
10. Select **Enabled** from the list under the **FRCA** column.
11. Click **Continue**.
12. Click **Apply**.
13. Stop and restart your server.

FRCA is now enabled. After enabling FRCA, you can set up logs and file caching.

Enabling FRCA logging

FRCA logging information allows you to track and generate reports on your HTTP Server's activity. You may specify various log attributes, such as the format for the information in the log file, rules for excluding entries from the log file, and client side information logging. Each server configuration file contains information about the type of log files the server will create. You must enable FRCA before FRCA logging can be set up. See Set up logs on HTTP Server for more information.

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select the context you want to work with from the **Server area** list.
5. Expand **Server Properties**.
6. Click **FRCA**.
7. Click the **FRCA Logs** tab in the form.
8. Click **Add** under the **FRCA logs** table.
9. Enter the name of the log file you want to use.
10. Enter the log attributes under the **Attributes** column.
11. Click **Continue**.
12. Click **OK**.
13. Stop and restart your server.

Enabling FRCA file caching

FRCA provides file caching support. You may specify the maximum cache size, the maximum file size to cache, the files to cache during server startup, and the directories to dynamically cache files from. You must enable FRCA before FRCA file caching can be set up.

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select the context you want to work with from the **Server area** list.
5. Expand **Server Properties**.
6. Click **FRCA**.
7. Click the **FRCA File Cache** tab in the form.
8. Select **Enabled** from the **FRCA file cache capabilities** list.
9. Enter a new value for **Maximum cache size** and select corresponding size unit, or keep the default value.
10. Enter a new value for **Maximum file size to cache** and select the corresponding size unit, or keep the default value.

11. Click **Add** under the **Files to cache during server startup** table to add file types or specific files to cache at HTTP Server startup.
12. Click **Continue** when finished adding files to table.
13. Click **Add** under the **Files to cache during server runtime** table to add file types or specific files to cache during HTTP Server runtime.
14. Click **Continue** when finished adding files to table.
15. Click **OK**.
16. Stop and restart your server.

Enabling FRCA reverse proxy caching

FRCA provides reverse proxy caching support. You may specify the maximum proxy cache size and the maximum proxy response size to cache. In addition, you may provide options for controlling which documents are cached based on expiration criteria, specify remote servers for proxy requests, and establish document retention policies. You must enable FRCA before FRCA Reverse Proxy caching can be set up.

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select the context you want to work with from the **Server area** list.
5. Expand **Server Properties**.
6. Click **FRCA**.
7. Click the **FRCA Reverse Proxy Cache** tab in the form.
8. Select **Enabled** from the **FRCA reverse proxy cache capabilities** list.
9. Enter a new value for **Maximum proxy cache size** and select its corresponding size unit, or keep the default value.
10. Enter a new value for **Maximum proxy response size to cache** and select its corresponding size unit, or keep the default value.
11. Enter a new value for **Document retention period** and select its time unit, or keep the default value.
12. Click **Add** under the **Proxy requests to remote servers** table.
13. Enter a virtual path under the **Local virtual path** column.
14. Enter a remote server URL under the **Remote server URL** column.
15. Click **Continue**.
16. Click **Add** under the **Document refresh policies** table.
17. Enter a full or partial URL under the **Match URL** column.
18. Enter a value under the **Period** column and select its corresponding time unit.
19. Click **Continue**.
20. Click **OK**.
21. Stop and restart your server.

Log and log file tasks

The IBM HTTP Server for i supports numerous log and log file tasks.

Related information

"Log formats for HTTP Server" on page 29

This topic provides information about log formats and log files.

Setting up logs on HTTP Server

Set up logs to record events and other information for your IBM HTTP Server for i instance using the IBM Web Administration for i interface.

Your HTTP Server can generate a record of events commonly referred to as a Log. Logs can contain error messages, information on what is being accessed on your HTTP Server, who is accessing your HTTP Server, script logs, and FRCA logs.

The following topics discuss general log settings required for all logs, Access logs, Error logs, Script logs, FRCA logs, where to find the HTTP Server job log, and how to run a trace.

General log settings

Before creating a specific log type, the general settings for all logs must be applied to your HTTP Server configuration. To configure the general settings for all logs, do the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select the context you want to work with from the **Server area** list.
5. Expand **Server Properties**.
6. Click **Logging**.
7. Click the **General Settings** tab in the form.

   The General Settings allow you to specify log entry time (local or Greenwich Mean Time), the log cycle, maximum log file size and **forensic log file name**.
8. Click **Apply**.

After you complete the general settings for all logs, you can specify what type of logs you want to create.

Access Logs

Access logs contain a record of requests to the HTTP Server. The access log itself can be configured to record specific information that you will want to review later. To configure an access log, do the following:

1. See General log settings.
2. Click the **Manage** tab.
3. Click the **HTTP Servers** subtab.
4. Select your HTTP Server from the **Server** list.
5. Select the context you want to work with from the **Server area** list.
6. Expand **Server Properties**.
7. Click **Logging**.
8. Click the **Custom Log** tab in the form.

   You can specify various types of information that can be logged in the Access log by specifying a customized log format. For more information how to specify a customized log format see Log Format.
9. Click **Apply**.

Error Logs

Error Logs contain records of errors that are encountered by visitors to the server. You can specify what types of errors that are logged. Also, you can specify the error log format for error log entries now. The tokens of “ErrorLogFormat” on page 320can be found in *Log file format tokens*. To configure error logs, do the following:

1. See General log settings.
2. Click the **Manage** tab.
3. Click the **HTTP Servers** subtab.
4. Select your HTTP Server from the **Server** list.
5. Select the context you want to work with from the **Server area** list.
6. Expand **Server Properties**.
7. Click **Logging**.
8. Click the **Error Logs** tab in the form.

   You must first enable error logging to edit what errors will be logged. Once enabled, do the following:
9. Enter the path and name of the error log.
10. Enter an expiration date.

    The value defines how long the error log will be maintained before information is rolled over.
11. Enter a maximum cumulative size.

    The value defines how large your error log can be before old log entries are deleted.
12. Select error log format that the server should log, Apache HTTP Server standard error log format or the data description specification (DDS) format. For standard error log, there is advanced format setting supported.
13. Select logging level.

    From the **Logging level** list, select the level of information you want entered in the error log.
14. Click **Apply**.

Script Logs

Script Logs contain errors generated by CGI programs running on the server. Generally you should only enable these logs when you are debugging programs on the server. To configure script logs, do the following:

Note: Set up a script log only if you are running CGI programs.

1. See General log settings.
2. Click the **Manage** tab.
3. Click the **HTTP Servers** subtab.
4. Select your HTTP Server from the **Server** list.
5. Select the context you want to work with from the **Server area** list.
6. Expand **Server Properties**.
7. Click **Logging**.
8. Click the **Script Logs** tab in the form.

   You must first enable script logging to edit what script errors will be logged. Once enabled, do the following:
9. Enter the path and name of the script error log.
10. Enter a maximum log file size.

    The value defines the size of the script error log.
11. Enter a maximum log entry size.

    The value defines the size of the script error log entry.
12. Click **Apply**.

FRCA Logs

Fast Response Cache Accelerator (FRCA) is an extension to the HTTP Server that enables caching and serving of data in Licensed Internal Code.

1. See General log settings.
2. Click the **Manage** tab.
3. Click the **HTTP Servers** subtab.
4. Select your HTTP Server from the **Server** list.
5. Select the context you want to work with from the **Server area** list.
6. Expand **Server Properties**.
7. Click **Logging**.
8. Click the **FRCA Logs** tab in the form.

   FRCA must be enabled before information is written to the FRCA log. Once enabled, do the following:
9. Click **Add** under the **FRCA logs** table.
10. Enter the path and name of the FRCA log.
11. Enter the log format.

    Note: For more information how to specify a customized log format see "Log formats for HTTP Server" on page 29.
12. Enter the environment variable conditions.
13. Enter an expiration date.

    The value defines how long the FRCA log will be maintained before information is rolled over.
14. Enter the maximum cumulative size of the FRCA log file.

    The value defines how large your FRCA log can be before old log entries are deleted.
15. Click **Continue**.
16. Click **Apply**.

HTTP server job logs

The HTTP Server job logs contain messages or exceptions. The HTTP Server job log is maintained in the QHTTPSVR subsystem, listed with a job name matching the name of your HTTP Server instance.

Run a trace

The HTTP Server trace allows you to view various levels of trace information related to a specific server. You will need to have a 5250 session on the IBM i server your HTTP Server is currently running on.

1. Start a 5250 session.
2. Start the server with a parameter of the STRTCPSVR command. Use the following:
   - -ve (error) for a trace that contains records for all error return codes or exception conditions.
   - -vi (information) for a trace that contains -ve level trace records as well as trace records for entry and exit points from application level API's and API parameters.
   - -vv (verbose) for a trace that contains -vi level trace records as well as trace records for debugging control flow or data corruption.

   For example `STRTCPSVR *HTTP HTTPSVR(JKLSERVER '-vv')`.
3. There are three ways to get output from the trace:
   - `ENDTCPSVR` - When the server is ended the trace data is placed into a spool file. There is a spool file for each job that is running on the server. If a server ends abnormally, trace data is placed into spool files even if tracing is not active at the time of the error.

- `DMPUSRTRC` - This command dumps the trace data for a specific job to the display or to a physical file member in the `QTEMP` library. For example:
  a. Use the `WRKACTJOB` command to find the server job number. For example WRKACTJOB SBS(QHTTPSVR).
  b. Dump the user trace to a file in QTEMP. For example `DMPUSRTRC JOB(nnnnnn/QTMHHTTP/MYSERVER)`, where nnnnnn is the job number and `MYSERVER` is the server.
  c. Use the `DSPPFM` command to view the contents of the trace. For example `DSPPFM QTEMP/QAP0ZDMP MBR(QP0Znnnnnn)`.
- `TRCTCPAPP` - You can use the `TRCTCPAPP` command to initiate a trace after the server is started and to end a trace. To use the `TRCTCPAPP` command, the server must have been started with the STRTCPSVR command.

  Note: If you started the trace with the STRTCPSVR and one of the trace startup parameters (-ve, -vi, or -vv), then you must do the following to end the trace:

  a. Enter the `TRCTCPAPP SET (*ON)` command to synchronize it with the STRTCPSVR command. For example: `TRCTCPAPP APP(HTTP) SET(*ON) HTTPSVR(JKLSERVER) TRCLVL(*VERBOSE)`.
  b. Enter the `TRCTCPAPP SET (*OFF)` command. For example: `TRCTCPAPP APP(*HTTP) SET (*OFF) TITLE('My title')`.

Proxy tasks

The IBM HTTP Server for i supports proxy tasks.

Related information

“Proxy server types and uses for HTTP Server” on page 24

This topic provides information about proxy server types and uses for the IBM HTTP Server for i Web server.

Setting up forward proxy for HTTP Server

Set up forward proxy for an IBM HTTP Server for i instance using the IBM Web Administration for i interface.

Configure your HTTP Server for forward proxy using the Web Administration for i interface. Only the steps necessary to configure a forward proxy are discussed.

To configure your HTTP Server for forward proxy, do the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select **Global configuration** from the **Server area** list.

   Note: To configure a forward proxy for a virtual host, select the virtual host from the **Server area** list. See JKL Toy Company creates virtual hosts on HTTP Server for more information.
5. Expand **Server Properties**.
6. Click **Proxy**.
7. Click the **Forward Proxy** tab in the form.
8. Select **Enabled** from the **Forward proxy capabilities** list.
9. Enter the domain default in the **Default domain for unqualified requests** field. The default domain is used if a request does not contain a domain name. For example, `http:\\www`, does not contain a domain name.

   Note: The remaining fields are not required to set up forward proxy for your HTTP Server. Edit the default values now or return to this form at a later time.

10. Click **OK**.

Setting up reverse proxy for HTTP Server

This topic provides information about how to set up a reverse proxy for your IBM HTTP Server for i with the IBM Web Administration for i interface.

Configure your HTTP Server for reverse proxy using the Web Administration for i. Only the tabs necessary to configure reverse proxy are discussed.

To configure your HTTP Server for reverse proxy, do the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select **Global configuration** from the **Server area** list.

   Note: If you want to configure a reverse proxy for a virtual host, click the virtual host from the **Server area** menu. See JKL Toy Company creates virtual hosts on HTTP Server for more information.
5. Expand **Server Properties**.
6. Click **Proxy**.
7. Click the **Reverse Proxy** tab in form.
8. Select **Enabled** from the **Reverse proxy capabilities** list.
9. Click **Add** under the **Proxy request to remote servers** table.

   Note: This table defines what requests will be mapped into the space of the server. The local server does not act as a proxy in the conventional sense, but appears as a mirror of the remote server.
10. Select **Client requests** from the **Request Type** list.

    When this option is used, non-proxy requests matching the URL specified in the **Local virtual path** column are transformed into proxy requests for the URL specified in the **Remote server URL** column. The proxy then handles the transformed request and returns any document (or error messages) the remote server provides. Clients remain unaware of any transformation.
11. Enter the local virtual path in the **Local virtual path** column.

    If a non-proxy requests matches the path specified in this column, the non-proxy request will be transformed into a proxy request for the URL specified in the **Remote server URL** column.
12. Select **Specify URL** from the list in the **Remote server URL** column.
13. Enter the remote server URL in the **Remote server URL** column.
14. Click **Add** under the **Proxy requests to remote servers** table.
15. Select **Redirect requests** from the **Request Type** list.

    When this option is used for *redirected requests*, headers in response documents are adjusted in the event that a "Redirect" is issued by the remote server. This allows clients to remain unaware of any transformation of the requests even if remote servers redirect the proxy.
16. Enter the path in the **Local virtual path** column.

    If your server is given a non-proxy request and the request matches the URL specified in the **Local virtual path** column, the URL request will be transformed into a proxy request for the URL specified in the **Remote server URL** column.
17. Enter the remote server URL in the **Remoter server URL** column.

    If a non-proxy request matches a URL in the **Local virtual path** column, the request will be transformed in the URL specified in the **Remote server URL** column. The client will be directed to the remote server URL without being aware of the redirect.
18. Click **Continue**.
19. Click **OK**.

All other options for reverse proxy are optional and allow you to modify specific reverse proxy capabilities.

After configuring your HTTP Server for reverse proxy, you can configure your server for a proxy chain.

Set up proxy chaining for HTTP Server

This topic provides information about how to set up a proxy chain with your HTTP Server and other proxy servers with the IBM Web Administration for i interface.

Configure your HTTP Server for proxy chaining using the Web Administration for i interface. Only the steps necessary to configure a proxy chain are discussed. Before you can configure your HTTP Server for a proxy chain, you must configure your HTTP Server for forward proxy or reverse proxy.

To configure your HTTP Server for a proxy chain, do the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select **Global configuration** from the **Server area** list.

   Note: If you want to configure a proxy chain for a virtual host, select the virtual host from the **Server area** list. See "JKL Toy Company creates virtual hosts on HTTP Server" on page 59 for more information.
5. Expand **Server Properties**.
6. Click **Proxy**.
7. Click the **Proxy Chaining** tab in the form.
8. Click **Add** under the **Remote proxies** table.
9. Enter the URL of the remote proxy in the **Remote proxy URL** column.

   Note: If you are not using the default port 80, include the port number with the remote proxy URL.

   Example: http://www.myserver.com:1975

   Note: For the remote server, only the HTTP protocol is supported. HTTPS and FTP are not supported in the remote proxy URL field.
10. Enter the full or partial URL in the **Match requests to forward** column.
11. Click **Continue**.
12. Click **OK**.

Security tasks

This topic provides step-by-step tasks for security with the IBM HTTP Server for i Web server.
Related information
"Security tips for HTTP Server" on page 30
This topic provides tips to secure your IBM HTTP Server for i Web server.

Setting up password protection on HTTP Server

Set up password protection for resources on your IBM HTTP Server for i instance using the IBM Web Administration for i interface.

You can protect Web resources by asking the user for a userid and password to gain access to these resources. Group files can be used to classify users into groups (for example: users and administrators). This allows you to limit access to those users that are defined in a group. If the user is listed in the group, then the userid and password are validated in one of the following ways:

- Internet users in a validation list - This requires you to create a validation list that contains Internet users. You can create a validation list and Internet users through the Web Administration for i.
- User profiles password protection - This requires that each user must have a system user profile.

- LDAP password protection - This requires that you configure a LDAP server with the user entries.

Group file password protection

The following steps explain how to add password protection (using groups) to a directory context.

1. Create a group file with the following format:

   `groupname: user1[, user2[, user3...]]`

   groupname
   Any name you want to use to identify the group you are defining. This name can be used on subsequent group definitions within the same server group file.

   user1[, user2[, user3...]]
   This can be any combination of user names and group names. Separate each item with a comma.

   For example:

   ```
   ducks: webfoot, billface, swandude
   geese: goosegg, bagel
   flock: ducks, geese
   ```

   In the above example, notice that once the groups named ducks and geese are defined, they can be included as part of the group named `flock`.

   Group Profile support is available now.

   Assign one IBM i group profile name surrounded with key word % as a member of one HTTP group. Then all the members of this IBM i group profile will be collected and added into that HTTP group.

   For example:

   GROUPA: USER1 %GRP1% USER2

   If group profile GRP1 has two members USER3 and USER4, HTTP server will collect user profile USER3 and USER4 and add them into group GROUPA along with USER1 and USER2.
2. Click the **Manage** tab.
3. Click the **HTTP Servers** subtab.
4. Select your HTTP Server from the **Server** list.
5. Select the context you want to work with from the **Server area** list.

   Note: Do not select Global configuration or Virtual Host. If the Authentication tab cannot be selected, select a different context to work with from the Server area list.
6. Expand **Server Properties**.
7. Click **Security**.
8. Click the **Authentication** tab in the form.
9. Select **Use Internet users in validation list** or **Use IBM i profile of client** under **User authentication method**.

   Note: Your selection should be based off of the incoming traffic your HTTP Server will receive. If incoming traffic is from outside of your local access network, using Internet users in a validation list would be more beneficial than using IBM i profiles. If incoming traffic is from a local access network, using IBM i profiles would be more beneficial than using Internet users in a validation list.
10. Enter an authentication name or realm. The realm name is displayed on the login prompt.
11. Add a user authentication method if necessary.
12. Click **OK**.

After configuring authentication, you must configure control access.

1. Select the same context you work with previously from the Server area list.
2. Expand **Server Properties**.

3. Click **Security**.
4. Click the **Control Access** tab in the form.
5. Select **Specific users and groups**.
6. Click **Add** under the **User and Group names** table.
7. Select **Group** from the list in the **Type** column.
8. Enter the name of the group in the **Name** column.
9. Enter the path/filename of the group file used above.
10. Click **OK**.

Note that changes to existing group files take effect after the HTTP Server is restarted.

User profiles password protection

You can protect Web resources by asking the user for a userid and password to gain access to these resources. An IBM i user profile can be used to authenticate users.

To configure password protection using a user profile, do the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select the context you want to work with from the Server area list.
5. Expand **Server Properties**.
6. Click **Security**.
7. Click the **Authentication** tab in the form.

   Note: If the Authentication tab cannot be selected, select a different context to work with from the **Server area** list.
8. Select **Use IBM i profile of client** under **User authentication method**.
9. Enter an authentication name or realm. The realm name is displayed on the login prompt.
10. Choose one of the two methods below:

    Enter a user name in the **IBM i user profile to process requests** field.

    Select a user name under **IBM i user profile to process requests**. Select **Default server profile** to allow the HTTP Server profile (QTMHHTTP) to process requests.
11. Click **OK**.

After configuring authentication, you must configure control access.

1. Select the same context you work with previously from the **Server area** list.
2. Expand Server Properties.
3. Click **Security**.
4. Click the **Control Access** tab in the form.
5. Select **All authenticated users (valid user name and password)** under **Control access based on who is making requests**.
6. Click **OK**.

LDAP password protection

You can protect Web resources by asking the user for a userid and password (to gain access to these resources). A Lightweight Directory Access Protocol (LDAP) server can be used to authenticate users.

LDAP is a directory service protocol that runs over TCP/IP, using non-secure or Secure Sockets Layer (SSL). The LDAP directory service follows a client/server model, where one or more LDAP servers contain the directory data. This allows any LDAP-enabled application to store information once (such as user authentication information). Other applications using the LDAP server are then able to request the stored information. The HTTP server can act as a LDAP client, making requests for information.

One of the advantages of using the LDAP server for authentication is that it allows the information to be shared by multiple LDAP clients, and stores the information in a platform independent fashion. This can help prevent information from being duplicated within a network.

The following steps explain how to add password protection (using LDAP) to a directory context.

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select the context you want to work with from the **Server area** list.
5. Expand **Server Properties**.
6. Click **Security**.
7. Click the **Authentication** tab in the form.

   Note: If the Authentication tab cannot be selected, select a different context to work with from the **Server area** list.
8. Select **Use user entries in LDAP server** under **User authentication method**.
9. Enter an authentication name or realm. The realm name is displayed on the login prompt.
10. Enter an LDAP configuration file.
11. Enter an LDAP group name or filter.
12. Click **OK**.

After configuring authentication, you must configure control access.

1. Select the same context you work with previously from the Server area list.
2. Expand **Server Properties**.
3. Click **Security**.
4. Click the **Control Access** tab in the form.
5. Select one of the options for who can access this resource.
6. Select one of the options for who can access this resource under **Users and groups who can access this resource**.
7. Select **Allow access to all, except the following** under **Control access based on where the request is coming from**.
8. Enter any domain names or IP address you do not want to allow access to.
9. Click **OK**.

Setting up to secure against a Telnet denial-of-service attack

This topic provides information about how to secure your IBM HTTP Server for i Web server against a Telnet denial-of-service (DoS) attack using the IBM Web Administration for i interface.

The HTTP Server configuration to protect against Telnet DoS attacks has default settings, but you may want to change them to suit your individual needs.

Your HTTP Server can detect a DoS attack by measuring the time-out and frequency, or the number of time-outs of certain clients' requests. If the HTTP Server does not receive a request from the client, then your HTTP Server determines that a Telnet DoS attack is in progress. This occurs after making the initial client connection to your HTTP Server.

The HTTP Server's default is to perform attack detection and penalization. However, this default may not be right for your environment. If all access to your HTTP Server is through a firewall or proxy server or Internet Service Provider (ISP), then the Telnet DoS protection is built into each of these entities. You should turn off the Telnet DoS protection for this HTTP Server instance so that the HTTP Server does not falsely detect a DoS condition.

To secure against a Telnet DoS attack perform the following steps:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Expand **Server Properties**.
5. Click **System Resources**.
6. Click the **HTTP Connections** tab in the form.

   Note: The values provided are the current HTTP connections settings used by your Web server. Continue only if you want to change the default values.
7. Enter new values for the provided fields.
8. Click **Apply**.
9. Click the **Denial of Service** tab in the form.

   Note: The values provided are the current denial-of-service settings used by your Web server. Continue only if you want to change the default values.
10. Enter new values for the provided fields.
11. Click **OK**.

See "User profiles and required authorities for HTTP Server" on page 31 for more information if you encounter authority problems.

WebDAV tasks

Web-based distributed authoring and versioning (WebDAV) is provided through the IBM HTTP Server for i Web server.

Related information

"WebDAV for HTTP Server" on page 47
This topic provides information about Web-based distributed authoring and versioning (WebDAV) for the IBM HTTP Server for i Web server.

Setting up WebDAV for HTTP Server

Set up WebDAV for your IBM HTTP Server for i instance using the Web Administration for i interface.

Web-based distributed authoring and versioning (WebDAV) is a set of extensions to the HTTP protocol that allows WebDAV clients (such as Microsoft Web Folders) to collaboratively edit and manage files on remote Web servers. See "WebDAV for HTTP Server" on page 47 for more information.

To configure WebDAV on your server, do the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select **Global configuration** from the **Server area** list.
5. Expand **Server Properties**.
6. Click **Request Processing**.
7. Click the **WebDAV** tab in the form.
8. Specify one of the following under **WebDAV lock databases**:

   - **Full path name for locking stream files**: - the full path of the DAV lock database for the Root (/) or QOpenSys streaming file system.

- **Library/name for locking QSYS objects**: - the library and file name of the DAV lock database for QSYS objects.

9. Click **OK**.
10. Select the context you want to work with from the **Server area** list. The server area you select will be WebDAV enabled.
11. Click **Request Processing**.
12. Click the **WebDAV** tab in the form.
13. Select **Enabled** to Enable WebDAV.
14. Enter the appropriate file system under **Repository provider**.
15. Enter any **WebDAV restrictions** you want enabled for this server area.
16. Click **OK**.

Web tasks

This topic provides step-by-step tasks for accessing Web applications with the IBM HTTP Server for i Web server.

Integrated Web Application Server

The Integrated Web Application Server provides a Web container for dynamic Web applications that uses minimal system resources, is easy to configure, and is imbedded into IBM i.

Details

The Integrated Web Application Server is ready for use without having to install any additional products. This Web container is capable of running Servlet or JSP applications. The Integrated Web Application Server is an ideal choice for less complex applications, or applications that are not required to be highly scalable. Since the Web container has a minimal resources foot print, low use applications that have a few users are ideal to run on the Integrated Web Application Server. This Web container is also a good choice when working on a proof of concept because no other products are necessary, the server is easy to create, and applications are easy to deploy. For applications that require a high degree of scalability, the IBM WebSphere Application Server product should be used.

The Integrated Web Application Server is available for IBM i 5.4, or later. The server supports dynamic Web applications running JSP and servlets. Support for database connectivity is also included for DB2 on either local or remote systems. Any Web application that was targeted to be run on a Web container such as AFS Tomcat would be a good candidate.

The IBM Web Administration for i interface has been updated to include full support for the Integrated Web Application Server. The interface provides several simple, easy to use wizards to create new server instances, stop and start servers, and deploy and manage the applications running on each server.

Prerequisites and assumptions

Ensure the HTTP Server prerequisites have been installed. In addition, load the latest HTTP Server group PTF.

Creating an Integrated Web Application Server

The Web Administration for i interface provides an easy to use wizard to create an Integrated Web Application Server on your IBM i server.

1. Access the IBM Web Administration for i from your browser. For information about how to access the Web Administration for i interface, see “Starting Web Administration for i” on page 7.
2. From the Web Administration for i interface, select the **Setup** tab, and then click **Create Application Server** to launch the Create Application Server wizard.

3. Click **Next** after reading the wizards welcome page.
4. From the **Integrated Web Application Server:** section select **a version**.
5. Complete the wizards to create an Integrated Web Application Server. Click on the (?) icon to display the help information for a particular panel.

Installing an application on the Integrated Web Application Server

Now that you have created an Integrated Web Application Server you will want to install and run applications on the server. The Web Administration for i interface provides an easy to use wizard to install your applications. Remember, you can only install applications that are contained in a Web Archive (WAR) file.

Complete the following steps to install an application on an Integrated Web Application Server:

1. Access the IBM Web Administration for i from your browser. For information about how to access the Web Administration for i interface, see "Starting Web Administration for i" on page 7.
2. From the IBM Web Administration for i interface, select the **Manage** tab.
3. Select the **Application Servers** subtab.
4. Select the Integrated Web Application Server that you want to install the application from the **Server** list.
5. Click **Install New Application** to launch the Install New Application wizard.
6. Complete the wizards to install your application. Click on the (?) icon to display the help information for a particular panel.

Creating a database connection for an Integrated Web Application Server application

The Create Database Connection wizard helps the user create a new entity that allows them to connect the Integrated Web Application Server to a specified database. The database connection allows installed applications to retrieve and store information in a database. There are two different database connection types supported by the Integrated Web Application Server. The IBM Developer Kit for Java database provider is available if you need to connect to a DB2 database.

For applications to use the database connection wizard they must meet the following requirements:

- The JNDI name used by the application must be unique in the Integrated Web Application Server..

Complete the following steps to create a database connection:

1. Access the IBM Web Administration for i from your browser. For information about how to access the Web Administration for i interface, see "Starting Web Administration for i" on page 7.
2. From the IBM Web Administration for i interface, select the **Manage** tab.
3. Select the **Application Servers** subtab.
4. Select the Integrated Web Application Server that you want to create a database connection from the **Server** list.
5. Click **Create Database Connection** to start the Database Connection wizard
6. Complete the wizards to install your application. Click on the (?) icon to display the help information for a particular panel.

Related information
Integrated Web Application Server home page

Integrated Web services for i

In support of Web services and Service Oriented Architecture (SOA), the IBM i operating system integrates software technologies that support externalizing integrated language environment (ILE) program objects as Web serviced and the consumption of a Web service by an ILE program object. These technologies are the integrated Web services server and the integrated Web services client for ILE.

Overview of technology

Web service technology promises a new range of possibilities for how organizations and their partners interoperate to offer dynamic e-business solutions. Web services connect business applications to each other, inside and outside the enterprise, regardless of their platform, design, or runtime environment. IBM provides the tools, protocols, technologies, support, and commitment to open standards, to help businesses create and use innovative Web services technology.

A Web service is a self-contained software component with a well-defined interface that describes a set of operations that are accessible over the Internet. XML technology provides a platform and programming language-independent means by which a Web service's interface can be defined. Web services can be implemented using any programming language, and can be run on any platform, as long as two components are provided to indicate how the Web service can be accessed: a standardized XML interface description, called WSDL (Web Services Description Language), and a standardized XML-based protocol, called Simple Object Access Protocol (SOAP). Applications can access a Web service by issuing requests formatted according to the XML interface.

Web services do not provide a Graphical User Interface (GUI) for the user. Instead, Web services share business logic, data, and processes through a programming interface across a network. Therefore, developers can access Web services from applications to gain specific functionality. In short, Web services are encapsulated functions which are offered using broadly adopted standard interface descriptions and protocols.

The Web services architecture is based on the interactions among three roles: service provider, service registry, and service requestor. The interactions involve the publish operations, find operations, and bind operations. Together, these roles and operations act upon the Web service artifacts: the Web service software module and its description. In a typical scenario, a service provider defines a service description for the Web service using Web Services Description Language (WSDL). The WSDL description of the service is then published to the service requestor or service registry. The service requestor uses a find operation to retrieve the service description locally or from the service registry. Once obtained, the service description is used to bind with the service provider and invoke or interact with the Web service implementation.

Service Provider (integrated Web services server)
From a business perspective, this is the owner of the service. From an architectural perspective, this is the platform that hosts access to the service.

Service Requestor (integrated Web services client for ILE)
From a business perspective, this is the business that demands that certain requirements be satisfied. From an architectural perspective, this is the application that is looking for and invoking, or initiating, an interaction with a Web service. The service requestor role can be played by a browser driven by a person, a program with a user interface, or a program without a user interface.

Prerequisites and assumptions

Ensure the HTTP Server prerequisites have been installed. In addition, load the latest HTTP Server group PTF.

Integrated Web services server

The integrated Web services server for IBM i greatly simplifies the process of externalizing ILE business logic as a service via the IBM Web Administration for i interface. The externalization of RPG and COBOL business logic as a service has been simplified to be an administrative task on IBM i. This simplification has been accomplished by abstracting the hidden complexities of Web services and extending the ILE programming model, to allow a System i administrators to directly externalize various ILE business tasks as services.

Creating a Web services server

The Create New Web Services server wizard provides a convenient way to externalize programs running on IBM i, such as RPG or COBOL ILE programs, as Web Services.

1. Access the IBM Web Administration for i from your browser. For information about how to access the Web Administration for i interface, see "Starting Web Administration for i" on page 7.
2. From the IBM Web Administration for i interface, select the **Setup** tab, and then click **Create Web Services Server** to launch the Create Web Services Server wizard.
3. Complete the wizards to create a Web services server. Click on the (?) icon to display the help information for a particular panel.

Externalizing IBM i programs as Web services

The Install New Service wizard provides a convenient way to externalize an IBM i program or service program as a Web Service. The wizards provides steps to specify the program object, select program export procedures to be made available through the Web service, and other parameters. When you finish the wizard, the Web service artifacts are created and a new Web service is deployed on the server.

1. Access the IBM Web Administration for i from your browser. For information about how to access the Web Administration for i interface, see "Starting Web Administration for i" on page 7.
2. From the IBM Web Administration for i interface, select the **Manage** tab.
3. Select the **Application Servers** subtab.
4. Select the Web services server that you want to install the new service on from the **Server** list.
5. Click **Install New service** to launch the Install New Service wizard.
6. Complete the wizards to install your program as Web services. Click on the (?) icon to display the help information for a particular panel.

Web services client for ILE

The Web services client is integrated into IBM i, providing a mechanism to generate service artifacts and allow ILE (RPG, COBOL, C, C++) to act as a services consumer with enablement for calling a variety of Web service implementations, including RPG, COBOL, C, C++, Java, PHP, .NET, WebSphere Process Server (WPS), and WebSphere Enterprise Service Bus (ESB).

The following lists some of the benefits and features for the web services client:

- Natural extension for the ILE programmer to consume services from a program or service program.
- ILE enablement to bind and call a service directly from IBM i service program or program.
- Leverages WSDL to generates proxy client code to be integrated in program or service program.
- Enhances existing System i development skills to interact with Web services and SOA.

Creating ILE Web service client stub (proxy) service program

Before you can create a Web service client application, you must first generate the client stubs using the wsdl2ws.sh tool.

1. Copy the WSDL file to a directory in which the client stubs will be generated.
2. Open Qshell and change the current working directory to where the WSDL file is located. For example, if the WSDL source file GetQuote.wsdl is in /stockquoteWS, then you would specify: `cd /stockquoteWS`
3. Run the wsdl2ws.sh tool with the following command to generate the client stubs:

   ```
   /qibm/proddata/os/webservices/v1/client/bin/wsdl2ws.sh GetQuote.wsdl
   ```

   Note: The command above generates C++ stubs. To generate C stubs simply add the -lc option to the command. For example:

```
/qibm/proddata/os/webservices/v1/client/bin/wsdl2ws.sh GetQuote.wsdl -lc
```

.

4. Examine the generated web service stub artifacts in the IBM i Integrated File System (IFS), to determine the interfaces for ILE service programs/programs to interact and invoke the service stub code.
5. Compile the C or C++ stubs you generated in the previous step. In the following example the generated stub file is StockQuote.cpp:

   ```
   CRTCPPMOD MODULE(MYLIB/
   STOCKQUOTE) SRCSTMF('/stockquoteWS/StockQuote.cpp')INCDIR('/qibm/
   proddata/os/webservices/v1/client/include')ENUM(*INT).
   ```
6. Create the Web service client proxy service program.

   For C++ stubs, your will need to bind to service program QSYS/QAXIS10C.
   ```
   CRTSRVPGM SRVPGM(MYLIB/GETQUOTEWS) MODULE(MYLIB/STOCKQUOTE) EXPORT(*ALL)
   BNDSRVPGM(QSYS/QAXIS10C)
   ```

   For C stubs, you will need to bind to service program QSYS/QAXIS10CC.
   ```
   CRTSRVPGM SRVPGM(MYLIB/GETQUOTEWS) MODULE(MYLIB/STOCKQUOTE) EXPORT(*ALL)
   BNDSRVPGM(QSYS/QAXIS10CC)
   ```

Once the client stubs have been generated and a service program containing the stubs created, you can now develop a Web service client application that can invoke the Web service via the stubs. More information on Web services client programming using Web services client for ILE can be found in the PDF files located in `/qibm/proddata/os/webservices/v1/client/docs`.

Related information

Integrated Web Services for i home page

Web Performance Advisor

The Web Performance Advisor provides a way to view, evaluate and modify the attributes that affect the performance of your Web environment. Clear definitions of the attributes are provided along with recommended values. The tool also provides rating for each attribute to help guide the user to acceptable settings.

A Web environment is a grouping of related Web and application servers that form a Web solution. A Web environment is typically made up of a single application server, its corresponding IBM HTTP Server for i Web server, and any system attributes that could have a direct effect on the performance of the Web environment. Supported application servers include WebSphere Application Server, Integrated Web Application Server for i, and the Integrated Web Services Server for i.

The Web Performance Advisor is made up of multiple components to help you tune the performance of your system and Web environment. These components include an advisor and an export function. These can be launched from the Web Performance Advisor introduction page. On this introduction page, the user is provided a quick, easy-to-read, high-level view of their system and Web environment performance.

The Advisor function allows you to manage system attributes and to manage Web environment attributes. From the manage system and manage Web environment panels, you can view, evaluate, and change each performance attribute. While evaluating each performance attribute, click the attribute's Advise link to learn about the attribute and find the recommended setting.

The export function allows you to save existing performance settings in a performance profile. This profile can be evaluated, compared, or sent to a performance expert for analysis and modification.

When the Web Performance Advisor tool is used to examine a Web related server, a flight recorder performance profile is created to save what all performance attributes are set to prior to any changes being made. Whenever changes are made through the Web Performance Advisor, all the performance attributes are saved (including the new changes) to another flight recorder performance profile file. This is necessary so that you can keep track of all changes made to a Web environment. All flight recorder performance profile files are located in the `'/QIBM/UserData/HTTPA/admin/WPA'` directory. The

Web Performance Advisor tool does not clean up these files; they remain until someone deletes them manually.

Because the attributes affecting performance in a Web environment are located in many places, the Web Performance Advisor combines all of the performance attributes into a performance profile. The profile contains:

- System attribute information made up of the physical and logical resources that have been allocated to the system and partition and selected system values that can have a direct effect on Web performance, TCP/IP settings, and PTF information including the PTF Groups and the individual product PTFs for the products that are used in a Web environment.
- Web attribute information for an application server.
- Web performance attributes for an application server, including the JVM settings, system and server resource settings, server JDBC providers and data source resources, and other additional server settings.
- Web attribute information related to your external HTTP server that is associated with the application server.

Details

The Web Performance Advisor gathers ratings and recommendations for each of the performance attributes being tuned. From these ratings, icons are displayed to convey whether the attribute is tuned well (green), may need some additional tuning (yellow), or needs immediate attention (red). The ratings that are displayed may vary based on the risk level (conservative or aggressive) you have configured in the General Settings. Conservative means that you do not want to be alerted to those performance attributes that are on the fringe. By using the conservative approach, fewer attributes are changed and drastic performance updates are not made. Of course, performance may not be tuned as well, but there is much less risk of degrading your machine as a whole. Using the aggressive approach, any attribute that is on the fringe is flagged as needing to be changed. In addition, attributes that would be flagged as good in a conservative mode, might actually be flagged as needing improvement. By doing this, more drastic performance updates are made which may dramatically improve performance. On the downside, the possibility exists that unexpected, unwanted consequences may result from these drastic performance changes.

Prerequisites and assumptions

The Web Performance Advisor feature supports a wide variety of WebSphere and non-WebSphere products. These include WebSphere Application Server, WebSphere Portal Server, Integrated Application Server, and the Integrated Web Services Server. The other product that is supported is the IBM HTTP Server for i Web server when it is configured to be used by one of the previously listed products.

Each of the following WebSphere Application Server products must be at the fix level specified before Web Performance Advisor can work. When WebSphere Application Server fixes are installed, the activation instructions must be followed completely, and the ADMIN server must be stopped and restarted. The following versions are supported:

- WebSphere Application Server V7 (Base and Express® editions and Network Deployment in a stand-alone environment)
- WebSphere Application Server V6.1 (Base and Express editions and Network Deployment in a stand-alone environment)
- WebSphere Portal V6.1.5

Note: The Web Performance Advisor supports an HTTP server when it is configured to be used by one of the other products supported. Standalone HTTP servers are not supported.

Start the Web Performance Advisor

The Web Performance Advisor can be started from the Web Administration for i interface:

1. Access the Web Administration for i from your browser. For information about how to access the Web Administration for i interface, see "Starting Web Administration for i" on page 7.
2. From the IBM Web Administration for i interface, select the server you want to examine.
3. In the navigation pane, expand **Web Performance**, and select **Web Performance Advisor**.

   Note: If **Web Performance Advisor** is not displayed in the navigation pane, either you need to install the latest HTTP Server group PTF, or the selected server is not supported by the Web Performance Advisor.

The Web Performance Advisor introduction page displays. From this page, you can select to manage your system or your Web attributes, change your general settings, or export your current performance settings.

More performance tuning tools

The Web Performance Advisor is only one tool available for you to tune your performance settings. The Web Performance Advisor, the Workload Estimator, and the documented minimums are all tools available to help you achieve improved performance. These resources can be used together to find the settings that are best for you.

Documented minimums: This is the smallest possible system you should run on. These systems may be appropriate for development or internal systems with a small number of users where longer response times are acceptable. Good performance is not expected on these systems.

Workload Estimator: This tool accounts for the specific characteristics of your workload to recommend an appropriate system. It should be used to determine the size and type of system that should be used based on the type of workloads you plan on running. It cannot recommend a system that is smaller than the documented minimum recommendations, but it may recommend a larger system.

Web Performance Advisor: This tool is recommended if you are trying to get good performance out of your applications and environment. It may recommend configurations that are somewhat larger than the documented minimums. The recommendations could, however, be smaller than the Workload Estimator recommendations, because the Web Performance Advisor does not account for the specific workload your system faces during the runtime of your applications or other things that may be running on your system.

Install WebSphere Application Server

The IBM® Web Administration for i interface provides some easy to use wizards to install and manage WebSphere® Application Server on your IBM i server.

WebSphere® Application Server is an important product, offering a valuable option for a fast and flexible Java application server runtime environment and enhanced reliability and resiliency. Starting with WebSphere Application Server V8.0, the product is installed using the IBM® Installation Manager. Installation Manager does not have a GUI interface for IBM i. The Web Administration for i interface provides an easy-to-use GUI interface to manage the WebSphere Application Server installation and fixes on IBM i. By Web Administration for i, you can easily do following operations on IBM i:

- Install WebSphere Application Server
- Update WebSphere Application Server with fix pack or interim fixes
- Uninstall WebSphere Application Server

It is recommended that you use the Web Administration for i interface to manage your WebSphere Application Server installations. This reduces the time and complexity of the many different operations.

Prerequisites and assumptions

- IBM HTTP Server for i (5770-DG1)
- IBM Developer Kit for Java (5770-JV1 *BASE)
- IBM Developer Kit for Java (5770-JV1 Option 11)
- Host Server (5770-SS1 Option 12)

- Qshell (5770-SS1 Option 30)
- Portable App Solutions Environment (5770-SS1 Option 33)
- IBM i Digital Certificate Manager (5770-SS1 Option 34)
- Extended Base Directory Support (5770-SS1 Option 3)

Install a WebSphere Application Server

The Web Administration for i interface provides an easy to use wizard to install a WebSphere Application Server on your IBM i server.

1. Access the IBM Web Administration for i from your browser. For information about how to access the Web Administration for i interface, see "Starting Web Administration for i" on page 7.
2. From the IBM Web Administration for i interface, select the **Manage** tab.
3. Select the **Installations** subtab.
4. Click **Install WebSphere Application Server** or **Install** button on the **manage Installations** form to launch the Install WebSphere Application Server wizard.
5. Click **Next** after reading the wizards welcome page.
6. Install Installation Manager. This step is only displayed when the tool is not installed on your system. Specify the install packages path of the Installation Manager on your system and click **Next**.
7. Specify the WebSphere Application Server product install packages location on local or remote accessible system. If the remote system requires authentication to access, you need to specify the user id and password. Click **Next**.
8. Choose the package to be installed on the system and Click **OK**.
9. Upgrade Installation Manger. This step is only displayed when the Installation Manger tool installed on your system does not meet the required minimum level to install the WebSphere Application Server installation. The wizard helps to upgrade the tool from local install packages or from Internet if your system has Internet access.
10. Complete the wizards to install a WebSphere Application Server on your system. Click on the (?) icon to display the help information for a particular panel.

Installing an application on the Integrated Web Application Server

Now that you have created an Integrated Web Application Server you will want to install and run applications on the server. The Web Administration for i interface provides an easy to use wizard to install your applications. Remember, you can only install applications that are contained in a Web Archive (WAR) file.

Complete the following steps to install an application on an Integrated Web Application Server:

1. Access the IBM Web Administration for i from your browser. For information about how to access the Web Administration for i interface, see "Starting Web Administration for i" on page 7.
2. From the IBM Web Administration for i interface, select the **Manage** tab.
3. Select the **Application Servers** subtab.
4. Select the Integrated Web Application Server that you want to install the application from the **Server** list.
5. Click **Install New Application** to launch the Install New Application wizard.
6. Complete the wizards to install your application. Click on the (?) icon to display the help information for a particular panel.

Update WebSphere Application Server with fix pack or interim fixes

Complete the following steps to update the WebSphere Application Server installation to a specific fix pack level or install related interim fixes:

1. Access the IBM Web Administration for i from your browser. For information about how to access the Web Administration for i interface, see "Starting Web Administration for i" on page 7.
2. From the IBM Web Administration for i interface, select the **Manage** tab.
3. Select the **Installations** subtab.
4. Select the WebSphere Application Server installation you want to update and click **Update** button on the **Manage Installations** form to launch the Update WebSphere Application Server wizard.
5. To update the installation to a specific fix pack level, check the **Fix pack** and specify the fix pack packages location. To update the installation with specific interim fixes, check the **Interim fix** and specify the interim fix packages location.
6. Complete the wizards to install your application. Click on the (?) icon to display the help information for a particular panel.

Uninstall WebSphere Application Server

Before uninstalling the WebSphere Application Server installation, all profiles based on the installation should be stopped. After the uninstall, the installation and all profiles on it are removed from the system. Complete the following steps to uninstall the WebSphere Application Server installation from your system:

1. Access the IBM Web Administration for i from your browser. For information about how to access the Web Administration for i interface, see "Starting Web Administration for i" on page 7.
2. From the IBM Web Administration for i interface, select the **Manage** tab.
3. Select the **Installations** subtab.
4. Select the WebSphere Application Server installation you want to uninstall and click **Uninstall** button on the **Manage Installations** form to launch the Uninstall WebSphere Application Server wizard.
5. Complete the wizards to install your application. Click on the (?) icon to display the help information for a particular panel.

Related information

Integrated Web Application Server home page

Virtual host tasks

This topic provides step-by-step tasks for configuring virtual hosts in the IBM HTTP Server for i Web server.

Related information

"Virtual hosts on HTTP Server " on page 23
This topic provides information about virtual host types on the IBM HTTP Server for i Web server.

Setting up virtual hosts on HTTP Server

Set up virtual hosts on your IBM HTTP Server for i instance using the IBM Web Administration for i interface.

Virtual hosts allow more than one Web site on one system or Web server. The servers are differentiated by their host name. Visitors to the Web site are routed by host name or IP address to the correct virtual host. Virtual hosting allows companies sharing one server to each have their own domain names. For example, *www.company1.com* and *www.company2.com* can both be hosted on the same server. See "Virtual hosts on HTTP Server " on page 23 for more information.

You can configure virtual hosts by doing the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select **Global configuration** from the **Server area** list.

5. Expand **Server Properties**.
6. Click **Virtual Hosts**.
7. Click either the **Name-based** virtual host tab or the **IP-based** virtual host tab in the form.

Name-based virtual hosts

The name-based virtual host allows one IP address to host more than one Web site (hostname). This approach allows a single HTTP Server to service requests directed at many different hostnames. This simplifies configuration and use, and requires no additional hardware or software. The main disadvantage to this approach is that the client must support HTTP 1.1 (or HTTP 1.0 with 1.1 extensions) that include the server hostname information inside the HTTP document requests. The latest versions of most browsers support HTTP 1.1 (or HTTP 1.0 with 1.1 extensions), but there are still old browsers that only support HTTP 1.0. For more information on virtual hosts refer to the <VirtualHost> directive.

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select **Global configuration** from the **Server area** list.
5. Expand **Server Properties**.
6. Click **Virtual Hosts**.
7. Click the **Name-based** tab in the form.
8. Click **Add** under the **Named virtual hosts** table.
9. Select or enter an IP address in the **IP address** column.

   Note: The Web Administration for i provides the IP addresses used by your IBM i system in the IP Address list; however, you will need to provide the hostname associated with the address you choose and register the hostname with your Domain Name Server (DNS).
10. Enter a port number in the **Port** column.
11. Click **Add** under the **Virtual host containers** table in the **Named host** column.
12. Enter the fully qualified server hostname for the virtual host in the **Server name** column.

    Note: Make sure the server hostname you enter is fully qualified and associated with the IP address you selected.
13. Enter a document root for the virtual host index file or welcome file in the **Document root** column.
14. Click **Continue**.
15. Click **OK**.

IP-based virtual hosts

The IP-based virtual host requires one IP address per Web site (host name). This approach works very well, but requires a dedicated IP address for every virtual host. For more information on virtual hosts refer to the <VirtualHost> directive.

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select **Global configuration** from the **Server area** list.
5. Expand **Server Properties**.
6. Click **Virtual Hosts**.
7. Click the **IP-based** tab in the form.
8. Click **Add** under the **Virtual host containers** table.
9. Enter a valid IP address in the **IP address or hostname** column.

10. Enter a valid port number in the **Port** column.
11. **Optional**: Enter a server name in the **Server name** column.
12. **Optional**: Enter the document root from where the files will be served in the **Document root** column.
13. Click **Continue**.
14. Click **OK**.

Mass-dynamic virtual hosting

Use the Mass-dynamic tab to create a dynamic virtual host with a Name-based or IP-based virtual host, or work with canonical names. A canonical name is the actual name of an HTTP Server resource. For example, a canonical name of the HTTP Server is its true name rather than an alias. See directive <UseCanonicalName> for more information.

The dynamic virtual host allows you to dynamically add Web sites (hostnames) by adding directories of content. This approach is based on automatically inserting the IP address and the contents of the Host: header into the pathname of the file that is used to satisfy the request.

The Mass-dynamic tab provides a subset of options that are more complex than those provided by the other tabs. The options include specifying the root directory for serving files, and selecting the root directory for CGI scripts. The availability of these settings are dependent on what server area you are working with.

At the global configuration server area, all mass-dynamic settings are available. These include:

- Options on how to build self-referencing URL's.
- Options for the root directory for serving files.
- Options for the root directory for CGI scripts.

The mass-dynamic settings use strings and substrings to create a dynamic virtual hosts. For example, to create a simple dynamic virtual host, the Root directory for serving files option is defined as **`/usr/local/apache/vhosts/%0`** and **Use server name** is selected. A request for **`http://www.ibm.com/directory/file.html`** returns **`/usr/local/apache/vhosts/www.ibm.com/directory/file.html`**.

The string **`%0`** is an interpolate (insert) string of the server name or IP address. The following defines the interpolate string:

Interpolate (insert) strings	
%%	inserts a %
%p	inserts the port number of the virtual host
%N.M	inserts (part of) the name

N and **M** are used to specify substrings of the name. **N** selects from the period-separated components of the name, and **M** selects characters within whatever **N** has selected. **M** is optional and defaults to zero if it is not present; the period must be present if and only if **M** is present. The interpretation is as follows:

Substring interpretation	
0	the whole name
1	the first part
2	the second part
-1	the last part
-2	the next to last part
2+	the second and all subsequent parts

Substring interpretation	
-2+	the next to last part and all preceding parts
1+ and -1+	the same as 0

For more information on mass-dynamic virtual hosts refer to mod_vhost_alias.

CGI tasks

This topic provides step-by-step tasks for configuring various HTTP Server attributes that affect how CGI programs are run within your Web server.

Related concepts

"CGI" on page 39

The Common Gateway Interface (CGI) specification was introduced to enable and standardize the interface between Web servers and external programs. The CGI is a relatively simple, platform and language independent, industry-standard interface for Web application development. Programs that implement the CGI standard are commonly called *CGI programs*.

Setting up CGI jobs

Use this topic to set up CGI jobs that can run on your IBM HTTP Server for i Web server.

To set CGI settings, do the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select the context you want to work with from the **Server area** list.
5. Expand **Server Properties**.
6. Click **Dynamic Content and CGI**.
7. Click the **General Settings** tab in the form.
8. Enter the values associated with your CGI jobs.
9. Click **OK**.

See CGI Programming examples for sample CGI programs.

Setting up persistent CGI jobs

Use this topic to set up persistent CGI jobs that can run on your IBM HTTP Server for i Web server.

Persistent CGI is an extension to the CGI interface. It allows a CGI program to remain active across multiple browser requests and maintain a client session. To set persistent CGI settings, do the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Select the context you want to work with from the **Server area** list.
5. Expand **Server Properties**.
6. Click **Dynamic Content and CGI**.
7. Click the **Persistent CGI** tab in the form.
8. Enter the values associated with the persistent CGI jobs.
9. Click **OK**.

See CGI Programming examples for sample CGI programs.

Apache module tasks

This topic provides step-by-step tasks for configuring Apache modules to extend the functionality of your IBM HTTP Server for i Web server.

Related concepts

"Apache modules" on page 41

Modules are service programs that can be dynamically linked and loaded to extend the nature of the HTTP Server.

Setting up Apache modules

Use this topic to configure an Apache module in order to extend the functionality of your IBM HTTP Server for i Web server.

To add an Apache model to your Web server, you will need to add the `LoadModule` directive to your HTTP Server configuration. Do the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select your HTTP Server from the **Server** list.
4. Expand **Tools**.
5. Click **Edit Configuration File**.
6. Add the following, where ***MODULELIB*** is the library in which the module service program resides and ***MODULE*** is the name of your module:

   ```
   LoadModule Module /QSYS.LIB/MODULELIB.LIB/MODULE.SRVPGM
   ```

7. Add any additional directives needed to the configuration file. Note that the compiled service program, MOD_FOOTER, is located in the QSYS directory. The " . " represent existing lines in the configuration file.

   Example (replace ***MYLIB.LIB*** with your library name):

   ```
   LoadModule footer_module /QSYS.LIB/MYLIB.LIB/MOD_FOOTER.SRVPGM
   .
   .
   .
   <Directory "/www/mydocs/htdocs">
      SetOutputFilter FOOTERFILTER
      FooterFile footer.hf
   </Directory>
   ```

   The **FOOTERFILTER** output filter and the **FooterFile** directive are defined in MOD_FOOTER, the module that was compiled and configured.

8. Click **OK**.

Programming

This topic provides information on CGI programming, Apache module programming, APIs, and other programming topics for the IBM HTTP Server for i Web server.

Application Programming Interface

This topic lists the application programming interfaces (APIs) that are supported by IBM HTTP Server for i.

Apache module APIs

This topic provides information about the Apache portable runtime (APR) and application programming interfaces (APIs) for the IBM HTTP Server for i. These APIs are generally used to write cross-platform Apache modules.

Links to the HTTP Server and APR APIs are listed below. To write, compile, and configure an HTTP Server module, you will need to use both APR and HTTP Server APIs.

Note: The APR APIs are actually independent of the HTTP Server. Users of APR can create their own applications using APR and not touch any Web servers.

- APR Core APIs - The APR APIs are not application specific and may be used with different server types and applications.
- HTTP Server APIs - The HTTP Server APIs are HTTP Server specific and are not part of the APR APIs.

"Module mod_example" on page 393 provides a simple example of the use of the HTTP Server and APR APIs.

Related information

"Apache module programming" on page 194
The IBM HTTP Server for i supports the extension of the functionality of the HTTP Server through the use of third-party Apache modules.

Developer Documentation for Apache 2.4
Apache Portable Runtime Project

CGI APIs

This topic provides information about IBM HTTP Server for i APIs for CGI applications.

HTTP Server supports the APIs listed below in C++, REXX, ILE C, ILE COBOL, and ILE RPG programming languages. Although all APIs are supported in all of these languages, most ILE C CGI applications will only need to use `QtmhCvtDB()`, `QzhbCgiParse()`, or `QzhbCgiUtils()`. This is because ANSI C can work with stdin, stdout, and environment variables directly. ILE C CGI applications use ANSI C function calls to work with stdin, stdout, environment variables, and string functions for parsing stdin and environment variable data.

To use these APIs in a CGI application, you must bind the CGI program to *SRVPGM QZHBCGI in library QHTTPSVR. ILE C programs must include header file QSYSINC/H(QZHBCGI). CGI application programs must be written and compiled in Integrated Language Environment® ILE C, ILE RPG, and ILE COBOL.

- "Get Environment Variable (QtmhGetEnv) API" on page 136
- "Put Environment Variable (QtmhPutEnv) API" on page 137
- "Read from Stdin (QtmhRdStin) API" on page 138
- "Write to Stdout (QtmhWrStout) API" on page 139
- "Convert to DB (QtmhCvtDB) API" on page 134
- "Parse QUERY_STRING Environment Variable or Post stdin data (QzhbCgiParse) API" on page 140
- "Produce Full HTTP Response (QzhbCgiUtils) API" on page 148
- "Send or Save CGI Stateful Data (QzhbCgiSendState_r) API" on page 147

- “Receive CGI Stateful Data (QzhbCgiRecvState_r) API” on page 143
- “Put environment variable with CCSID (QzsrPutEnvCCSID) API” on page 144
- “Get environment variable with CCSID (QzsrGetEnvCCSID) API” on page 145

Convert to DB (QtmhCvtDB) API

The `QtmhCvtDB()` API provides an interface for CGI programs to parse CGI input, defined as a series of keywords and their values, into a buffer which is formatted according to a DDS file specification.

Required Parameter Group:

1	Qualified database file name	Input	Char(20)
2	Input string	Input	Char(*)
3	Length of input string	Input	Binary(4)
4	Response variable	Output	Char(*)
5	Length of response variable	Input	Binary(4)
6	Length of response available	Output	Binary(4)
7	Response code	Output	Binary(4)
8	Error Code	I/O	Char(*)

CGI input data, which comes to the CGI program as character data, will be converted by the `QtmhCvtDB()` API to the data type defined for the keyword by the corresponding field name in the input DDS file. Language statements, such as the ILE C #pragma mapinc statement, provide the ability to map the returned structure with field names defined in the DDS file. See the appropriate language user's guide for details.

Note: `QtmhCvtDB()` API is not allowed in CGI mode %%BINARY%%.

The following DDS field types are handled:

- **A** - Alphanumeric (see note 1 below)
- **P** - Packed Decimal (see note 2 below)
- **S** - Zoned Decimal
- **F** - Floating Point
- **T** - Time
- **L** - Date
- **Z** - Timestamp
- **B** - Binary (see note 3 below)
- **O** - DBCS

The following DDS field types are not handled:

- **H** - Hexadecimal (see note 4 below)
- **G** - Graphic
- **J** - DBCS
- **E** - DBCS

Notes:

1. The VARLEN keyword is not supported.
2. When using a packed decimal field, the #pragma mapinc() must use **_P** the option, to create a packed structure.
3. Input to Binary fields is converted to integer. The DDS file specification must declare zero decimal positions (for example, “xB 0”, where x is 1-9).

4. ILE C converts hex DDS field data to character fields. Since the input stream to `QtmhCvtDB()` is a text string, the “hex” data would be converted from text to character fields. Therefore, using the **A** (Alphanumeric) field type to obtain the same conversion.

Required parameter group

Qualified database file name
Input:CHAR(20)

The input variable containing the name of the database file defining field names and data types for the keywords anticipated in the input to the CGI program. Typically, the database file is generated using DDS to define the fields corresponding to the keywords anticipated in the CGI inputs. The first 10 characters contain the database file name, and the second 10 characters contain the library name.

Input string
INPUT:CHAR(*)

The input variable containing the string of CGI input parameters to be parsed. When the environment variable REQUEST_METHOD indicates that the method is GET, characters up to the first ? are ignored. The string must meet the format requirements for CGI input keyword strings.

Length of input string
INPUT:BINARY(4)

The input variable containing the length of the character string that contains the CGI input parameters to be parsed. The length of the string must be greater than 0.

Response variable
OUTPUT:CHAR(*)

The output variable which is to contain the structure mapped according to the database file describing the input parameters anticipated by the CGI program.

Length of response available
INPUT:BINARY(4)

The input variable containing the total length of the buffer into which the CGI input parameters will be parsed.

Length of response
OUTPUT:BINARY(4)

The output variable that contains the length of the response. If the response variable is too small to contain the entire response, this parameter will be set to the size that is required to contain the entire response.

Response code
OUTPUT:BINARY(4)

A code that indicates the status of the request.

- **0** - All keywords have been translated according the database file.
- **-1** - The database file contains definitions for structure fields for which the CGI input has no corresponding keyword.
- **-2** - The CGI input contains one or more keywords for which the database file contains no corresponding field.
- **-3** - A combination of the condition for response codes -1 and -2 has been detected.
- **-4** - An error occurred while converting the CGI input string to the DDS defined data types. The data may or may not be usable.
- **-5** - This API is not valid when a program is not called by HTTP Server. No data parsing is done.
- **-6** - This API is not valid when operating in %%BINARY%% mode. No data parsing is done.

Error Code
I/O CHAR(*)

The structure in which to return error information. For the format of the structure and for details on how to process API errors, see the API error reporting topic in the IBM i Information Center.

Error messages

CPF24B4 E
Severe Error while addressing parameter list.

CPF3C17 E
Error occurred with input data parameter.

CPF3C19 E
Error occurred with receiver variable specified.

CPF3CF1 E
Error code parameter not valid.

CPF9810 E
Library &1 not found.

CPF9812 E
File &1 in library &2 not found.

CPF9822 E
Not authorized to file &1 in library &2

Get Environment Variable (QtmhGetEnv) API

The `QtmhGetEnv()` API allows you to get the value set by the IBM HTTP Server for i server for a particular HTTP environment variable.

Required Parameter Group:

1	Receiver variable	Output	Char(*)
2	Length of receiver variable	Input	Binary(4)
3	Length of response	Output	Binary(4)
4	Request variable	Input	Char(*)
5	Length of request variable	Input	Binary(4)
6	Error Code	I/O	Char(*)

Required parameter group

Receiver variable
OUTPUT:CHAR(*)

The output variable that contains the value set by the server for the requested environment variable. In CGI input mode %%MIXED%%, this value will be in CCSID 37; otherwise, it will be in the CCSID of the current job. Note that the QUERY_STRING in %%BINARY%% mode is not converted by the server.

Length of receiver variable
INPUT:BINARY(4)

The input variable containing the length of the space provided to receive the environment variable value.

Length of response
OUTPUT:BINARY(4)

The output variable that contains the length of the environment variable value. When the API is unable to determine the value for the requested environment variable, the length of the environment variable value is set to zero. When the size required for the environment variable value is larger than the length of the receiver variable, the size required to receive the value is returned.

Request variable
INPUT:CHAR(*)

The input variable containing the desired environment variable name.

Length of request variable
INPUT:BINARY(4)

The input variable containing the length (without trailing blanks) of the desired environment variable name.

Error Code
I/O:CHAR(*)

The structure in which to return error information. For the format of the structure and for details on how to process API errors, see the API error reporting topic in the IBM i Information Center.

Error messages

CPF24B4 E
Severe Error while addressing parameter list.

CPF3C17 E
Error occurred with input data parameter.

CPF3C19 E
Error occurred with receiver variable specified.

CPF3CF1 E
Error code parameter not valid.

Note: The Environment Variable APIs provide the `getenv()` (Get Value of Environment Variable) function necessary to retrieve environment variables in ILE C. Therefore, programs written in ILE C do not need to use the `QtmhGetEnv()` API. This API, for ILE C, is more difficult to use (and is slower) than the `getenv()` API on which it is based.

Programs that need CCSID conversion support for environment variables should use the Get environment variable with CCSID (QzsrGetEnvCCSID) API.

Put Environment Variable (QtmhPutEnv) API

The `QtmhPutEnv()` API allows you to set or create a job-level environment variable.

Required Parameter Group:

1	Environment string	Input	Char(*)
2	Length of environment string	Input	Binary(4)
3	Error Code	I/O	Char(*)

Required parameter group

Environment string
INPUT:CHAR(*)

The input string of the form: "`envVar=value`". Where "`envVar`" is the name of the new or existing environment variable, and "`value`" is the value you want to set the environment variable. Note that they are both case sensitive. The server expects this value to be in the CCSID of the job.

Length of environment string
INPUT:BINARY(4)

The input variable that contains the length of the environment string parameter (without trailing blanks). For example, the length of the environment string "`envVar=value`" is twelve.

Error Code
I/O:CHAR(*)

The structure in which to return error information. For the format of the structure and for details on how to process API errors, see the API error reporting topic in the IBM i Information Center.

Error messages

CPF24B4 E
Severe Error while addressing parameter list.

CPF3021 E
The value specified for the argument is not correct.

CPF3C17 E
Error occurred with input data parameter.

CPF3CF1 E
Error code parameter not valid.

CPF3408 E
The address used for an argument is not correct.

CPF3460 E
Storage allocation request failed.

CPF3474 E
Unknown system state.

CPF3484 E
A damaged object was encountered.

Note: The Environment Variable APIs provide the `putenv()` (Put Value in Environment Variable) function necessary to set (or create and set) an environment variable. Therefore, programs written in ILE C do not need to use the `QtmhPutEnv()` API. This API, for ILE C, is more difficult to use (and is slower) than the `putenv()` API on which it is based.

Programs that need CCSID conversion support for environment variables should use the Put environment variable with CCSID (QzsrPutEnvCCSID) API.

Read from Stdin (QtmhRdStin) API

The `QtmhRdStin()` API allows CGI programs that are written in languages other than ILE C to read from stdin. CGI programs read from stdin when the request from the browser indicates the method that is POST. This API reads what the server has generated as input for the CGI program.

Required Parameter Group:

1	Receiver variable	Output	Char(*)
2	Length of receiver variable	Input	Binary(4)
3	Length of response available	Output	Binary(4)
4	Error Code	I/O	Char(*)

Important: CGI input data is only available from standard input when the client request is submitted with method POST. There are no standard input data when the method is GET or HEAD. In addition, the Content_Length environment variable is set only when the Request_Method is POST.

The program reads all of the data in a single request. This is because the API treats each request as a request for data starting at its beginning. The API handles each request as if it was the only request.

The length of the data returned by QtmhRdStin includes all the data from stdin. This includes line-formatting characters that are normally a part of the POST data as defined by the CGI specification.

Note that the format of this data is different depending on the CGI input mode being used. For %%MIXED%% mode, the data will have American National Standard Code for Information Interchange (ASCII) hexadecimal encoded characters. For %%EBCDIC%% mode, all data including hexadecimal will be in the CCSID of the job. The server performs no conversion for %%BINARY%% mode.

Required parameter group

Receiver variable
OUTPUT:CHAR(*)

The output variable that contains the data read from stdin. In CGI input mode %%MIXED%%, this data is in the CCSID of the job except that the encoded characters "%xx" are still represented by the ASCII 819 octet. In %%EBCDIC%% mode, this data is in the CCSID of the job, including the escape sequences. In %%BINARY%% mode, the data is in the code page sent by the browser.

Length of receiver variable
INPUT:BINARY(4)

The input variable containing the number of bytes that are to be read from stdin.

Length or response available
OUTPUT:BINARY(4)

The output variable containing the length of the data read from stdin. If there is no data available from stdin, this variable will be set to zero.

Error Code
I/O:Char(*)

The structure in which to return error information. For the format of the structure and for details on how to process API errors, see the API error reporting topic in the IBM i Information Center.

Error messages

CPF24B4 E
Severe Error while addressing parameter list.

CPF3C17 E
Error occurred with input data parameter.

CPF3C19 E
Error occurred with receiver variable specified.

CPF3CF1 E
Error code parameter not valid.

Write to Stdout (QtmhWrStout) API

The `QtmhWrStout()` API provides the ability for CGI programs that are written in languages other than ILE C to write to stdout.

Required Parameter Group:

1	Data variable	Input	Char(*)
2	Length of data variable	Input	Binary(4)
3	Error Code	I/O	Char(*)

Required parameter group

Data variable
Input:CHAR(*)

The input variable containing the data to write to stdout.

Length of data variable
INPUT:BINARY(4)

The input variable contains the length of the data written to stdout. The length of the data must be larger than 0.

Error Code
I/O:CHAR(*)

The structure in which to return error information. For the format of the structure and for details on how to process API errors, see the API error reporting topic in the IBM i Information Center.

Error messages

CPF24B4 E
Severe Error while addressing parameter list.

CPF3C17 E
Error occurred with input data parameter.

CPF3CF1 E
Error code parameter not valid.

Note: CGI programs written in the ILE C language do not require a special API to write data to stdout. The following example shows how a CGI program might write to stdout:

```
fwrite(buffer,1,sizeof(buffer),stdout);
```

CGI programs are expected to produce data in the stdout that is formatted according to the CGI interface specification. The `QtmhWrStout()` API provides no line formatting; the user of the API must perform prescribed formatting which includes the requirement for text line characters (such as new line). Errors are not indicated for data that is not formatted per CGI requirements.

Parse QUERY_STRING Environment Variable or Post stdin data (QzhbCgiParse) API

The `QzhbCgiParse()` API allows you to parse the QUERY_STRING environment variable, in the case of the GET method, or standard input, in the case of POST method, for CGI scripts. If the QUERY_STRING environment variable is not set, the `QzhbCgiParse()` API reads the CONTENT_LENGTH characters from its input. All return output is written to its standard output.

Required Parameter Group:

1	Command string	Input	Char(*)
2	Output format	Input	Char(*)
3	Target Buffer	Output	Char(*)
4	Length of Target Buffer	Input	Binary(4)
5	Length of response	Output	Binary(4)
6	Error Code	I/O	Char(*)

You can only call `QzhbCgiParse()` once for the POST method. To use this API with the POST method, you would first want to read all of stdin and assign it to the QUERY_STRING environment variable. You would then change the environment variable REQUEST_METHOD to GET.

This API does not work with the %%MIXED%% CGI input mode.

Required parameter group

Command string
Input:CHAR(*)

The command string is a null ended string for flags and modifiers. At least one space must separate each flag. There is a one-character equivalent for each flag. The following flags are supported:

-a[gain] ***continuation-handle***
The continuation-handle is the value returned to the caller in the target buffer when only partial information is returned. This flag is not valid on the first call to this API. It is used to retrieve the next set of information that would have been returned on a previous call if there had been enough space in the target buffer. All other flags must be the same as the previous call. Incomplete or inaccurate information may result if all other flags are not the same.

Note: This flag can only be used for the CGII0200 format.

-k[eywords]
Parses QUERY-STRING for keywords. Keywords are decoded and written to the target buffer, one per line.

-f[orm]
Parses QUERY_STRING as form request. The field names will be set as environment variables with the prefix **FORM_**. Field values are the contents of the variables.

-v[alue] *field-name*
Parses QUERY_STRING as form request. Returns only the value of *field-name* in the target buffer.

-r[ead]
Reads CONTENT_LENGTH characters from standard input and writes them to the target buffer.

-i[nit]
If QUERY_STRING is not set, reads the value of standard input and returns a string that can be used to set QUERY_STRING.

-s[ep] *separator*
Specifies the string that is used to separate multiple values. If you are using the **-value** flag, the default separation is newline. If you are using the **-form** flag, the default separator is a comma (,).

-p[refix] *prefix*
Used with **-POST** and **-form** to specify the prefix to use when creating environment variable names. The default is "**FORM_**".

-c[ount]
Used with -**keywords**, **-form**, and **-value**, returns a count of items in the target buffer that is related to these flags:

- **-keywords**: Returns the number of keywords.
- **-form**: Returns the number of unique fields (multiple values are counted as one).
- **-value** *field-name*: Returns the number of values for *field-name*. If there is no field that is named *field-name*, the output is 0.

-number
Used with **-keywords**, **-form**, and **-value**. Returns the specified occurrence in the target buffer related to the following flags:

- **-keywords**: Returns the n'th keyword. For example, **-2 -keywords** writes the second keyword.
- **-form**: Returns all the values of the n'th field.
- **-value** *field-name*: Returns the n'th of the multiple values of field *field-name*.

-Post
Information from standard input is directly decoded and parsed into values that can be used to set environment variables. This flag is the equivalent to consecutive use of the **-init** and **-form** options.

-F[sccsid] *FileCCSID*
The *FileCCSID* is the name of the file system CCSID used in CCSID conversion when processing the CGI input data. The CGI program wants the data to be returned in this CCSID. It only applies when the server is using %%BINARY%% CGI conversion mode. When an unknown CCSID is set, the current value of the CGI_EBCDIC_CCSID environment variable is used.

-N[etccsid] *NetCCSID*
The *NetCCSID* is the network CCSID used in CCSID conversion when processing the CGI input data. This is the CCSID that the data is presumed to be in at this time (as assumed or as set in a charset tag). It only applies when the server is using %%BINARY%% CGI Input mode. When an unknown CCSID is set, the current value of the CGI_ASCII_CCSID environment variable is used.

Output format
INPUT:CHAR(*)

The format of the data to be returned in the target buffer. You must use one of the following format names:

- **CGII0100** - This format is the free-form format returned to standard output on other platforms.
- **CGII0200** - CGI form variable format. This format only applies to the -form and -POST option.

Target Buffer
OUTPUT:CHAR(*)

This is output buffer that contains the information requested by the command string (if any).

Length of Target Buffer
INPUT:BINARY(4)

The length of the target buffer provided to receive the API output.

Length of Response
OUTPUT:BINARY(4)

The actual length of the information returned in the target buffer.

Error Code
I/O:CHAR(*)

The structure in which to return error information. For the format of the structure and for details on how to process API errors, see the API error reporting topic in the IBM i Information Center.

CGII0200 Format

Offset Decimal	Offset Hexadecimal	Type	Field
0	0	Binary(4)	Bytes returned
4	4	Binary(4)	Bytes available
8	8	Char(20)	Continuation handle
28	1C	Binary(4)	Offset to first variable entry
32	20	Binary(4)	Number of variable entries returned
36	24	Char(*)	Reserved
		Binary(4)	Length of variable entry (see note below)
		Binary(4)	Length of variable name (see note below)
		Char(*)	Variable name (see note below)
		Binary(4)	Length of variable value (see note below)
		Char(*)	Variable value (see note below)
		Char(*)	Reserved (see note below)

Note: These fields contain variable entry information and are repeated for each variable entry returned.

Field descriptions

Bytes returned
The number of bytes of data returned.

Bytes available
The number of bytes of data available to be returned. All available data is returned if enough space is available.

Continuation handle
The handle that is returned when more data is available to return, but the target buffer is not large enough. The handle indicates the point in the repository that the retrieval stopped. If the handle is used on the next call to the API (using the **-again** flag), the API returns more data starting at the point that the handle indicates. This field is set to blanks when all information is returned.

Offset to first variable entry
The offset to the first variable entry returned. The offset is from the beginning of the structure. If no entries are returned, the offset is set to zero.

Number of variable entries returned
The number of variable entries returned. If the target buffer is not large enough to hold the information, this number contains only the number of variables actually returned.

Reserved
This field is ignored.

Length of variable entry
The length of this variable entry. This value is used in determining the offset to the next variable entry. Note that this value is always set to a multiple of four.

Length of variable name
The length of the variable name for this entry.

Variable name
A field name as found in the form data. If the server is using %%EBCDIC%% or %%MIXED%% CGI mode, this value is in the CCSID of the job. If the server is using %%BINARY%% CGI mode, this value is in the codepage as sent from the browser unless **-fsccsid** is specified on the API invocation. If **-fsccsid** is specified, the value is in that CCSID.

Length of variable value
The length of the variable value for this entry.

Variable value
A field name as found in the form data. If the server is using %%EBCDIC%% or %%MIXED%% CGI mode, this value is in the CCSID of the job. If the server is using %%BINARY%% CGI mode, this value is in the codepage as sent from the browser unless **-fsccsid** is specified on the API invocation. If **-fsccsid** is specified, the value is in that CCSID.

Error messages

CPF24B4 E
Severe Error while addressing parameter list.

CPF3C17 E
Error occurred with input data parameter.

CPF3C19 E
Error occurred with receiver variable specified.

CPF3CF1 E
Error code parameter not valid.

Note: Error messages are added to the error log or script log except for those listed.

Receive CGI Stateful Data (QzhbCgiRecvState_r) API

The `QzhbCgiRecvState_r()` API allows a high availability CGI programs to receive the CGI stateful data.

Required Parameter Group:

1	Target buffer	Output	Char(*)
2	Length of target buffer	Input	Binary(4)
3	Length of response	Output	Binary(4)

4	Continuation handle	I/O	Char(*)
5	Error Code	I/O	Char(*)

The HTTP Server receives the data for the next request to the stateful CGI so that if a failover occurs the data is available on the backup system (new primary system). This API is used with API `QzhbCgiSendState_r()`.

Required parameter group

Target buffer
OUTPUT:CHAR(*)

The target buffer containing the state of a high availability CGI program.

Length of target buffer
INPUT:BINARY(4)

The length of the target buffer that receives the API output. The minimum length is 1 byte and the maximum length is 61,000 bytes.

Length of response
OUTPUT:BINARY(4)

The length of response is the actual length of the information that is returned from the target buffer. If this value is greater than the length of the target buffer, then there is more state to read. The difference between these two values represents the amount of bytes the caller should read in subsequent calls to this API.

Continuation handle
I/O:CHAR(*)

The continuation handle is the handle that is returned when more data is available to return, but the target buffer is not large enough. The caller must pass this handle to the `QzhbCgiRecvState_r()` API on subsequent calls as it was received from the previous call. On the first call to this API, the continuation handle must be set to 0 (equivalent to NULL in C). The caller must not allocate, deallocate, or modify the continuation handle. This field is set to 0 when all information is returned.

Error code
I/O:CHAR(*)

The structure in which to return error information. For the format of the structure, see the API error reporting topic in the IBM i Information Center.

Error messages

CPF24B4 E
Severe Error while addressing parameter list.

CPF3C17 E
Error occurred with input data parameter.

CPF3CF1 E
Error code parameter not valid.

HTP4005 E
Highly Available CGI invoked `QzhbCgiRecvState_r()` after it had already received the entire state.

HTP4006 E
`QzhbCgiRecvState_r()` was called when there was no state.

Put environment variable with CCSID (QzsrPutEnvCCSID) API

The `QzsrPutEnvCCSID()` API allows a CGI program to set or create a job-level environment variable. CCSID support allows you to specify the encoding of the environment string.

Required parameter group:

Environment string	Input	Char(*)
Lenth of environment string	Input	Binary(4)
CCSID of environment string	Input	Binary(4)
Error code	I/O	Char(*)

Required parameter group

Environment string
INPUT:CHAR(*)

The input string of the form: *`envVar=value`*. Where *envVar* is the name of the new or existing environment variable, and *value* is the value you want to set the environment variable. They are both case sensitive. The `QzsrPutEnvCCSID()` API expects this value to be in the CCSID of the environment string.

Length of environment string
INPUT:BINARY(4)

The input variable that contains the length of the environment string parameter (without trailing blanks). For example, the length of the environment string `envVar=value` is twelve.

CCSID environment string
INPUT:BINARY(4)

The CCSID to be used for the encoding of the environment string. The valid values for this parameter are:

- **0** : The CCSID of the environment string.
- **1-65533** : A valid CCSID in this range must be specified or an error is returned.

Error code
I/O:CHAR(*)

The structure in which to return error information. Error messages are added to the error log or script log except for those listed below. For the format of the structure and for details on how to process API errors, see the API error reporting topic in the IBM i Information Center.

Error messages

CPF24B4 E
Severe error while addressing parameter list.

CPF3CF1 E
Error code parameter not valid.

Note: The Environment Variable APIs provide the `putenv()` (Put Value in Environment Variable) function necessary to set (or create and set) an environment variable. Programs that need CCSID conversion support for environment variables should use the `QzsrPutEnvCCSID()` API. See also "Get environment variable with CCSID (QzsrGetEnvCCSID) API" on page 145.

Get environment variable with CCSID (QzsrGetEnvCCSID) API

The `QzsrvGetEnvCCSID()` API allows a CGI program to get the value set by the server for a particular HTTP environment variable using CCSID support for input and output values.

Required parameter group:		
Receiver variable	Output	Char(*)
Length of receiver variable	Input	Binary(4)
Length of response	Output	Binary(4)
Request variable	Input	Char(*)

Length of request variable	Input	Binary(4)
CCSID of request variable	Input	Binary(4)
CCSID of returned environment variable	Input	Binary(4)
Error Code	I/O	Char(*)

Required parameter group

Receiver variable
OUTPUT:CHAR(*)

The output variable that contains the value set by the server for the requested environment variable. This value will be returned in the CCSID specified for the returned environment variable.

The output variable that contains the value set by the server for the requested environment variable. This value will be returned in the CCSID specified for the returned environment variable.

Length of receiver variable
INPUT:BINARY(4)

The input variable containing the length of the space provided to receive the environment variable value.

Length of response
OUTPUT:BINARY(4)

The output variable that contains the length of the environment variable value. When the `QzsrvGetEnvCCSID()` API is unable to determine the value for the requested environment variable, the length of the environment variable value is set to zero. When the size required for the environment variable value is larger than the length of the receiver variable, the size required to receive the value is returned.

Request variable
INPUT:CHAR(*)

The input variable containing the desired environment variable name.

Length of request variable
INPUT:BINARY(4)

The input variable containing the length (without trailing blanks) of the desired environment variable name.

CCSID of request variable
INPUT:BINARY(4)

The CCSID to be used for the encoding of the request variable. The valid values for this parameter are:

- **0** : The CCSID of the job.
- **1-65533** : A valid CCSID in this range must be specified or an error is returned.

CCSID of returned environment variable
INPUT:BINARY(4)

The CCSID to be used for the encoding of the returned environment variable. The valid values for this parameter are:

- **0** : The CCSID of the job.
- **1-65533** : A valid CCSID in this range must be specified or an error is returned.

Error code
I/O:CHAR(*)

The structure in which to return error information. Error messages are added to the error log or script log except for those listed below. For the format of the structure and for details on how to process API errors, see the API error reporting topic in the IBM i Information Center.

Error messages

CPF24B4 E
Severe error while addressing parameter list.

CPF3CF1 E
Error code parameter not valid.

Note: The Environment Variable APIs provide the `getenv()` (Get Value of Environment Variable) function necessary to retrieve environment variables in ILE C. Programs that need CCSID conversion support for environment variables should use the "Get environment variable with CCSID (QzsrGetEnvCCSID) API" on page 145.

Send or Save CGI Stateful Data (QzhbCgiSendState_r) API

The `QzhbCgiSendState_r()` API allows a high availability CGI program to send or save CGI stateful data.

Required Parameter Group:

1	CGI's state string	Input	Char(*)
2	Length of the string	Input	Binary(4)
3	Error Code	I/O	Char(*)

The HTTP Server saves the data for the next request to the stateful CGI so that if a failover occurs the data is available on the backup system (new primary system).

Required parameter group

CGI's state string
INPUT:CHAR(*)

The CGI's state string is the state of a high availability CGI that the Web server stores and passes to the CGI with the subsequent request. This string can consist of any information necessary for the CGI state (for example, a structure of several variables or fields). The Web server treats the contents of the state as binary data.

Length of the string
INPUT:BINARY(4)

The length of the CGI's state. The minimum length is 1 byte and the maximum length is 61,000 bytes.

Error code
I/O:CHAR(*)

The structure in which to return error information. For the format of the structure, see the API error reporting topic in the IBM i Information Center.

Error messages

CPF24B4 E
Severe Error while addressing parameter list.

CPF3C17 E
Error occurred with input data parameter.

CPF3CF1 E
Error code parameter not valid.

Produce Full HTTP Response (QzhbCgiUtils) API

The `QzhbCgiUtils()` API allows a CGI program to produce a full HTTP 1.0/1.1 response for non-parsed header CGI programs. This API provides functionality similar to the **`cgiutils`** command used by other HTTP server platforms.

Required Parameter Group:

1	Command string	Input	Char(*)
2	Error code	I/O	Char(*)

Required parameter group

Command string
INPUT:CHAR(*)

The command string is a null ended string of flags and modifiers. Each flag must be separated by at least one space. The following flags are supported:

-nodate
Does not return the Date: header to the browser.

-noel
Does not return a blank line after headers. This is useful if you want other MIME headers after the initial header lines.

-status *nnn*
Returns full HTTP response with status code *nnn*, instead of only a set of HTTP headers. Do not use this flag if you only want the Expires: header.

-reason *explanation*
Specifies the reason line for the HTTP response. You can only use this flag with the **-status** flag. If the explanation text contains more than one word, you must enclose it in parentheses.

-ct [*type/subtype*]
Specifies MIME Content-Type header to return to the browser. If you omit the type/subtype, the MIME content type is set to the default text/plan.

-charset *character-set*
Used with the **-ct** flag to specify the charset tag associated with the text Content-Types.

-ce *encoding*
Specifies MIME Content-Encoding header to return to the browser.

-cl *language-code*
Specifies MIME Content-Language header to return to the browser.

-length *nnn*
Specifies MIME Content-Length header to return to the browser.

-expires *Time-Spec*
Specifies MIME Expires header to return to the browser. This flag specifies the time to live in any combination of years, months, days, hours, minutes, and seconds. The time must be enclosed in parentheses. For example:

```
-expires (2 days 12 hours)
```

-expires now
Produces an Expires: header that matches the Date: header to return to the browser.

-uri *URI*
Specifies the Universal Resource Identifier (URI) for the returned document. URI can be considered the same as URL.

-extra *xxx: yyy*
Specifies an extra header that cannot otherwise be specified.

Error Code
I/O:CHAR(*)

The structure in which to return error information. For the format of the structure and for details on how to process API errors, see the API error reporting topic in the IBM i Information Center.

Error messages

CPF24B4 E
Severe Error while addressing parameter list.

CPF3C17 E
Error occurred with input data parameter.

CPF3CF1 E
Error code parameter not valid.

HTTP Server configuration APIs

This topic provides information about IBM HTTP Server for i configuration APIs, server instance APIs, and group APIs.

HTTP Server supports the APIs listed below in C++, REXX, ILE C, ILE COBOL, and ILE RPG programming languages.

Configuration APIs

The configuration APIs are in *SRVPGM QZHBCONF in library QHTTPSVR. ILE C programs must include header file QHTTPSVR/H(QZHBCONF). While each individual API lists its own authorities, the following authorities are needed to run all configuration APIs:

- *OBJOPR, *READ, *ADD, and *EXECUTE to the QUSRSYS library
- *READ, *ADD, *DELETE, *EXECUTE, *OBJOPR, *OBJEXIST, and either *OBJMGT or *OBJALTER to the QUSRSYS/QATMHTTPC file
- *READ, *ADD, *DELETE, *EXECUTE, *OBJOPR, *OBJEXIST, and either *OBJMGT or *OBJALTER to the QUSRSYS/QATMHTTPA file

Note: The QUSRSYS/QATMHTTPA file is the administration (ADMIN) server configuration file.

- “Add Config Object (QzuiAddConfigObject) API” on page 163
- “Change Config Object Value (QzuiChangeConfigObject) API” on page 165
- “Close Apache Config File (QzuiCloseConfig) API” on page 168
- “Find Config Object (QzuiFindConfigObject) API” on page 171
- “Open Apache Config File (QzuiOpenConfig) API” on page 177
- “Remove Config Object (QzuiRemoveConfigObject) API” on page 178

Server instance APIs

The server instance APIs are in *SRVPGM QZHBCONF in library QHTTPSVR. ILE C programs must include header file QHTTPSVR/H(QZHBCONF). While each individual API lists its own authorities, the following authorities are needed to run all server instance APIs:

- *OBJOPR, *READ, *ADD, and *EXECUTE to the QUSRSYS library
- *READ, *ADD, *DELETE, *EXECUTE, *OBJOPR, *OBJEXIST, and either *OBJMGT or *OBJALTER to the QUSRSYS/QATMHINSTC file
- *READ, *ADD, *DELETE, *EXECUTE, *OBJOPR, *OBJEXIST, and either *OBJMGT or *OBJALTER to the QUSRSYS/QATMHINSTA file

Note: The QUSRSYS/QATMINSTA file is the administration (ADMIN) server instance file.

- “Change Apache Server Instance Data (QzuiChangeInstanceData) API” on page 166

- “Create Apache Server Instance (QzuiCreateInstance) API” on page 169
- “Get Apache Server Instance Data (QzuiGetInstanceData) API” on page 173
- “Get Server Instance Names (QzuiGetInstanceNames) API” on page 175
- “Get Instance Type (QzuiGetInstanceType) API” on page 176

Group file APIs

The group file APIs are in *SRVPGM QZHBCONF in library QHTTPSVR. ILE C programs must include header file QHTTPSVR/H(QZHBCONF).

- “Create a new Group File (QzhbCreateGroupList) API” on page 153
- “Read a Group File into Memory (QzhbOpenGroupList) API” on page 161
- “Free Group File from Memory (QzhbCloseGroupList) API” on page 152
- “Retrieve the next Group in the Group List (QzhbGetNextGroup) API” on page 157
- “Locate a named group in a Group List (QzhbFindGroupInList) API” on page 154
- “Retrieve the Name of a Group (QzhbGetGroupName) API” on page 156
- “Add a new Group to the end of a Group List (QzhbAddGroupToList) API” on page 150
- “Remove a Group from a Group List (QzhbRemoveGroupFromList) API” on page 162
- “Retrieve the next User in the Group (QzhbGetNextUser) API” on page 158
- “Locate a User in a Group (QzhbFindUserInGroup) API” on page 155
- “Retrieve the Name of a User (QzhbGetUserString) API” on page 159
- “Add a new user to the end of a Group (QzhbAddUserToGroup) API” on page 151
- “Remove a User or Element from a Group (QzhbRemoveUserFromGroup) API” on page 163

Add a new Group to the end of a Group List (QzhbAddGroupToList) API

In theIBM HTTP Server for i, use the `QzhbAddGroupToList()` API to add a new group to an in-memory group list.

Required Parameter Group:

1	grplist	Input	Binary(4)
2	group	Input	Char(*)
3	group_len	Input	Binary(4)
4	grp	Output	Binary(4)
5	errcode	I/O	Char(*)

Threadsafe: Yes

Authorities and locks

None.

Required parameter group

grplist
INPUT:BINARY(4)

The group list handle returned from a call to the `QzhbCreateGroupList()` or `QzhbOpenGroupList()` API.

group
INPUT:CHAR(*)

The group name to add to the list.

group_len
INPUT:BINARY(4)

The length of the group name. The length must be greater than or equal to 1.

grp
OUTPUT:BINARY(4)

The handle of the newly created group, or the handle of an existing group if the named group already exists. Attempting to add a group that already exists is not considered an error by the system.

errcode
I/O:CHAR(*)

The structure in which to return error information.

Error messages

CPF3CF1 E
Error code parameter not valid.

CPF3C1D E
Input variable length in parameter &1 not valid.

HTPA001 E
Input parameter &1 not valid.

HTPA203 E
Input group list handle in parameter &1 not valid.

Add a new user to the end of a Group (QzhbAddUserToGroup) API

In the IBM HTTP Server for i, use the `QzhbAddUserToGroup()` API to add a new user to an in-memory group.

Required Parameter Group:

1	grplist	Input	Binary(4)
2	grp	Input	Binary(4)
3	user	Input	Char(*)
4	user_len	Input	Binary(4)
5	usr	Output	Binary(4)
6	errcode	I/O	Char(*)

Threadsafe: Yes

Authorities and locks

None.

Required parameter group

grplist
INPUT:BINARY(4)

The group list handle returned from a call to the `QzhbCreateGroupList()` or `QzhbOpenGroupList()` API.

grp
INPUT:BINARY(4)

The group handle returned from a call to the `QzhbGetNextGroup()`, `QzhbFindGroupInList()`, or `QzhbAddGroupToList()` API.

user
INPUT:CHAR(*)

The user name to be added to the group.

user_len
INPUT:BINARY(4)

The length of the user string. The length must be greater than or equal to 1.

usr
OUTPUT:BINARY(4)

The handle of the newly created user, or the handle of an existing user if the named user already exists in the group. Attempting to add a user that already exists is not considered an error by the system.

errcode
I/O:CHAR(*)

The structure in which to return error information.

Error messages

CPF3CF1 E
Error code parameter not valid.

CPF3C1D E
Input variable length in parameter &1 not valid.

HTPA001 E
Input parameter &1 not valid.

HTPA203 E
Input group list handle in parameter &1 not valid.

HTPA204 E
Input group handle in parameter &1 not valid.

Free Group File from Memory (QzhbCloseGroupList) API

In the IBM HTTP Server for i, use the `QzhbCloseGroupList()` API to free the memory of an in-memory copy of a group file. You can optionally write the in-memory version of the group list back to the group file before the memory is freed.

Required Parameter Group:

1	grplist	Input	Binary(4)
2	write	Input	Binary(4)
3	errcode	I/O	Char(*)

Threadsafe: Yes

Authorities and locks

None.

Required parameter group

grplist
INPUT:BINARY(4)

The group list handle returned from a call to the `QzhbCreateGroupList()` API or `QzhbOpenGroupList()` API.

write
INPUT:BINARY(4)

The value of 0 (false) or a value of 1 (true), indicating whether or not to write the contents of the in-memory group list back to the group file before freeing it from memory. If you specify 1 for this parameter, and the write fails, the memory is not freed and the grplist handle is still valid.

Note: In order to specify a write value of 1, you must have previously used either the `QzhbCreateConfigList()` API or specified a writelock of 1 on the `QzhbOpenGroupList()` API. If these conditions are not met, the contents of the file are not written.

errcode
I/O:CHAR(*)

The structure in which to return error information.

Error messages

CPF3CF1 E
Error code parameter not valid.

HTPA001 E
Input parameter &1 not valid.

HTPA202 E
Unable to update group file &1.

HTPA203 E
Input group list handle in parameter &1 not valid.

Create a new Group File (QzhbCreateGroupList) API

In the IBM HTTP Server for i, use the `QzhbCreateGroupList()` API to create a new empty group file, and return a handle to that empty in-memory version of the file.

Required Parameter Group:

1	path	Input	Binary(4)
2	path_len	Input	Binary(4)
3	grplist	Output	Binary(4)
4	errcode	I/O	Char(*)

Threadsafe: Yes

Normally this API would be followed by calls to the `QzhbAddGroupToList()` and `QzhbAddUserToGroup()` APIs, followed by the `QzhbCloseGroupList()` API to write group information out.

Upon successful completion of this API, a new group list handle is returned. This is a handle much like the one returned by the `QzhbOpenGroupList()` API against an already existing file, with a writelock argument of 1 (TRUE). After a call to the `QzhbCreateGroupList()` API the new file is left open for write access and the `QzhbCloseGroupList()` API can be invoked with a write argument of 1. For more details about the writelock argument, see "Read a Group File into Memory (QzhbOpenGroupList) API" on page 161.

Authorities and locks

- *X authority to each directory in the path of the specified group file
- *WX authority to the last directory in the path that will contain the group file path

Required parameter group

path
INPUT:BINARY(4)

The path to the group file to be created in the Integrated File System. You can specify an absolute or relative path to the working directory. This path should be in the job CCSID.

path_len
INPUT:BINARY(4)

The length of the path string.

grplist
OUTPUT:BINARY(4)

The variable that receives the integer handle of the newly created empty group list. Subsequent API calls use this handle.

errcode
I/O:CHAR(*)

The structure in which to return error information.

Error messages

CPF3CF1 E
Error code parameter not valid.

CPF3C1D E
Input variable length in parameter &1 not valid.

HTPA001 E
Input parameter &1 not valid.

HTPA202 E
Unable to update group file &1.

HTPA208 E
Group file &1 already exists.

Locate a named group in a Group List (QzhbFindGroupInList) API

In the IBM HTTP Server for i, use the `QzhbFindGroupInList()` API to search an in-memory group list for a named group.

Required Parameter Group:

1	grplist	Input	Binary(4)
2	group	Input	Binary(4)
3	group_len	Input	Binary(4)
4	grp	Output	Binary(4)
5	errcode	I/O	Char(*)

Threadsafe: Yes

Authorities and locks

None.

Required parameter group

grplist
INPUT:BINARY(4)

The group list handle returned from a call to the `QzhbCreateGroupList()` or `QzhbOpenGroupList()` API.

group
INPUT:CHAR(*)

The group name for which the system will search the list . The group name is case-sensitive. Leading and trailing blanks are included with the name.

group_len
INPUT:BINARY(4)

The length of the group name string. The length must be greater than or equal to 1.

grp
OUTPUT:BINARY(4)

The group name handle returned if the named group was found in the list.

errcode
I/O:CHAR(*)

The structure in which to return error information.

Error messages

CPF3CF1 E
Error code parameter not valid.

CPF3C1D E
Input variable length in parameter &1 not valid.

HTPA001 E
Input parameter &1 not valid.

HTPA203 E
Input group list handle in parameter &1 not valid.

HTPA206 E
Group file &1 not found in group list.

Locate a User in a Group (QzhbFindUserInGroup) API

In the IBM HTTP Server for i, use the `QzhbFindUserInGroup()` API to search an in-memory group for a specific user.

Required Parameter Group:

1	grplist	Input	Binary(4)
2	grp	Input	Binary(4)
3	user	Input	Char(*)
4	user_len	Input	Binary(4)
5	usr	Output	Binary(4)
6	errcode	I/O	Char(*)

Threadsafe: Yes

Authorities and locks

None.

Required parameter group

grplist
INPUT:BINARY(4)

The group list handle returned from a call to the `QzhbCreateGroupList()` or `QzhbOpenGroupList()` API.

grp
INPUT:BINARY(4)

The group handle returned from a call to the `QzhbGetNextGroup()`, `QzhbFindGroupInList()`, or `QzhbAddGroupToList()` API.

user
INPUT:CHAR(*)

The user name for which the system will search the group . The user name is case-sensitive. Leading and trailing blanks are included with the name.

user_len
INPUT:BINARY(4)

The length of the user string. The length must be greater than or equal to 1.

usr
OUTPUT:BINARY(4)

The handle of the user if it was found in the group.

errcode
I/O:CHAR(*)

The structure in which to return error information.

Error messages

CPF3CF1 E
Error code parameter not valid.

CPF3C1D E
Input variable length in parameter &1 not valid.

HTPA001 E
Input parameter &1 not valid.

HTPA203 E
Input group list handle in parameter &1 not valid.

HTPA204 E
Input group handle in parameter &1 not valid.

HTPA207 E
User &1 not found in group.

Retrieve the Name of a Group (QzhbGetGroupName) API

In the IBM HTTP Server for i, use the `QzhbGetGroupName()` API to retrieve the name of a group using the group handle.

Required Parameter Group:

1	grplist	Input	Binary(4)
2	grp	Input	Binary(4)
3	buf	Output	Char(*)
4	buf_len	Input	Binary(4)
5	buf_actlen	Output	Binary(4)
6	errcode	I/O	Char(*)

Threadsafe: Yes

Authorities and locks

None.

Required parameter group

grplist
INPUT:BINARY(4)

The group list handle returned from a call to the `QzhbCreateGroupList()` or `QzhbOpenGroupList()` API.

grp
INPUT:BINARY(4)

The group handle returned from a call to the `QzhbGetNextGroup()`, `QzhbFindGroupInList()`, or `QzhbAddGroupToList()` API.

buf
OUTPUT:BINARY(4)

The buffer to receive the group name.

buf_len
OUTPUT:BINARY(4)

The size of the buffer.

buf_actlen
OUTPUT:BINARY(4)

The actual length of the group name. If the buf_actlen value is greater than the buf_len value, the data is truncated.

errcode
I/O:CHAR(*)

The structure in which to return error information.

Error messages

CPF3CF1 E
Error code parameter not valid.

CPF3C1D E
Input variable length in parameter &1 not valid.

HTPA001 E
Input parameter &1 not valid.

HTPA203 E
Input group list handle in parameter &1 not valid.

HTPA204 E
Input group handle in parameter &1 not valid.

Retrieve the next Group in the Group List (QzhbGetNextGroup) API

In the IBM HTTP Server for i, use the `QzhbGetNextGroup` API to retrieve the next group from an in-memory group list.

Required Parameter Group:

1	grplist	Input	Binary(4)
2	prev_grp	Input	Binary(4)
3	grp	Output	Binary(4)
4	errcode	I/O	Char(*)

Threadsafe: Yes

Authorities and locks

None.

Required parameter group

grplist
INPUT:BINARY(4)

The group list handle returned from a call to the `QzhbCreateGroupList()` or `QzhbOpenGroupList()` API.

prev_grp
INPUT:BINARY(4)

The group handle returned from a call to the `QzhbGetNextGroup()`, `QzhbGetNextGroup()`, `QzhbFindGroupInList()`, or `QzhbAddGroupToList()` API, that returns the group immediately following this group. A handle of 0 returns the first group in the group list.

grp
OUTPUT:BINARY(4)

The group name handle returned if the next group is found in the list. If no next group exists, then error HTPA206 is returned.

errcode
I/O:CHAR(*)

The structure in which to return error information.

Error messages

CPF3CF1 E
Error code parameter not valid.

HTPA001 E
Input parameter &1 not valid.

HTPA203 E
Input group list handle in parameter &1 not valid.

HTPA204 E
Input group handle in parameter &1 not valid.

HTPA206 E
Group file &1 not found in group list.

Retrieve the next User in the Group (QzhbGetNextUser) API

In the IBM HTTP Server for i, use the `QzhbGetNextUser()` API to retrieve the next user from a group.

Required Parameter Group:

1	grplist	Input	Binary(4)
2	grp	Input	Binary(4)
3	prev_usr	Input	Binary(4)
4	usr	Output	Binary(4)
5	errcode	I/O	Char(*)

Threadsafe: Yes

Authorities and locks

None.

Required parameter group

grplist
INPUT:BINARY(4)

The group list handle returned from a call to the `QzhbCreateGroupList()` or `QzhbOpenGroupList()` API.

grp
INPUT:BINARY(4)

The group handle returned from a call to the `QzhbGetNextGroup()`, `QzhbFindGroupInList()`, or `QzhbAddGroupToList()` API.

prev_usr
INPUT:BINARY(4)

The user handle for an existing user that returns the user immediately following this user. A handle of 0 returns the first user in the group list.

usr
OUTPUT:BINARY(4)

The handle of the user if a next user is found in the group. If no next user is found, error HTPA207 is returned.

errcode
I/O:CHAR(*)

The structure in which to return error information.

Error messages

CPF3CF1 E
Error code parameter not valid.

HTPA001 E
Input parameter &1 not valid.

HTPA203 E
Input group list handle in parameter &1 not valid.

HTPA204 E
Input group handle in parameter &1 not valid.

HTPA205 E
Input user handle in parameter &1 not valid.

HTPA207 E
User &1 not found in group.

Retrieve the Name of a User (QzhbGetUserString) API

In the IBM HTTP Server for i, use the `QzhbGetUserString()` API to retrieve the name string of a group member given the user handle, as returned by the `QzhbGetNextUser()`, `QzhbFindUserInGroup()`, or `QzhbAddUserToGroup()` API.

Required Parameter Group:

1	grplist	Input	Binary(4)
2	grp	Input	Binary(4)
3	usr	Input	Binary(4)
4	buf	Output	Char(*)
5	buf_len	Input	Binary(4)
6	buf_actlen	Output	Binary(4)
7	errcode	I/O	Char(*)

Threadsafe: Yes

Authorities and locks

None.

Required parameter group

grplist
INPUT:BINARY(4)

The group list handle returned from a call to the `QzhbCreateGroupList()` or `QzhbOpenGroupList()` API.

grp
INPUT:BINARY(4)

The group handle returned from a call to the `QzhbGetNextGroup()`, `QzhbFindGroupInList()`, or `QzhbAddGroupToList()` API.

usr
INPUT:BINARY(4)

The user handle returned from a call to the `QzhbGetNextUser()`, `QzhbFindUserInGroup()`, or `QzhbAddUserToGroup()` API.

buf
OUTPUT:CHAR(*)

The buffer to receive the user string.

buf_len
INPUT:BINARY(4)

The size of the buffer.

buf_actlen
OUTPUT:BINARY(4)

The actual length of the user string. If the buf_actlen value is greater than the buf_len value, the data is truncated by the system.

errcode
I/O:CHAR(*)

The structure in which to return error information.

Error messages

CPF3CF1 E
Error code parameter not valid.

CPF3C1D E
Input variable length in parameter &1 not valid.

HTPA001 E
Input parameter &1 not valid.

HTPA203 E
Input group list handle in parameter &1 not valid.

HTPA204 E
Input group handle in parameter &1 not valid.

HTPA205 E
Input group handle in parameter &1 not valid.

Read a Group File into Memory (QzhbOpenGroupList) API

In the IBM HTTP Server for i, use the `QzhbOpenGroupList()` API to read in an existing group file, and return a handle to an in-memory version of the file.

Required Parameter Group:

1	path	Input	Binary(4)
2	path_len	Input	Binary(4)
3	writelock	Input	Binary(4)
4	grplist	Output	Binary(4)
5	errcode	I/O	Char(*)

Threadsafe: Yes

See "Free Group File from Memory (QzhbCloseGroupList) API" on page 152 for information about freeing memory and optionally writing the group list information out.

Authorities and locks

- *X authority to each directory in the path of the specified group file
- *R authority to the group file for a writelock value of 0
- *RW authority to the group file for a writelock value of 1

Required parameter group

path

INPUT:BINARY(4)

The path to the group file to be created in the integrated file system. You can specify an absolute or relative path to the working directory.

path_len

INPUT:BINARY(4)

The length of the path string.

writelock

INPUT:BINARY(4)

If the value is 1, the group file is opened for write access with a lock and kept open. No other user is allowed to update the group file while the lock is in place. The group file is closed and the lock released by invoking the `QZHbCloseGroupList()` API. If the value is 0, then the following are true:

- The group file is opened for read access
- A lock is not placed on the group file
- The group file does not remain open

Note: You must specify a writelock of 1 in order to later specify a write argument of 1 on the `QzhbCloseGroupList()` API. If you do not hold the group file open for write, the `QzhbCloseGroupList()` API will not write the contents of the file.

grplist

OUTPUT:BINARY(4)

The handle of the group list. Subsequent API calls use this handle.

errcode

I/O:CHAR(*)

The structure in which to return error information.

Error messages

CPF3CF1 E
: Error code parameter not valid.

CPF3C1D E
: Input variable length in parameter &1 not valid.

HTPA001 E
: Input parameter &1 not valid.

HTPA201 E
: Group file &1 not found or is unreadable.

HTPA202 E
: Unable to update group file &1.

Remove a Group from a Group List (QzhbRemoveGroupFromList) API

In the IBM HTTP Server for i, use the `QzhbRemoveGroupFromList()` API to remove a named group, and all the users in that group, from an in-memory group list.

Required Parameter Group:

1	grplist	Input	Binary(4)
2	grp	Input	Binary(4)
3	errcode	I/O	Char(*)

Threadsafe: Yes

Authorities and locks

None.

Required parameter group

grplist
: INPUT:BINARY(4)

  The group handle returned from a call to the `QzhbCreateGroupList()` or `QzhbOpenGroupList()` API.

grp
: INPUT:BINARY(4)

  The group handle returned from a call to the `QzhbGetNextGroup()`, `QzhbFindGroupInList()`, or `QzhbAddGroupToList()` API.

errcode
: I/O:CHAR(*)

  The structure in which to return error information.

Error messages

CPF3CF1 E
: Error code parameter not valid.

HTPA001 E
: Input parameter &1 not valid.

HTPA203 E
: Input group list handle in parameter &1 not valid.

HTPA204 E
: Input group handle in parameter &1 not valid.

Remove a User or Element from a Group (QzhbRemoveUserFromGroup) API

In the IBM HTTP Server for i, use the `QzhbRemoveUserFromGroup()` API to remove a user from an in-memory group.

Required Parameter Group:

1	grplist	Input	Binary(4)
2	grp	Input	Binary(4)
3	usr	Input	Binary(4)
4	errcode	I/O	Char(*)

Threadsafe: Yes

Authorities and locks

None.

Required parameter group

grplist
INPUT:BINARY(4)

The group list handle returned from a call to the `QzhbCreateGroupList()` or `QzhbOpenGroupList()` API.

grp
INPUT:BINARY(4)

The group handle returned from a call to the `QzhbGetNextGroup()`, `QzhbFindGroupInList()`, or `QzhbAddGroupToList()` API.

usr
INPUT:BINARY(4)

The user handle returned from a call to the `QzhbGetNextUser()`, `QzhbFindUserInGroup()`, or `QzhbAddUserToGroup()` API.

errcode
I/O:CHAR(*)

The structure in which to return error information.

Error messages

CPF3CF1 E
Error code parameter not valid.

HTPA001 E
Input parameter &1 not valid.

HTPA203 E
Input group list handle in parameter &1 not valid.

HTPA204 E
Input group handle in parameter &1 not valid.

HTPA205 E
Input user handle in parameter &1 not valid.

Add Config Object (QzuiAddConfigObject) API

In the IBM HTTP Server for i, use the `QzuiAddConfigObject()` API to add scope or directive to the configuration. It may be placed relative to a directive or scope, at the end or beginning of the file, or at the beginning or end of a scope. A handle to the object is returned allowing directives to be added to it.

Required Parameter Group:

1	cfg	Input	Binary(4)
2	obj_type	Input	Binary(4)
3	key	Input	Char(*)
4	key_size	Input	Binary(4)
5	val	Input	Char(*)
6	val_size	Input	Binary(4)
7	place	Input	Binary(4)
8	where	Input	Binary(4)
9	object	Output	Binary(4)
10	errcode	I/O	Char(*)

Threadsafe: Yes

Authorities and locks

None.

Required parameter group

cfg
INPUT:BINARY(4)

Handle to the config.

obj_type
INPUT:BINARY(4)

Type of object to add (0 = directive, 1 = scope).

key
INPUT:CHAR(*)

Keyword of scope or directive to add.

key_size
INPUT:BINARY(4)

Size of key passed.

val
INPUT:CHAR(*)

Value for scope.

val_size
INPUT:BINARY(4)

Size of value.

place
INPUT:BINARY(4)

Placement directive (0 = at the end of the file, 1 = at start of file, 2 = after "where", 3 = before "where", 4 = at start of scope specified by "where", 5 = at end of scope specified by "where").

where
INPUT:BINARY(4)

Optional handle to scope or directive for scope placement.

object
OUTPUT:BINARY(4)

Handle of the object added.

errcode
I/O:CHAR(*)

Error information structure.

Error messages

CPF3C17 E
Error occurred with input data parameter.

CPF3C19 E
Error occurred with receiver variable specified.

CPF3C1D E
Input variable length in parameter &1 not valid.

CPF3CF1 E
Error code parameter not valid.

HTPA001 E
Input parameter &1 not valid.

HTPA106 E
Input configuration handle not valid.

HTPA121 E
Object handle in parameter &1 not valid.

HTPA122 E
Object handle in parameter &1 not a scope.

HTPA124 E
Combination of insertion position and relative object not valid.

HTPA126 E
Keyword &1 not valid for object type.

Change Config Object Value (QzuiChangeConfigObject) API

In the IBM HTTP Server for i, use the `QzuiChangeConfigObject()` API to change the value portion of a scope or directive.

Required Parameter Group:

1	cfg	Input	Binary(4)
2	object	Input	Binary(4)
3	value	Input	Char(*)
4	value_size	Input	Binary(4)
5	errcode	I/O	Char(*)

Threadsafe: Yes

The value is considered anything after the keyword. For example, in the directive "BrowserMatch Mozilla/2 nokeepalive", the keyword is "BrowserMatch" and the value is "Mozilla/2 nokeepalive".

Authorities and locks

None.

Required parameter group

cfg
INPUT:BINARY(4)

Handle to the config.

object
INPUT:BINARY(4)

Handle to the scope or directive to be changed.

value
INPUT:CHAR(*)

New value for the object.

value_size
INPUT:BINARY(4)

Size of value.

errcode
I/O:CHAR(*)

Error information structure.

Error messages

CPF3C17 E
Error occurred with input data parameter.

CPF3CF1 E
Error code parameter not valid.

HTPA001 E
Input parameter &1 not valid.

HTPA106 E
Input configuration handle not valid.

HTPA121 E
Object handle in parameter &1 not valid.

HTPA125 E
Value &1 not valid for keyword &2.

Change Apache Server Instance Data (QzuiChangeInstanceData) API

In the IBM HTTP Server for i, use the `QzuiChangeInstanceData()` API to change the information contained in the instance file. The information is retrieved in the format specified by INSD0110.

Required Parameter Group:

1	name	Input	Char(10)
2	idata	Input	Char(*)
3	idata_size	Input	Binary(4)
4	format	Input	Char(8)
5	errcode	I/O	Char(*)

Threadsafe: Yes

Authorities and locks

- *EXECUTE authority to the QUSRSYS library
- *OBJOPR, *OBJMGT, *ADD, and *DLT authority to the QUSRSYS/QATMHINSTC file

Required parameter group

name
INPUT:CHAR(10)

Name of the server instance from which data is retrieved.

idata
INPUT:CHAR(*)

Buffer in format INSD0110 containing instance file data.

idata_size
INPUT:BINARY(4)

Length of instance data passed.

format
INPUT:CHAR(8)

Format of the instance data (INSD0110).

errcode
I/O:CHAR(*)

Error information structure.

INSD0110 format

This data format is used by the `QzuiCreateInstance()`, `QzuiGetInstanceData()`, and `QzuiChangeInstanceData()` APIs.

Offset	Type	Field
0	Char(10)	Autostart
12	Binary(4)	Threads
16	Binary(4)	CCSID
20	Char(10)	Outgoing table name
30	Char(10)	Outgoing table library
40	Char(10)	Incoming table name
50	Char(10)	Incoming table library
60	Char(512)	Config file (full path)
572	Char(512)	Server root path

Field description

Note: In the descriptions below, *GLOBAL indicates that the global server parameter value for this field is used by the instance, and *CFG indicates that the value from the named configuration file is used. All character strings are padded with blanks as necessary, and are NOT null terminated.

Autostart
Indicates if the instance starts automatically. It is a 10 character string that contains *NO, *YES, or *GLOBAL.

Threads
The number of threads to use for this instance. It is an integer from 0 to 999, where 0 means the *CFG value.

CCSID
The character set to be used by the instance. It is an integer from 0 to 65533, where 0 means *GLOBAL.

Outgoing table name
The name of the table object to use as the EBCDIC to ASCII conversion table for outgoing data. It is a 10 character name or *GLOBAL.

Outgoing table library
The library containing the EBCDIC to ASCII table. This field is blank if the outgoing table name is *GLOBAL.

Incoming table name
The name of the table object to use as the ASCII to EBCDIC conversion table for incoming data. It is a 10 character name or *GLOBAL.

Incoming table library
The library containing the ASCII to EBCDIC table. This field is blank if the incoming table name is *GLOBAL.

Config file (full path)
The path to the server instance configuration file.

Server root path
The path to the server root.

Error messages

CPF3C17 E
Error occurred with input data parameter.

CPF3C1D E
Input variable length in parameter &1 not valid. CPF3C21 E

CPF3C21 E
Format name &1 not valid.

CPF3CF1 E
Error code parameter not valid.

CPF9822 E
Not authorized to file &1 in library &2.

CPFB602 E
Cannot open file.

HTPA001 E
Input parameter &1 not valid.

HTPA101 E
Server instance &1 not found or is unreadable.

HTPA102 E
Unable to update server instance &1.

HTPA103 E
Value in field &1 of the instance data structure not valid.

HTPA127 E
Server instance &1 is not a HTTP Server type instance.

Close Apache Config File (QzuiCloseConfig) API

In the IBM HTTP Server for i, use the `QzuiCloseConfig()` API to optionally write the memory copy of the configuration out to the file and then free the memory copy. If the file name is specified, the configuration is written to that file, otherwise it is written to the original file.

Required Parameter Group:

1	cfg	Input	Binary(4)
2	write	Input	Binary(4)
3	fname	Input	Char(*)
4	fname_size	Input	Binary(4)
5	errcode	I/O	Char(*)

Threadsafe: Yes

Authorities and locks

- If the file is closed without write, no authority is needed
- *X authority to each directory in the path of the specified group file
- *RW authority to the group file for a writelock value of 1

Required parameter group

cfg
INPUT:BINARY(4)

Handle to the config to be closed.

write
INPUT:BINARY(4)

Has the following values: 0 = no write, 1 = write.

fname
INPUT:CHAR(*)

Path and name of config file to be written (optional).

fname_size
INPUT:BINARY(4)

Length of file name (0 for no file name).

errcode
I/O:CHAR(*)

Error information structure.

Error messages

CPF3C17 E
Error occurred with input data parameter.

CPF3C1D E
Input variable length in a parameter &1 not valid.

CPF3CF1 E
Error code parameter not valid.

HTPA001 E
Input parameter &1 not valid.

HTPA120 E
Unable to update server configuration &1.

Create Apache Server Instance (QzuiCreateInstance) API

The `QzuiCreateInstance()` API allows users to create a new IBM HTTP Server for i server instance.

Required Parameter Group:

1	name	Input	Char(10)
2	idata	Input	Char(*)
3	idata_size	Input	Binary(4)
4	format	Input	Char(8)
5	errcode	I/O	Char(*)

Threadsafe: Yes

Authorities and locks

- *EXECUTE and *ADD authority to the QUSRSYS library
- *OBJOPR, *ADD, *DLT, and either *OBJMGT or *OBJALTER authority to the QUSRSYS/QATMHINSTC file

Required parameter group

name
INPUT:CHAR(10)

The name of the instance to be created.

idata
INPUT:CHAR(*)

The instance data.

idata_size
INPUT:BINARY(4)

The length of the instance data.

format
INPUT:CHAR(8)

The format of the instance data (INSD0110).

See "INSD0110 format" on page 167 for more information.

errcode
I/O:CHAR(*)

The error information structure.

Error messages

CPF3C17 E
Error occurred with input data parameter.

CPF3C19 E
Error occurred with receiver variable specified.

CPF3CF1 E
Error code parameter not valid.

CPF9822 E
Not authorized to file &1 in library &2.

HTPA001 E
Input parameter &1 not valid.

HTPA102 E
Unable to update server instance &1.

HTPA103 E
Value in field &1 of the instance data structure not valid.

Delete a Server Instance (QzuiDeleteInstance) API

The `QzuiDeleteInstance()` API allows you to delete an IBM HTTP Server for i server instance.

Required Parameter Group:

1	name	Input	Char(10)
2	errcode	I/O	Char(*)

Threadsafe: Yes

Authorities and locks

- *EXECUTE authority to the QUSRSYS library
- *OBJOPR, *OBJEXIST, *DLT and either *OBJMGT or *OBJALTER authority to the QUSRSYS/QATMHINSTC file

Required parameter group

name
INPUT:CHAR(10)

The server instance name you want to delete. The name can be up to 10 characters long (padded with blanks).

errcode
I/O:CHAR(*)

The structure in which to return error information.

Error messages

CPF3CF1 E
Error code parameter not valid.

HTPA001 E
Input parameter &1 not valid.

HTPA101 E
Server instance &1 not found or is unreadable.

HTPA102 E
Unable to update server instance &1.

CPF9802 E
Not authorized to object &2 &3.

Find Config Object (QzuiFindConfigObject) API

The `QzuiFindConfigObject()` API allows you to search an IBM HTTP Server for i configuration file for the object (and possibly value) specified and returns a handle to it.

Required Parameter Group:

1	cfg	Input	Binary(4)
2	fdata	Input	Char(*)
3	fdata_size	Input	Binary(4)
4	format	Input	Char(8)
5	object	Output	Binary(4)
6	val	Output	Char(*)
7	val_size	Input	Binary(4)
8	val_actlen	Output	Binary(4)
9	errcode	I/O	Char(*)

Threadsafe: Yes

If "start" is not specified, the configuration file scope is used. If a value is specified, the value is tokenized and compared with the tokens of the matching keywords. For example, if the keyword is "BrowserMatch" and the value is "Mozilla/2" the search would find "BrowserMatch Mozilla/2 nokeepalive". Also, the "val" field would contain "Mozilla/2 nokeepalive". You need only pass the object type and keyword. For example, to find a "Port" directive, set the object type to 1, the keyword to "Port" and fdata_size to 8. If the value field is not needed, set "val_size" to 0.

Authorities and locks

None.

Required parameter group

cfg
INPUT:BINARY(4)

Handle to the configuration file.

fdata
INPUT:CHAR(*)

Find data in format CFGF0110.

fdata_size
INPUT:BINARY(4)

Size of Find data format buffer.

format
INPUT:CHAR(8)

Name of format (CFGF0110).

object
OUTPUT:BINARY(4)

Handle to the object found (-1 indicates not found).

val
OUTPUT:CHAR(*)

Contains the whole value of the configuration object found.

val_size
INPUT:BINARY(4)

Size of value buffer.

val_actlen
OUTPUT:BINARY(4)

Actual size of value.

errcode
I/O:CHAR(*)

Error information structure.

CFGF0110 format

This data format is used by `QzuiFindConfigObject()` API.

Offset	Type	Field
0	Binary(4)	Object type (0=directive, 1=scope)
4	Char(40)	Keyword object to search for (required)
44	Binary(4)	Case sensitive (0=insensitive, 1=sensitive)

Offset	Type	Field
48	Binary(4)	Where to search (0=entire configuration, 1=with scope specified in "Start", 2=start search at object specified in "Start", 3=start search at scope specified in object start)
52	Binary(4)	Start - the search start handle (0 if no start is to be used)
56	Binary(4)	Value when searching (0=no, 1=yes)
60	Char(100)	Value of object to search for

Error messages

CPF3C17 E
Error occurred with input data parameter.

CPF3C19 E
Error occurred with receiver variable specified.

CPF3C1D E
Input variable length in parameter &1 not valid.

CPF3C21 E
Format name &1 not valid.

CPF3CF1 E
Error code parameter not valid.

HTPA001 E
Input parameter &1 not valid.

HTPA106 E
Input configuration handle not valid.

HTPA121 E
Object handle in parameter &1 not valid.

HTPA122 E
Object handle in parameter &1 not a scope.

HTPA123 E
No matching object found.

Get Apache Server Instance Data (QzuiGetInstanceData) API

The `QzuiGetInstanceData()` API allows you to retrieve configuration data from a specified IBM HTTP Server for i server instance file.

Required Parameter Group:

1	name	Input	Char(10)
2	buf	Output	Char(*)
3	buf_size	Input	Binary(4)
4	format	Input	Char(8)
5	buf_actlen	Output	Binary(4)
6	running	Output	Binary(4)
7	errcode	I/O	Char(*)

Threadsafe: Yes

The data information is returned in the format specified by INSD0110. See "INSD0110 format" on page 167 for more information.

Authorities and locks

- *EXECUTE authority to the QUSRSYS library
- *OBJOPR and *READ authority to the QUSRSYS/QATMHINSTC file

Required parameter group

name
INPUT:CHAR(10)

Name of the server instance from which data is retrieved.

buf
OUTPUT:CHAR(*)

Buffer in format INSD0110 containing instance file data.

buf_size
INPUT:BINARY(4)

Length of instance data buffer.

format
INPUT:CHAR(8)

Format of the instance data (INSD0110).

See "INSD0110 format" on page 167 for more information.

buf_actlen
OUTPUT:BINARY(4)

Actual length of instance data returned.

running
OUTPUT:BINARY(4)

Indicates if the instance is currently running (1 = running).

errcode
I/O:CHAR(*)

Error information structure.

Error messages

CPF3C17 E
Error occurred with input data parameter.

CPF3C19 E
Error occurred with receiver variable specified.

CPF3C1D E
Input variable length in parameter &1 not valid.

CPF3C21 E
Format name &1 not valid.

CPF3CF1 E
Error code parameter not valid.

HTPA001 E
Input parameter &1 not valid.

HTPA101 E
Server instance &1 not found or is unreadable.

HTPA127 E
Server instance &1 is not a HTTP Server type instance.

Get Server Instance Names (QzuiGetInstanceNames) API

The `QzuiGetInstanceNames()` API allows you to obtain a list of IBM HTTP Server for i instance names.

Required Parameter Group:

1	buf	Output	Char(*)
2	buf_size	Input	Binary(4)
3	format	Input	Char(8)
4	buf_actlen	Output	Binary(4)
5	count	Output	Binary(4)
6	errcode	I/O	Char(*)

Threadsafe: Yes

Authorities and locks

- *EXECUTE authority to the QUSRSYS library
- *OBJOPR and *READ authority to the QUSRSYS/QATMHINSTC file

Required parameter group

buf
OUTPUT:CHAR(*)

Buffer to hold instance names and running data.

buf_size
INPUT:BINARY(4)

Size of buffer passed.

format
INPUT:CHAR(8)

Format of instance name data (INSN0110).

buf_actlen
OUTPUT:BINARY(4)

Number of bytes of data placed in buf.

count
OUTPUT:BINARY(4)

Total number of instance names.

errcode
I/O:CHAR(*)

Error information structure.

INSN0110 format

This data format is used by the `QzuiGetInstanceNames()` API.

Offset	Type	Field
0	Char(10)	Instance name

Offset	Type	Field
10	Char(2)	Reserved
12	Binary(4)	Running status
16	Binary(4)	Instance type 1 = HTTP Server

Error messages

CPF3C17 E
Error occurred with input data parameter.

CPF3C19 E
Error occurred with receiver variable specified.

CPF3C1D E
Input variable length in parameter &1 not valid.

CPF3C21 E
Format name &1 not valid.

HTPA001 E
Input parameter &1 not valid.

Get Instance Type (QzuiGetInstanceType) API

The `QzuiGetInstanceType()` API allows you to obtain the type of an IBM HTTP Server for i instance. If the specified instance is not a valid instance, a –1 is returned.

Required Parameter Group:

1	name	Input	Char(10)
2	itype	Output	Binary(4)
3	errcode	I/O	Char(*)

Threadsafe: Yes

Authorities and locks

- *EXECUTE authority to the QUSRSYS library
- *OBJOPR and *READ authority to the QUSRSYS/QATMHINSTC file

Required parameter group

name
INPUT:CHAR(10)

The name of the instance.

itype
OUTPUT:BINARY(4)

The type of instance (-1 = Invalid, 1 = Apache)

errcode
I/O:CHAR(*)

The error information structure.

Error messages

CPF3C17 E
Error occurred with input data parameter.

CPF3C19 E
Error occurred with receiver variable specified.

CPF3CF1 E
Error code parameter not valid.

CPF9822 E
Not authorized to file &1 in library &2.

HTPA101 E
Server instance &1 not found or is unreadable.

Open Apache Config File (QzuiOpenConfig) API

The `QzuiOpenConfig()` API allows you to read into memory an IBM HTTP Server for i server configuration file. The handle that is returned by the `QzuiOpenConfig()` API is used in subsequent API calls to manipulate directives and scopes within the server configuration data.

Required Parameter Group:

1	name	Input	Char(*)
2	namelength	Input	Binary(4)
3	writelock	Input	Binary(4)
4	cfg	Output	Binary(4)
5	errcode	I/O	Char(*)

Threadsafe: Yes

Authorities and locks

- *X authority to each directory in the path of the specified group file
- *WX authority to the last directory in the path that will contain the group file path

Required parameter group

name
INPUT:CHAR(*)

File name (including path) to the configuration file to be opened.

namelength
INPUT:BINARY(4)

Length of the file name.

writelock
INPUT:BINARY(4)

Has the following values: 0 = no lock, 1 = exclusive write lock will be put on config file.

cfg
OUTPUT:BINARY(4)

Handle to the memory copy of the config file.

errcode
I/O:CHAR(*)

Error information structure.

Error messages

CPF3C17 E
Error occurred with input data parameter.

CPF3C19 E
Error occurred with receiver variable specified.

CPF3C1D E
: Input variable length in parameter &1 not valid.

CPF3CF1 E
: Error code parameter not valid.

CPFB602 E
: Cannot open file.

HTPA001 E
: Input parameter &1 not valid.

HTPA104 E
: Server configuration not found or is unreadable.

Remove Config Object (QzuiRemoveConfigObject) API

The `QzuiRemoveConfigObject()` API allows you to remove a directive or scope from the IBM HTTP Server for i server configuration data. If a scope is removed, all the directives within it are also removed.

Required Parameter Group:

1	cfg	Input	Binary(4)
2	object	Input	Binary(4)
3	errcode	I/O	Char(*)

Threadsafe: Yes

Authorities and locks

None.

Required parameter group

cfg
: INPUT:BINARY(4)

  Handle to the config.

object
: INPUT:BINARY(4)

  Handle to the object to be removed.

errcode
: I/O:CHAR(*)

  Error information structure.

Error messages

CPF3C17 E
: Error occurred with input data parameter.

CPF3CF1 E
: Error code parameter not valid.

HTPA001 E
: Input parameter &1 not valid.

HTPA106 E
: Input configuration handle not valid.

HTPA121 E
: Object handle in parameter &1 not valid.

CGI programming

The IBM HTTP Server for i supports the extension of the functionality of the HTTP Server through the use of Common Gateway Interface (CGI) programs.

The CGI Process

The basic principle of Common Gateway Interface (CGI) is that a Web server passes client request information to CGI programs in system environment variables (and in some cases through standard input or command line arguments) and all standard output of CGI programs is returned to Web clients.

Most CGI programs include the following three stages:

- Parsing CGI input
- Processing the request
- Generating the response

Throughout the topic there will be references to conversion modes, which has to deal with how data is presented to a CGI programs and how data that is returned by the CGI program is processed by the HTTP Server. To learn more about conversion modes, see “CGI data conversions” on page 181.

Note: Any CGI program with a name that begins with nph_ is considered a no parse header CGI program. This means that the server does no conversions on the data and adds no headers back in the response from the CGI program. The CGI programmer is in total control and is responsible for parsing the request and then sending all of the necessary headers back with the response.

Parsing CGI input

When the environment variables have been set by the HTTP server, it starts the CGI program. (For complete list of environment variables set by the HTTP Server, see “Environment variables set by HTTP Server” on page 634.) It is then up to this CGI program to find out where to get the information needed to fulfill the request.

The two most common ways a CGI program may be called from the HTML document:

- By using an HTML form and the request method (environment variable REQUEST_METHOD) POST.
- By using an HTML anchor tag to specify the URL for the CGI program and adding the variables to this URL. This would be interpreted as `REQUEST_METHOD=GET`.

The CGI script has to perform the following tasks in order to retrieve the necessary information:

1. Find out the REQUEST_METHOD used by the client.
2. If the REQUEST_METHOD used was the GET method, the CGI program knows that all additional values may be retrieved from the QUERY_STRING environment variable.
3. If the REQUEST_METHOD used was POST, the CGI knows that additional information was passed using STDIN. It will then have to query the CONTENT_LENGTH environment variable to know how much information it will have to read from STDIN.

An example of data read in the QUERY_STRING variable (%%MIXED%% mode):

```
NAME=Eugene+T%2E+Fox&ADDR=etfox%40ibm.net&INTEREST=RCO
```

Where

- A plus sign (+) represents spaces.
- A percent sign (%) that is followed by the American National Standard Code for Information Interchange (ASCII) hexadecimal equivalent of the symbol represents special characters, such as a period (.) or slash (/).
- An ampersand (&) separates fields and sends multiple values for a field such as check boxes.

Parsing breaks the fields at the ampersands and decodes the ASCII hexadecimal characters. The results look like this:

```
NAME=Eugene T. Fox
ADDR=etfox@ibm.net
INTEREST=RCO
```

You can use the `QtmhCvtDb()` API to parse the information into a structure. The CGI program can refer to the structure fields. If using %%MIXED%% input mode, the "%xx" encoding values are in ASCII and must be converted into the "%xx" EBCDIC encoding values before calling `QtmhCvtDb()`. If using %%EBCDIC%% mode, the server will do this conversion for you. The system converts ASCII "%xx" first to the ASCII character and then to the EBCDIC character. Ultimately, the system sets the EBCDIC character to the "%xx" in the EBCDIC CCSID.

The main advantage of using the GET method is that you can access the CGI program with a query without using a form.

The main advantage to the POST method is that the query length can be unlimited so you do not have to worry about the client or server truncating data. The query string of the GET method cannot exceed 8 KB.

Processing the request

Processing the request is the second stage of a CGI program. In this stage, the program takes the parsed data and performs the appropriate action. For example, a CGI program designed to process an application form might perform one of the following functions:

1. Take the input from the parsing stage
2. Convert abbreviations into more meaningful information
3. Plug the information into an e-mail template
4. Use SNDDST to send the e-mail.

Generating the response

When the CGI program has finished processing it has to send its result back to the HTTP server that invoked the program. By doing so the output indirectly is sent to the client that initially requested the information.

Because the CGI program issues its result through STDOUT, the HTTP server has to read the information from there and interpret what to do.

A CGI program writes a CGI header that is followed by an entity body to standard output. The CGI header is the information that describes the data in the entity body. The entity body is the data that the server sends to the client. A single newline character always ends the CGI header. The newline character for ILE C is \n. For ILE RPG or ILE COBOL, it is hexadecimal '15'. The following are some examples of Content-Type headers:

```
Content-Type: text/html\n\n
Content-Type: text/html; charset=iso-8859-2\n\n
```

If the response is a static document, the CGI program returns either the URL of the document using the CGI Location header or returns a Status header. The CGI program does not have an entity body when using the Location header. If the host name is the local host, HTTP Server will retrieve the specified document that the CGI program sent. It will then send a copy to the Web client. If the host name is not the local host, the HTTP processes it as a redirect to the Web client. For example:

```
Location: http://www.acme.com/products.html\n\n
```

The Status header should have a Content_Type: and a Status in the CGI header. When Status is in the CGI header, an entity body should be sent with the data to be returned by the server. The entity body data contains information that the CGI program provides to a client for error processing. The Status line is the

Status with an HTTP 3 digit status code and a string of alphanumeric characters (A-Z, a-z, 0-9 and space). The HTTP status code must be a valid 3 digit number from the HTTP/1.1 specification.

Note: The newline character \n ends the CGI header.

```
CONTENT-TYPE: text/html\n
Status: 600 Invalid data\n
\n
<html><head><title>Invalid data</title>
</head><body>
<h1>Invalid data typed</h1>
<br><pre>
The data entered must be valid numeric digits for id number
<br></pre>
</body></html>
```

Related information

"CGI data conversions" on page 181
The server can perform ASCII to EBCDIC conversions before sending data to CGI programs. This is needed because the Internet is primarily ASCII-based and the IBM i server is an extended binary-coded decimal interchange code (EBCDIC) server. The server can also perform EBCDIC to ASCII conversions before sending data back to the browser. HTTP and HTML specifications allow you to tag text data with a character set (charset parameter on the Content-Type header). However, this practice is not widely in use today (although technically required for HTTP1.0/1.1 compliance). According to this specification, text data that is not tagged can be assumed to be in the default character set ISO-8859-1 (US-ASCII). The server correlates this character set with ASCII coded character set identifier (CCSID) 819.

"CGI APIs" on page 133
This topic provides information about IBM HTTP Server for i APIs for CGI applications.

"Environment variables set by HTTP Server" on page 634
The IBM HTTP Server for i supports the standard environment variables in addition to environment variables that are unique to the IBM i server.

CGI data conversions

The server can perform ASCII to EBCDIC conversions before sending data to CGI programs. This is needed because the Internet is primarily ASCII-based and the IBM i server is an extended binary-coded decimal interchange code (EBCDIC) server. The server can also perform EBCDIC to ASCII conversions before sending data back to the browser. HTTP and HTML specifications allow you to tag text data with a character set (charset parameter on the Content-Type header). However, this practice is not widely in use today (although technically required for HTTP1.0/1.1 compliance). According to this specification, text data that is not tagged can be assumed to be in the default character set ISO-8859-1 (US-ASCII). The server correlates this character set with ASCII coded character set identifier (CCSID) 819.

National language support HTTP Server CGI directives

You can configure HTTP Server to control which mode is used by specifying the CGIConvMode directive in different contexts, such as server config or directory:

```
CGIConvMode Mode
```

Where *Mode* is one of the following:

BINARY
EBCDIC
EBCDIC_JCD

You can configure HTTP Server to set the ASCII and EBCDIC CCSIDs that are used for conversions by specifying the directives DefaultNetCCSID and CGIJobCCSID in different contexts, such as server config or directory. For example:

- DefaultNetCCSID 819

- CGIJobCCSID 37

You can configure HTTP Server to set the locale environment variable by specifying the CGIJobLocale in different contexts, such as server config or directory: `CGIJobLocale /QSYS.LIB/EN_US.LOCALE`.

CGI input conversion modes

The following table summarizes the type of conversion that is performed by the server for each CGI mode.

Table 13. Conversion action for text in CGI Stdin

CGI_MODE	Conversion	Stdin encoding	Environment variable	Query_String encoding	argv encoding
BINARY or %%BINARY%%	None	No conversion	CGI job CCSID	No conversion	No conversion
EBCDIC or %%EBCDIC%%	CGI NetCCSID to CGI job CCSID	CGI job CCSID	CGI job CCSID	CGI job CCSID	CGI job CCSID
%%EBCDIC%% or %%EBCDIC_JCD%% with charset tag received	Calculate target EBCDIC CCSID based on received ASCII charset tag	EBCDIC equivalent of received charset	CGI job CCSID	CGI job CCSID	CGI job CCSID
EBCDIC_JCD or %%EBCDIC_JCD%%	Detect input based on received data. Convert data to CGI job CCSID	Detect ASCII input based on received data. Convert data to CGI job CCSID.	CGI job CCSID	Detect ASCII input based on received data. Convert data to CGI job CCSID.	Detect ASCII input based on received data. Convert data to CGI job CCSID
%%MIXED%% (Compatibility mode)	CGI NetCCSID to CGI job CCSID (receive charset tag is ignored)	CGI job CCSIDwith ASCII escape sequence	CCSID 37	CCSID 37 with ASCII escape sequence	CCSID 37 with ASCII escape sequence

Note: If the directive CGIJobCCSID is present, the CGI job runs under its specified CCSID value. Otherwise, the DefaultFsCCSID value is used (the default job CCSID).

BINARY
: The BINARY mode, delivers QueryString and stdin to the CGI program in ASCII, exactly as it was received from the client. The environment variables are in the CGI job CCSID. If CGIJobCCSID is present the job CCSID has its value; otherwise, the value associated with DefaultFsCCSID (the default job CCSID) is used.

EBCDIC
: The EBCDIC mode, delivers all of the information to the CGI program in the job CCSID. The ASCII CCSID of the QueryString or stdin data is determined from a charset tag on the content type header if present. If CGIJobCCSID is present the job CCSID has its value; otherwise, the value associated with DefaultFsCCSID (the default job CCSID) is used.

EBCDIC_JCD
The EBCDIC_JCD mode is the same as the EBCDIC mode except that a well-known Japanese codepage detection algorithm is used to determine the ASCII CCSID when the charset tag is not present. Japanese browsers can potentially send data in one of three code pages, JIS (ISO-2022-JP), S-JIS (PC-Windows), or EUC (UNIX).

CGI output conversion modes

This following table summarizes the type of conversion that is performed and the charset tag that is returned to the browser by the server.

Table 14. Conversion action and charset tag generation for text in CGI Stdout

CGI Stdout CCSID/Charset in HTTP header	Conversion action	Server reply charset tag
EBCDIC CCSID/Charset	Calculate EBCDIC to ASCII conversion based on supplied EBCDIC CCSID/Charset	Calculated ASCII charset
ASCII CCSID/Charset	No conversion	Stdout CCSID/Charset as Charset
65535	No conversion	None
None (CGIConvMode= %%BINARY%%, %%BINARY/MIXED%%, or %%BINARY/EBCDIC%%)	Default Conversion - job CCSID to NetCCSID	NetCCSID as charset
None (CGIConvMode= BINARY or %%BINARY/BINARY%%)	No conversion	None
None (CGIConvMode= EBCDIC, %%EBCDIC%%, %%EBCDIC/MIXED%%, or %%EBCDIC/EBCDIC%%)	Default Conversion - job CCSID to NetCCSID	NetCCSID as charset
None (CGIConvMode= EBCDIC, EBCDIC_JCD, %%EBCDIC%%, %%EBCDIC/MIXED%%, or %%EBCDIC/EBCDIC%% with charset tag received on HTTP request)	Use inverse of conversion calculated for stdin	Charset as received on HTTP request
None (CGIConvMode= %%EBCDIC_JCD%%, %%EBCDIC_JCD/MIXED%%, or %EBCDIC_JCD/EBCDIC%%)	Use inverse of conversion calculated by the Japanese codepage detection	ASCII CCSID as charset
None (CGIConvMode= %%MIXED%% or %%MIXED/MIXED%%)	Default Conversion - job CCSID to NetCCSID	None (compatibility mode)
Invalid	CGI error 500 generated by server	

BINARY
In this mode HTTP header output is in CCSID 819 with the escape sequences also being the ASCII representative of the ASCII code point. An example of a HTTP header that may contain escape sequences is the Location header. The body is always treated as binary data and the server performs no conversion.

EBCDIC
In this mode HTTP header output is assumed to be in the CGI job CCSID, unless otherwise specified in a charset or CCSID tag by the CGI program. However, the escape sequence must be the EBCDIC representative of the EBCDIC code point for the 2 characters following the "%" in the escape

sequence. An example of a HTTP header that may contain escape sequences is the Location header. The body (if the mime type is text/*) is assumed to be in the job CCSID, unless otherwise specified in a charset or CCSID tag by the CGI program. If CGIJobCCSID is present the CGI job CCSID has its value; otherwise, the value associated with DefaultFsCCSID (the default job CCSID) is used.

EBCDIC_JCD

In this mode HTTP header output is assumed to be in the job CCSID, unless otherwise specified in a charset or CCSID tag by the CGI program. However, the escape sequence must be the EBCDIC representation of the EBCDIC code point for the 2 characters following the "%" in the escape sequence. An example of a HTTP header that may contain escape sequences is the Location header. The body (if the mime type is text/*) is assumed to be in the job CCSID, unless otherwise specified in a charset or CCSID tag by the CGI program. If CGIJobCCSID is present the job CCSID has its value; otherwise, the value associated with DefaultFsCCSID (the default job CCSID) is used.

CGI environment variables

The following CGI environment variables that are related to national language support are set by the HTTP server prior to calling a CGI program:

- CGI_MODE - which input conversion mode the server is using (%%MIXED%%, %%EBCDIC%%, %%BINARY%%, %%EBCDIC_JCD%%, EBCDIC, BINARY, or EBCDIC_JCD)
- CGI_ASCII_CCSID - from which ASCII CCSID was used to convert the data
- CGI_EBCDIC_CCSID - which EBCDIC CCSID the data was converted into
- CGI_OUTPUT_MODE - which output conversion mode the server is using (%%MIXED%%, %%EBCDIC%%, %%BINARY%, EBCDIC, BINARY, or EBCDIC_JCD)
- CGI_JOB_LOCALE - which locale to use in the CGI program. This environment variable is set only if the CGIJobLocale directive is set.

For complete list of environment variables set by the HTTP Server, see "Environment variables set by HTTP Server" on page 634.

DBCS considerations

URL-encoded forms containing DBCS data could contain ASCII octets that represent parts of DBCS characters. The server can only convert non-encoded character data. This means that it must un-encode the double-byte character set (DBCS) stdin and QUERY_STRING data before performing the conversion. In addition, it has to reassemble and re-encode the resulting EBCDIC representation before passing it to the CGI program. Because of this extra processing, CGI programs that you write to handle DBCS data may choose to receive the data as BINARY and perform all conversions to streamline the entire process.

Using the EBCDIC_JCD mode: The EBCDIC_JCD mode determines what character set is being used by the browser for a given request. This mode is also used to automatically adjust the ASCII/EBCDIC code conversions used by the web server as the request is processed.

After auto detection, the %%EBCDIC_JCD%% or EBCDIC_JCD mode converts the stdin and QUERY_STRING data from the detected network CCSID into the correct EBCDIC CCSID for Japanese. The default conversions configured for the CGI job are overridden. The DefaultFsCCSID directive or the -fsccsid startup parameter specifies the default conversions. The startup FsCCSID must be a Japanese CCSID. Alternately, the CGIJobCCSID can be set to a Japanese CCSID.

The possible detected network code page is Shift JIS, eucJP, and ISO-2022-JP. The following are the associated CCSIDs for each code page:

```
Shift JIS
=========
CCSID 932: IBM PC (old JIS sequence, OS/2 J3.X/4.0, IBM Windows J3.1)
CCSID 942: IBM PC (old JIS sequence, OS/2 J3.X/4.0)
CCSID 943: MS Shift JIS (new JIS sequence, OS/2 J4.0
MS Windows J3.1/95/NT)
eucJP
=====
CCSID 5050: Extended UNIX Code (Japanese)
```

```
ISO-2022-JP
===========
CCSID 5052: Subset of RFC 1468 ISO-2022-JP (JIS X 0201 Roman and
JIS X 0208-1983) plus JIS X 0201 Katakana.
CCSID 5054: Subset of RFC 1468 ISO-20220JP (ASCII and JIS X 0208-1983)
plus JIS X 0201 Katakana.
```

The detected network CCSID is available to the CGI program. The CCSID is stored in the CGI_ASCII_CCSID environment variable. When JCD can not detect, the default code conversion is done as configured (between NetCCSID and FsCCSID or CGIJobCCSID).

Since the code page of Stdin and QUERY_STRING are encoded according to the web client's outbound code page, we recommend using the following configuration value combinations when you use the EBCDIC_JCD or %%EBCDIC_JCD%% mode.

Table 15. Recommended CCSID configuration combinations

Startup (FsCCSID)/CGI job CCSID (CGIJobCCSID)	Startup (DefaultNetCCSID)/CGI Net CCSID (DefaultNetCCSID)	Description
5026/5035 (See note 4)	943 Default:	MS Shift JIS
5026/5035 (See note 4)	942 Default	IBM PC
5026/5035 (See note 4)	5052/5054 Default	ISO-2022-JP

Using CCSID 5050(eucJP) for the startup NetCCSID, is not recommended. When 5050 is specified for the startup NetCCSID, the default code conversion is done between FsCCSID and 5050. This means that if JCD cannot detect a code page, JCD returns 5050 as the default network CCSID. Most browser's use a default outbound code page of Shift JIS or ISO-2022-JP, not eucJP.

If the web client sends a charset tag, JCD gives priority to the charset tag. Stdout function is the same. If the charset/ccsid tag is specified in the Content-Type field, stdout gives priority to charset/ccsid tag. Stdout also ignores the JCD detected network CCSID.

Notes:

1. If startup NetCCSID is 932 or 942, detected network, Shift JIS's CCSID is the same as startup NetCCSID. Otherwise, Shift JIS's CCSID is 943.

   ```
   Startup NetCCSID Shift JIS (JCD detected CCSID)
   ---------------- -----------------------------
   932 932
   942 942
   943 943
   5052 943
   5054 943
   5050 943
   ```

2. Netscape Navigator 3.x sends the alphanumeric characters by using JIS X 0201 Roman escape sequence (CCSID 5052) for ISO-2022-JP. Netscape Communicator 4.x sends the alphanumeric characters by using ASCII escape sequence (CCSID 5054) for ISO-2022-JP.
3. JCD function has the capability to detect EUC and SBCS Katakana, but it is difficult to detect them. IBM recommends that you do not use SBCS Katakana and EUC in CGI.
4. CCSID 5026 assigns lowercase alphabet characters on a special code point. This often causes a problem with lowercase alphabet characters. To avoid this problem, do one of the following:

   - Do not use lowercase alphabet literals in CGI programs if the FsCCSID is 5026.
   - Use CCSID 5035 for FsCCSID.
   - Use the Charset/CCSID tag as illustrated in the following excerpt of a CGI program:

     ```
     main(){
     printf("Content-Type: text/html; Charset=ISO-2022-JP\n\n");
     ...
     }
     ```

- Do the code conversions in the CGI program. The following sample ILE C program converts the literals into CCSID 930 (the equivalent to CCSID 5026):

```
main(){
printf("Content-Type: text/html\n\n);
#pragama convert(930)
printf("<html>");
printf("This is katakana code page\n");
#pragama convert(0)
...
}
```

- When the web client sends a charset tag, the network CCSID becomes the ASCII CCSID associated with Multipurpose Internet Mail Extensions (MIME) charset header. The charset tag ignores the JCD detected CCSID. When the Charset/CCSID tag is in the Content-Type header generated by the CGI program, the JCD-detected CCSID is ignored by this Charset/CCSID. Stdout will not perform a conversion if the charset is the same as the MIME's charset. Stdout will not perform a conversion if the CCSID is ASCII. Stdout will perform code conversion if the CCSID is EBCDIC. Because the environment variables and stdin are already stored in job CCSID, ensure that you are consistent between the job CCSID and the Content-Type header's CCSID.

Writing high availability CGI programs

High availability CGI programs use APIs to preserve state information. The state information can be accessed by different IBM i servers that are participating as cluster nodes in a clustered environment, even after a failure or switchover of the HTTP Server or IBM i server.

During the configuration of a Web server, the server administrator indicates whether CGI programs are allowed to be cluster-enabled high availability CGI programs. If the server receives a request for a CGI program that is allowed to be Highly Available (HA), the Web server passes to the CGI an environment variable that indicates the CGI may be cluster-enabled. The server also creates and passes a unique session handle to the CGI program. The CGI program must then acknowledge that it is a cluster-enabled HA CGI program to the server, otherwise the server will regard the CGI as not being cluster-enabled.

The following environment variables are passed by the Web server to High Availability CGI programs:

- QZHBIS_FIRST_REQUEST
- QZHBIS_CLUSTER_ENABLED
- QZHBNEXT_SESSION_HANDLE
- QZHBRECOVERY
- QZHBHA_MODEL

The "Cluster-Enabled" and "Accept-HTSession" headers should be returned in each response from a High Availability CGI program. For example,

```
Cluster-Enabled:1
```

An error will result if the "Cluster-Enabled" header is returned by a CGI program with a value of "1", but the Web Server is not configured to allow that CGI program to be Highly available.

When the Web server receives the "Cluster-Enabled" header with a value of "1", the server will create a new session entry and indicate that the session is cluster-enabled.

Cluster-enabled CGI programs will return the "Accept-HTSession" header to the Web server with a value equal to the value passed to the CGI in the QZHBNEXT_SESSION_HANDLE environment variable. An error will result if the value specified with "Accept-HTSession" does not match the value passed to the CGI in QZHBNEXT_SESSION_HANDLE. For CGI programs that are not cluster-enabled, the "Accept-HTSession" CGI header remains unmodified.

The Web server associates a high availability CGI program's state with the unique session handle that was passed as an environment variable to the CGI. If a request to run the CGI is sent to the Web server, and the requested URL includes the specific session handle, the Web server will be able to correctly restore the previous state of the CGI. For this reason it is important that the session handle appear in all URLs that were generated by the high availability CGI program to be returned to the client.

A high availability CGI program uses two APIs to maintain its state. To store state information, the CGI calls the API `QzhbCgiSendState_r()`. To retrieve state information, the CGI program calls the API `QzhbCgiRecvState_r()`.

Guidelines for writing high availability CGIs

A CGI program developer should follow the following rules when writing high availability CGI programs:

- Write the CGI in such a way that running them with the same state more than once does not cause any problem.
- Store the CGI program's state between client's requests only in the Web server.
- Avoid using data sharing mechanisms that do not fit in the high availability Web server programming model provided by the HTTP Server. An example of such a model would be a CGI program that is using shared memory.
- The Web server limits the total number of persistent CGIs, which includes high availability CGI, using the MaxPersistentCGI directive.

Table 16. CGI problems and solutions. This table identifies potential problem areas and suggests a solution:

Potential problems	**Solutions**
When the stateful CGI is run with the same state more than once, its correctness is not ensured.	Rewrite the CGI so that it can run with the same state more than once.
The stateful CGI accesses shared memory.	Eliminate the use of shared memory.
The stateful CGI generates session handles ignoring session handles passed by the Web server.	Rewrite the CGI to use session handles passed by the Web server.

There are two categories of high availability Web server programming models to consider when writing high availability CGI programs or enabling an existing CGI program for use as a high availability CGI program. The two categories are:

- Primary/backup
- Peer model

For the primary/backup, follow these additional guidelines:

- The stateful data is saved by the high availability CGI program by calling the `QzhbCgiSendState_r()` API. To retrieve any stateful data that has been stored use the `QzhbCgiRecvState_r()` API. The `QzhbCgiRecvState_r()` API returns stateful information when the environment variable QZHBRECOVERY is set and QZHBHA_MODEL is equal to PRIMARYBACKUP. If the QZHBRECOVERY is not set, then the CGI program should not use the `QzhbCgiRecvState_r()` API. You must write a persistent CGI that maintains the data in static variables. If the environment variable QZHBRECOVERY is set, retrieve the data using the `QzhbCgiRecvState_r()` API and restore the static variables.

For the Peer model, follow these additional guidelines:

- The stateful data is saved by the high availability CGI program by calling the `QzhbCgiSendState_r()` API. To retrieve any stateful data that has been stored use the `QzhbCgiRecvState_r()` API. The `QzhbCgiRecvState_r()` API must be used with each new request to retrieve any stateful data that has been stored for a previous high availability CGI program invocation. In this model your CGI program must not save stateful data in static variables.
- If QZHBHA_MODEL is PUREPEER the CGI is expected to restore its state, to serve the request, and to return its new state to the Web server. When the Web server receives the new CGI's state, it stores the state (which will be passed to the CGI with the subsequent request), returns the response to the client, and terminates the CGI job.

Related information

“Highly available HTTP Server” on page 43
The IBM HTTP Server for i supports Web server clusters, which ensures high availability of your Web site.

“CGI data conversions” on page 181
The server can perform ASCII to EBCDIC conversions before sending data to CGI programs. This is needed because the Internet is primarily ASCII-based and the IBM i server is an extended binary-coded decimal interchange code (EBCDIC) server. The server can also perform EBCDIC to ASCII conversions before sending data back to the browser. HTTP and HTML specifications allow you to tag text data with a character set (charset parameter on the Content-Type header). However, this practice is not widely in use today (although technically required for HTTP1.0/1.1 compliance). According to this specification, text data that is not tagged can be assumed to be in the default character set ISO-8859-1 (US-ASCII). The server correlates this character set with ASCII coded character set identifier (CCSID) 819.

“CGI APIs” on page 133
This topic provides information about IBM HTTP Server for i APIs for CGI applications.

“Environment variables set by HTTP Server” on page 634
The IBM HTTP Server for i supports the standard environment variables in addition to environment variables that are unique to the IBM i server.

Writing persistent CGI programs

Persistent CGI is an extension to the CGI interface that allows a CGI program to remain active across multiple browser requests and maintain a session with that browser client. This allows files to be left open, the state to be maintained, and long running database transactions to be committed or rolled-back based on end-user input.

The CGI program must be written using named activation groups which allows the program to remain active after returning to the server. The CGI program notifies the server it wants to remain persistent using the "`Accept-HTSession`" CGI header as the first header it returns. This header defines the session ID associated with this instance of the CGI program and is not returned to the browser. Subsequent URL requests to this program must contain the session ID as the first parameter after the program name. The server uses this ID to route the request to that specific instance of the CGI program. The CGI program should regenerate this session ID for each request. It is strongly recommended that you use Secure Sockets Layer (SSL) for persistent and secure business transaction processing.

Accept-HTSession CGI Header

This header specifies the session handle associated with this instance of the Persistent CGI program. This session handle is used to route back subsequent requests to that program and must be unique, or the server will not honor the persistence request. A message is logged in the error log of the server.

```
Accept-HTSession = "Accept-HTSession" ":" handle
```

When the server receives this header, the CGI job servicing the request will be reserved in a persistent state. Only requests coming in with that session handle in the URL are routed back to that instance of the CGI program. The URL must be in the following format:

```
/path/cgi-name/handle/rest/of/path
```

Where *handle* is an exact match of the handle provided in the "`Accept-HTSession`" CGI header for the program `cgi-name`.

Note: The `cgi-name` that is being resolved is the name as it appears in the URL. It is not necessarily the actual name of the program being started on the system. This is to remain consistent with the name resolution performed by the server.

HTTimeout CGI Header

The *HTTimeout* header is for the CGI program to define the amount of time, in minutes, that this CGI program wants to wait for a subsequent request. If not specified, the value specified on the `PersistentCGITimeout` directive is used. If specified, it takes precedence over the `PersistentCGITimeout` directive, but the server will not wait longer than the time specified on the `MaxPersistentCGITimeout` directive. This allows individual CGI programs to give users more time to respond to lengthy forms or explanations. However, it still gives the server ultimate control over the maximum time to wait.

```
HTTimeout = "HTTimeout" ":" minutes
```

The *time-out* value is a non-negative decimal integer, representing the time in minutes. This header must be preceded by an "`Accept-HTSession`" header, if not, it is ignored. If you omit the header, the default *time-out* value for the server is used. When a CGI program is ended because of a timeout, a message is logged in the error log of the server.

Considerations for using Persistent CGI Programs

You should be aware of the following considerations when using persistent CGI programs:

- The web administrator can limit the number of persistent CGI programs that the server supports by using the MaxPersistentCGI configuration directive.
- There are some job or thread-level resources that the server code running in the CGI job usually manipulates (directly or indirectly) on behalf of CGI programs. The following attributes will (potentially) change across calls:
  - Environment variables the server sets
  - Stdin/Stdout/Stderr file descriptors
  - User profile
  - Library list
- The server will not set the rest of the job attributes set by the server, and therefore, will maintain state across calls if changed by the CGI program. Note, however, that the CGI program must restore the initial state of these values before ending its persistence in order to guarantee compatibility across subsequent server requests:
  - Job Language, Region, CCSID
  - Job Priority
  - Printer/Output Queue
  - Message Logging
  - Environment variables set by the CGI program
- For added security, web server administrators can protect their persistent CGI programs using registered Internet users, thereby forcing authentication by the user before processing each request.

Persistent CGI Program Example

The Persistent CGI programming example located at CGI Programming examples displays a counter that is increased each time the Persistent CGI program is called.

Related information

"CGI data conversions" on page 181

The server can perform ASCII to EBCDIC conversions before sending data to CGI programs. This is needed because the Internet is primarily ASCII-based and the IBM i server is an extended binary-coded decimal interchange code (EBCDIC) server. The server can also perform EBCDIC to ASCII conversions before sending data back to the browser. HTTP and HTML specifications allow you to tag text data with a character set (charset parameter on the Content-Type header). However, this practice is not widely in use today (although technically required for HTTP1.0/1.1 compliance). According to this specification, text data that is not tagged can be assumed to be in the default character set ISO-8859-1 (US-ASCII). The server correlates this character set with ASCII coded character set identifier (CCSID) 819.

"CGI APIs" on page 133
This topic provides information about IBM HTTP Server for i APIs for CGI applications.

"Environment variables set by HTTP Server" on page 634
The IBM HTTP Server for i supports the standard environment variables in addition to environment variables that are unique to the IBM i server.

CGI programs and activation groups

The following section is intended to give a brief overview of activation groups.

Note: It is very important to become familiar with the details of activation groups prior to developing or porting a CGI application that will use this support.

Activation groups

Program activation is the process that is used to prepare a program to run. The system must activate ILE programs before they can be run. Program activation includes the allocation and initialization of static storage for the program in addition to completing the binding of programs to service programs. Named activation groups must be used when running persistent CGI.

Program activation is not a unique concept. All modern computer operating systems must perform program initialization and load. What is unique to CGI programs on the IBM i server is the concept of Activation Groups. All ILE programs and service programs are activated within an activation group. This substructure contains the resources necessary to run the program. The resources that are contained and are managed with an activation group include:

- Static and automatic program variables
- Dynamic storage
- Temporary data management resources (For example, open files and SQL cursors)
- Certain types of exception handlers and ending procedures

Runtime creation of ILE activation groups is controlled by specifying an activation group attribute when your program or service program is created. The attribute is specified by using the ACTGRP parameter on the CRTPGM or CRTSRVPGM command. The valid options for this attribute include user-named, *NEW, and *CALLER. The following is a brief description of these options:

user-named
A named activation group allows you to manage a collection of ILE programs and ILE service programs as one application. The activation group is created when it is first needed. All programs and service programs that specify the same activation group name use it then. A user-named activation group is left active after the program has exited normally. All storage associated with that program is still allocated and in "last-used" state. The program is not initialized when it is called again. In addition, for the ILE C runtime, all settings are in "last-used" state, such as `signal()`, and `strtok()`. The RCLACTGRP command is used to end a named activation group. Use the DSPJOB OPTION(*ACTGRP) command to display all the activation groups for the job.

***NEW**
The name for this activation group is selected by ILE and will always be unique. System-named activation groups are always deleted when the high level language returns. *NEW is the standard behavior that can be expected on other systems such as UNIX.

***CALLER**
Specifying *CALLER causes the ILE program or service program to be activated within the activation group of the calling program. A new activation group is never created with this attribute.

Notes:

1. When you create a persistent CGI program, you must specify a named activation group.

2. CGI programs that are not persistent should not refer to job-level scoped resources.

For additional information about activation groups see the ILE Concepts manual.

CGI considerations

There are advantages to running CGI programs in either a user-named or *CALLER activation group. The performance overhead associated with activating a CGI every time that is requested can be drastically reduced. It is important to understand that because the system does not delete user-named activation groups, normal high level language end verbs cannot provide complete end processing. For example, the system will not close open files, and the system will not return the static and heap storage that are allocated by a program. The program must manage these resources explicitly. This will be especially important when changing the activation group of CGI programs that rely on their end processing functions to run properly.

Note: When you activate multi-threaded CGI on your web server, you get multiple thread support for your CGI application Your CGI application must end all of its threads before returning to the server. When using multi-thread capable CGI, you need to put the CGI program in a new or named activation group.

The following section shows examples which will work fine running in a *NEW activation group, however will cause problems if run in a user-named or *CALLER activation group.

Activation group examples

Note: CGI programming examples are also available on the IBM HTTP Server for i website.

In the following example a CGI program when run in a *NEW activation group, would write Hello World to the browser. What is important to understand is that this application is taking advantage of job end processing to delete the stdio buffers that are used to buffer the stdout data.

You could build the following CGI program to run in either a user-named or *CALLER activation group. In such an instance, the server will not process the information that was written to stdout. This will cause the web browser to display a "Document Contains No Data" error message. Another application could run again in the same activation group that properly erased stdout. In this instance, the data that has been buffered from previous calls would be sent.

```
#include <stdio.h>
void main(void) {

/* Write header information. */
printf("Content-type: text/html\n\n");

/* Write header information. */
printf("Hello World\n");
}
```

End processing may not erase stdio buffers so the application must erase the stdout with a `fflush(stdout)` call. The following example will work regardless of the activation group specification:

```
#include <stdio.h>
void main(void) {

/* Write header information. */
printf("Content-type: text/html\n\n");

/* Write header information. */
printf("Hello World\n");

/* Flush stdout. */
fflush(stdout);
}
```

When run in a *NEW activation group, this example CGI would read CONTENT_LENGTH bytes of data from stdin and write this back out to stdout. The system has allocated the buffer that is used to hold the data by invoking `malloc()`. Like the example that is previously shown, this application is relying on several aspects of job end processing to function properly.

If this CGI program were built to run in either a user-named or *CALLER activation group, the following problems would occur:

- As with the simple example that is previously shown, the application is not erasing stdout. This would cause the web browser to display a "Document Contains No Data" error message. You could run another application again in the same activation group that properly erased stdout. This would send the data that has been buffered from previous calls.
- Stdin is buffered similar to stdout. If the contents of stdin are not erased, the stdin data on the second and all following calls of the CGI program will be unpredictable and the contents may at times contain information from subsequent requests.
- The heap storage allocated using `malloc()` is not being freed. Over time, a memory leak error like this could use significant amounts of memory. This is a common application error that only surfaces when the application is not running in a *NEW activation group.

```
/**********************************************************/
/* CGI Example program.                                   */
/**********************************************************/
#include
void main(void)
{
char* stdinBuffer;
char* contentLength;
int numBytes;
int bytesRead;
FILE* pStdin;

/* Write the header. */
printf("Content-type: text/html\n\n");

/* Get the length of data on stdin. */
contentLength = getenv("CONTENT_LENGTH");
if (contentLength != NULL) {

  /* Allocate storage and clear the storage to hold the data. */
  numBytes = atoi(contentLength);
  stdinBuffer = (char*)malloc(numBytes+1);
  if ( stdinBuffer )
    memset(stdinBuffer, 0x00, numBytes+1);

  /* Read the data from stdin and write back to stdout. */
  bytesRead = fread(stdinBuffer, 1, numBytes, pStdin);
  stdinBuffer[bytesRead+1] = '\0';
  printf("%s", stdinBuffer);
}
else
  printf("Error getting content length\n");
return;
}
```

The following example shows the changes that would be required to this application to allow it to run in a user-named or *CALLER activation group:

```
/**********************************************************/
/* CGI Example program with changes to support user-named */
/* and *CALLER ACTGRP.                                    */
/**********************************************************/
#include
void main(void)
{
char* stdinBuffer;
char* contentLength;
int numBytes;
int bytesRead;
FILE* pStdin;

/* Write the header. */
printf("Content-type: text/html\n\n");

/* Get the length of data on stdin. */
contentLength = getenv("CONTENT_LENGTH");
if (contentLength != NULL) {

  /* Allocate storage and clear the storage to hold the data. */
  numBytes = atoi(contentLength);
```

```
   stdinBuffer = (char*)malloc(numBytes+1);
   if ( stdinBuffer )
     memset(stdinBuffer, 0x00, numBytes+1);

   /* Reset stdin buffers. */
   pStdin = freopen("", "r", stdin);

   /* Read the data from stdin and write back to stdout. */
   bytesRead = fread(stdinBuffer, 1, numBytes, pStdin);
   stdinBuffer[bytesRead+1] = '\0';
   printf("%s", stdinBuffer);

   /* Free allocated memory. */
   free(stdinBuffer);
 }
 else
   printf("Error getting content length\n");

 /* Flush stdout. */
 fflush(stdout);
 return;
 }
```

Running CGI programs in IBM PASE for i

The IBM HTTP Server for i Web server can run CGI programs created to run in the IBM Portable Application Solutions Environment for i. In addition, the HTTP Server can also run programs that follow the FastCGI protocol.

CGI programs that currently run on the AIX platform may be able to run on an IBM HTTP Server for i Web server in PASE for i. To do this, store your CGI programs in the QOpenSys file system. You should then verify that your program will run in PASE for i. For more information on how to prepare your code and ensure that it will run effectively in PASE for i, see the Prepare programs to run in IBM PASE for i topic. And finally, use the ScriptAlias directive in the configuration file, httpd.conf, to map the URL to the program, as you would with any CGI program.

For CGI programs that run in PASE for i, environment variables are converted from the CGI job CCSID to the CCSID specified by the ILE environment variable QIBM_PASE_CCSID. The ILE environment variable PASE_LANG specifies the PASE Locale. The default values are functions of the current LANGID and CNTRYID attributes of the CGI job, but the system uses PASE_LANG=POSIX and QIBM_PASE_CCSID=819 if it does not recognize the LANGID and CNTRYID pair. The LANG environment variable controls the default locale for the CGI program that will be running in PASE for i. These default values may be overridden by setting both ILE environment variables 'PASE_LANG' and 'QIBM_PASE_CCSID' using the HTTP directive 'setenv'. If either of these are not set, the default values will be used. For example, `setenv PASE_LANG JA_JP setenv QIBM_PASE_CCSID 1208`

See PASE for i Locales to determine what locales are supported.

Note: CGI programs that run in PASE for i must have file names that do not include the following extensions which are reserved for CGI programs that do not run in PASE for i:

- .rexx
- .pl
- .pgm
- .class

Sample CGI Program Configuration

This sample code shows one way to use the ScriptAlias directive to map your CGI program to a URL.

```
ScriptAlias /cgi-pase/ /QOpenSys/myserver/cgi-bin/
```

Running FastCGI applications in IBM PASE for i

The IBM HTTP Server for i is able to run AIX programs that implement the FastCGI protocol. FastCGI is an interface between Web servers and applications which combines some of the performance characteristics of native Web server modules with the Web server independence of the CGI programming interface. Like

AIX CGI programs, AIX FastCGI applications are run in the PASE for i environment. For more information about how the HTTP Server supports FastCGI, see the IBM HTTP Server for i Documentation Web page.

Related information

FastCGI Web site

Setting up CGI programs for HTTP Server

This topic provides information about how to set up CGI programs for your IBM HTTP Server for i Web server.

You can extend the capability of the HTTP Server by adding CGI programs. The HTTP Server supports Integrated Language Environment (ILE) CGI programs and AIX CGI programs.

Here is a summary of the steps you need to take to enable your server to run CGI programs:

1. Create the CGI program.

ILE CGI programs can be written in ILE C/C++, ILE RPG, or ILE COBOL programming languages. The HTTP Server provides CGI application programming interfaces in support of ILE CGI programming.

In addition to support for ILE CGI programs, the HTTP Server has the ability to run REXX programs and AIX programs as CGI programs. For more information about running AIX CGI programs, see "Running CGI programs in IBM PASE for i" on page 193.

2. Move the CGI program to the CGI directory.

ILE CGI programs must reside in the `QSYS.LIB` file system. REXX CGI programs must reside in database files named REXX or QREXSRC. AIX CGI programs must reside in the `QOpenSys` file system.

3. Ensure that your program has the correct authority using *PUBLIC, QTMHHTTP or QTMHHTP1.

If the `UserID` directive is not active, the server profile QTMHHTP1 needs access to the CGI program and all objects the program accesses. If the `UserID` directive is active, the `UserID` profile needs access to the CGI program and all objects the program accesses.

4. Make changes to the HTTP Server configuration file.

For example, you need to add the `ScriptAlias` directive at a minimum.

Note: For REXX programs, you only need to indicate the path and the file name in the ScriptAlias directive. For example:

```
ScriptAlias /REXX /QSYS.LIB/AS400CGI.LIB/QREXSRC.FILE/*
```

The URL is :

```
http://hostname/REXX/samplecgi.REXX
```

Apache module programming

The IBM HTTP Server for i supports the extension of the functionality of the HTTP Server through the use of third-party Apache modules.

Related information

"Apache module APIs" on page 133

This topic provides information about the Apache portable runtime (APR) and application programming interfaces (APIs) for the IBM HTTP Server for i. These APIs are generally used to write cross-platform Apache modules.

Developer Documentation for Apache 2.4

Apache Portable Runtime Project

Setting up third party modules for HTTP Server

This topic provides information about how to set up third party modules for your IBM HTTP Server for i Web server.

The HTTP Server can extend its functionality in specific areas of your server using modules. For example, a module could be configured to create a new type of authentication that is not available with the shipped HTTP Server. The Apache Software Foundation (ASF) provides basic information for writing your own modules. Before the module can be used by your HTTP Server, it must be compiled and saved in the QSYS directory. In addition, the LoadModule directive must be entered in your server configuration file along with any specific context required information.

As of IBM i 5.4, modules must be recompiled with a UTF locale. This creates an environment where locale-dependent C runtime functions assume that string data is encoded in UTF-8. Any hardcoded constants can be encoded in UTF-8 by adding a `#pragma convert(1208)` statement in the module. Additionally, input data from the client will no longer be converted to EBCDIC but will be passed as-is. Output data sent from the module is not converted either so it must be encoded in ASCII or UTF8 as required. APR and HTTP APIs as of V5R4, expect data in UTF-8. Note that several APIs have additional functions that allow a CCSID to be set to indicate the encoding of the parameters being passed. Conversion functions between UTF-8 and EBCDIC have been added. Be sure to review APIs used by your module to be aware of current changes.

Follow the below directions to compile and use a new module.

1. Save the source code

Save the source code in your QSYS or IFS directory. All objects created from compiling and creating the service program must be placed in the QSYS directory.

2. Compile the source code

Compile the source code using the CRTCMOD command. Before you compile the program, make sure you have the correct programming language compiler installed on your IBM i server (the most common programming language used is C). Replace the text in the parenthesis ( ) with your own information.

```
CRTCMOD MODULE(Destination module name and library for the compiled module object.)
```

Any Apache modules will need to be changed in order to run as a UTF-8 based server module as opposed to an EBCDIC based server module.

- For ILE C use:

```
CRTCMOD MODULE(MYLIB/MOD_TEST) SRCSTMF('/mydir/mymodule/source/mod_test.c')
DEFINE(AS400 AS400_UTF8) LOCALETYPE(*LOCALEUTF) TERASPACE(*YES)
INCDIR('/qibm/proddata/httpa/include')
```

- For C++ use:

```
CRTCPPMOD MODULE(MYLIB/MOD_TEST) SRCSTMF('/mydir/mymodule/source/mod_test.c')
DEFINE(AS400 AS400_UTF8) LOCALETYPE(*LOCALEUTF) TERASPACE(*YES)
INCDIR('/qibm/proddata/httpa/include')
```

Notice the change in the LOCALETYPE parameter. Using LOCALETYPE(*LOCALEUTF) does the following: Program objects created with this option use the locale support provided by *LOCALE objects. Wide-character types contain four-byte UTF-32 values. Narrow character types contain UTF-8 values. The effect of this change enables the locale dependent C runtime functions to work on UTF-8 strings. See WebSphere Development Studio: ILE C/C++ Programmer's Guide for more information.

Correct any errors found while compiling. Continue to compile the source code until there are no errors. Save the compiled module in the QSYS directory.

3. Create a service program

Create a service program using the CRTSRVPGM command. Replace the text in the parenthesis ( ) with your own information.

```
CRTSRVPGM SRVPGM(Destination service program name and library.)
   MODULE(Module or modules to be built into the service program. Same as CRTCMOD above.)
```

```
    EXPORT(Name of the data item to be exported.)
    BNDSRVPGM(Specifies other service programs needed to bind to when creating the service
 program.)
```

Note: The **EXPORT** field can only have the value of either ***ALL** or ***SRCFILE**. If ***SRCFILE** is used, you will need to have an export source file defining which data items or procedures need to be exported and contain the name of the module structure (for example, cgi_module).

The **BNDSRVPGM** field must have, at a minimum, the following: **(QHTTPSVR/QZSRAPR QHTTPSVR/QZSRCORE QHTTPSVR/QZSRXMLP QHTTPSVR/QZSRSDBM)**. These values will cover all the HTTP Sever APIs that may be used when building the service program.

4. Add LoadModule to HTTP Server configuration file

See "Setting up Apache modules" on page 132 for the steps you need to perform to add the `LoadModule` directive.

Note: Some third-party modules designed for previous IBM i releases may require code changes due to the API changes of new 2.4 version HTTP Server for i. All third-party modules are required to be recompiled against the new 2.4 version HTTP server runtime . For the API update plase refer to API update for detail information.

Related information

"Apache module APIs" on page 133
This topic provides information about the Apache portable runtime (APR) and application programming interfaces (APIs) for the IBM HTTP Server for i. These APIs are generally used to write cross-platform Apache modules.

Developer Documentation for Apache 2.4

Apache Portable Runtime Project

Handler for HTTP Server

In the IBM HTTP Server for i, a handler is an internal representation of the action that is performed when a file or URL is requested.

Generally, files have implicit handlers, based on the file type. Normally, all files are simply served by the server, but certain file types are handled separately. For example, you may use a type of `application/x-httpd-cgi` to invoke CGI scripts.

Handlers are unrelated to file type. They are either based on filename extensions or on location. This allows both a type and a handler to be associated with a file (see Files with Multiple Extensions).

Handlers are either built into the server, built into a module, or are added with the Action directive. The built-in handlers are:

- **default-handler**: Send the file using the default_handler(), which is the handler used by default to handle static content. (core)
- **send-as-is**: Send file with HTTP headers as is (mod_asis).
- **cgi-script**: Treat the file as a CGI script (mod_cgi).
- **imap-file**: Imagemap rule file (mod_imagemap).
- **type-map**: Parse as a type map file for content negotiation (mod_negotiation).
- **proxy-server**: Determine if file is local (mod_proxy)

Server-side scripting languages

The IBM HTTP Server for i supports the extension of the functionality of the HTTP Server through the use of scripting languages that run on the server.
Related concepts

"Service-side includes" on page 42
Server-side includes (SSI) are the simplest way to add dynamic content to a Web site. A set of directives is embedded in the HTML code and is interpreted by the server before the document is sent to a client.

SSI can be used to call a CGI program or return information about documents or the value of environment variables.

Net.Data

Net.Data is a server-side scripting engine that allows you to easily create dynamic documents using live data from a variety of sources such as relational and non-relational database management systems (DBMSs), including DB2 databases that can be accessed through DRDA, files, and native applications written in programming languages such as RPG, Cobol, Java, C, C++, and REXX.

Net.Data operates on scripts called macros, which contains a series of statements that are defined by the Net.Data macro language. These statements can include standard HTML (or XML, etc.) and language environment-specific statements (for example, SQL statements) as well as macro directives. These statements act as instructions to the Net.Data macro processor, telling it how to construct the dynamic page. Net.Data interprets the statements to create dynamic Web pages with customized content based on input from the user, the current state of your databases, other data sources, existing business logic, and other factors that you design into your macro. The dynamic page that is generated can be rendered in a variety of formats. For example, HTML for browser clients, XML for browser and application clients, wireless markup language (WML) for wireless clients, and Excel for application clients.

The Net.Data macro processor communicates with the HTTP Server through its CGI-BIN interface. Like other CGI-BIN programs, Net.Data is typically stored in the server's CGI-BIN directory. Net.Data is accessed when a URL received by the server refers to the Net.Data macro processor executable, `DB2WWW`, in the CGI-BIN directory.

When a URL is received by the server that refers to the Net.Data macro processor program, the server starts an instance of the macro processor. It then passes essential information, including the name of the requested macro and the section of the macro to use. The macro processor then:

1. Reads and parses through the macro.
2. Interprets all the macro statements.
3. Dynamically builds the page.
4. Sends the data to the HTTP server by writing to stdout.

The macro writer has complete control over what format the generated data is in (for example: HTML or XML). The macro processor imposes no restrictions. After the text is passed back to the server, the macro processor ends. The resulting text is passed to the client (or browser) where the user interacts with it. Further requests from this user or any other user will result in the whole process just described taking place again.

For more detailed information about Net.Data, including how to configure Net.Data and how to write Net.Data macros and language environments, see the IBM Net.Data for i Web site.

Node.js

Node.js is an open source project based on the Google Chrome JavaScript Engine. It provides a platform for server-side JavaScript applications running without browsers.

Many developers are basing the architecture of their real-time applications on the Node.js framework because of its inherent event-driven architecture and non-blocking I/O API. But the power of that architecture can't be realized unless the hosting environment provides enterprise-grade scalability and reliability, and that is where the IBM i platform enters into the picture.

Node.js can be run on the IBM i platform. In addition, extensions have been created to allow Node.js applications to access IBM DB2 for i objects and IBM i system resources and objects.

To find out everything about running Node.js applications on IBM i, see the IBM i Open Source Technologies support page.

Related information
IBM i Open Source Resources

PHP

Hypertext Preprocessor (PHP) is one of the world's most popular server-side scripting language for building dynamic, data-driven Web applications.

PHP is a powerful, open, and easy-to-use Web application environment that has the support of a large community with thousands of applications and components to share. It is an open source scripting language that is designed for Web application development. PHP is widely used for content management, customer relationship management, database access, forums, blogs, wikis, and other Web-based applications.

PHP applications are easily integrated with data in IBM DB2 for i and RPG, COBOL, and other business applications on IBM i.

To see what options are available to run PHP scripts, see the IBM i Open Source Technologies support page.

Related information

IBM i Open Source Resources

Python

Python is an agile, dynamically typed, expressive, open source programming language that supports multiple programming philosophies, including procedural, object-oriented, and functional.

Python is a popular high-level programming language that is easily extensible through the use of third-party packages and often allows powerful function to be written with few lines of code.

You can run Python applications on the IBM i platform. In addition, extensions have been created to allow Python applications to access IBM DB2 for i objects and IBM i system resources and objects.

To find out everything about running Python applications on IBM i, see the IBM i Open Source Technologies support page.

Related information

IBM i Open Source Resources

Running Java Web applications

Java servlets and Java server pages (JSPs) are Java programs that run on a Java application server and extend the capabilities of the Web server.

Java servlets are Java classes that are designed to respond to HTTP requests in the context of a Web application.

You can look at JSPs as an extension of HTML that gives you the ability to seamlessly embed snippets of Java code within your HTML pages. These bits of Java code generate dynamic content, which is embedded within the other HTML/XML content. A JSP is translated into a Java servlet and executed on the server. JSP statements embedded in the JSP become part of the servlet generated from the JSP. The resulting servlet is executed on the server.

The HTTP Server does not run Java Web applications directly. HTTP requests for Java applications are forwarded by the HTTP Server to Java application servers. IBM provides the following Java application servers to run Java applications:

- WebSphere Application Server

  IBM's strategic Web application server and provides enterprise level support for Java servlets, JSPs, and EJBs (Enterprise Java Beans).
- Integrated Web Application Server

  A lightweight application server for Java applications that is integrated into the IBM i operating system.

Related information

JavaServer Pages Technology
Java Servlet Technology
WebSphere Application Server for IBM i
Integrated Web Application Server

Troubleshooting

This topic lists common problems and solutions for the IBM HTTP Server for i, the IBM Web Administration for i, and other features associated with the product.

Important: Information for this topic supports the latest PTF levels for IBM HTTP Server for i. It is recommended that you install the latest PTFs to upgrade to the latest level of IBM HTTP Server for i. See the IBM HTTP Server for i Support Web page for more information.

Related information

IBM HTTP Server for i FAQs
IBM HTTP Server for i Support

Troubleshooting Web Administration for i

This topic lists common problems and solutions for the IBM Web Administration for i, and other features associated with the product.

Important: Information for this topic supports the latest PTF levels for IBM HTTP Server for i. It is recommended that you install the latest PTFs to upgrade to the latest level of IBM HTTP Server for i. See the IBM HTTP Server for i Support Web page for more information.

List of symptoms:

- “Symptom: Cannot read or write to QUSRSYS/QATMHINSTC” on page 199
- “Symptom: Web browser problems with HTTP Server” on page 200
- “Symptom: ADMIN server will not start” on page 200
- “Symptom: HTTP Server will not start or functions will not work” on page 200
- “Symptom: Unknown server type when working with HTTP Servers in ADMIN” on page 201
- “Symptom: All servers show status 'Stopped'” on page 201
- “Symptom: Cannot access ADMIN or some functions do not work” on page 201
- “Symptom: User Profile does not have *IOSYSCFG” on page 201
- “Symptom: Cannot create new HTTP Server instance” on page 202
- “Symptom: Net.Data error” on page 202
- “Symptom: Error occurred opening file” on page 202

Symptom: Cannot read or write to QUSRSYS/QATMHINSTC

Cause

The Web Administration for i interface uses the IBM Toolbox for Java. When reading and writing files in QSYS, the Java Toolbox sometimes uses the DDM server. If the DDM server is not running, this may result in problems reading or writing the QUSRSYS/QATMHINSTC file containing HTTP Server definitions.

Solution

On an IBM i command line, enter STRTCPSVR *DDM.

Symptom: Web browser problems with HTTP Server

Cause
Your Web browser may not be configured correctly.

Solution
Below is a list of common problems and solutions for your Web browser.

Miscellaneous Microsoft Internet Explorer errors related to incorrect interpretation of HTTP/1.1 in response
Microsoft Internet Explorer sends requests in HTTP/1.1 format but seems to only accept responses in HTTP/1.0 format. The work around is to tell HTTP Server the request came in as HTTP/1.0 format.

Fore example: `BrowserMatch "MSI 4\.0b2;" downgrade-1.0 force-response-1.0`

URL not found when clicking on a file in a directory listing from Netscape
If `AlwaysDirectoryIndex` is set to OFF and a URL for a directory without a trailing slash is requested, then Netscape does not request the file relative to the director in which the file exists in the resulting directory listing.

Microsoft Internet Explorer does not display customized error messages
If Internet Explorer is not displaying the customized error messages, check to see if the preferences for the browser are set to show friendly HTTP error messages. Disable this preference and the customized error massages should display properly.

When using HTTPS, Microsoft Internet Explorer shows pages that were cached when using HTTP
If the browser is showing cached pages instead of connecting to the server using SSL, clear the browser's cache.

Prompted for password when using certificate for client authentication
If you are using a Certificate Authority that offers the option to protect the private key of your certificate with a password (such as for the Microsoft Internet Explorer browser), and you use the certificate for client authentication, you are prompted for the password after about 2 minutes of idle time. This happens even if you have disabled SSLV2 in the browser being used and in the server because you are trying to use the longer SSLV3 cache time-out interval. This is a security feature that protects your private key if you are away form your client, even though it may look like an SSLV3 caching problem.

Certificate not recognized by browser
If you add a certificate to your browser, the browser may not recognize that there is a new certificate until you restart your computer.

Symptom: ADMIN server will not start

Solution
Check to make sure you have the proper authorities. See "User profiles and required authorities for HTTP Server" on page 31 for specific authority and profile information.

Databases fail to deploy

Symptom: HTTP Server will not start or functions will not work

Solution
General items to check:

1. Check /QIBM/UserData/HTTPA/admin/logs, HTTPAdmin.log, error_log, and any other logs you may have. More information on the cause of the problem may be found there.
2. Use CHKPRDOPT to 57XXDG1, SS1, TC1 and JV1.
3. Check joblog for user QTMHHTTP.
4. Check QTMHHTTP and QTMHHTP1 user profiles.
5. Verify that *PUBLIC is not *EXCLUDEd from '/' (Use WRKLNK '/' and take option 9).

6. Verify that QSERVER and QUSRWRK subsystems are running.

Error messages:

ZSRV_MSG0252: SSL initialization operation failed, return code error = 107
: 107 is the Secure socket API error code, it means GSK_KEYFILE_CERT_EXPIRED. You may be able to circumvent this problem by going to DCM to extend the validity.

Error ZSRV_MSG0358
: Found in admin log. Verify that there is a host table entry in CFGTCP Option 10 that matches the host + domain name in CFGTCP Option 12, and set 'Host Name Search Priority' to *LOCAL.

Error ZUI_50004 - 'no *IOSYSCFG authority'
: Verify that user has *IOSYSCFG Authority. If *IOSYSCFG is granted by a GROUP profile, verify that PTF SF65588 (V4R5) is applied. Check that there are NO user .jar files in the /QIBM/ProdData directory path - this directory is for IBM use only.

Error HTP8015
: Verify that the latest PTFs for DG1 product are applied.

Error CEE0200
: Verify that 57XXJV1 Options *Base, 5, and 6 are installed,

Error ZSRV_MSG0302 :User qsecofr:authentication failure for "/":1
: Known problem with 128 character passwords on V5R1. HTTP servers cannot use 128 character passwords. You may be able to circumvent this problem by changing the password in the user profile to CAPITAL letters and using CAPITAL letters to log into the ADMIN screen.

ZSRV_MSG0252: SSL initialization operation failed, return code error = 107.
: 107 is the Secure socket API error code, it means GSK_KEYFILE_CERT_EXPIRED. You may be able to circumvent this problem by going to DCM to extend the validity.

Symptom: Unknown server type when working with HTTP Servers in ADMIN

Solution
: Ensure that LOOPBACK and LOCALHOST are configured to resolve to 127.0.0.1 and can be PINGed from the IBM i command line. Verify that there are no exit programs for exit point QIBM_QPWFS_FILE_SERV. Verify that QSERVER and QUSRWRK subsystems are running and that current group PTF for DG1 product is applied.

Symptom: All servers show status 'Stopped'

Cause
: This problem was determined to be caused by an OEM security application that registers many exit point programs.

Solution
: Remove the application to eliminate the problem.

Symptom: Cannot access ADMIN or some functions do not work

Solution
: Verify the following:

- Verify that user's browser is not using a proxy to access the ADMIN server.
- Verify latest DG1 PTF's.
- Verify that user profiles QTMHHTTP and QTMHHTP1 are enabled.

Symptom: User Profile does not have *IOSYSCFG

Solution
: In the HTTPAdmin.log you will find error: 'NoRouteToHostException'. Do the following:

- Verify that 127.0.0.1, LOOPBACK and LOCALHOST are configured and work.

Symptom: Cannot create new HTTP Server instance

Solution
Verify LOCALHOST , LOOPBACK and 127.0.0.1 exist and work.

Symptom: Net.Data error

Include object specified in /QIBM/ProdData/HTTPSVR/MRIXXX/Macro/qzhamsg.nds at line 208

Solution
Verify that directory `/QIBM/ProdData/HTTPSVR/Macro/` contains only objects that are appropriate to the current OS version .

Symptom: Error occurred opening file

Cause
If your HTTP Server configuration uses the Rewrite directive and does not have the proper access for QTMHHTTP configured, your server will not start.

Solution
Make sure QTMHHTTP has *RWX access authority to the */tmp* directory.

Related information
"Troubleshooting HTTP Server" on page 202
This topic lists common problems and solutions for the IBM HTTP Server for i and other features associated with the product.

IBM HTTP Server for i FAQs
IBM HTTP Server for i Support

Troubleshooting HTTP Server

This topic lists common problems and solutions for the IBM HTTP Server for i and other features associated with the product.

Important: Information for this topic supports the latest PTF levels for IBM HTTP Server for i. It is recommended that you install the latest PTFs to upgrade to the latest level of IBM HTTP Server for i. See the IBM HTTP Server for i Support Web page for more information.

List of symptoms:

- "Symptom: Error 404 on HTTP Server" on page 202
- "Symptom: HTTP Server has a slow response" on page 203
- "Symptom: Error 500 on HTTP Server" on page 203
- "Symptom: HTTP Server on port 80 does not start" on page 203
- "Symptom: Web browser problems with HTTP Server" on page 204
- "Symptom: HTTP Server will not start or functions will not work" on page 205
- "Symptom: Error occurred opening file" on page 205
- "Symptom: WebSphere Portal authentication performance problems" on page 206

Symptom: Error 404 on HTTP Server

Cause
HTTP Server is not able to find the resource that was requested or the user profile on HTTP Server does not have authority to the requested resource.

Solution
Check the following:

- Make sure the file exists.
- Make sure that the user profile used to access the resource has object authority. The user profile QTMHHTTP is used by default. The user profile QTMHHTP1 is used by default when the request is a CGI program.

Symptom: HTTP Server has a slow response

Solution

Refer to the following:

- “Managing HTTP Server performance” on page 102

Symptom: Error 500 on HTTP Server

Cause

A program on your HTTP Server has failed or there is an error in your CGI program.

Solution

Check the following:

- Check the server Primary job log, QSYSOPR messeges, error log and CGI job logs for more information.
- If you have not used the IBM Web Administration for i interface to create an HTTP Server configuration, a required directive may be missing from the configuration file. View the configuration file with the Web Administration for i interface for possible errors.

Symptom: HTTP Server on port 80 does not start

Cause

By default, APACHEDFT server autostart setting is *GLOBAL. If, in addition, the global server setting for autostart is "Yes", then APACHEDFT server will start during STRTCP command processing. APACHEDFT server uses port 80 and may cause any other HTTP Server using port 80 to not start.

Solution

Do the following:

If you HTTP Server does not start or appears to start, but then stops, check the following:

1. The cause of the problem may be in the job log. Use WRKACTJOB immediately after the server is started. If the job is active, the enter **`WRKACTJOB`** to work with job and display the job log. If the job is not active, then enter **`WRKSPLF SELECT(QTMHHTTP)`** to find the name of the server and display the spool file.
2. If you have configured the error logs, then the cause of the problem may be in the error log. For example, `/www/myserver/logs/basic_error_log`, where "`myserver`" is the name of your HTTP Server.

   Note: If the error messages have been customized, the error will not be identified in the same manner as the above example.

If these steps do not help, then try starting the server with verbose tracing. See Manage server performance for HTTP Server for tracing.

By default, APACHEDFT server autostart setting is *GLOBAL. If, in addition, the global server setting for autostart is "Yes", then APACHEDFT will start during STRTCP command processing. APACHEDFT server uses port 80 and may cause any other HTTP Server using port 80 to not start. To avoid this condition, you can :

- Change APACHEDFT server configuration autostart setting to "No".
- Change APACHEDFT server configuration to use a port other than 80.

To change the autostart value on APACHEDFT server, do the following:

1. Click the **Manage** tab.

2. Click the **HTTP Servers** subtab.
3. Select **APACHEDFT** from the **Server** list.
4. Expand **Server Properties**.
5. Click **General Server Configuration**.
6. Click the **General Settings** tab in the form.
7. Select **No** (instead of *GLOBAL or Yes) from the **Autostart** list.
8. Click **OK**.

To change the port number on APACHEDFT server, do the following:

1. Click the **Manage** tab.
2. Click the **HTTP Servers** subtab.
3. Select **APACHEDFT** from the **Server** list.
4. Expand **Server Properties**.
5. Click **General Server Configuration**.
6. Click the **General Settings** tab in the form.
7. Select the IP address and port from the **Server IP addresses and ports to listen on** table.
8. Enter a new value for the port number in the **Port** column.
9. Click **Continue**.
10. Click **OK**.

As a final precaution, make sure APACHEDFT server is not started by doing the following:

1. Click the **Manage** tab.
2. Click the **All Servers** subtab.
3. Click the **All HTTP Servers** tab.
4. Select **APACHEDFT** from the table.
5. Click **Stop**.

Symptom: Web browser problems with HTTP Server

Cause

Your Web browser may not be configured correctly.

Solution

Below is a list of common problems and solutions for your Web browser.

Miscellaneous Microsoft Internet Explorer errors related to incorrect interpretation of HTTP/1.1 in response

Microsoft Internet Explorer sends requests in HTTP/1.1 format but seems to only accept responses in HTTP/1.0 format. The work around is to tell HTTP Server the request came in as HTTP/1.0 format.

Fore example: `BrowserMatch "MSI 4\.0b2;" downgrade-1.0 force-response-1.0`

URL not found when clicking on a file in a directory listing from Netscape

If `AlwaysDirectoryIndex` is set to OFF and a URL for a directory without a trailing slash is requested, then Netscape does not request the file relative to the director in which the file exists in the resulting directory listing.

Microsoft Internet Explorer does not display customized error messages

If Internet Explorer is not displaying the customized error messages, check to see if the preferences for the browser are set to show friendly HTTP error messages. Disable this preference and the customized error massages should display properly.

When using HTTPS, Microsoft Internet Explorer shows pages that were cached when using HTTP
If the browser is showing cached pages instead of connecting to the server using SSL, clear the browser's cache.

Prompted for password when using certificate for client authentication
If you are using a Certificate Authority that offers the option to protect the private key of your certificate with a password (such as for the Microsoft Internet Explorer browser), and you use the certificate for client authentication, you are prompted for the password after about 2 minutes of idle time. This happens even if you have disabled SSLV2 in the browser being used and in the server because you are trying to use the longer SSLV3 cache time-out interval. This is a security feature that protects your private key if you are away form your client, even though it may look like an SSLV3 caching problem.

Certificate not recognized by browser
If you add a certificate to your browser, the browser may not recognize that there is a new certificate until you restart your computer.

Symptom: HTTP Server will not start or functions will not work

Solution
General items to check:

1. Check /QIBM/UserData/HTTPA/admin/logs, HTTPAdmin.log, error_log, and any other logs you may have. More information on the cause of the problem may be found there.
2. Use CHKPRDOPT to 57XXDG1, SS1, TC1 and JV1.
3. Check joblog for user QTMHHTTP.
4. Check QTMHHTTP and QTMHHTP1 user profiles.
5. Verify that *PUBLIC is not *EXCLUDEd from '/' (Use WRKLNK '/' and take option 9).
6. Verify that QSERVER and QUSRWRK subsystems are running.

Error messages:

Error ZSRV_MSG0358
Found in admin log. Verify that there is a host table entry in CFGTCP Option 10 that matches the host + domain name in CFGTCP Option 12, and set 'Host Name Search Priority' to *LOCAL.

Error ZUI_50004 - 'no *IOSYSCFG authority'
Verify that user has *IOSYSCFG Authority. If *IOSYSCFG is granted by a GROUP profile, verify that PTF SF65588 (V4R5) is applied. Check that there are NO user .jar files in the /QIBM/ProdData directory path - this directory is for IBM use only.

Error HTP8015
Verify that the latest PTFs for DG1 product are applied.

Error CEE0200
Verify that 57XXJV1 Options *Base, 5, and 6 are installed,

Error ZSRV_MSG0302 :User qsecofr:authentication failure for "/":1
Known problem with 128 character passwords on V5R1. HTTP servers cannot use 128 character passwords. You may be able to circumvent this problem by changing the password in the user profile to CAPITAL letters and using CAPITAL letters to log into the ADMIN screen.

ZSRV_MSG0252: SSL initialization operation failed, return code error = 107.
107 is the Secure socket API error code, it means GSK_KEYFILE_CERT_EXPIRED. You may be able to circumvent this problem by going to DCM to extend the validity.

Symptom: Error occurred opening file

Cause
If your HTTP Server configuration uses the Rewrite directive and does not have the proper access for QTMHHTTP configured, your server will not start.

Solution

Make sure QTMHHTTP has *RWX access authority to the */tmp* directory.

Symptom: WebSphere Portal authentication performance problems

If you are experiencing performance problems when users are logging into Portal (the authentication phase), the following indicators may help determine that the filters are causing these performance problems:

- Your LDAP server is populated with a large number of entries.
- When you type `WRKACTJOB` in a console command line, QSQSRVR jobs are using an excessive amount of CPU during the Portal authentication (sign on) phase.
- When two Portal users sign on concurrently, one sign on request takes two times as long as the other request.

Cause

You may encounter a performance problem if you configure a secure WebSphere Portal server with LDAP. This problem only occurs if you use the **Create WebSphere Portal wizard** in the Web Administration for i interface. When configuring LDAP with the WebSphere Portal wizard, the two LDAP fields **LDAPUserFilter** and **LDAPGroupFilter** are configured with default values depending on the type of LDAP server being used. For example, if you are securing your WebSphere Portal server using the IBM Directory Server, the two LDAP fields are set to *"(&(|(cn=%v)(uid=%v))(objectclass=person))"* and *"(&(cn=%v)(|(objectclass=groupOfUniqueNames)(objectclass=groupOfNames)(objectclass=group)))"*, respectively. By configuring the fields with the default values, the WebSphere Portal wizard allows the wpsadmin Portal administrator to successfully login and existing LDAP entries can be used once the Portal server is successfully configured and secured. However, if the LDAP server has a large number of entries, or if many additional users are added to the LDAP server, Portal's authentication performance may be noticeably impacted.

Solution

If you determine that the filters, as configured by the WebSphere Portal wizard, are causing authentication performance problems, complete the following steps:

1. Start the Web Administration for i interface.
2. Click the **Manage** tab.
3. Click the **Application Servers** subtab.
4. Expand **Tools**.
5. Click **Launch Administrative Console**.
6. Login to the console and click **OK**.
7. Expand **Security**.
8. Expand **User Registries**.
9. Click **LDAP**.
10. Click **Advanced LDAP Settings** in the **Additional Properties** table.
11. Edit the **User Filter** and the **Group Filter** properties values to more precise values to increase authentication performance. For more information about this syntax, see the IBM Tivoli Directory Server for i (LDAP) and the WebSphere Portal and Lotus Web Content Management Web site.

1. Edit the **User Filter** and the **Group Filter** properties values to more precise values to increase authentication performance. For more information about this syntax, see the IBM Tivoli Directory Server for i (LDAP) and the WebSphere Portal and Lotus Web Content Management Web site.
2. Click **OK**.
3. Click **Save** to apply changes to the master configuration.
4. Click **Save** again on the next page.

Note: You may need to restart your WebSphere Application Server for these changes to take affect.

Related information
Application servers
Business solutions
IBM HTTP Server for i FAQs
IBM HTTP Server for i Support
WebSphere Portal and Lotus Web Content Management

Troubleshooting CGI programs

This topic lists common CGI program problems and solutions.

You can use the Work with Active Jobs (WRKACTJOB) command to check on the status of server jobs. To start Work with Active Jobs command, type the following in during a 5250 session on a command line:

```
WRKACTJOB SBS(QHTTPSVR) JOB(server_instance)
```

Where *server_instance* is the name of your HTTP Server instance.

When the server is not processing a request, the Work with Active Jobs display will show several server jobs. The first job is the manager job for the server instance. (Function PGM-QZHBMAIN). Server jobs showing PGM - QZSRLOG are logging jobs. Server jobs showing PGM - QZSRHTTP are primary jobs. (There will be 2 of these unless you specify HotBackup Off in your configuration.) Only one of these jobs will be actively handling requests. Jobs showing PGM -QZSRCGI are CGI jobs.

To find out if server jobs have ended abnormally, check the spooled files that contain the job logs (QPJOBLOG) for the user profile QTMHHTTP.

More CGI troubleshooting tips and hints can be found at the Troubleshooting your CGI program Web page on the HTTP Server Web site.

The symptoms that are described in this section would be seen running a request to the server at a browser.

List of symptoms:

- “Symptom: Connection abandoned, dropped, or no data sent” on page 207
- “Symptom: The system is not converting or handling special characters as expected” on page 209
- “Symptom: Error 500: Bad script request -- script '/qsys.lib/qsyscgi.lib/progname.pgm' not found or not executable” on page 209
- “Symptom: A browser request that runs a CGI program runs longer than expected. The browser keeps waiting for a response” on page 209
- “Symptom: A CGI written form is not cached in the browser” on page 210
- “Symptom: The configuration uses the CGIConvMode value of %%MIXED/MIXED%% and the input characters your CGI program receives are incorrect” on page 210

Symptom: Connection abandoned, dropped, or no data sent

Note: Different browser issues different messages when no data is returned to the browser. Abandoned, dropped or no data will be displayed at the browser.

Cause: The system has incorrectly formatted a CGI program that writes data to standard output. The data that is written to stdout may have one of the following problems:

- No data written to stdout
- No “Content-type”, “Location”, or “Status” line
- No new line character after HTTP response header
- No data after HTTP response header.

Solution: Write the data to stdout with “Content-type: ” line with two new line characters (“\n”) and the data to be returned to the client. For example:

```
Content-type: text/plain\n
   \n
   This data is returned to the client
```

Cause: CGI program caused an exception message that was not handled by the CGI program.

Solution: If the system does not indicate a message in the joblog for the active server jobs, do a `WRKSPLF QTMHHTTP`. Check for server jobs that ended when the system ran the CGI program. Change the program to monitor for the message not being handled.

Cause: The program being called does not exist in the library.

Solution: Check the library for the correct name.

Cause: There is a bug in your user-created CGI program.

Solution: You need to set up a scaffolding environment to debug the CGI application prior to integration with server:

1. Issue the command `ENDTCPSVR *HTTP HTTPSVR(server_instance)`
2. Issue the command `STRTCPSVR *HTTP HTTPSVR(server_instance '-minat 1 -maxat 1')`

   Note: You also may need to change script_timeout and output_timeout to be larger. If you are stepping through your code, it may take too long and script_timeout or output_timeout may expire. This causes the server to terminate the job you are debugging.

   Ending and starting the server ensures that only one worker job is running.

   a. Issue the command `WRKACTJOB JOB(`*`server_instance`*`)`

      Look for the CGI jobs as described above.

      Select **option 10** to display the job log.

      If your CGI program is single thread capable, message HTP2001 will be in the job log. If your CGI program is multithread capable, message HTP2002 will be in the job log.

      Record the *Number:*, *User:*, and *Job:* values for your CGI program job.

      Press **F12**.

      Issue the command `STRSRVJOB <`*`Number/User/Job`*`>`.

   b. For the user CGI program, issue the command STRDBG <usercgilib/cgipgm>

      If the program accesses a database file on the server, you must specify `UPDPROD(*YES)`. See the help for the STRDBG command.

      Note: You will need additional authority to troubleshoot the CGI program. For example, you will need authority to the QTMHHTTP user profile.

   c. Set breakpoints in the program.

   d. On the browser, issue a URL that would run the CGI program.

   e. After the system issues an HTTP request on the browser, return to the session that ran `STRSRVJOB`. It should have stopped at a program breakpoint.

      Ending and starting the server ensures that only one worker thread is running.

3. When finished with debug, reset the server values:

   a. Issue the command `ENDDBG`

   b. Issue the command `ENDSRVJOB`

   c. Issue the command `WRKACTJOB SBS(QHTTPSVR) JOB(server_instance)`

   d. Issue the command `STRTCPSVR *HTTP HTTPSVR(server_instance)`

Symptom: The system is not converting or handling special characters as expected

Cause: The browser inserts special characters using escape sequences which requires special handling by the CGI program.

Solution: Browsers create escape sequences (ISO 8859) for special characters (for example, : . , ! @ # $ % *, and so on.) These characters come into standard input or into the QUERY_STRING environment variable in the form "%xx", where "xx" is the two characters representing the ASCII hexadecimal value. (For example, a comma comes in as "%2C". For CGI input mode %%MIXED%%, these three characters "%xx" are converted to EBCDIC, but the values of "xx" are not changed to the corresponding EBCDIC code points.

There are two approaches to handling escape sequences:

1. Convert the EBCDIC representation of the ASCII escape sequence to an EBCDIC escape sequence or use CGI input mode %%EBCDIC%%. This is necessary because the QtmhCvtDB API assumes that escape sequences represent EBCDIC code points, and the API converts them to the corresponding EBCDIC character. For example, %2C, which represents an ASCII comma, is converted to EBCDIC X'2C', which is not an EBCDIC comma.
2. Convert the EBCDIC representation of the ASCII escape sequence to the EBCDIC equivalent character.

The following approach outlined in the first conversion technique listed above:

Note: The hex representation of the %2C from the browser was 0x253243. When this escape sequence is converted to EBCDIC, it ends up as 0x6CF2C3.

1. Convert the "xx" in "%xx" to the corresponding EBCDIC character. In this case 0xF2C3 is converted to 0x2C.
2. For the first approach, convert the EBCDIC character to the two-byte form. Then you can reinsert the two bytes back into the input stream in the same place they originally appeared. The 0x6B would be converted to 0xF6C2, and the resultant escape sequence would be 0x6CF6C2. For the second approach, leave the data in its EBCDIC form and replace the original escape sequence (three characters) with the single character. In this case, replace 0x6CF2C3 with 0x6B.

   Note: The CGI program should preserve an escape sequence that represents the character "%".
3. Call QtmhCvtDB to convert the input stream.

   Note: 7-bit ASCII CCSID 367 is standard on browsers.

Symptom: Error 500: Bad script request -- script '/qsys.lib/qsyscgi.lib/progname.pgm' not found or not executable

Cause: Configuration or authority error.

This message can appear for the following reasons:

- The script does not exist.
- There is a problem with the script, for example, a send error or function check.
- The user QTMHHTP1 does not have authority to run this program.

Solution: Check the configuration and authorities given to the CGI program.

Symptom: A browser request that runs a CGI program runs longer than expected. The browser keeps waiting for a response

Cause: The CGI application that was running has taken a function check.

Solution: Look at the QSYSOPR message queue for a message that requires a reply sent from the CGI program that was running. Note the statement where the program is failing. Use the procedure described under "Symptom: Error 500".

Symptom: A CGI written form is not cached in the browser

Using the back button on the browser results in a request to the server. The form contains no headers or meta tags telling the browser to request (not cache) the page.

Cause: The server is sending a last-modified header.

Solution: Use the *—nolastmod* HTTP Server startup value to specify that the server should not send a last-modified header.

Symptom: The configuration uses the CGIConvMode value of %%MIXED/MIXED%% and the input characters your CGI program receives are incorrect

Cause: The file CCSID language for your server has characters that do not match the EBCDIC code page 37. Use the EBCDIC mode rather than the MIXED mode.

Solution: Configure CGIConvMode for %%EBCDIC/MIXED%%.

Related information

"Troubleshooting HTTP Server" on page 202
This topic lists common problems and solutions for the IBM HTTP Server for i and other features associated with the product.

IBM HTTP Server for i FAQs

IBM HTTP Server for i Support

Reference information for HTTP Server

This topic provides additional reference documentation for IBM HTTP Server for i and the IBM Web Administration for i interface.

See "Related information for HTTP Server" on page 660 for additional reference documentation.

Directives for HTTP Server

This topic provides information about the supported directives for IBM HTTP Server for i.

The supported modules can be found in the HTTP Server directive finder.

See "Directives no longer supported on HTTP Server" on page 212 for modules no longer supported for this version of HTTP Server.

Note: This information is provided for reference only. Use the IBM Web Administration for i to set up and manage your HTTP Server.

Directive term definitions for HTTP Server

This topic provides information about the directive terms used for IBM HTTP Server for i.

Each configuration directive is described using the following attributes:

Module: directive existence

Syntax: directive_name *arguments*

Default: directive_name default_value

Context: context_list

Override: directive override activation

Origin: origin

Usage Considerations: important usage considerations required in the server configuration file

Example: example of directive and its arguments

Module

This attribute identifies the module the directive is associated with.

Syntax

This attribute indicates the format of the directive as it would appear in a configuration file. This syntax is directive-specific, so refer to the text of the directive's other attributes for details. Strings should be quoted. The string ("word1 word2") contains spaces. If the strings do not contain spaces they do not need to be quoted.

Default

This attribute specifies if the directive has a default value. For example, if you omit the directive from your configuration entirely, HTTP Server will behave as though you set it to a particular value. If there is no default value, this attribute says "none".

Context

This attribute indicates where in the server's configuration the directive is supported. It's a comma-separated list of one or more of the following values:

server config
The directive is valid in the global server configuration.

virtual host
The directive is valid in <VirtualHost> containers.

directory
The directive is valid in <Directory>, <Location>, and <Files> containers, subject to the restrictions outlined in the "“Fundamental directive, context, and server area concepts on HTTP Server” on page 13" topic.

directory (but not location)
The directive is valid in <Directory>, <Files> containers, subject to the restrictions outlined in the "“Fundamental directive, context, and server area concepts on HTTP Server” on page 13" topic, but is not valid in the <Location> container.

.htaccess
The directive is valid in per-directory .htaccess files. It may not be processed, however, depending upon the overrides currently active. For more information on how to use .htaccess files, see the Apache HTTP Server Project Web site.

Not in Limit
The directive is not valid in <Limit> containers, subject to the restrictions outline in the "“Fundamental directive, context, and server area concepts on HTTP Server” on page 13" topic.

All
The directive is valid in all contexts.

Note: The directive is only allowed within its supported context; if you try to use it elsewhere, you will receive a configuration error that will either prevent the server from handling requests, or will keep the server from starting. The valid context for a directive is actually the result of a "Boolean OR" of all of the listed contexts. In other words, a directive that is marked as being valid in "server config, .htaccess" can be used in the server configuration file and in .htaccess files, but not within any <Directory> or <VirtualHost> containers.

Override

This attribute indicates which configuration override must be active in order for the directive to be processed when it appears in a .htaccess file. If the directive's context does not permit it to appear in .htaccess files, this attribute is none.

Origin

This attribute reveals the origin of an HTTP directive. Possible values for this attribute include:

IBM
A new directive created for the IBM HTTP Server for i Web server.

Modified
An Apache server directive modified to support the IBM HTTP Server for i Web server.

Apache
An unmodified Apache server directive.

Usage Considerations

This attribute specifies if important usage considerations such as a LoadModule are required in the server configuration file prior to using the directive. If this attribute is not available, the directive does not require any usage considerations.

Example

This attribute specifies at least one example for directives that take a file path name as an argument. It will include both a root example and a QSYS.LIB example, if both apply.

Directives no longer supported on HTTP Server

This topic provides information about what directives are no longer supported by IBM HTTP Server for i.

The following directives are no longer supported on HTTP Server.

Directives

- “AddModule” on page 212
- “ClearModuleList” on page 213
- “IconPath” on page 213
- “Port” on page 214

AddModule

Module: core

Syntax: AddModule *module [module ...]*

Default: none

Context: server config

Override: none

Origin: Apache

Example: AddModule mod_cgi

The AddModule directive allows the server to activate specific modules in the server after a ClearModuleList has been performed. The server comes with a pre-loaded list of active modules. Only those modules are valid. A list of valid modules can be obtained using the '-l' option on the command line. The example above would activate the module mod_cgi. If this module is already active then the directive will be ignored.

Parameter: *module*

- *Module* is any valid module in the pre-loaded list that came with the HTTP Server.

See also “ClearModuleList” on page 213.

ClearModuleList

Module: core

Syntax: ClearModuleList

Default: none

Context: server config

Override: none

Origin: Apache

Example: ClearModuleList

The ClearModuleList directive will clear the built-in list of active modules provided by the server. To reactivate this module list use the "AddModule" on page 212 directive.

IconPath

Module: mod_auto_index

Syntax: IconPath

Default: IconPath /icons

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: IBM

Example: IconPath /myicons/small/

The IconPath directive to specify URL information to be added at the beginning of each icon-URL specified on the following directives:

- AddIcon
- AddIconByType
- AddIconByEncoding
- DefaultIcon

The value that you specify on this directive is added to the icon-URL value on each of the other directives to form the full request URL for each icon. The following path and directory is the default location for icons:

```
/QIBM/ProdData/HTTPA/icons
```

Special Usage Considerations:

- You must enable your server for serving the icons from the default location by adding the following statement to your configuration:

  ```
  Alias /icons /QIBM/ProdData/HTTPA/icons
  ```

- You must use this directive in your configuration before any of the other icon directives that are to use the path (DefaultIcon, AddIcon, AddIconByType, and AddIconByEncoding).

For example, a configuration containing:

```
Alias /icons/small /QIBM/ProdData/HTTPA/icons/small
IconPath /icons/small/
AddIcon blank.gif ^^BLANKICON^^
```

This causes the server to generate a request for the directory list icon as /icons/small/blank.gif. The server uses the alias directive to resolve the request to the proper file. This is different from Apache than on other platforms.

On another platform you would use:

```
Alias /icons /full/icon/path
AddIcon /icons/blank.gif ^^BLANKICON^^
```

IconPath is an IBM i specific directive for Apache; therefore, precautions must be taken if the Apache configuration file is modified manually. On the IBM i server, you would use:

```
Alias /icons /QIBM/ProdData/HTTPA/icons
AddIcon blank.gif ^^BLANKICON^^
```

Since IconPath is set to /icons/ by default, it will be prepended to 'blank.gif' when the AddIcon directive is used.

Port

Module: core

Syntax: Port *number*

Default: Port 80

Context: server config

Override: none

Origin: Apache

Example: Port 8080

The Port directive has two behaviors:

- In the absence of any Listen directives specifying a port number, a Port directive given in the "main server" (for example, outside any <VirtualHost> section) sets the network port on which the server listens. If there are any Listen directives specifying the port number then Port has no effect on what address the server listens at. The use of the Listen directive causes all Port directives to be ignored.
- The Port directive sets the SERVER_PORT environment variable (for CGI and SSI), and is used when the server must generate a URL that refers to itself (for example when creating an external redirect to itself). This behavior is modified by UseCanonicalName.

In no event does a Port setting affect what ports a VirtualHost responds on, the VirtualHost directive itself is used for that. The primary behavior of Port should be considered to be similar to that of the ServerName directive. The ServerName and Port together specify what you consider to be the *canonical* address of the server. (See also UseCanonicalName.)

Parameter: *number*

- Where *number* is a number from 0 to 65535; some port number (especially below 1024) are reserved for particular protocols. The standard port for http protocol is 80.

Note: The “Listen” on page 337 directive is used as an alterative to Port.

Module mod_access

Module mod_access contains directives for the IBM HTTP Server for i Web server.

Summary

The module mod_access provides access control based on a client's hostname or IP address.

It's a compatibility module with previous version of HTTP Server. The directives provided by this module have been deprecated by the new authz refactoring. Please see mod_authz_host.

Module mod_actions

Module mod_actions contains directives for the IBM HTTP Server for i Web server.

Summary

The module mod_actions provides for executing CGI scripts based on media type or request method.

Directives

- "Action" on page 215
- "Script" on page 215

Action

Module: mod_actions

Syntax: Action *action-type cgi-script*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: Action application/x-www-form-urlencoded /cgi-bin/file.pgm

The Action directive adds an action, which will activate CGI script when action-type is triggered by the request.

Example: MIME type

```
# Requests for files of a particular MIME content type:
Action image/gif /cgi-bin/images.pgm
```

In this example, requests for files with a MIME content type of image/gif will be handled by the specified cgi script /cgi-bin/images.pgm.

Example: File extension

```
# Files of a particular file extension
AddHandler my-file-type .xyz
Action my-file-type /cgi-bin/program.pgm
```

In this example, requests for files with a file extension of .xyz are handled by the specified cgi script /cgi-bin/program.pgm.

Parameter One: *action-type*

- The action-type can be either a handler or a MIME content type. It sends the URL and file path of the requested document using the standard CGI PATH_INFO and PATH_TRANSLATED environment variables. The handler used for the particular request is passed using the REDIRECT_HANDLER variable.

Parameter Two: *CGI-script*

- The cgi-script is the URL-path to a resource that has been designated as a CGI script using "ScriptAlias" on page 222 or "AddHandler" on page 493.

Script

Module: mod_actions

Syntax: Script *method CGI-script*

Default: none

Context: server config, virtual host, directory

Override: none

Origin: Apache

Example: Script PUT /cgi-bin/bob.pgm

The Script directive adds an action, which will activate *CGI-script* when a file is requested using the method of *method*. It sends the URL and file path of the requested document using the standard CGI PATH_INFO and PATH_TRANSLATED environment variables. Method names are case-sensitive, so Script *PUT* and Script *put* have two entirely different effects.

Parameter One: *method*

- The *method* names listed can be one or more of the following: GET, POST, PUT, DELETE, CONNECT, OPTIONS, PATCH, PROPFIND, PROPPATCH, MKCOL, COPY, MOVE, LOCK and UNLOCK. User defined method names can also be used. The *method* name is case-sensitive. If GET is used it will also handle HEAD requests.

Parameter Two: *CGI-script*

- The *CGI-script* can be any valid CGI script or other resource that is capable of handling the requested *method*.

Note: The *CGI-script* command defines default actions only. If a CGI script is called, or some other resource that is capable of handling the requested method internally, it will do so. Also note that CGI script with a *method* of GET will only be called if there are query arguments present (for example, bob.html?hi). Otherwise, the request will proceed normally.

Module mod_alias

Module mod_alias contains directives for the IBM HTTP Server for i Web server.

Summary

The module mod_alias provides mapping for different parts of the host file system in the document tree and also for URL redirection.

Directives

- “Alias” on page 216
- “AliasMatch” on page 217
- “MapMatch” on page 218
- “Redirect” on page 219
- “RedirectMatch” on page 220
- “RedirectPermanent” on page 222
- “RedirectTemp” on page 222
- “ScriptAlias” on page 222
- “ScriptAliasMatch” on page 223

Alias

Module: mod_alias

Syntax: Alias [*URL-path*] *file-path | directory-path*

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Example: Alias /image /QIBM/UserData/pub/image

Example: Alias /httpfile/ /QSYS.LIB/AS400LIB.LIB/HTML.FILE/

This directive allows documents to be stored in the local filesystem other than under the "DocumentRoot " on page 313. URLs with a (%-decoded) path beginning with the value of the URL-path parameter will be mapped to local files beginning with the value of directory-filename. Alias also allows you to hide the file system path from users, enhancing both security of your server and the ability to change the filesystem structure or paths without impacting the end users.

Parameter One: *url-path*

- The *url-path* paramter is any valid URL path. If you include a trailing '/' in the URL path, then the server will require a trailing '/' in order to expand the alias. That is, if you use `'Alias / icons/ /www/images/i/icons/'` then the URL `'/icon'` will not be aliased.

Parameter Two: *file-path | directory-path*

- The *file-path | directory-path* parameter is any valid directory/filename combination on the system.

Note: You may need to specify additional "<Directory> " on page 311 containers that cover the destination of aliases. Aliasing occurs before <Directory> containers are checked, so only the destination of aliases are affected. "<Location> " on page 339 containers are run through once before aliases are performed, so they will apply.

In particular, if you are creating an Alias to a directory outside of your "DocumentRoot " on page 313, you may need to explicitly permit access to the target directory.

```
Alias /image /ftp/pub/image
<Directory /ftp/pub/image>
    Require all granted
</Directory>
```

Any number slashes in the *URL-path* parameter matches any number of slashes in the requested URL-path.

If the Alias directive is used within a "<Location> " on page 339 or "<LocationMatch>" on page 340 section with the URL-path is omitted, then the file-path will be interpreted using expression syntax.

```
<Location "/image">
    Alias "/ftp/pub/image"
</Location>
```

```
<LocationMatch "/error/(?<NUMBER>[0-9]+)">
    Alias "/www/webserver/htdocs/errors/%{env:MATCH_NUMBER}.html"
</LocationMatch>
```

See "ScriptAlias" on page 222 for more information.

AliasMatch

Module: mod_alias

Syntax: AliasMatch *regex directory-filename*

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Example: AliasMatch ^/icons(.*) /www/images/HTTP_Server/icons$1

Example: AliasMatch ^/lib/docs(.*) /QSYS.LIB/DOCLIB.LIB/HTMLDOC.FILE/$1.MBR

This directive is equivalent to “Alias” on page 216, but makes use of standard regular expressions, instead of simple prefix matching. The supplied regular expression is matched against the URL, and if it matches, the server will substitute any parenthesized matches into the given string and use it as a filename.

Parameter One: ***regex***

- The *regex* parameter is a regular expression that is matched against the URL. Subexpressions are grouped within parentheses. Then parenthetically enclosed regular expressions will be substituted in a subsequent $n statement.

Parameter Two: ***directory-filename***

- The *directory-filename* parameter is any valid directory/filename that is supported on the IBM i server. If there is a *$* symbol (followed by a digit) that is not a substitution variable in the *directory-filename* parameter, or there is an *&* symbol in the *directory-filename* parameter that is part of the directory or filename, the symbol must be escaped (\).

If the directory-filename is /usr/local/apache/icons&gifs/ the *&* would need to be escaped as follows on the AliasMatch directive:

```
AliasMatch  ^/icons(.*) /usr/local/apache/icons\gifs/
```

One subtle difference between “Alias” on page 216 and “AliasMatch” on page 217 is that Alias will automatically copy any additional part of the URI, past the part that matched, onto the end of the file path on the right side, while “AliasMatch” on page 217 will not. This means that in almost all cases, you will want the regular expression to match the entire request URI from beginning to end, and to use substitution on the right side.

In other words, just changing “Alias” on page 216 to “AliasMatch” on page 217 will not have the same effect. At a minimum, you need to add ^ to the beginning of the regular expression and add (.*)$ to the end, and add $1 to the end of the replacement.

For example, suppose you want to replace this with AliasMatch:

```
Alias /image/ /ftp/pub/image/
```

This is NOT equivalent - don't do this! This will send all requests that have /image/ anywhere in them to /ftp/pub/image/:

```
AliasMatch /image/ /ftp/pub/image/
```

This is what you need to get the same effect:

```
AliasMatch ^/image/(.*)$ /ftp/pub/image/$1
```

Of course, there's no point in using “AliasMatch” on page 217 where “Alias” on page 216 would work. “AliasMatch” on page 217 lets you do more complicated things. For example, you could serve different kinds of files from different directories:

```
AliasMatch ^/image/(.*)\.jpg$ /files/jpg.images/$1.jpg
AliasMatch ^/image/(.*)\.gif$ /files/gif.images/$1.gif
```

Multiple leading slashes in the requested URL are discarded by the server before directives from this module compares against the requested URL-path.

See Regular expression notation for more information regarding regular expressions.

MapMatch

Module: mod_alias

Syntax: MapMatch *regex URI*

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Example: MapMatch ^/icons(.*) /www/apache/icons\&gifs/

The MapMatch directive uses standard regular expressions to change a URI to a different URI. The supplied regular expression is matched against the URL, and if it matches, the server will substitute any parenthesized matches into the given string and use it as the URI. This is not a terminating directive. The server will use the new URI as input to Alias, Redirect or other MapMatch directives.

Parameter One: *regex*

- The *regex* paramter is a regular expression that is matched against the URL. Subexpressions are grouped within parentheses. The parenthetically enclosed regular expressions will be substituted in a subsequent $n statement.

Parameter Two: *URI*

- The *URI* paramater is any valid URI that is supported on the IBM i server. If there is a *$* symbol (followed by a digit) that is not a substitution variable in the URI parameter, or there is an *&* symbol in the URI parameter that is part of the URI, the symbol must be escaped (\).

If the target URI is /www/apache/icons\&gifs/ the & would need to be escaped as follows on the MapMatch directive:

```
MapMatch ^/icons(.*) /www/apache/icons\&gifs/
```

If the target URI is /www/apache/icon$1/ the $ would need to be escaped as follows on the MapMatch directive:

```
MapMatch ^/icons(.*) /www/apache/icon\$1/
```

See "Regular expression notation for HTTP Server" on page 631 for more information.

Redirect

Module: mod_alias

Syntax: Redirect *[status] [url-path] url*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: Redirect /service http://foo2.bar.com/service

The Redirect directive maps an old URL into a new one. The new URL is returned to the client, who then attempts to access the page with the new address. URL-path is a (%-decoded) path; any requests for documents beginning with this path will be returned with a redirect error to a new (%-encoded) URL beginning with *url*.

Parameter One: *status*

- The *status* parameter is used to return the below HTTP status codes:

Status	Description
permanent	Returns a permanent redirect status (301) indicating that the resource has moved permanently.
temp	Returns a temporary redirect status (302). This is the default.
seeother	Returns a "See Other" status (303) indicating that the resource has been replaced.
gone	Returns a "Gone" status (410) indicating that the resource has been permanently removed. When this status is used the *url* argument should be omitted.

If no status argument is given, the redirect will be "temporary" (HTTP status 302). This indicates to the client that the resource has moved temporarily. Other status codes can be returned by giving the numeric status code as the value of status. If the status is between 300 and 399, the url argument must be present, otherwise it must be omitted. Regardless, any HTTP status given must be known to HTTP Server.

Parameter Two: *url-path*

- If the url-path has a trailing slash ('/'), the *url* should also have a trailing slash. If the *url-path* does not contain a trailing slash, the *url* should not either. Double check the designated *url-path* and the *url*, or a double-slash ('//') may appear in the resulting URL. The *url-path* must be an absolute path, not a relative path, even when used with .htaccess files or inside of "<Directory> " on page 311 containers. The *url-path* must match the requested resource exactly or be a proper ancestor of it.

Parameter Three: *url*

- The *url* parameter should be a complete URL string, including the scheme ('http://...') and the 'server:host' portion. When the status parameter is "gone", the url argument should be omitted.

Note: Redirect directives take precedence over Alias and ScriptAlias directives, regardless of their order in the configuration file. Redirect directives inside a Location take precedence over Redirect and Alias directives with an URL-path.

If the Redirect directive is used within a "<Location> " on page 339 or "<LocationMatch>" on page 340 section with the URL-path omitted, then the URL parameter will be interpreted using expression syntax.

```
<Location "/one">
    Redirect permanent "http://example.com/two"
</Location>
```

```
<Location "/three">
    Redirect 303 "http://example.com/other"
</Location>
```

```
<LocationMatch "/error/(?<NUMBER>[0-9]+)">
    Redirect permanent "http://example.com/errors/%{env:MATCH_NUMBER}.html"
</LocationMatch>
```

RedirectMatch

Module: mod_alias

Syntax: RedirectMatch *[status] regex url*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: RedirectMatch (.*)\.gif$ http://www.anotherserver.com$1.jpg

This directive is equivalent to "Redirect" on page 219, but makes use of standard regular expressions, instead of simple prefix matching. The supplied regular expression is matched against the URL, and if it matches, the server will substitute any parenthesized matches into the given string and use it as a filename.

Parameter One: *status*

- The *status* parameter is used to return the below HTTP status codes:

Status	Description
permanent	Returns a permanent redirect status (301) indicating that the resource has moved permanently.
temp	Returns a temporary redirect status (302). This is the default.
seeother	Returns a "See Other" status (303) indicating that the resource has been replaced.
gone	Returns a "Gone" status (410) indicating that the resource has been permanently removed. When this status is used the *url* argument should be omitted.

If no status argument is given, the redirect will be "temporary" (HTTP status 302). This indicates to the client that the resource has moved temporarily. Other status codes can be returned by giving the numeric status code as the value of status. If the status is between 300 and 399, the url argument must be present, otherwise it must be omitted. Regardless, any HTTP status given must be known to HTTP Server.

Parameter Two: *regex*

- The *regex* parameter is aregular expression that is matched against the URL. Subexpressions are grouped within parentheses. Then, parenthetically enclosed regular expressions will be substituted in a subsequent $n statement.

Parameter Three: *url*

- The *url* parameter should be a complete URL string, including the scheme ('http://...') and the 'server:port' portion. If there is a *$* symbol (followed by a digit) that is not a substitution variable in the url parameter, or there is a *&* symbol in the url parameter that is part of the URL, the symbol must be escaped (\).

If the URL to redirect to is http://www.anotherserver.com/cgi-bin/welcome.cgi?parm1=login&parm2=mainlist the & would need to be escaped as follows on the RedirectMatch directive:

```
RedirectMatch(.*) http://www.anotherserver.com/cgi-bin/welcome.cgi?parm1=login\&parm2=mainlist
```

If the URL to redirect to is http://www.anotherserver.com/htdocs/welcome$2login.html the $2 would need to be escaped as follows on the RedirectMatch directive:

```
RedirectMatch (.*)  http://www.anotherserver.com/htdocs/welcome\$2login.html
```

See "Regular expression notation for HTTP Server" on page 631 for more information.

RedirectPermanent

Module: mod_alias

Syntax: RedirectPermanent *url-path url*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: RedirectPermanent /payroll http://payroll.server.com/payroll

The RedirectPermanent directive notifies the client that the Redirect is permanent (status 301). This is the exact equivalent to Redirect permanent.

Parameter One: *url-path*

- The *url-path* parameter is any valid URL path. If you include a trailing '/' in the URL path, then the server will require a trailing '/' in order to expand the alias. That is, if you use `'Alias /icons/ /www/images/i/icons/'` then the URL `'/icon'` will not be aliased.

Parameter Two: *url*

- The *url* parameter should be a complete URL string, including the scheme ('http://...') and the 'server:host' portion. When the status parameter is "gone", the url argument should be omitted.

See "Regular expression notation for HTTP Server" on page 631 for more information.

RedirectTemp

Module: mod_alias

Syntax: RedirectTemp *url-path url*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: RedirectTemp /service http://foo2.bar.com/service

The RedirectTemp directive notifies the client that the Redirect is only temporary (status 302). This is the exact equivalent to Redirect temp.

Parameter One: *url-path*

- The *url-path* parameter is any valid URL path. If you include a trailing '/' in the URL path, then the server will require a trailing '/' in order to expand the alias. That is, if you use *'Alias /icons/ /www/images/i/icons/'* then the URL *'/icon'* will not be aliased.

Parameter Two: *url*

- The *url* parameter should be a complete URL string, including the scheme ('http://...') and the 'server:host' portion. When the status parameter is "gone", the *url* argument should be omitted.

See "Regular expression notation for HTTP Server" on page 631 for more information.

ScriptAlias

Module: mod_alias

Syntax: ScriptAlias [*url-path*] *file-path* | *directory-path*

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Example: ScriptAlias /cgi-bin/ /web/cgi-bin/

Example: ScriptAlias /cgi-bin/ /QSYS.LIB/QSYSCGI.LIB/

The ScriptAlias directive has the same behavior as the "Alias" on page 216 directive, except that in addition it marks the target directory as containing CGI scripts, and then executes the CGI program. URLs with a (%-decoded) path beginning with url-path will be mapped to scripts beginning with directory-filename. Additional "<Directory> " on page 311 containers that cover the destination of the ScriptAlias may need to be specified. Aliasing occurs before <Directory> containers are checked, so only the destination of Aliases are affected.

Parameter One: *url-path*

- The *url-path* parameter is any valid url-path. It must end with a slash ('/') character so that any files in the directory will be routed.

Parameter Two: *file-path | directory-path*

- The *file-path | directory-path* parameter is any valid directory/filename on the IBM i server.

Note: If the URL ends in a slash ("/") character, the ScriptAlias must also end in a slash character.

If the ScriptAlias directive is used within a"<Location> " on page 339 or "<LocationMatch>" on page 340 section with the URL-path omitted, then the URL parameter will be interpreted using expression syntax.

```
<Location "/cgi-bin">
     ScriptAlias "/web/cgi-bin/"
</Location>
```

```
<LocationMatch "/cgi-bin/errors/(?<NUMBER>[0-9]+)">
    ScriptAlias "/web/cgi-bin/errors/%{env:MATCH_NUMBER}.pgm"
</LocationMatch>
```

ScriptAliasMatch

Module: mod_alias

Syntax: ScriptAliasMatch *regex directory-filename*

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Example: ScriptAliasMatch ^/cgi-bin/(.*)\.cgi /QSYS.LIB/QSYSCGI.LIB/$1.PGM

This directive is equivalent to "ScriptAlias" on page 222, but makes use of standard regular expressions, instead of simple prefix matching. The supplied regular expression is matched against the URL, and if it matches, the server will substitute any parenthesized matches into the given string and use it as a filename.

Parameter One: *regex*

- The *regex* parameter is a regular expression that is matched against the URL. Subexpressions are grouped within parentheses. Then, parenthetically enclosed regular expressions will be substituted in a subsequent $n statement.

Parameter Two: *directory-filename*

- This is any valid directory/filename that is supported on the IBM i server. If there is a *$* symbol (followed by a digit) that is not a substitution variable in the directory-filename parameter, or there is a *&* symbol in the directory-filename parameter that is part of the directory or filename, the symbol must be escaped (\).

If the directory-filename is /usr/local/apache/cgi-bin&sym/$1.pgm, where the $1 is a substitution variable, the & would need to be escaped as follows on the ScriptAliasMatch directive:

```
ScriptAliasMatch ^/cgi-bin/(.*)\.cgi /usr/local/apache/cgi-bins\&sym/$1.pgm
```

If the directory-filename is /usr/local/apache/cgi-bin$2sym/ $1.pgm, where the $1 is a substitution variable, the $2 would need to be escaped as follows on the ScriptAliasMatch directive:

```
ScriptAliasMatch ^/cgi-bin/(.*)\.cgi /usr/local/apache/cgi-bin\$2sym/$1.pgm
```

Module ap_charset

Module mod_ap_charset contains directives for the IBM HTTP Server for i Web server.

Summary

The module ap_charset provides support for performing ASCII to EBCDIC and EBCDIC to ASCII codepage conversions.

Directives

- "UseJCD" on page 224

UseJCD

Module: ap_charset

Syntax: UseJCD *On | Off*

Default: UseJCD Off

Context: server config

Override: none

Origin: IBM

Example: UseJCD Off

This directive is used to instruct the server to perform Japanese codepage detection on the request body.

Japanese browsers can potentially send data in one of three code pages, JIS (ISO-2022-JP), S-JIS (PC-Windows), or EUC (UNIX). If this directive is set to *On*, the server uses a well-known JCD utility to determine which codepage to use (if not explicitly specified by a charset tag) to convert the request body.

Parameter: *On | Off*

- When *On* is specified, the server uses a well-known JCD utility to determine which codepage to use (if not explicitly specified by a charset tag) to convert the request body.
- When *Off* is specified, Japanese codepage detection on the request body is disabled.

This directive is intended for module writers that need the server to detect JCD on the request body. CGI writers can use the CGIConvMode value "EBCDIC_JCD" to instruct the server to perform JCD.

Module mod_authz_core

Module mod_authz_core supports directives for the IBM HTTP Server for i Web server.

Summary

This module mod_authz_core provides core authorization capabilities so that authenticated users can be allowed or denied access to portions of the web site. It also allows for advanced logic to be applied to the authorization processing.

- “AuthMerging” on page 225
- “AuthzSendForbiddenOnFailure” on page 226
- “Require” on page 226
- “<RequireAll>” on page 228
- “<RequireAny>” on page 229
- “<RequireNone>” on page 229

AuthMerging

Module: mod_authz_core

Syntax: AuthMerging *Off | And | Or*

Default: AuthMerging *Off*

Context: Directory, .htaccess

Override: AuthConfig

Origin: Apache

Examples: AuthMerging Or

The AuthMerging directive controls the manner in which each configuration section's authorization logic is combined with that of preceding configuration sections.

When authorization is enabled, it is normally inherited by each subsequent configuration section, unless a different set of authorization directives are specified. This is the default action, which corresponds to an explicit setting of *AuthMerging Off*.

However, there may be circumstances in which it is desirable for a configuration section's authorization to be combined with that of its predecessor while configuration sections are being merged. Two options are available for this case, *And and Or*.

When a configuration section contains *AuthMerging And* or *AuthMerging Or*, its authorization logic is combined with that of the nearest predecessor (according to the overall order of configuration sections) which also contains authorization logic as if the two sections were jointly contained within a “<RequireAll>” on page 228 or “<RequireAny>” on page 229 directive, respectively.

Note: The setting of “AuthMerging” on page 225 is not inherited outside of the configuration section in which it appears. In the following example, only users belonging to group alpha may access */www/docs*.

Users belonging to either groups alpha or beta may access */www/docs/ab*. However, the default *Off* setting of “AuthMerging” on page 225 applies to the “<Directory> ” on page 311 configuration section for */www/docs/ab/gamma*, so that section's authorization directives override those of the preceding sections. Thus only users belong to the group gamma may access */www/docs/ab/gamma*.

Example:

```
<Directory /www/docs>
   AuthType Basic
   AuthName "Restricted Directory"
   PasswdFile web/users
   GroupFile /web/groups
   Require group alpha
</Directory>
<Directory /www/docs>
   AuthMerging Or
   Require group beta
</Directory>
<Directory /www/docs/ab/gamma>
```

```
    Require group gamma
</Directory>
```

AuthzSendForbiddenOnFailure

Module: mod_authz_core

Syntax: AuthzSendForbiddenOnFailure *on/off*

Default: AuthzSendForbiddenOnFailure Off

Context: directory, .htaccess

Override: none

Origin: Apache

Examples: AuthzSendForbiddenOnFailure *on*

The AuthzSendForbiddenOnFailure directive sends '403 FORBIDDEN' instead of '401 UNAUTHORIZED' if authentication succeeds but authorization fails.

Parameter: *on | off*

- When set to *off*, if authentication succeeds but authorization fails, HTTP Server will respond with an HTTP response code of '401 UNAUTHORIZED' by default. This usually causes browsers to display the password dialogue to the user again, which is not wanted in all situations.
- When set to *on*, if authentication succeeds but authorization fails, HTTP Server will respond with an HTTP response code of '403 FORBIDDEN' instead of '401 UNAUTHORIZED'.

Note: Modifying the response in case of missing authorization weakens the security of the password, because it reveals to a possible attacker, that his guessed password was right.

Require

Module: mod_authz_core

Syntax: Require *[not] entity-name [entity-name] ...*

Default: None

Context: directory, .htaccess

Override: AuthConfig

Origin: Apache

Example:

```
Require all granted
Require group  admin
Require user  bob  carol  don
Require valid-user
```

This directive selects which authenticated users can access a directory.

Parameter: *[not] entity-name [entity-name] ...*

- If *Require user userid [userid] ...*, then only the named users can access the resource.
- If *Require group group-name [group-name] ...*,, then only users in the named groups can access the resource.
- If *require valid-user*, then all valid users can access the resource.
- If *Require ip 10 172.20 192.168.2* , then clients in the specified IP address ranges can access
- If *Require all granted*, then access is allowed unconditionally.
- If *Require all denied*, then access is denied unconditionally.

- If *Require env env-var [env-var] ...*, then access is allowed only if one of the given environment variables is set.
- If *Require method http-method [http-method] ...*, then access is allowed only for the given HTTP methods.
- If *Require expr expression*, then access is allowed if expression evaluates to true.

Require env

The *env* provider allows access to the server to be controlled based on the existence of an environment variable. When Require env env-variable is specified, then the request is allowed access if the environment variable env-variable exists. The server provides the ability to set environment variables in a flexible way based on characteristics of the client request using the directives provided by mod_setenvif. Therefore, this directive can be used to allow access based on such factors as the clients User-Agent (browser type), Referer, or other HTTP request header fields.

SetEnvIf User-Agent ^KnockKnock/2\.0 let_me_in

```
<Directory /docroot>
  Require env let_me_in
</Directory>
```

In this case, browsers with a user-agent string beginning with KnockKnock/2.0 will be allowed access, and all others will be denied.

When the server looks up a path via an internal subrequest such as looking for a "DirectoryIndex" on page 375 or generating a directory listing with mod_autoindex, per-request environment variables are not inherited in the subrequest. Additionally, "SetEnvIf" on page 584 directives are not separately evaluated in the subrequest due to the API phases mod_setenvif takes action in.

Require all

The *all* provider mimics the functionality the was previously provided by the **'Allow from all'** and **'Deny from all'** directives. This provider can take one of two arguments which are **'granted'** or **'denied'**. The following examples will grant or deny access to all requests.

```
Require all granted
Require all denied
```

Require method

The method provider allows using the HTTP method in authorization decisions. The GET and HEAD methods are treated as equivalent.

The following example will allow GET, HEAD, POST, and OPTIONS requests without authentication, and require a valid user for all other methods:

```
<RequireAny>
     Require method GET POST OPTIONS
     Require valid-user
</RequireAny>
```

Require expr

The *expr* provider allows basing authorization decisions on arbitrary expressions.

Require expr %{TIME_HOUR} -ge 9 && %{TIME_HOUR} -le 17

```
<RequireAll>
    Require expr "!(%{QUERY_STRING} =~ /secret/)"
    Require expr "%{REQUEST_URI} in { '/cgi-bin/example.pgm', 'cgi-bin/other.pgm' }"
</RequireAll>
```

```
Require expr "!(%{QUERY_STRING} =~ /secret/) && %{REQUEST_URI} in { '/cgi-bin/
example.pgm', '/cgi-bin/other.pgm' }"
```

Normally, the expression is evaluated before authentication. However, if the expression returns false and references the variable %{REMOTE_USER}, authentication will be performed and the expression will be re-evaluated.

In most cases, for a complete authentication and authorization configuration, Require must be accompanied by AuthName and AuthType directives, and directives such as PasswdFile and GroupFile (to define users and groups) in order to work correctly. For example:

```
AuthType Basic
AuthName "Restricted Directory"
PasswdFile web/users
GroupFile /web/groups
Require group admin
```

Access controls which are applied in this way are effective for all methods. This is what is normally desired. If you want to apply access controls only to specific methods, while leaving other methods unprotected, then place the require statement into a "<Limit>" on page 333 section.

Access controls can be used in a named protection setup. To implement a named protection setup, place all of the access control directives in a file. Use the Include directive to include the file in your "<Directory> " on page 311, "<Files>" on page 323, "<Location> " on page 339 context. This allows users that want to use the same type of protection setup within multiple contexts to add an include statement inside of each context.

The result of the Require directive may be negated through the use of the not option. As with the other negated authorization directive "<RequireNone>" on page 229, when the Require directive is negated it can only fail or return a neutral result, and therefore may never independently authorize a request.

In the following example, all users in the alpha and beta groups are authorized, except for those who are also in the reject group.

```
<Directory /www/docs>
   <RequireAll>
        Require group alpha beta
        Require not group reject
   </RequireAll>
</Directory>
```

When multiple Require directives are used in a single configuration section and are not contained in another authorization directive like "<RequireAll>" on page 228, they are implicitly contained within a directive. Thus the first one to authorize a user authorizes the entire request, and subsequent Require directives are ignored.

Note: The "Require valid-user" directive should NOT be configured in the same context as any "Require user" or "Require group" directives. The require directives are processed in order (from top to bottom) as they appear in the configuration file. Since "Require valid-user" allows access to ANY authenticated user, the "Require valid-user" directive effectively overrides the presence of any "Require user" or "Require group" directives.

Note: Exercise caution when setting authorization directives in Location sections that overlap with content served out of the filesystem. By default, these configuration sections overwrite authorization configuration in Directory, and Files sections.

The AuthMerging directive can be used to control how authorization configuration sections are merged.

<RequireAll>

Module: mod_authz_core

Syntax: <RequireAll> ... </RequireAll>

Default: None

Context: directory, .htaccess

Override: AuthConfig

Origin: Apache

Examples:

```
<RequireAll>
    Require group sales
    Require ip 192.168
</RequireAll>
```

<RequireAll> and </RequireAll> are used to enclose a group of authorization directives of which none must fail and at least one must succeed in order for the “<RequireAll>” on page 228 directive to succeed.

If none of the directives contained within the “<RequireAll>” on page 228 directive fails, and at least one succeeds, then the “<RequireAll>” on page 228 directive succeeds. If none succeed and none fail, then it returns a neutral result. In all other cases, it fails.

The example below expresses the following authorization logic. In order to access the resource, the user must belong to group admins and group operators at the same time.

```
<Directory /www/mydocs>
  <RequireAll>
    Require group admins
    Require group operators
  </RequireAll>
</Directory>
```

<RequireAny>

Module: mod_authz_core

Syntax: <RequireAny> ... </RequireAny>

Default: None

Context: directory, .htaccess

Override: AuthConfig

Origin: Apache

Examples:

```
<RequireAny>
    Require group sales
    Require group managers
</RequireAny>
```

<RequireAny> and </RequireAny> are used to enclose a group of authorization directives of which one must succeed in order for the “<RequireAny>” on page 229 directive to succeed.

If none of the directives contained within the “<RequireAny>” on page 229 directive fails, and at least one succeeds, then the “<RequireAny>” on page 229 directive succeeds. If none succeed and none fail, then it returns a neutral result. In all other cases, it fails.

Note: Because negated authorization directives are unable to return a successful result, they can not significantly influence the result of a “<RequireAny>” on page 229 directive. (At most they could cause the directive to fail in the case where they failed and all other directives returned a neutral value.) Therefore negated authorization directives are not permitted within a “<RequireAny>” on page 229 directive.

<RequireNone>

Module: mod_authz_core

Syntax: <RequireNone> ... </RequireNone>

Default: None

Context: directory, .htaccess

Override: AuthConfig

Origin: Apache

Examples:

```
<RequireNone>
    Require group sales
    Require group managers
</RequireNone>
```

<RequireNone> and </RequireNone> are used to enclose a group of authorization directives of which none must succeed in order for the "<RequireNone>" on page 229 directive to not fail.

If one or more of the directives contained within the "<RequireNone>" on page 229 directive succeed, then the "<RequireNone>" on page 229 directive fails. In all other cases, it returns a neutral result. Thus as with the other negated authorization directive Require not, it can never independently authorize a request because it can never return a successful result. It can be used, however, to restrict the set of users who are authorized to access a resource.

Note: Because negated authorization directives are unable to return a successful result, they can not significantly influence the result of a "<RequireNone>" on page 229 directive. Therefore negated authorization directives are not permitted within a "<RequireNone>" on page 229 directive.

Module mod_arm4_ap20

Module mod_arm4_ap20 contains directives for the IBM HTTP Server for i Web server.

Summary

The module mod_arm4_ap20 uses the ARM (Application Response Measurement) 4.0 APIs to classify requests and record the time spent for each one. Configuring these directives enables ARM services for the IBM HTTP Server for i.

To enable ARM onIBM HTTP Server for i, perform these steps:

1. Ensure that the EWLM managed server is configured and started, and that it is communicating properly with its EWLM domain manager.
2. Ensure that IBM HTTP Server for i is installed and configured.
3. Ensure you have the latest required PTFs installed for EWLM to monitor the HTTP Server for IBM i application.
4. Add the following directives to the configuration file:

   ```
   LoadModule arm4_module /QSYS.LIB/QHTTPSVR.LIB/QZSRARM.SRVPGM
   ArmLoadLibrary /QSYS.LIB/QSYS2.LIB/LIBARM4.SRVPGM
   ```

   To edit the configuration file, follow these steps:

   a. Start the IBM Web Administration for i interface.
   b. Click the **Manage** tab.
   c. Click the **HTTP Servers** subtab.
   d. Select your HTTP Server from the **Server** list.
   e. Select **System Resources**.
   f. Change **Activate Application Response Measurment (ARM) instrumentation** to **Enabled**.
   g. Click **OK** when you finish editing the configuration file.
   h. Stop and restart the HTTP Server.

Directives

ArmApplicationName

Module: mod_arm4_ap20

Syntax: ArmApplicationName *application_name*

Default: ArmApplicationName "IBM Webserving Plugin"

Context: server

Override: none

Origin: IBM

Usage: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule arm4_module /QSYS.LIB/QHTTPSVR.LIB/QZSRARM.SRVPGM

Example: ArmApplicationName "IBM Webserving Plugin"

IBM HTTP Server for i is an ARM-instrumented application. ARM 4.0 enables the real time measurement of transactions, transaction components, and underlying resource usage associated with the execution of an application. Use this directive to set specific information passed by the ARM API function calls which will be used in the filtering criteria that EWLM uses for transaction classification.

ArmInstrumentHandler

Module: mod_arm4_ap20

Syntax: ArmInstrumentHandler *on|off*

Default: ArmInstrumentHandler off

Context: server

Override: none

Origin: IBM

Usage: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule arm4_module /QSYS.LIB/QHTTPSVR.LIB/QZSRARM.SRVPGM

Example: ArmInstrumentHandler off

When the ArmInstrumentHandler directive is turned on, arm_block|unblock_transaction is called across content handlers to notify the IBM ARM implementation that a blocking condition is finished.

ArmLoadLibrary

Module: mod_arm4_ap20

Syntax: ArmLoadLibrary *arm4-api-service-program-name*

Default: ArmLoadLibrary /QSYS.LIB/QSYS2.LIB/LIBARM4.SRVPGM

Context: server

Override: none

Origin: IBM

Usage: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule arm4_module /QSYS.LIB/QHTTPSVR.LIB/QZSRARM.SRVPGM

Example: ArmLoadLibrary /QSYS.LIB/QSYS2.LIB/LIBARM4.SRVPGM

This directive is needed to activate the EWLM (Enterprise Workload Management) instrumentation module for HTTP Server. It uses the ARM (Application Response Measurement) 4.0 APIs to classify requests and record the time spent for each one.

ArmTransactionName

Module: mod_arm4_ap20

Syntax: ArmTransactionName *transaction_name*

Default: ArmTransactionName WebRequest

Context: server

Override: none

Origin: IBM

Usage: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule arm4_module /QSYS.LIB/QHTTPSVR.LIB/QZSRARM.SRVPGM

Example: ArmTransactionName WebRequest

IBM HTTP Server for i is an ARM-instrumented application. ARM 4.0 enables the real time measurement of transactions, transaction components, and underlying resource usage associated with the execution of an application. Use this directive to set specific information passed by the ARM API function calls, which are used in the filtering criteria that EWLM uses for transaction classification.

Module mod_as_auth

Module mod_as_auth contains directives for the IBM HTTP Server for i Web server.

Summary

The module mod_as_auth provides user authentication using IBM i system profiles, Internet users (through validation lists), or LDAP users.

Directives

- "AsAuthAuthoritative" on page 232
- "GroupFile" on page 233
- "PasswdFile" on page 233
- "UserID" on page 234

AsAuthAuthoritative

Module: mod_as_auth

Syntax: AsAuthAuthoritative *On | Off*

Default: AsAuthAuthoritative On

Context: directory

Override: none

Origin: IBM

Example: AsAuthAuthoritative Off

Setting the AsAuthAuthoritative directive explicitly to off allows for both authentication and authorization to be passed on to lower level modules (if there is no userid or rule matching the supplied userid).

Parameter: *On | Off*

- When *On* is specified, both authentication and authorization are not allowed to be passed on to lower level modules (if there is no userid or rule matching the supplied userid).
- When *Off* is specified, allows for both authentication and authorization to be passed on to lower level modules (if there is no userid or rule matching the supplied userid).

If a userid appears in an authentication realm other than those supported by IBM i (for example, System Userid), or if a valid Require directive applies to more than one module, the first module verifies the credentials and no access is passed on regardless of the AsAuthAuthoritative setting.

GroupFile

Module: mod_as_auth

Syntax: GroupFile *filename*

Default: none

Context: directory

Override: none

Origin: IBM

Example: GroupFile /docs/restrict.group

The GroupFile directive sets the name of a GroupFile to use for a protection setup. Group files are used to classify users into various groups. A protection setup can use groups on limit directives. If a protected directory contains an ACL file, the rules in the ACL file can also use the groups that you define in the group file.

Parameter: *filename*

- The *filename* parameter is any valid filename.

Note: The GroupFile directive is case-sensitive. If the filename is incorrectly cased, the GroupFile directive will not work properly. Since IBM i user profiles are not case-sensitive, the entries in the GroupFile will be treated as non-case-sensitive if the PasswdFile directive is set to %%SYSTEM%%. For all other values of PasswdFile, the values in the GroupFile will be treated as case-sensitive.

To work correctly this directive must be accompanied by "PasswdFile" on page 233, "AuthType" on page 610, and "Require" on page 351.

PasswdFile

Module: mod_as_auth

Syntax: PasswdFile *passfile [passfile passfile ...]*

Default: none

Context: directory

Override: none

Origin: IBM

Example: PasswdFile %%SYSTEM%%

Example: PasswdFile "QUSRSYS/MY_USERS QGPL/DOC_USERS"

The PasswdFile directive specifies where the passwords (or certificates) are stored for authentication.

Parameter: *passfile*
The different values supported by the passfile parameter value are:

%%SYSTEM%%
: The passfile parameter can be in the %%SYSTEM%% format. Using this value indicates that the server should use the IBM i User Profile support to validate username/password.

%%LDAP%%
: The passfile can also be in the %%LDAP%% format to validate the LDAP server that has been defined to the server.

%%KERBEROS%%
: The passfile parameter should be set to %%KERBEROS%% when the directive AuthType Kerberos is configured.

passfile [passfile passfile ...]
: The passfile parameter can be formatted to fit the Internet user list. To use this format, specify QUSRSYS/MY_USERS as the filename. The HTTP Server allows a space separated list of Internet User lists (for example: 'library/vldl library/fort').

This directive may be configured multiple times in a container. The directives are processed from the first to the last occurrence.

To work correctly this directive must be accompanied by “AuthType” on page 610, “AuthName” on page 610, and “Require” on page 351.

UserID

Module: mod_as_auth

Syntax: Userid *user-profile | %%SERVER%% | %%CLIENT%%*

Default: none

Context: directory

Override: none

Origin: IBM

Example: UserID WEBUSER

Example: UserID %%SERVER%%

Example: UserID %%CLIENT%%

The UserID directive specifies the IBM i system profile to the server. For a protected resource (one for which Protection directives are defined), the UserID directive specifies which IBM i system profile the server temporarily swaps to while serving that resource. The directive must be a valid user profile.

Parameter: *user-profile | %%SERVER%% | %%CLIENT%%*

- For *user-profile*, a valid IBM i system profile must be specified. The value 'QSECOFR' cannot be specified on the directive. The profile that issued the STRTCPSVR command to start HTTP Server must have *USE authority to the profile specified on all of the UserID directives and other directives. All UserID directives (and directives specified for a protected resource) are verified during startup. If any UserID directive, or any other directive, does not satisfy the rules listed here, the server instance does not start and a message is sent to the user's interactive job log.
- Entering *%%SERVER%%* uses the default profile QTMHHTTP unless the ServerUserId directive is specified.
- Entering *%%CLIENT%%* causes the user profile from the request to be used on the swap. If Kerberos is specified for the AuthType directive, the server will use Enterprise Identity Mapping (EIM) to attempt to match the user ID associated with the server ticket with an IBM i system profile. If there is no IBM i system profile associated with the server ticket user ID, the HTTP request will fail. This value cannot be used for LDAP or Validation lists authentication. If is valid for IBM i profiles, client certificates, and Kerberos.

The profile that issued the STRTCPSVR command to start HTTP Server must have *USE authority to the profile specified on all of the UserID directives and other directives. All UserID directives (and directives specified for a protected resource) are verified during startup. If any UserID directive, or any other directive, does not satisfy the rules, the server instance does not start and a message is sent to the user's interactive joblog.

Note: Because HTTP Server swaps to the profile that you specify on the UserID directive, you should be careful what profile you specify. For example, if you create a profile MIGHTY1 that is of the class *SECOFR and use this profile on the UserID directive, then whenever the server invokes a swap to that profile, all IBM i authority checking for the requested resource is based on that profile.

When HTTP Server is running under the QTMHHTTP profile (the QTMHHTTP profile is the default) and a UserID directive is not in effect, the server switches to the QTMHHTP1 profile before starting a CGI program. However, when a CGI program is running on servers where the UserID directive is in effect or within a protection setup where the UserID directive has been specified, the program is run under the specified profile, unless the profile is QTMHHTTP. In which case, QTMHHTP1 is used. If the profile does not have authority to the specified program, the request is rejected.

There are two special values you can use on the UserID directive. Entering *%%SERVER%%* uses the default profile QTMHHTTP unless a protection setup has a different UserID specified. Entering *%%CLIENT%%* causes the server to challenge the client on each and every request for a user ID and password.

See also "ServerUserID" on page 358.

To work correctly, this directive must be accompanied by the PasswdFile, AuthType, AuthName, and Require directives.

Module mod_as_cache

Module mod_as_cache contains directives for the IBM HTTP Server for i Web server.

Summary

The module mod_as_cache provides support for caching frequently referenced files. It can be used to cache file content, file descriptors or both, or mmap the file.

Directives

- "CacheLocalFD" on page 236
- "CacheLocalFile" on page 236
- "CacheLocalFileMmap" on page 237
- "CacheLocalFilePublic" on page 238
- "CacheLocalFileSizeLimit" on page 238
- "CacheLocalSizeLimit" on page 238
- "DynamicCache" on page 239
- "FRCACacheLocalFileRunTime" on page 239
- "FRCACacheLocalFileSizeLimit" on page 240
- "FRCACacheLocalFileStartUp" on page 241
- "FRCACacheLocalSizeLimit" on page 241
- "FRCACookieAware" on page 242
- "FRCAEnableFileCache" on page 242
- "FRCAEnableProxy" on page 243
- "FRCAEndofURLMarker" on page 243
- "FRCAMaxCommBufferSize" on page 243
- "FRCAMaxCommTime" on page 244
- "FRCAProxyCacheEntitySizeLimit" on page 244

- “FRCAProxyCacheExpiryLimit” on page 245
- “FRCAProxyCacheRefreshInterval” on page 245
- “FRCAProxyCacheSizeLimit” on page 245
- “FRCAProxyPass” on page 246
- “FRCARandomizeResponse” on page 246
- “LiveLocalCache” on page 247
- “PublicCache” on page 247

CacheLocalFD

Module: mod_as_cache

Syntax: CacheLocalFD *filename*

Default: none

Context: server config

Override: none

Origin: IBM

Example: CacheLocalFD some_image.gif

The CacheLocalFD directive is used to specify the names of ASCII/BINARY stream files whose descriptors you want to cache at server startup. The file is opened (share read) and remains open while the server is active. The configuration file can contain multiple directive occurrences. Include a separate directive for each file that you want to remain open. By keeping your most frequently requested files/images opened at server startup, you can improve your server's response time for those files. For example, if you open your server's welcome page files at startup, the server can handle requests for the page much more quickly than if it had to open the files each time they are requested.

Parameter: *filename*

- The *filename* parameter specifies the names of ASCII/BINARY stream files whose descriptors are cached at server startup.

The advantage of using CacheLocalFD directive over CacheLocalFile is that it does not cache the content of the file, and therefore does not allocate a large amount of memory, yet provides similar performance. The disadvantage of using CacheLocalFD directive over CacheLocalFile is that it only caches the file descriptors of ASCII/BINARY stream files and it keeps the file open (share read) while the server is active.

The LiveLocalCache directive setting does not apply to this directive and if a cached file is updated, the cached entity is discarded and the updated file is served from the file system. If a cached file is modified while at the same time being served, the content of the response body is unpredictable.

Note: You can use an asterisk ('*') as a wildcard character on the file names (for example, CacheLocalFD *.gif). File name matching is not recursive through subdirectories. The server will only cache files in the specified directory. No files in subdirectories are affected.

CacheLocalFile

Module: mod_as_cache

Syntax: CacheLocalFile *filename*

Default: none

Context: server config

Override: none

Origin: IBM

Example: CacheLocalFile bobwelcome.html

The CacheLocalFile directive is used to specify the names of files that you want to load into the server's memory each time that you start the server, and is the recommended file cache method. You can have multiple occurrences of this directive in the configuration file. Include a separate directive for each file that you want to load into memory. By keeping your most frequently requested files loaded in the server's memory, you can improve your server's response time for those files. For example, if you load your server's welcome page into memory at startup, the server can handle requests for the page much more quickly than if it had to read the file from the file system.

Parameter: *filename*

- The *filename* parameter specifies the names of files that you want to load into the server's memory each time that you start the server.

Note: You can use an asterisk ('*') as a wildcard character on the file names (for example, CacheLocalFile *.html). File name matching is not recursive through subdirectories. The server will only cache files in the specified directory. No files in subdirectories are affected.

CacheLocalFileMmap

Module: mod_as_cache

Syntax: CacheLocalFileMmap *filename*

Default: none

Context: server config

Override: none

Origin: IBM

Example: CacheLocalFileMmap bobwelcome.html

The CacheLocalFileMmap directive is used to specify the names of files that you want to map to the server's memory each time that you start the server. This directive is similar to the CacheLocalFile directive. Whereas CacheLocalFile allocates storage and copies (read/write) the content of the file to the allocated storage, CacheLocalFileMmap maps the file content to the process storage space without actually allocating storage.

The LiveLocalCache directive setting does not apply to this directive and if a cached file is updated, the cached entity is discarded and the updated file is served from the file system. If a cached file is modified while at the same time being served, the content of the response body is unpredictable.

Parameter: *filename*

- The *filename* parameter specifies the names of files that you want to map to the server's memory each time that you start the server.

You can have multiple occurrences of this directive in the configuration file. Include a separate directive for each file that you want to load into memory. By keeping your most frequently requested files mapped in the server's address space, you can improve your server's response time for those files. For example, if you map your server's welcome at startup, the server can handle requests for the page much more quickly than if it had to read the file from the file system.

Note: You can use an asterisk (*) as a wildcard character on the file names (for example, CacheLocalFileMmap *.html). File name matching is not recursive through subdirectories. The server will only cache files in the specified directory. No files in subdirectories are affected. The relative/absolute path rules apply to this directive, meaning that a path that begins without a leading (/) character is considered to be absolute. Otherwise, the path is based on the server's document root.

CacheLocalFilePublic

Module: mod_as_cache

Syntax: CacheLocalFilePublic *filename*

Default: none

Context: server

Override: none

Origin: IBM

Example: CacheLocalFilePublic bobwelcome.html

The CacheLocalFilePublic directive is used to specify the names of files that you want to load into the server's memory each time that you start the server. The files cached here are files that are served without any server authentication. This directive is used by SSL sites which have pages that are publicly available. This simulates the FRCA function completed by the server for non-SSL publicly available files. You can have multiple occurrences of this directive in the configuration file. Include a separate directive for each file that you want to load into memory. By keeping your most frequently requested public files loaded in the server's memory, you can improve your server's response time for those files. For example, if you load your server's welcome page into memory at startup, the server can handle requests for the page much more quickly than if it had to read the file from the file system.

Note: You can use an asterisk (''*'') as a wildcard character on the file names, (for example, CacheLocalFile *.html).

File name matching is not recursive through subdirectories. The server only caches files in the specified directory. No files in subdirectories are affected. There is no authentication or authorization done before any files in this cache are served.

CacheLocalFileSizeLimit

Module: mod_as_cache

Syntax: CacheLocalFileSizeLimit *size*

Default: CacheLocalFileSizeLimit 90000

Context: server config

Override: none

Origin: IBM

Example: CacheLocalFileSizeLimit 5000000

The CacheLocalFileSizeLimit directive is used to specify, in bytes, the largest file that will be placed in the local memory cache. A file larger than the value specified for CacheLocalFileSizeLimit will not be placed in the cache. This prevents the cache from being filled by only a small number of very large files. The upper limit for this directive is capped at 16,000,000. If you specify a larger value the value 16,000,000 will be used.

CacheLocalSizeLimit

Module: mod_as_cache

Syntax: CacheLocalSizeLimit *size*

Default: CacheLocalSizeLimit 2000

Context: server config

Override: none

Origin: IBM

Example: CacheLocalSizeLimit 25000

The CacheLocalSizeLimit directive is used to specify the maximum amount of memory, in kilobytes, that you want to allow for file caching. You must specify the files that you want cached with the CacheLocalFile directive or by setting DynamicCache to on. The number you specify is the upper limit (the maximum upper limits 93 gigabytes (100,000,000,000 bytes)); the storage is allocated as a file is cached.

Parameter: *size*

- The *size* parameter specifies the maximum amount of memory, in kilobytes, that you want to allow for file caching.

Note: CacheLocalSizeLimit can help limit your cache size when you are using the wildcard character to specify the files on the CacheLocalFile directive.

DynamicCache

Module: mod_as_cache

Syntax: DynamicCache *on | off*

Default: DynamicCache off

Context: server config

Override: none

Origin: IBM

Example: DynamicCache on

The DynamicCache directive is used to specify if you want the server to dynamically cache frequently accessed files. Setting the dynamic cache directive to "on" instructs the server to cache the most frequently accessed files. This results in better performance and system throughput.

Parameter: *on | off*

- If the parameter is set to *on* the server will dynamically cache frequently accessed files.
- If the parameter is set to *off* the server will not dynamically cache frequently accessed files.

Note: Note requires links.If you know the files that are frequently accessed or you have a large number of files, then it is better to use CacheLocalFile , CacheLocalFD, or CacheLocalFileMmap to cache them at server startup.

FRCACacheLocalFileRunTime

Module: mod_as_cache

Syntax: FRCACacheLocalFileRunTime *filename*

Default: none

Context: server config

Override: none

Origin: IBM

Example: FRCACacheLocalFileRunTime /www/html/index.html

The FRCACacheLocalFileRunTime directive specifies the name of a file that you want to load into the SLIC NFC during server run time if and when it is requested by a client. The configuration file can contain multiple directive occurrences.

Parameter: *filename*

- The *filename* parameter value specifies the name of a file that you want to load into the SLIC NFC during server run time if and when it is requested by a client.

During server run time, the below example caches the specified file in FRCA NFC if it is requested by a client.

```
FRCACacheLocalFileRunTime /www/html/index.html
```

Note: You can use an asterisk (*) as a wild card character on the file name. Filename matching is not recursive through subdirectories. The server only caches files in the specified directory. No files in other sub directories are affected.

During server run time, the below example caches in the FRCA NFC any .gif file in the /www/images directory that is requested by a client. For example,

```
FRCACacheLocalFileRunTime /www/images/*.gif
```

Note: You can use an asterisk (*) as a wild card character on the file name. Filename matching is not recursive through subdirectories. The server will only cache files in the specified directory and its subdirectories.

During server run time, the below example will dynamically cache in the SLIC NFC (based on the file usage) any file that is in a directory path that starts with /www/imag and its subdirectories. For example,

```
FRCACacheLocalFileRunTime /www/imag*
```

Note: If directory name begins with / it is absolute, otherwise it is relative to the server's document root.

During server run time, the below example will dynamically cache in the SLIC NFC (based on the file usage) any file in any directory.

```
FRCACacheLocalFileRunTime /*
```

Note: If a directory name begins with / it is absolute, otherwise it is relative to the server's document root.

For caching files at the server run time, only specify the path name of the files that are intended for public viewing. That is, do not specify or configure file names containing sensitive information which is not intended for general users. FRCACacheLocalFileRunTime only caches files that do not require conversion. (IFS binary or ASCII files).

FRCACacheLocalFileSizeLimit

Module: mod_as_cache

Syntax: FRCACacheLocalFileSizeLimit *size*

Default: FRCACacheLocalFileSizeLimit 92160

Context: server config

Override: none

Origin: IBM

Example: FRCACacheLocalFileSizeLimit 32000

The FRCACacheLocalFileSizeLimit directive specifies the maximum file size (in bytes) that you want to allow for file caching. The directive can control cache storage for a number of smaller files when using wild card characters to specify files in the FRCACacheLocalFileStartUp and FRCACacheLocalFileDynamic directives

Parameter: *size*

- The *size* parameter value specifies the maximum file size (in bytes) that you want to allow for file caching.

The below example allows only caching of files that are equal to or less than 32000 bytes. Files greater than 32000 bytes are not cached.

```
FRCACacheLocalFileSizeLimit 32000
```

FRCACacheLocalFileStartUp

Module: mod_as_cache

Syntax: FRCACacheLocalFileStartUp *filename*

Default: none

Context: server config

Override: none

Origin: IBM

Example: FRCACacheLocalFileStartUp /www/html/index.html

The FRCACacheLocalFileStartUp directive specifies the file name that you want to load into the SLIC NFC each time you start the server. The configuration file can contain multiple directive occurrences.

Parameter: *filename*

- The *filename* parameter value specifies the file name that you want to load into the SLIC NFC each time you start the server.

The below example caches a specific file.

```
FRCACacheLocalFileStartUp /www/html/index.html
```

Note: You can use an asterisk (*) as a wild card character on the file name. Filename matching is not recursive through subdirectories. The server only caches files in the specified directory. No files in other sub directories are affected.

The below example caches all .gif files in the /www/images directory.

```
FRCACacheLocalFileStartUp /www/images/*.gif
```

Note: If a directory name begins with / it is absolute, otherwise it is relative to the server's document root.

FRCACacheLocalFileStartUp only caches files that do not require conversion. (IFS binary or ASCII files). FRCA Proxy does not perform authentication or authorization checking. Therefore, do not specify or configure file names containing sensitive information that is not intended for public viewing.

FRCACacheLocalSizeLimit

Module: mod_as_cache

Syntax: FRCACacheLocalSizeLimit *size*

Default: FRCACacheLocalSizeLimit 2000

Context: server config

Override: none

Origin: IBM

Example: FRCACacheLocalSizeLimit 5000

The FRCACacheLocalSizeLimit directive specifies the maximum amount of storage (in kilobytes) that you want to allow for FRCA file caching.

Parameter: *size*

- The *size* parameter value specifies the maximum amount of storage (in kilobytes) that you want to allow for FRCA file caching.

The below example caches files until the accumulated size reaches 5000 kilobytes.

```
FRCACacheLocalSizeLimit 5000
```

Note: The specified value is the upper limit, the actual amount of allocated storage is the accumulated size of the cached files. This directive can limit the cache size when using wild card character to specify the files in the FRCACacheLocalFileStartUp directive.

If the specified directive size is greater than the amount of available storage in the FRCA network file cache, the FRCA network file only caches as many files as it has space for.

FRCACookieAware

Module: mod_as_cache

Syntax: FRCACookieAware *<path>*

Default: none

Context: server config

Override: none

Origin: IBM

Example: FRCACookieAware /some_path_segment

This FRCACookieAware directive indicates URL prefix for which the cookie should be included in cache lookup. This directive makes it possible to serve a cached entity only for the requests with the same cookie

Parameter: *<path>*

- The *<path>* parameter value specifies a valid path name.

FRCAEnableFileCache

Module: mod_as_cache

Syntax: FRCAEnableFileCache *on | off*

Default: FRCAEnableFileCache off

Context: server config

Override: none

Origin: IBM

Example: FRCAEnableFileCache on

The FRCAEnableFileCache directive enables or disables FRCA file caching support for the specified server.

Parameter: *on | off*

- If the parameter value is *on*, FRCA file caching support is enabled for the specified server.
- If the parameter value is *off*, all other FRCA file cache related directives in the configuration file are ignored.

Note: FRCA does not perform authentication or authorization checking for the HTTP requests that are served from the FRCA cache.

FRCAEnableProxy

Module: mod_as_cache

Syntax: FRCAEnableProxy *on | off*

Default: FRCAEnableProxy off

Context: server config, virtual host

Override: none

Origin: IBM

Example: FRCAEnableProxy on

The FRCAEnableFileCache directive enables or disables FRCA proxy support.

Parameter: *on | off*

- If the parameter value is *on*, FRCA proxy support is enabled for the specified container.
- If the parameter value is *off*, only FRCA directives in the server configuration section are ignored. If FRCAEnableProxy is set to off in a virtual host container, only FRCA directives in that virtual host container are ignored.

FRCA proxy does not perform authentication or authorization checking for the HTTP requests that are served by the FRCA Proxy support.

Note: Virtual host containers do not inherit the FRCAEnableProxy setting from the server configuration.

FRCAEndofURLMarker

Module: mod_as_cache

Syntax: FRCAEndofURLMarker #

Default: none

Context: server config

Override: none

Origin: IBM

Example: FRCAEndofURLMarker #

The FRCAEndofURLMarker directive specifies the unique string that identifies the end of URLs. Suppose a link in an html page is http://some.org/some_path/some_parms#. Before the client sends this request to the server, it may pad the URL with data such as client_padded_data. The some.org server will receive the path /some_path/some_parms#client_padded_data.

By specifying FRCAEndofURLMarker #, FRCA support can identify the end of the original URL (link) before it was modified or padded by the client.

FRCAMaxCommBufferSize

Module: mod_as_cache

Syntax: FRCAMaxCommBufferSize *size*

Default: FRCAMaxCommBufferSize 8000

Context: server config

Override: none

Origin: Apache

Example: FRCAMaxCommBufferSize 4000000

The FRCAMaxCommBufferSize directive sets the communication buffer size (in bytes) in FRCA for performance. The data being sent to HTTP Server consists of log data, message data, and collection services data. FRCA will buffer the size of data specified until the buffer is full. Once the buffer is full, the data will be transmitted to Apache for processing.

Parameter: *size*

- The *size* parameter value sets the communication buffer size (in bytes) in FRCA for performance.

FRCAMaxCommTime

Module: mod_as_cache

Syntax: FRCAMaxCommTime *time*

Default: FRCAMaxCommTime 120

Context: server config

Override: none

Origin: Apache

Example: FRCAMaxCommTime 240

The FRCAMaxCommTime directive sets the maximum number of seconds to wait before the data buffer is sent from FRCA to HTTP Server. The data being sent to HTTP Server consists of log data, message data, and collection services data. Once the time limit has been reached, the data will be transmitted to HTTP Server for processing. Valid values include integers 0 through 65,535.

Parameter: *time*

- The *time* parameter value sets the maximum number of seconds to wait before the data buffer is sent from FRCA to HTTP Server.

FRCAProxyCacheEntitySizeLimit

Module: mod_as_cache

Syntax: FRCAProxyCacheEntitySizeLimit *size*

Default: FRCAProxyCacheEntitySizeLimit 92160

Context: server config

Override: none

Origin: IBM

Example: FRCAProxyCacheEntitySizeLimit 8000

The FRCAProxyCacheEntitySizeLimit directive specifies the maximum proxy response entity size (in bytes) for FRCA to cache.

Parameter: *size*

- The *size* parameter value specifies the maximum proxy response entity size (in bytes) for FRCA to cache.

The below example only allows caching of proxy responses that are equal to, or less than, 8000 bytes.

```
FRCAProxyCacheEntitySizeLimit 8000
```

FRCAProxyCacheExpiryLimit

Module: mod_as_cache

Syntax: FRCAProxyCacheExpiryLimit *<time>*

Default: FRCAProxyCacheExpiryLimit 86400

Context: server config

Override: none

Origin: IBM

Example: FRCAProxyCacheExpiryLimit 3600

The FRCAProxyCacheExpiryLimit directive sets the expiration (in seconds) for FRCA proxy cached HTTP documents. Expiry time for FRCA proxy cached HTTP documents will be set to at most *nnn* number of seconds into the future. FRCA proxy cached HTTP documents can be at most *nnn* seconds out of date. If the expire header is present with the document in the response, then the lower of the two values is used.

Parameter: *<time>*

- The *<time>* parameter value sets the expiration (in seconds) for FRCA proxy cached HTTP documents.

FRCA proxy cached HTTP documents are limited by the specified time interval (in seconds). This restriction is enforced even if an expiration date is supplied with the HTTP document.

FRCAProxyCacheRefreshInterval

Module: mod_as_cache

Syntax: FRCAProxyCacheRefreshInterval *<proxy> <time>*

Default: none

Context: server config, virtual host

Override: none

Origin: IBM

Example: FRCAProxyCacheRefreshInterval /mirror/ibm/test 30

The FRCAProxyCacheRefreshInterval directive sets the time period (in seconds) to use each cached entity, for the specified URI, before refreshing the cache.

Parameter One: *<path>*

- The *<path>* parameter value specifies the URI associated with cached entity.

Parameter Two: *<time>*

- The *<time>* parameter value sets the time period (in seconds) to use each cached entity, for the specified URI, before refreshing the cache. Possible values include integers 0 through 2,147,483,647.

Note: If the value specified for *<time>* is zero, then the document for the specified path are always current. That is the document is not cached.

FRCA proxy cached HTTP documents are limited by the specified interval (in seconds). This restriction is enforced even if an expiration date is supplied with the HTTP document.

FRCAProxyCacheSizeLimit

Module: mod_as_cache

Syntax: FRCAProxyCacheSizeLimit *size*

Default: FRCAProxyCacheSizeLimit 2000

Context: server config

Override: none

Origin: IBM

Example: FRCAProxyCacheSizeLimit 5000

The FRCAProxyCacheSizeLimit directive specifies the maximum amount of storage (in kilobytes) that FRCA proxy caching uses for the specified server.

Parameter One: *size*

- The *size* parameter value specifies the maximum amount of storage (in kilobytes) that FRCA proxy caching uses for the specified server.

The below example caches proxy response entities until the accumulated size reaches 5000 kilobytes.

```
FRCAProxyCacheSizeLimit 5000
```

Note: The specified value is the upper limit; the actual amount of allocated storage is the accumulated proxy entity cache size.

FRCAProxyPass

Module: mod_as_cache

Syntax: FRCAProxyPass *<path>* *<URL>*

Default: none

Context: server config, virtual host

Override: none

Origin: IBM

Example: FRCAProxyPass /mirror/foo/ http://foo.com/

The FRCAProxyPass directive allows remote servers to map into the local server space. The local server does not act as a proxy in the conventional sense; it acts a mirror of the remote server.

Parameter One: *<path>*

- The *<path>* parameter value specifies the name of a local virtual path. The value is case sensitive.

Parameter Two: *<URL>*

- The *<URL>* parameter value specifies the partial URL for the remote server.

If the local server address is `http://ibm.com/ then FRCAProxyPass /mirror/ibm1/ http://ibm1.com/` causes a local request for the `http://ibm.com/mirror/ibm1/location` to be internally converted into a proxy request of `http://ibm1.com/location`.

Note: FRCA Proxy does not perform authentication or authorization checking. Therefore, do not specify or configure paths or URLs that would result in responses with sensitive information that is not intended for public viewing.

FRCARandomizeResponse

Module: mod_as_cache

Syntax: FRCARandomizeResponse *<path>* *<string>* *<nnn>* *<mmm>*

Default: none

Context: server config

Override: none

Origin: IBM

Example: FRCARandomizeResponse /some_path/fileNNN.html NNN 1 1000

Example: FRCARandomizeResponse /some_path/fileXXX.html XXX 200 300

The FRCARandomizeResponse directive specifies the path template, the replacement string marker, and the random number range that you would like FRCA to randomly use when selecting and serving files of that template. For example, if you have 1000 files with names *file1.html* through *file1000.html*. By configuring `FRCARandomizeResponse /document_root_alias_path/fileNNN.html NNN 1 1000` and requesting the URL `http://some_host:port/dirpath/fileNNN.html`, FRCA will randomly select and serve one of the 1000 files.

Parameter One: *<path>*

- The *<path>* parameter value specifies valid paths in the form of /some_path_segment/some_partial_file_name#.ext where "#" is replaced with a randomly generated number by FRCA before serving the response.

  Note: the path must begin with '/'. It cannot be a relative path.

Parameter Two: *<string>*

- Text *<string>* parameter value specifies the replacement string marker ("NNN") in the path.

Parameter Three: *<nnn>*

- The *<nnn>* parameter value specifies the lower limit for random numbers.

Parameter Four: *<mmm>*

- The *<mmm>* parameter value specifies the upper limit for random numbers.

LiveLocalCache

Module: mod_as_cache

Syntax: LiveLocalCache *on | off*

Default: LiveLocalCache on

Context: server config

Override: none

Origin: IBM

Example: LiveLocalCache off

The LiveLocalCache directive is used to specify if the cache is updated when a cached file is modified. Set this directive to "on" if you want users, requesting a cached file, to receive the file with the latest updates. Setting this directive to "off" is the optimum setting for performance. When LiveLocalCache directive is set to "on", before responding to a request for a file that is stored in memory, the server checks to see if the file has changed since the server was started. If the file has changed, the server responds to this request with the updated file. The server then deletes the older file version from memory. Restart the server to load the new file into memory.

Parameter: *on | off*

- If the parameter value is set to *on*, the cache is updated when a cached file is modified.
- If the parameter value is set to *off*, the cache is not updated when a cached file is modified.

PublicCache

Module: mod_as_cache

Syntax: PublicCache *on* | *off*

Default: PublicCache off

Context: server config

Override: none

Origin: IBM

Example: PublicCache on

The PublicCache directive enables caching with the CacheLocalFilePublic directive on an SSL enabled server. It is used in conjunction with the CacheLocalFilePublic directive and has a server-wide scope. See the CacheLocalFilePublic directive for additional details.

Parameter: *on* | *off*

- If the parameter value is set to *on*, caching is turned on for directive CacheLocalFilePublic.
- If the parameter value is set to *off*, caching is turned off for directive CacheLocalFilePublic.

Module mod_asis

Module mod_asis does not provide directives for the IBM HTTP Server for i Web server.

Summary

The module mod_asis provides the handler send-as-is which causes Apache HTTP Server to send the document without adding most of the usual HTTP headers.

This can be used to send any kind of data from the server, including redirects and other special HTTP responses, without requiring a cgi-script or an nph script.

This module will also process any file with the mime type httpd/send-as-is.

Usage

In the server configuration file, associate files with the send-as-is handler, for example:

```
AddType httpd/send-as-is asis
```

The contents of any file with a .asis extension will then be sent by Apache HTTP Server to the client with almost no changes. In particular, HTTP headers are derived from the file itself according to mod_cgi rules, so an asis file must include valid headers, and may also use the CGI Status: header to determine the HTTP response code. The Content-Length: header will automatically be inserted or, if included, corrected by HTTP Server.

Here is an example of a file whose contents are sent asis, telling the client that a file has redirected.

```
Status: 301 Now where did I leave that URL
Location: http://xyz.example.com/foo/bar.html
Content-type: text/html

<HTML>
<HEAD>
<TITLE>Lame excuses'R'us</TITLE>
</HEAD>
<BODY>
<H1>Fred's exceptionally wonderful page has moved to
<A HREF="http://xyz.example.com/foo/bar.html">Joe's</A> site.
</H1>
</BODY>
</HTML>
```

Note: The server always adds a Date: and Server: header to the data returned to the client, so these should not be included in the file. The server does not add a Last-Modified header.

Module mod_autoindex

Module mod_autoindex contains directives for the IBM HTTP Server for i Web server.

Summary

The module mod_autoindex provides for automatic directory indexing. The index of a directory can come from one of two sources:

- A file written by the user, typically called index.html. The “DirectoryIndex” on page 375 directive sets the name of this file. This is controlled by mod_dir.
- A listing generated by the server. The other directives control the format of this listing. The AddIcon, AddIconByEncoding and AddIconByType are used to set a list of icons to display for various file types; for each file listed, the first icon listed that matches the file is displayed. These are controlled by mod_autoindex.

If the FancyIndexing keyword is present on the IndexOptions directive, the column headers are links that control the order of the display. If you select a header link, the listing will be regenerated, sorted by the values in that column. Selecting the same header repeatedly toggles between ascending and descending order.

For all mod_autoindex directives that specify a file name (AddDescription, AddIcon, and so on), case sensitivity is handled based on the file system. If the object is in the QOpenSys file system, the name is handled in a case sensitive manner. If the object is a file system other than QOpenSys, the name is handled in a case insensitive manner.

Note: When the display is sorted by "Size", it is the actual size of the files that's used, not the displayed value - so a 1010-byte file will always be displayed before a 1011-byte file (if in ascending order) even though the size of both files could be displayed as "1K".

Directives

AddAlt

Module: mod_autoindex

Syntax: AddAlt *string file [file...]*

Default: none

Context: server config, virtual host, directory (but not location), .htaccess

Override: Indexes

Origin: Apache

Example: AddAlt "IMG" jpg gif

The AddAlt directive sets the alternate text to display for automatic directory indexing.

Parameter One: *string*

- The *string* parameter is enclosed in double quotes ("..."). This alternate text is displayed if the client is image-incapable or has image loading disabled.

Parameter Two: *file*

- The *file* parameter is either ^^DIRECTORY^^ for child directories, ^^PARENT^^ for parent directories, ^^BLANKICON^^ for blank lines (to format the list correctly), a file extension, a wildcard expression, a partial file, or a complete filename. It could also be a QSYS.LIB member type if this directive is being used to set alternate text for QSYS.LIB members. For example:

```
AddAlt "IMG" .jpg .gif
AddAlt " " ^^BLANKICON^^
AddAlt "BAK" *~
```

Note: This directive is not supported in "<Location> " on page 339 containers.

AddAltByEncoding

Module: mod_autoindex

Syntax: AddAltByEncoding *string MIME-encoding [MIME-encoding...]*

Default: none

Context: server config, virtual host, directory (but not location), .htaccess

Override: Indexes

Origin: Apache

Example: AddAltByEncoding "CMP" x-compress

The AddAltByEncoding directive sets the alternate text to display for a file, instead of an icon, for automatic directory indexing.

Parameter One: *string*

- The *string* parameter is enclosed in double quotes ("..."). This alternate text is displayed if the client is image-incapable or has image loading disabled.

Parameter Two: *MIME-encoding*

- The *MIME-encoding* parameter is a valid content-encoding, such as x-compress.

Note: This directive is not supported in "<Location> " on page 339 containers.

AddAltByType

Module: mod_autoindex

Syntax: AddAltByType *string MIME-type [MIME-type ...]*

Default: none

Context: server config, virtual host, directory (but not location), .htaccess

Override: Indexes

Origin: Apache

Example: AddAltByType "HTM" text/html

The AddAltByType directive sets the alternate text to display for a file, instead of an icon, for automatic directory indexing.

Parameter One: ***string***

- The *string* parameter is enclosed in double quotes ("..."). This alternate text is displayed if the client is image-incapable or has image loading disabled.

Parameter Two: ***MIME-type***

- The *MIME-type* parameter is a valid content-type, such as text/html.

Note: This directive is not supported in "<Location> " on page 339 containers.

AddDescription

Module: mod_autoindex

Syntax: AddDescription *string file [file...]*

Default: none

Context: server config, virtual host, directory (but not location), .htaccess

Override: Indexes

Origin: Apache

Example: AddDescription "Famous People" /web/pics/famous*

Example: AddDescription "My pictures" /QSYS.LIB/MYLIB/MYFILE.FILE/pic*

The AddDescription directive sets the description to display for a file, for automatic directory indexing. File is a file extension, partial filename, QSYS.LIB member type, wildcard expression or full filename for files to describe. String is enclosed in double quotes ("). For example:

```
AddDescription "The planet Mars" /web/pics/mars.gif
```

By default, the description field is 23 bytes wide. Seven more bytes may be added if the directory is covered by an IndexOptions SuppressSize, and 19 bytes may be added if IndexOptions SuppressLastModified is in effect. The widest this column can be is therefore 49 bytes, unless configured differently using IndexOptions DescriptionMaxWidth.

The DescriptionWidth IndexOptions keyword allows you to adjust this width to any arbitrary size.

The following order of precedence will be used to search for a directory listing file description. The first mechanism from this list that applies will be used to generate the file description:

1. The file matches one of those specified on an AddDescription directive. The string from the directive is displayed. This option is the least CPU intensive.
2. The file system contains a description for the file. The file system description information is displayed. Note that if the file is a QSYS.LIB member, the member text is displayed.
3. If IndexOptions ScanHTMLTitles is configured, the title is extracted from HTML documents for fancy indexing. This is CPU and disk intensive.

Note: Descriptive text defined with AddDescription may contain HTML markup, such as tags and character entities. If the width of the description column should happen to truncate a tagged element (such as cutting off the end of a bold phrase), the results may affect the rest of the directory listing. This directive is not supported in "<Location> " on page 339 containers.

AddIcon

Module: mod_autoindex

Syntax: AddIcon *icon name [name ...]*

Default: none

Context: server config, virtual host, directory (but not location), .htaccess

Override: Indexes

Origin: Apache

Example: AddIcon (IMG,icons/image) .gif .jpg

The AddIcon directive sets the icon to display next to a file ending in name for automatic directory indexing.

Parameter One: *icon*

- The *icon* parameter is either a (%-escape) relative URL to the icon or of the format (alttext,url) where alttext is the text tag given for an icon for non-graphical browsers.

Parameter Two: *name*

- The *name* parameter is either `^^DIRECTORY^^` for child directories, `^^PARENT^^` for parent directories, `^^BLANKICON^^` for blank lines (to format the list correctly), a file extension, a wildcard expression, a partial file or a complete filename. For example

```
AddIcon (IMG,icons/image) .gif .jpg
AddIcon (PAR, icons/parent .gif) ^^PARENT^^
AddIcon /dir.gif ^^DIRECTORY^^
AddIcon backup.gif *~
```

"AddIconByType" on page 252 should be used in preference to AddIcon, when possible.

Note: This directive is not supported in "<Location> " on page 339 containers.

AddIconByEncoding

Module: mod_autoindex

Syntax: AddIconByEncoding *icon MIME-encoding [MIME-encoding ...]*

Default: none

Context: server config, virtual host, directory (but not location), .htaccess

Override: Indexes

Origin: Apache

Example: AddIconByEncoding /compress.xbm x-compress

The AddIConByEncoding directive sets the icon to display next to files with MIME-encoding for automatic directory indexing.

Parameter One: *icon*

- The icon parameter is either a (%-escaped) relative URL to the icon or of the format (alttext,url) where alttext is the text tag five for an icon for non-graphical browsers.

Parameter Two: *MIME-encoding*

- The *MIME-encoding* parameter is a wildcard expression matching required content-encoding.

Note: This directive is not supported in "<Location> " on page 339 containers.

AddIconByType

Module: mod_autoindex

Syntax: AddIconByType *icon MIME-type [MIME-type ...]*

Default: none

Context: server config, virtual host, directory (but not location), .htaccess

Override: Indexes

Origin: Apache

Example: AddIconByType (IMG,image.gif) image/*

The AddIconByType directive sets the icon to display next to files of type MIME-type for FancyIndexing. Icon is either a (%-escaped) relative URL to the icon, or of the format (alttext,url) where alttext is the text tag given for an icon for non-graphical browsers.

Parameter One: *icon*

- The icon parameter is either a (%-escaped) relative URL to the icon or of the format (alttext,url) where alttext is the text tag given for an icon for non-graphical browsers.

Parameter Two: *MIME-type*

- The MIME-type parameter is a wildcard expression matching the required MIME types.

Note: This directive is not supported in "<Location> " on page 339 containers.

DefaultIcon

Module: mod_autoindex

Syntax: DefaultIcon *url*

Default: none

Context: server config, virtual host, directory (but not location), .htaccess

Override: Indexes

Origin: Modified

Example: DefaultIcon /icon/unknown.gif

The DefaultIcon directive sets the icon to display for files when no specific icon is known, for automatic directory indexing.

Parameter: *url*

- The url parameter is either a (%-escaped) relative URL to the icon or of the format (alttext,url) where alttext is the text tag given for an icon for non-graphical browsers. For example:

  ```
  DefaultIcon (UNK,unknown.gif)
  ```

Note: This directive is not supported in "<Location> " on page 339 containers.

HeaderName

Module: mod_autoindex

Syntax: HeaderName *filename*

Default: none

Context: server config, virtual host, directory (but not location), .htaccess

Override: Indexes

Origin: Apache

Example: HeaderName headerfile

Example: HeaderName PREAMBLE.MBR

The HeaderName directive sets the name of the file that will be inserted at the top of the index listing.

Parameter: *filename*

- The *filename* parameter is the name of the file to include.

Filename is treated as a URI path relative to the one used to access the directory being indexed, and must resolve to a document with a major content type of "text" (for example, text/html, text/plain). This means that filename may refer to a CGI script if the script's actual file type (as opposed to its output) is marked as text/html such as with a directive like:

```
AddType text/html .cgi
```

Content negotiation will be performed if the MultiViews option is enabled. See "Content negotiation for HTTP Server" on page 17 for more information.

If filename resolves to a static text/html document (not a CGI script) and the Includes Option is enabled, the file will be processed for server-side includes. See mod_include for more information.

See also "ReadmeName" on page 259.

Note: This directive is not supported in "<Location> " on page 339 containers.

IndexHeadInsert

Module: mod_autoindex

Syntax: IndexHeadInsert *markup*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: Indexes

Origin: Apache

Example:

```
IndexHeadInsert "<link rel=\"sitemap\" href=\"/sitemap.html\">"
```

The IndexHeadInsert directive specifies a string to insert in the <head> section of the HTML generated for the index page.

Parameter: *markup*

- The *markup* parameter is a string to be inserted in the <head> section of the HTML generated for the index page. The *markup* parameter must be enclosed in double quotes ("...").

IndexIgnore

Module: mod_autoindex

Syntax: IndexIgnore file [file ...]

Default: none

Context: server config, virtual host, directory (but not location), .htaccess

Override: Indexes

Origin: Apache

Example: IndexIgnore README .htaccess

Example: IndexIgnore README.MBR

The IndexIgnore directive adds to the list of files to hide when listing a directory. Multiple IndexIgnore directives add to the list, rather than the replacing the list of ignored files. By default, the dot directory (.) is ignored.

Parameter: *file*

- The *file* parameter is a file extension, QSYS.LIB member type, partial filename, wildcard expression or full filename for files to ignore.

Note: This directive is not supported in "<Location> " on page 339 containers.

IndexIgnoreReset

Module: mod_autoindex

Syntax: IndexIgnoreReset *ON/OFF*

Default: IndexIgnoreReset *OFF*

Context: server config, virtual host, directory, .htaccess

Override: Indexes

Origin: Apache

Example: IndexIgnoreReset ON

The "IndexIgnoreReset" on page 255 directive removes any files ignored by "IndexIgnore" on page 254 otherwise inherited from other configuration sections.

Parameter: *on / off*

- When *on* is specified, any files ignored by "IndexIgnore" on page 254 will be reset.
- When *off* is specified, it inherites from other configuration sections by default.

For example:

```
<Directory /var/www>
  IndexIgnore *.bak .??* *~ *# HEADER* README* RCS CVS *,v *,t
</Directory>
<Directory /var/www/backups>
  IndexIgnoreReset ON
  IndexIgnore .??* *# HEADER* README* RCS CVS *,v *,t
</Directory>
```

IndexOptions

Module: mod_autoindex

Syntax: IndexOptions *[+|-]option [+|-]option ...*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: Indexes

Origin: Apache

Example: IndexOptions FancyIndexing ShowOwner FoldersFirst

The IndexOptions directive specifies the behavior of the directory indexing. The option parameter can be one of the following:

AddAltClass
Adds an additional CSS class declaration to each row of the directory listing table when IndexOptions HTMLTable is in effect and an IndexStyleSheet is defined. Rather than the standard even and odd classes that would otherwise be applied to each row of the table, a class of even-ALT or odd-ALT

where ALT is either the standard alt text associated with the file style (eg. snd, txt, img, etc) or the alt text defined by one of the various AddAlt* directives.

DescriptionWidth= [n | *]
The DescriptionWidth keyword allows you to specify the width of the description column in characters. -DescriptionWidth (or unset) allows mod_autoindex to calculate the best width. DescriptionWidth=n fixes the column width to n characters wide. DescriptionWidth=* grows the column to the width necessary to accommodate the longest description string. See the section on AddDescription for dangers inherent in truncating descriptions.

FancyIndexing
This option turns on fancy indexing of directories. With FancyIndexing, the column headers are links that control the order of the display. If you select a header link, the listing will be regenerated, sorted by the values in that column. Selecting the same header repeatedly toggles between ascending and descending order.

FoldersFirst
If this option is enabled, subdirectories in a FancyIndexed listing will always appear first, followed by normal files in the directory. The listing is broken into two components, the files and the subdirectories, and each is sorted separately and then displayed (subdirectories-first). For instance, if the sort order is descending by name, and FoldersFirst is enabled, subdirectory Zed will be listed before subdirectory Beta, which will be listed before normal files Gamma and Alpha. This option only has an effect if FancyIndexing is also enabled

IconsAreLinks
This makes the icons part of the anchor for the filename, for fancy indexing.

IconHeight=[pixels]
Presence of this option, when used with IconWidth, will cause the server to include HEIGHT and WIDTH attributes in the IMG tag for the file icon. This allows browser to precalculate the page layout without having to wait until all the images have been loaded. If no value is given for the option, it defaults to the standard height of the icons supplied with the the HTTP Server software. This option only has an effect if FancyIndexing is also enabled.

IconWidth=[pixels]
Presence of this option, when used with IconHeight, will cause the server to include HEIGHT and WIDTH attributes in the IMG tag for the file icon. This allows browser to precalculate the page layout without having to wait until all the images have been loaded. If no value is given for the option, it defaults to the standard width of the icons supplied with the HTTP Server software.

IgnoreCase
If this option is enabled, names are sorted in a case-insensitive manner. For instance, if the sort order is ascending by name, and IgnoreCase is enabled, file zeta will be listed after file Alpha. Likewise, if IgnoreCase is disabled, file zeta will be listed before file Alpha. By default IgnoreCase is disabled. This option only has an effect if FancyIndexing is also enabled. The new IgnoreCase value replaces the IndexOrderDefault CaseSense|NoCaseSense parameter.

IgnoreClient
This option causes mod_autoindex to ignore all query variables from the client, including sort order (implies SuppressColumnSorting.)

NameWidth=[n | *]
The NameWidth keyword allows you to specify the width of the filename column in characters. If the keyword value is '*', then the column is automatically sized to the length of the longest filename in the display. -NameWidth (or unset) allows mod_autoindex to calculate the best width. NameWidth=n fixes the column width to n characters wide. The minimum value allowed is 5.

NameMinWidth=[n]
The NameMinWidth keyword allows you to specify the minimum width that will always be reserved for the filename column in characters. The default setting is 15. The minimum value allowed is 5. If NameMinWidth is greater than NameWidth, then the filename column will have a length=NameMinWidth.

ScanHTMLTitles
This enables the extraction of the title from HTML documents for fancy indexing. If the file does not have a description given by AddDescription then the HTTP Server will read the document for the value of the TITLE tag. This is CPU and disk intensive.

SelectiveDirAccess
This option will cause the server to return directory listings only for directories that contain a wwwbrws file. The contents of wwwbrws file are not important. The server only checks for its existence. The object is a member name of an IBM i physical file or a type of object in an integrated file system directory. For case-sensitive file systems such as /QOpenSys, the wwwbrws name is lowercase. **SelectiveDirAccess is an AS400 specific option. This specific option works on a "per directory" basis, in other words you must specify the +/-SelectiveDirAccess on a Directory container.

ShowForbidden

This option is new for Apache 2.2. If you use this option, Apache will show files normally hidden because the subrequest returned HTTP_UNAUTHORIZED or HTTP_FORBIDDEN.

ShowOwner.
This directive determines whether directory listings should include the owner ID for each file.

SuppressColumnSorting
If specified, the HTTP Server will not make the column headings in a FancyIndexed directory listing into links for sorting. The default behavior is for them to be links; selecting the column heading will sort the directory listing by the values in that column.

SuppressDescription
This will suppress the file description in fancy indexing listings. By default, no file descriptions are defined, and so the use of this option will regain 23 characters of screen space to use for something else. See "AddDescription" on page 251 for information about setting the file description. See also the DescriptionWidth index option to limit the size of the description column. This option only has an effect if FancyIndexing is also enabled.

SuppressHTMLPreamble
If the directory actually contains a file specified by the HeaderName directive, the module usually includes the contents of the file after a standard HTML preamble (<HTML> <HEAD>). The SuppressHTMLPreamble option disables this behavior, causing the module to start the display with the header file contents. The header file must contain appropriate HTML instructions in this case. If there is no header file, the preamble is generated as usual.

SuppressIcon
This directive suppresses the display of icons on directory listings. The default is that no options are enabled.

SuppressLastModified
This directive will suppress the display of the last modification date, in fancy indexing listings. This option only has an effect if FancyIndexing is also enabled.

SuppressRules
This directive will suppress the horizontal rule lines (HR tags) in directory listings. Combining both SuppressIcon and SuppressRules yields proper HTML 3.2 output, which by the final specification prohibits IMG and HR tags from the PRE block (used to format FancyIndexed listings). This option only has an effect if FancyIndexing is also enabled.

SuppressSize
This directive will suppress the file size in fancy indexing listings. This option only has an effect if FancyIndexing is also enabled.

TrackModified
This returns the Last-Modified and ETag values for the listed directory in the HTTP header. It is only valid if the operating system and file system return appropriate stat() results. Once this feature is enabled, the client or proxy can track changes to the list of files when they perform a HEAD request. Changes to the size or date stamp of an existing file will not update the Last-Modified header on all Unix platforms. If this is a concern, leave this option disabled.

VersionSort
The VersionSort keyword causes files containing version numbers to sort in a natural way. Strings are sorted as usual, except that substrings of digits in the name and description are compared according to their numeric value. For example:

- foo-1.73
- foo-1.7.2
- foo-1.7.12
- foo-1.8.2
- foo-1.8.2a
- foo-1.12

If the number starts with a zero, then it is considered to be a fraction:

- foo-1.001
- foo-1.002
- foo-1.030
- foo-1.04

XHTML
The XHTML keyword forces mod_autoindex to emit XHTML 1.0 code instead of HTML 3.2. This option only has an effect if FancyIndexing is also enabled.

Multiple IndexOptions directives for a single directory are merged together. The directive allows incremental syntax (i.e., prefixing keywords with '+' or '-'). Whenever a '+' or '-' prefixed keyword is encountered, it is applied to the current IndexOptions settings (which may have been inherited from an upper-level directory). However, whenever an non-prefixed keyword is processed, it clears all inherited options and any incremental settings encountered so far. Consider the following example:

```
IndexOptions +ScanHTMLTitles -IconsAreLinks FancyIndexing
IndexOptions +SuppressSize
```

The net effect is equivalent to IndexOptions FancyIndexing +SuppressSize, because the non-prefixed FancyIndexing discarded the incremental keywords before it, but allowed them to start accumulating again afterward. To unconditionally set the IndexOptions for a particular directory, clearing the inherited settings, specify keywords without either '+' or '-' prefixes.

Note: IndexOptions directive is not supported in <Location> containers.

IndexOrderDefault

Module: mod_autoindex

Syntax: IndexOrderDefault [*ascending | descending] [name | date | size | owner | description*] [*CaseSense | NoCaseSense*]

Default: IndexOrderDefault Ascending Name CaseSense

Context: server config, virtual host, directory (but not location), .htaccess

Override: Indexes

Origin: Modified

Example: IndexOrderDefault descending size

The IndexOrderDefault directive is used in combination with the FancyIndexing index option. By default, FancyIndexed directory listings are displayed in ascending order by filename; the IndexOrderDefault allows you to change this initial display order.

IndexOrderDefault takes two required arguments and a third optional argument.

Parameter One: *ascending | descending*

- The *ascending* and *descending* parameter indicates the direction of the sort.

Parameter Two: *name | date | size | owner | description*

- The *name*, *date*, *size*, *owner*, and *description* parameter arguments must be used and identifies the primary key. The secondary key is always ascending filename.

Parameter Three: *CaseSense | NoCaseSense*

- The *CaseSense* and *NoCaseSense* parameters are optional third keywords that allow you to choose if the column sort is case sensitive. This keyword is valid if the second keyword is *name*, *owner* or *description* only. If the second keyword is *date* or *size*, then this parameter is ignored. The default for keyword is *CaseSense*.

You can force a directory listing to only be displayed in a particular order by combining this directive with the SuppressColumnSorting index option; this will prevent the client from requesting the directory listing in a different order.

Note: This directive is not supported "<Location> " on page 339 containers. The directive may be inherited in a "<Directory> " on page 311 context, but not in a "<VirtualHost> " on page 363 context.

IndexStyleSheet

Module: mod_autoindex

Syntax: IndexStyleSheet *url-path*

Default: none

Context: Server, Virtual Host, Directory, .htaccess

Override: Indexes

Origin: Apache

Example: IndexStyleSheet "/css/style.css"

The IndexStyleSheet directive sets the name of the file that will be used as the CSS for the index listing.

ReadmeName

Module: mod_autoindex

Syntax: ReadmeName *filename*

Default: none

Context: server config, virtual host, directory (but not location), .htaccess

Override: Indexes

Origin: Apache

Example: ReadMeName readme

Example: ReadMeName README.MBR

The ReadmeName directive sets the name of the file that will be appended to the end of the index listing.

Parameter: *filename*

- The *filename* parameter is the name of the file to include and is taken to be relative to the location being indexed. Details of how its handled may be found under the description of the "HeaderName" on page 253 directive, which uses the same mechanism as ReadmeName.

Note: This directive is not supported in "<Location> " on page 339 containers.

Module mod_buffer

Module mod_buffer supports directives for the IBM HTTP Server for i Web server.

Summary

This module provides the ability to buffer the input and output filter stacks.

Under certain circumstances, content generators might create content in small chunks. In order to promote memory reuse, in memory chunks are always 8k in size, regardless of the size of the chunk itself. When many small chunks are generated by a request, this can create a large memory footprint while the request is being processed, and an unnecessarily large amount of data on the wire. The addition of a buffer collapses the response into the fewest chunks possible.

When HTTP Server is used in front of an expensive content generator, buffering the response may allow the backend to complete processing and release resources sooner, depending on how the backend is designed.

The buffer filter may be added to either the input or the output filter stacks, as appropriate, using the "SetInputFilter" on page 359, "SetOutputFilter" on page 360, "AddOutputFilter" on page 495 or "AddOutputFilterByType" on page 604 directives.

Using buffer with mod_include for example:

```
    AddOutputFilterByType INCLUDES;BUFFER text/html
```

Note: The buffer filters read the request/response into RAM and then repack the request/response into the fewest memory buckets possible, at the cost of CPU time. When the request/response is already efficiently packed, buffering the request/response could cause the request/response to be slower than not using a buffer at all. These filters should be used with care, and only where necessary.

Directives

- "BufferSize" on page 260

BufferSize

Module: mod_buffer

Syntax: BufferSize *integer*

Default: BufferSize *131072*

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Example: BufferSize 262144

The "BufferSize" on page 260 directive specifies the Maximum size in bytes to buffer by the buffer filter.

Parameter: *integer*

- The *integer* parameter is the amount of data in bytes that will be buffered before being read from or written to each request. The default is 128 kilobytes.

Module mod_cern_meta

Module mod_autoindex supports directives for the IBM HTTP Server for i Web server.

Summary

The module mod_cern_meta provides for CERN httpd meta file semantics.

Directives

- “MetaFiles” on page 261
- “MetaDir” on page 261
- “MetaSuffix” on page 262

MetaFiles

Module: mod_cern_meta

Syntax: MetaFiles *on | off*

Default: MetaFiles off

Context: directory

Override: none

Origin: Apache

Example: MetaFiles on

This directive allows you to emulate the CERN Meta file semantics. Meta files are HTTP headers that can be output in addition to the normal range of headers for each file accessed. They appear like the .asis files, and are able to influence the Expires: header.

Parameter: *on | off*

- Turns *on* or *off* the meta file processing on a per-directory basis.

MetaDir

Module: mod_cern_meta

Syntax: MetaDir *directoryname*

Default: MetaDir .web

Context: directory

Override: none

Origin: Apache

Example: MetaDir .meta Specifies the name of the

Specifies the name of the directory where HTTP Server can find meta information files. The directory is usually a hidden subdirectory of the directory that contains the file being accessed. Set directory name to "." in order to look in the same directory as the file. Hidden directories begin with "." so the default directory will be hidden.

Parameter: *directoryname*

- The *directoryname* parameter specifies the name of the directory in which HTTP Server can find meta information files.

MetaSuffix

Module: mod_cern_meta

Syntax: MetaSuffix *suffix*

Default: MetaSuffix .meta

Context: directory

Override: none

Origin: Apache

Example: MetaSuffix .stuff

Specifies the file name suffix for the file containing the meta information. A request will cause the server to look in the file with the MetaSuffix in the "MetaDir" on page 261 directory, and will use its contents to generate additional MIME header information.

Parameter: *suffix*

- The *suffix* parameter is the file name suffix of the file containing the meta information.

Module mod_cache

Module mod_cache supports directives for the IBM HTTP Server for i Web server.

Summary

This module contains directives that define support for the HTTP Proxy function which includes the proxy caching function.

Cache Expiry Times

Cache expiry times are different than expiry times provided in HTTP response data. Cache expiry times are calculated by caching agents (such as a proxy server), whereas expiry times in HTTP response data are provided by content servers (for example, via HTTP Expires headers). If cacheable data from content servers contains expiry times, a caching agent (or proxy) must use cache expiry times that are no later than the corresponding data expiry times. In other words, caching agents may not serve data from cache after it has expired, however they may stop serving it from cache prior to such time.

If content servers do not provide expiry times for cacheable data, the caching agent (or proxy) may try to use other response information to calculate acceptable cache expiry times, or it may use some arbitrary default value, as determined by the administrator.

Note: Response data is considered cacheable for the proxy function if it satisfies criteria described under "Criteria for Local Proxy Cache" on page 263.

The proxy function follows these rules to determine which directive settings to use to calculate cache expiry times for HTTP proxy response data stored in the local proxy cache.

1. If HTTP response data contains expiry times (via Expires header for HTTP requests only) these times are also used as cache expiry times.
2. If HTTP response data does not contain expiry times, but does contain information pertaining to when it was last modified (via Last-Modified header for HTTP requests, or MDTM command for FTP requests), the CacheLastModifiedFactor and CacheMaxExpire directive settings are used to calculate cache expiry times.
3. If HTTP response data does not contain expiry times, nor does it contain information pertaining to when it was last modified, the CacheDefaultExpire directive setting is used to calculate arbitrary cache expiry times.

Note: The first rule has one exception. If response code 304 (Not Modified) is received for HTTP requests, Expires headers (if any) are not used to set new cache expiry time. The second rule is applied (for 304 responses) if last modified times from cached data are available to recalculate new cache expiry times. If last modified times are not available from cached data, the third rule is applied.

Criteria for Local Proxy Cache

When configured, the server handles certain requests using the proxy function to obtain data from remote servers, which it then serves as HTTP proxy response data. It does this when acting as either a forward proxy or a reverse proxy (see ProxyRequests or ProxyReverse). By default, the proxy function obtains and handles data separately for each request. The server may be made more efficient, however, by using a local proxy cache to store HTTP proxy response data locally, which it then serves multiple times for multiple requests. The server is more efficient since remote servers need only be contacted when data in the local proxy cache expires.

Not all response data obtained by the server is cached and served for multiple requests, due mostly for reasons involving privacy, version control (frequency of change), and negotiable content. This type of response data is not considered cacheable and must be obtained from remote servers for each request.

Standard Criteria

Standard criteria for the server's local proxy cache and proxy function, in regards to response data obtained using specified protocols, is described in the following lists. This criteria is used to determine whether HTTP proxy response data is cacheable and may be served multiple times for multiple requests.

HTTP response data:

- Only data requested using the GET method is cacheable.
- Only data received on a request that does not end with a '/' is cacheable.
  - 200 (OK)
  - 203 (Non Authoritative)
  - 300 (Multiple Choices)
  - 301 (Moved Permanently)
  - 304 (Not Modified)
- If data contains an Expires header, the header must be valid.

  Note: This does not apply to data that does not contain an Expires header.
- If data contains an Expires header, the header must not specify a time that has already past (according to local system time).
- If data contains an Expires header, the expiration time must be greater than the configured minimum expiration time.
- Data received with response code 200 (OK) must contain either a Last-Modified header or an ETag header. This requirement is waived if on is specified for the CacheIgnoreNoLastMod directive.
- Data received with response code 304 (Not Modified) is not cacheable if a previous version is not already in cache.
- If data contains a Cache-Control header, the header must not specify the value "no-store" or "private".
- If data contains a Pragma header, the header must not specify the value "no-cache".
- If the request provides an Authorization header (possibly used by the remote server), response data must contain a Cache-Control header that specifies one or more of the following values: "s-maxage", "must-revalidate" or "public".
- If data contains a Content-Length header, the header must not specify a value that exceeds the minimum or maximum data size limits set by the CacheMinFileSize and CacheMaxFileSize directives. See Additional Criteria for more information.

FTP response data:

- Only data requested using the GET method is cacheable.
- Data is only cached if LIST or RETR commands return one of the following response codes:

  - 125 (OK, Data Transfer Starting)
  - 150 (OK, Opening Data Connection)
  - 226 (OK, Closing Data Connection)
  - 250 (OK)

  Note: The LIST command is used to retrieve directory listings. The RETR command is used to retrieve data files.

- Data must contain information for an HTTP Last-Modified header (produced via MDTM command with response code 213, see Notes®: below). This requirement is waived if on is specified for the CacheIgnoreNoLastMod directive.
- If data contains information for an HTTP Content-Length header (produced via SIZE command with response code 213), the header must not specify a value that exceeds the minimum or maximum data size limits set by the CacheMinFileSize and CacheMaxFileSize directives, respectively. See Additional Criteria for more information.

HTTPS (or SSL-tunneling over HTTP) response data:

- Data requested using SSL-tunneling over HTTP is not cacheable.

No other protocols are supported by the proxy function.

Additional Criteria

Additional criteria for the server's local proxy cache and proxy functions may be imposed by the function providing underlying cache support. Currently, this includes only the disk cache function.

The following list describes additional restrictions on HTTP proxy response data stored in a local proxy cache, imposed by the mod_cache_disk module:

- Cache data must not exceed the minimum or maximum data size limits set by the CacheMinFileSize and CacheMaxFileSize directives. This restriction applies regardless of Content-Length header values (if any) in HTTP proxy response data.
- Data with cache expiry times that will expire within the minimum time margin set by the CacheTimeMargin directive is not cached. This restriction applies to HTTP proxy response data, using cache expiry times calculated according to rules described in the Cache Expiry Times. See mod_cache_disk for other restriction that may apply.

Avoiding the Thundering Herd

When a cached entry becomes stale, mod_cache will submit a conditional request to the backend, which is expected to confirm whether the cached entry is still fresh, and send an updated entity if not.

A small but finite amount of time exists between the time the cached entity becomes stale, and the time the stale entity is fully refreshed. On a busy server, a significant number of requests might arrive during this time, and cause a **thundering herd** of requests to strike the backend suddenly and unpredictably.

To keep the thundering herd at bay, the CacheLock directive can be used to define a directory in which locks are created for URLs in flight. The lock is used as a hint by other requests to either suppress an attempt to cache (someone else has gone to fetch the entity), or to indicate that a stale entry is being refreshed (stale content will be returned in the mean time).

Initial caching of an entry:

- When an entity is cached for the first time, a lock will be created for the entity until the response has been fully cached. During the lifetime of the lock, the cache will suppress the second and subsequent attempt to cache the same entity. While this doesn't hold back the thundering herd, it does stop the cache attempting to cache the same entity multiple times simultaneously.

Refreshment of a stale entry:

- When an entity reaches its freshness lifetime and becomes stale, a lock will be created for the entity until the response has either been confirmed as still fresh, or replaced by the backend. During the lifetime of the lock, the second and subsequent incoming request will cause stale data to be returned, and the thundering herd is kept at bay.

Locks and Cache-Control: no-cache:

- Locks are used as a hint only to enable the cache to be more gentle on backend servers, however the lock can be overridden if necessary. If the client sends a request with a Cache-Control header forcing a reload, any lock that may be present will be ignored, and the client's request will be honored immediately and the cached entry refreshed.

As a further safety mechanism, locks have a configurable maximum age. Once this age has been reached, the lock is removed, and a new request is given the opportunity to create a new lock. This maximum age can be set using the CacheLockMaxAge directive, and defaults to 5 seconds.

Example:

#Enable the cache lock#

```
CacheLock on
CacheLockPath /QIBM/UserData/HTTPA/tmp/mod_cache-lock
CacheLockMaxAge 5
```

Directives

- "CacheDefaultExpire " on page 267
- "CacheDetailHeader" on page 265
- "CacheDisable" on page 268
- "CacheEnable" on page 268
- "CacheExpiryCheck" on page 270
- "CacheHeader" on page 266
- "CacheIgnoreCacheControl" on page 271
- "CacheIgnoreNoLastMod" on page 272
- "CacheIgnoreHeaders" on page 271
- "CacheIgnoreURLSessionIdentifiers" on page 273
- "CacheKeyBaseURL" on page 274
- "CacheLastModifiedFactor" on page 274
- "CacheLock" on page 275
- "CacheLockMaxAge" on page 276
- "CacheLockPath" on page 276
- "CacheMaxExpire" on page 277
- "CacheMinExpire" on page 278
- "CacheQuickHandler" on page 278
- "CacheStoreNoStore" on page 280
- "CacheStaleOnError" on page 279
- "CacheStoreExpired" on page 280
- "CacheStorePrivate" on page 280
- "CacheTimeMargin" on page 281

CacheDetailHeader

Module: mod_cache

Syntax: CacheDetailHeader *on|off*

Default:CacheDetailHeader *off*

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheDetailHeader *on*

The CacheDetailHeader directive specifies whether an X-Cache-Detail header will be added to the response containing the detailed reason for a particular caching decision.

Parameter: *on | off*

- If *on* is specified, an **X-Cache-Detail** header will be added to the response.
- If *off* is specified(the default) , **X-Cache-Detail** header will not be added to the response by default.

Example:

```
    # Enable the X-Cache header
    CacheHeader on
```

X-Cache-Detail: "conditional cache hit: entity refreshed" from localhost

CacheHeader

Module: mod_cache

Syntax: CacheHeader *on/off*

Default: CacheHeader *off*

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheHeader *on*

The CacheHeader directive specifies whether an **X-Cache** header will be added to the response with the cache status of this response.

Parameter: *on | off*

- If *on* is specified, an **X-Cache** header will be added to the response.
- If *off* is specified (the default) , **X-Cache** header will not be added to the response by default.

If the normal handler is used, this directive may appear within a "<Directory> " on page 311 or "<Location> " on page 339 directive. If the quick handler is used, this directive must appear within a server or virtual host context, otherwise the setting will be ignored.

HIT

The entity was fresh, and was served from cache.

REVALIDATE

The entity was stale, was successfully revalidated and was served from cache.

MISS

The entity was fetched from the upstream server and was not served from cache.

Example:

```
# Enable the X-Cache header
CacheHeader on
```

X-Cache: **HIT** from localhost

CacheDefaultExpire

Module: mod_cache

Syntax: CacheDefaultExpire *period*

Default: CacheDefaultExpire 3600

Context: server config, Virtual Host, directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheDefaultExpire 3

The CacheDefaultExpire directive specifies the default number of seconds in which cacheable HTTP proxy response data will be set to expire within the local proxy cache, starting from the time it is obtained by the server.

Parameter: *period*

- The *period* parameter defines the default cache expiry period, in seconds.

This setting is used to calculate arbitrary cache expiry times for HTTP proxy response data stored in the local proxy cache. See Cache Expiry Times for more information on how the server determines which settings to use to calculate cache expiry times. See the CacheIgnoreNoLastMod directive for information relating to how cache criteria may be waived for this setting to take affect.

If this setting is used, cache expiry times are calculated by adding the specified number of seconds to the time that data is received by the proxy function.

Example:

```
ProxyRequests on
CacheRoot proxyCache
CacheDefaultExpire 3600
CacheMaxExpire 86400
CacheLastModifiedFactor 0.3
```

In the example, if a cacheable data is retrieved from a server that does not provide an expiry time (via HTTP Expires header), nor does it indicate when the data was last modified (via HTTP Last-Modified header, or FTP MDTM command), the server will cache and serve the data for 3600 seconds (since CacheDefaultExpire is set to 3600 and "on" is specified for CacheIgnoreNoLastMod). If an expiry time or last-modified time is provided, CacheDefaultExpire would not be used (see Cache Expiry Times).

Note: Response data is considered cacheable for the proxy function if it satisfies criteria described under Criteria for Local Proxy Cache.

(1) The following conditions will negate this directive:

1. off is specified for both “ProxyRequests” on page 540 and “ProxyReverse” on page 541
2. off is specified for CacheOn.
3. “CacheRoot” on page 389 is not specified
4. on is specified for “ProxyNoConnect” on page 521

CacheDisable

Module: mod_cache

Syntax: CacheDisable *url-string| on*

Default: none

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheDisable /local_files

The “CacheDisable” on page 268 directive instructs “Module mod_cache” on page 262 to not cache urls at or below url-string.

If used in a “<Location> ” on page 339 directive, the path needs to be specified below the Location, or if the word "on" is used, caching for the whole location will be disabled.

Example:

```
<Location /foo>
   CacheDisable on
</Location>
```

The *no-cache* environment variable can be set to disable caching on a finer grained set of resources

CacheDisable will not make ProxyNoCache obsolete. They can be used in conjunction with each other (CacheDisable will have precedence). CacheDisable also takes presidence over CacheEnable directives, no matter the order.

Note: The directive can't be specified in “<Directory> ” on page 311, “<Limit>” on page 333 and “<Files>” on page 323 directives.

CacheEnable

Module: mod_cache

Syntax: CacheEnable *cache_type [url-string]*

Default: none

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule cache_disk_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheEnable disk

The CacheEnable directive instructs mod_cache to cache urls at or below url-string. The cache storage manager is specified with the cache_type argument (note: we do not support types socache implemented by mod_cache_socache). The CacheEnable directive can alternatively be placed inside either "<Location> " on page 339 or "<LocationMatch>" on page 340 sections to indicate the content is cacheable. *Cache_type* disk instructs mod_cache to use the disk based storage manager implemented by mod_cache_disk.

CacheEnable directives within "<Location> " on page 339 or "<LocationMatch>" on page 340 sections are processed before globally defined CacheEnable directives.

When acting as a forward proxy server, *url-string* must minimally begin with a protocol for which caching should be enabled.

Example 1

```
# Cache content (normal handler only)
CacheQuickHandler off
<LocationMatch /foo>
    CacheEnable disk
</LocationMatch>
```

Example 2

```
# Cache regex (normal handler only)
CacheQuickHandler off
<LocationMatch /foo$>
    CacheEnable disk
</LocationMatch>
```

Example 3

```
# Cache all but forward proxy url's  (normal or quick handler)
CacheEnable disk /
```

Example 4

```
# Cache FTP-proxied url's (normal or quick handler)
CacheEnable disk ftp://
```

Example 5

```
# Cache forward proxy  content from www.apache.org (normal or quick handler)
CacheEnable disk http://www.apache.org/
```

A hostname starting with a "*" matches all hostnames with that suffix. A hostname starting with "." matches all hostnames containing the domain components that follow.

Example 6

```
# Match www.example.org, and fooexample.org
CacheEnable  disk  http://*example.org/
```

Example 7

```
# Match www.example.org, but not fooexample.org
CacheEnable  disk  http://.example.org/
```

A hostname starting with a "*" matches all hostnames with that suffix. A hostname starting with "." matches all hostnames containing the domain components that follow.

```
# Match www.example.org, and fooexample.org
CacheEnable  disk  http://*example.org/

# Match www.example.org, but not fooexample.org
CacheEnable  disk  http://.example.org/
```

The no-cache environment variable can be set to disable caching on a finer grained set of resources.

IBM i has an additional enhancement to "CacheEnable" on page 268. If **%%PROXY%%** is specified as the url-string, all proxy requests will be cached (unless disabled by "CacheDisable" on page 268). This makes it easy for the customer to cache all proxy requests (they then do not have to maintain a list of CacheEnable protocols).

```
  # Cache all proxied url's
  CacheEnable disk %%PROXY%%
```

The IBM i HTTP server only supports cache_type disk (mod_cache_disk). If you wish to improve caching performance, use FRCA or memory based local cache mechanisms (CacheLocal directives). Implementing the CacheEnable directive will not make DynamicCache obsolete. URL's specified by CacheEnable will take precedence over dynamic cache, and will mark the request as not being a candidate for Dynamic Cache.

CacheExpiryCheck

Module: mod_cache

Syntax: CacheExpiryCheck *on | off*

Default: CacheExpiryCheck on

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheExpiryCheck on

The CacheExpiryCheck directive specifies whether the server is to observe cache expiry times when cached data is requested using the disk cache function (see CacheRoot).

Parameter: *on | off*

- If *on* is specified (the default), the server will perform and apply all cache expiry time checks for data currently available in cache.
- If *off* is specified, cache expiry times will not be observed and cached data (if any) will always be available.

Cache expiry time checks may be disabled (off) when the content of the cache is managed by an application or process other than the server itself. If the content of the cache is not managed by an application or process other than the server, this setting must be set to on (the default) to prevent the disk cache function from making expired data appear valid.

Note: When the disk cache function is used to support a local proxy cache, this setting determines whether cache expiry times are observed for the proxy function. Once cached, data is usually available from cache until its respective cache expiry times has passed. However, if cache expiry time checks are disabled (CacheExpiryCheck off), the proxy function will serve cached HTTP proxy response data regardless of whether it has expired. This effectively causes the disk cache function to ignore cache expiry times calculated using the CacheDefaultExpire, CacheMaxExpire, and CacheLastModifiedFactor directives for a local proxy cache, as well as any expiry time provided via Expires headers (for HTTP requests).

See the CacheRoot directive for more information on how the disk cache function is used to support a local proxy cache.

CacheIgnoreCacheControl

Module: mod_cache

Syntax: CacheIgnoreCacheControl *on | off*

Default: CacheIgnoreCacheControl off

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM`

Example: CacheIgnoreCacheControl on

The CacheIgnoreCacheControl directive specifies whether the server is to observe certain cache controlling request headers (for example, Cache-Control and Pragma) when handling requests using the proxy function.

Parameter: *on | off*

- If *on* is specified, the server will not observe cache controlling request headers.
- If *off* is specified (the default), the server will observe cache controlling request headers when HTTP proxy response data is available from the local proxy cache.

By default, the server observes certain cache controlling request headers (for example, "Cache-Control : no-store" and "Pragma : no-cache") when handling requests using the proxy function. If such headers are present in HTTP request data sent to the server, the proxy function will not serve HTTP proxy response data from the local proxy cache since these headers indicate that cached data is not wanted. However, if on is specified for this setting, the proxy function will ignore cache controlling request headers and serve HTTP proxy response data from cache, if it is available.

- Setting ProxyRequests and ProxyReverse to off negates this directive.
- This directive is used only if CacheRoot is set.

CacheIgnoreHeaders

Module: mod_cache

Syntax: CacheIgnoreHeaders *header-string [header-string]*

Default: CacheIgnoreHeaders None

Context: server, virtual host

Override: none

Origin: Apache

Example 1: CacheIgnoreHeaders Set-Cookie

Example 2: CacheIgnoreHeaders None

Do not store the given HTTP headers in the cache. According to RFC 2616, hop-by-hop HTTP headers are not stored in the cache. The following HTTP headers are hop-by-hop headers and thus do not get stored in the cache in any case regardless of the setting of CacheIgnoreHeaders:

- Connection
- Keep-Alive
- Proxy-Authenticate
- TE
- Trailers
- Transfer-Encoding
- Upgrade

CacheIgnoreHeaders specifies additional HTTP headers that should not be stored in the cache. For example, it makes sense in some cases to prevent cookies from being stored in the cache.

CacheIgnoreHeaders takes a space separated list of HTTP headers that should not be stored in the cache. If only hop-by-hop headers should not be stored in the cache (the RFC 2616 compliant behaviour), CacheIgnoreHeaders can be set to None.

Warning: If headers like Expires which are needed for proper cache management are not stored due to a CacheIgnoreHeaders setting, the behaviour of mod_cache is undefined.

CacheIgnoreNoLastMod

Module: mod_cache

Syntax: CacheIgnoreNoLastMod *on | off*

Default: CacheIgnoreNoLastMod off

Context: Server, Virtual Host, directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheIgnoreNoLastMod on

The CacheIgnoreNoLastMod directive specifies whether the server may cache HTTP proxy response data in the local proxy cache, if it does not contain a Last-Modified header or an ETag header.

Parameter: *on | off*

- If *off* is specified (the default), the server requires either an ETag header or a Last-Modified header to be present in all HTTP proxy response data cached in the local proxy cache.
- If *on* is specified, the server will not require an ETag header or Last-Modified header to be present in HTTP proxy response data cached in the local proxy cache.

By default, if data does not contain either an ETag header or a Last-Modified header, the server does not consider it cacheable. Specifying on for this setting waives this criteria. See Criteria for Local Proxy Cache for more information.

Example One:

```
ProxyRequests on
CacheRoot proxyCache
```

```
CacheIgnoreNoLastMod off
CacheDefaultExpire 1
```

In the example, if data is received from a server that does not provide an expiry time (via HTTP Expires header), nor does it have an ETag or Last-Modified header, it is not considered cacheable since off is specified for "CacheIgnoreNoLastMod" on page 272. The server serves the data for the current request, but does not cache it for subsequent requests. The settings for"CacheDefaultExpire " on page 267 is not used.

Example Two:

```
ProxyRequests on
CacheRoot proxyCache
CacheIgnoreNoLastMod on
CacheDefaultExpire 1
```

In this example, if data is received from a server that does not provide an expiry time (via HTTP Expires header), nor does it have an ETag or Last-Modified header (as in example one), it is still considered cacheable since on is specified for CacheIgnoreNoLastMod. The server serves the data for the current request, and may calculate a cache expiry time using CacheDefaultExpire to cache it for subsequent requests, assuming it satisfies all other cache criteria.

Note: Response data is considered cacheable for the proxy function if it satisfies criteria described under Criteria for Local Proxy Cache.

- Setting ProxyRequests and ProxyReverse to off negates this directive.
- Setting ProxyNoConnect to on negates this directive.
- This directive is used only if CacheRoot is set.

CacheIgnoreURLSessionIdentifiers

Module: mod_cache

Syntax: CacheIgnoreURLSessionIdentifiers *identifier [identifier] ...*

Default: CacheIgnoreURLSessionIdentifiers *None*

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example:CacheIgnoreURLSessionIdentifiers jsessionid

The CacheIgnoreURLSessionIdentifiers directive ignores defined session identifiers encoded in the URL when caching

Sometimes applications encode the session identifier into the URL like in the following Examples:

- /someapplication/image.gif;jsessionid=123456789
- /someapplication/image.gif?PHPSESSIONID=12345678

This causes cachable resources to be stored separately for each session, which is often not desired. "CacheIgnoreURLSessionIdentifiers" on page 273 lets define a list of identifiers that are removed from the key that is used to identify an entity in the cache, such that cachable resources are not stored separately for each session.

CacheIgnoreURLSessionIdentifiers None clears the list of ignored identifiers. Otherwise, each identifier is added to the list.

Example 1

CacheIgnoreURLSessionIdentifiers jsessionid

Example 2

CacheIgnoreURLSessionIdentifiers None

CacheKeyBaseURL

Module: mod_cache

Syntax: CacheKeyBaseURL *URL*

Default: *None*

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheKeyBaseURL http://www.example.com/

When the "CacheKeyBaseURL" on page 274 directive is specified, the URL provided will be used as the base URL to calculate the URL of the cache keys in the reverse proxy configuration. When not specified, the scheme, hostname and port of the current virtual host is used to construct the cache key. When a cluster of machines is present, and all cached entries should be cached beneath the same cache key, a new base URL can be specified with this directive.

Example:

```
# Override the base URL of the cache key.
CacheKeyBaseURL http://www.example.com/
```

Note: Take care when setting this directive. If two separate virtual hosts are accidentally given the same base URL, entries from one virtual host will be served to the other.

CacheLastModifiedFactor

Module: mod_cache

Syntax: CacheLastModifiedFactor *factor*

Default: CacheLastModifiedFactor *0.1*

Context: server config, Virtual Host, directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheLastModifiedFactor 0.3

The CacheLastModifiedFactor directive specifies a multiplication factor used in the formula:

```
period = time-since-last-modification *<factor>
```

Parameter: ***factor***

- The *factor* parameter specifies the multiplication factor used in the formula (described above) to calculate cache expiry times.

  This formula is used and setting is used along with CacheMaxExpire to calculate cache expiry times for HTTP proxy response data store in the local proxy cache, based on when the data was last modified. See Cache Expiry Times for more information on how the server determines which settings to use when calculating cache expiry times.

  If this setting is used, cache expiry times are calculated by adding the lesser of the calculated period (using the formula above) and the period specified for CacheMaxExpire to the time that data is received by the proxy function. Using this method, data that has not changed recently is served from cache longer than data that has changed recently, since its last-modified time is older and will produce a greater cache expiry period. This assumes that both responses yield calculated cache expiry periods that are less than the CacheMaxExpire directive setting.

Example:

```
ProxyRequests on
CacheRoot proxyCache
CacheMaxExpire 86400
CacheLastModifiedFactor 0.3
```

In this example, if cacheable data is received from a server that does not provide an expiry time (via HTTP Expires header), but does indicate that the data was last changed 10 hours ago (via HTTP Last-Modified header, or FTP MDTM command), the server would calculate a period of 3 hours using CacheLastModifiedFactor (10 * 0.3) and would cache and serve the data for the same period of time since it is less than the maximum limit of 24 hours set by CacheMaxExpire.

Note: Response data is considered cacheable for the proxy function if it satisfies criteria described under Criteria for Local Proxy Cache.

If a similar response for this example indicates that the data was last changed 8 days ago (or 192 hours), the server would calculate a period of 57.6 hours using CacheLastModifiedFactor (192 * 0.3), but it would cache and serve the data for a period of only 24 hours since CacheMaxExpire sets a limit on the maximum period for the CacheLastModifiedFactor formula.

- Setting ProxyRequests and ProxyReverse to off negates this directive.
- Setting ProxyNoConnect to on negates this directive.
- This directive is used only if CacheRoot is set.

CacheLock

Module: mod_cache

Syntax: CacheLock *on|off*

Default: CacheLock *off*

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheLock off

The CacheLock directive enables the thundering herd lock for the given URL space.

Parameter: *on | off*

- The value *on* enables the thundering herd lock.
- The value *off* disables the thundering herd lock, this is the default behavior.

In a minimal configuration the following directive is all that is needed to enable the thundering herd lock in the default cache lock temp directory /QIBM/UserData/HTTPA/tmp specified via CacheLockPath directive.

Example:

```
# Enable cache lock
CacheLock on
```

CacheLockMaxAge

Module: mod_cache

Syntax: CacheLockMaxAge *integer*

Default: CacheLockMaxAge 5

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheLockMaxAge 10

The "CacheLockMaxAge" on page 276 directive specifies the maximum age of any cache lock.

A lock older than this value in seconds will be ignored, and the next incoming request will be given the opportunity to re-establish the lock. This mechanism prevents a slow client taking an excessively long time to refresh an entity.

CacheLockPath

Module: mod_cache

Syntax: CacheLockPath *directory*

Default: CacheLockPath /QIBM/UserData/HTTPA/tmp

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheLockPath /QIBM/UserData/HTTPA/tmp/myCacheLock

The CacheLockPath directive allows you to specify the directory in which the locks are created. By default, /QIBM/UserData/HTTPA/tmp is used as the default cache lock directory. Locks consist of empty files that only exist for stale URLs in flight, so is significantly less resource intensive than the traditional disk cache.

Parameter: *directory*

- The *directory* parameter accepts a file system path name to specify the file system directory for the cache lock path (see cache lock directory limits below).

The server must have *RWX data authorities and *ALL object authorities to the specified directory.

Cache lock directory limits:

- If the directory parameter specifies an absolute path it must start with /QIBM/UserData/HTTPA/tmp, otherwise the default folder will be used.
- If the directory parameter does not specify an absolute path (does not start with a '/'), it will be assumed to be relative to the following: /QIBM/UserData/HTTPA/tmp

Example 1 (absolute path):

```
        CacheLockPath /QIBM/UserData/HTTPA/tmp/myCacheLock
```

Example 2 (relative path):

```
        CacheLockPath myCacheLock
```

CacheMaxExpire

Module: mod_cache

Syntax: CacheMaxExpire *period*

Default: CacheMaxExpire 86400

Context: server config, Virtual Host, directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheMaxExpire 43200

The CacheMaxExpire directive specifies the maximum number of seconds in which cacheable HTTP proxy response data will be set to expire within the local proxy cache (when the CacheLastModifiedFactor directive setting is used). This setting has no affect on other settings used to calculate cache expiry times.

Parameter: *period*

- The *period* parameter specifies the maximum cache expiry period, in seconds, that may be used when expiry times are calculated using the CacheLastModifiedFactor directive setting.

  This setting is used along with the CacheLastModifiedFactor directive setting to calculate expiry times for HTTP proxy response data stored in the local proxy cache, based on when data was last modified. See Cache Expiry Times for more information on how the server determines which settings to use when calculating cache expiry times. If this setting is used, cache expiry times are calculated by adding the lesser of the specified period and the period calculated using CacheLastModifiedFactor to the time that data is received by the proxy function.

Example

```
ProxyRequests on
CacheRoot proxyCache
CacheMaxExpire 86400
CacheLastModifiedFactor 0.3
```

In this example, if cacheable data is received from a server that does not provide an expiry time (via HTTP Expires header), but does indicate that the data was last changed 5 days ago (via HTTP Last-Modified header, or FTP MDTM command), the server would calculate a period of 1.5 days using CacheLastModifiedFactor (5 * 0.3), but it would cache and serve the data for a period of only 86400 seconds (1 day) since CacheMaxExpire sets a maximum limit of 86400 seconds.

Note: Response data is considered cacheable for the proxy function if it satisfies criteria described under Criteria for Local Proxy Cache.

- Setting ProxyRequests and ProxyReverse to off negates this directive.
- Setting ProxyNoConnect to on negates this directive.
- This directive is used only if CacheRoot is set

CacheMinExpire

Module: mod_cache

Syntax: CacheMinExpire *seconds*

Default: CacheMinExpire 0

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheMinExpire 3600

The "CacheMinExpire" on page 278 directive specifies the minimum number of seconds for which cachable HTTP documents will be retained without checking the origin server. This is only used if no valid expire time was supplied with the document.

CacheQuickHandler

Module: mod_cache

Syntax: CacheQuickHandler *on | off*

Default: CacheQuickHandler *on*

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheQuickHandler on

The CacheQuickHandler directive controls the phase in which the cache is handled.

Parameter: *on | off*

- If *on* is specified (the default) , the cache operates within the quick handler phase. This phase short circuits the majority of server processing, and represents the most performant mode of operation for a typical server. The cache bolts onto the front of the server, and the majority of server processing is avoided.
- If *off* is specified, the cache operates as a normal handler, and is subject to the full set of phases when handling a server request. While this mode is slower than the default, it allows the cache to be used in cases where full processing is required, such as when content is subject to authorization.

Example 1

```
# Run cache as a normal handler
CacheQuickHandler off
```

It is also possible, when the quick handler is disabled, for the administrator to choose the precise location within the filter chain where caching is to be performed, by adding the CACHE filter to the chain.

Example 2

```
# Cache content before mod_include and mod_deflate
CacheQuickHandler off
AddOutputFilterByType CACHE;INCLUDES;DEFLATE text/html
```

If the CACHE filter is specified more than once, the last instance will apply.

CacheStaleOnError

Module: mod_cache

Syntax: CacheStaleOnError *on | off*

Default: CacheStaleOnError *on*

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheStaleOnError *on*

When the "CacheStaleOnError" on page 279 directive is switched on, and when stale data is available in the cache, the cache will respond to 5xx responses from the backend by returning the stale data instead of the 5xx response. While the Cache-Control headers sent by clients will be respected, and the raw 5xx responses returned to the client on request, the 5xx response so returned to the client will not invalidate the content in the cache.

Example

```
# Serve stale data on error.
CacheStaleOnError on
```

CacheStoreExpired

Module: mod_cache

Syntax: CacheStoreExpired *on | off*

Default: CacheStoreExpired Off

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheStoreExpired On

By default, responses which have already expired are not stored in the cache. The "CacheStoreExpired" on page 280 directive allows this behavior to be overridden. *CacheStoreExpired* On tells the server to attempt to cache the resource if it is stale. Subsequent requests would trigger an If-Modified-Since request of the origin server, and the response may be fulfilled from cache if the backend resource has not changed.

CacheStoreNoStore

Module: mod_cache

Syntax: CacheStoreNoStore *on | off*

Default: CacheStoreNoStore Off

Context: server config, Virtual Host, directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheStoreNoStore On

Attempt to cache requests or responses that have been marked as no-store. Ordinarily, requests or responses with Cache-Control: no-store header values will not be stored in the cache. The CacheStoreNoCache directive allows this behavior to be overridden. CacheStoreNoCache On tells the server to attempt to cache the resource even if it contains no-store header values. Resources requiring authorization will never be cached.

CAUTION: As described in RFC 2616, the no-store directive is intended to "prevent the inadvertent release or retention of sensitive information (for example, on backup tapes)." Enabling this option could store sensitive information in the cache. You are hereby warned.

CacheStorePrivate

Module: mod_cache

Syntax: CacheStorePrivate *on | off*

Default: CacheStorePrivate Off

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheStorePrivate On

Ordinarily, responses with Cache-Control: private header values will not be stored in the cache. The CacheStorePrivate directive allows this behavior to be overridden. CacheStorePrivate On tells the server to attempt to cache the resource even if it contains private header values. Resources requiring authorization will never be cached.

CAUTION: This directive will allow caching even if the upstream server has requested that the resource not be cached. This directive is only ideal for a private cache.

CacheTimeMargin

Module: mod_cache

Syntax: CacheTimeMargin *period*

Default: CacheTimeMargin 120

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule cache_disk module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheTimeMargin 300

The CacheTimeMargin directive specifies the minimum number of seconds remaining prior to data expiration, as indicated in the expires response header, in order for data to be cached by the server using the disk cache function. If the disk cache function is disabled (see CacheRoot), this setting has no affect.

Parameter: *period*

- The *period* parameter specifies the minimum time margin for cache update requests (in seconds).

  The server calculates cache time margins (or periods) for cache update requests by subtracting the current system time from the computed expiry time. Data for cache update requests that produce cache time margins, that are less than the specified minimum time margin is not cached by the server.

Notes for local proxy cache:

The disk cache function uses CacheDefaultExpire, CacheLastModifiedFactor, and CacheMaxExpire directives which may produce cache time margins that are less than the minimum time margin specified by the CacheTimeMargin directive. In this case, the CacheTimeMargin directive will also be used to determine if the file will be cached. See the CacheRoot directive for more information on how the disk cache function is used to support a local proxy cache.

Example

```
ProxyRequests on
CacheRoot proxyCache
CacheTimeMargin 120
```

In this example, if cacheable HTTP proxy response data is available, the data will be served (by proxy), but it will not be cached for subsequent proxy requests if set to expire in less than 120 seconds (CacheTimeMargin 120). If the HTTP proxy response data is set to expire in more than two minutes, the data will be served (by proxy) and will also be cached for subsequent proxy requests.

Module mod_cache_disk

Directives

- "CacheReadSize" on page 282
- "CacheReadTime" on page 282
- "CacheDirLevels" on page 283
- "CacheMaxFileSize" on page 284
- "CacheMinFileSize" on page 285

CacheReadSize

Module: mod_cache_disk

Syntax: CacheReadSize *bytes*

Default: CacheReadSize *0*

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
cache_disk_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheReadSize 102400

The "CacheReadSize" on page 282 directive sets the minimum amount of data, in bytes, to be read from the backend before the data is sent to the client. The default of zero causes all data read of any size to be passed downstream to the client immediately as it arrives. Setting this to a higher value causes the disk cache to buffer at least this amount before sending the result to the client. This can improve performance when caching content from a reverse proxy.

This directive only takes effect when the data is being saved to the cache, as opposed to data being served from the cache.

CacheReadTime

Module: mod_cache_disk

Syntax: CacheReadTime *milliseconds*

Default: CacheReadTime *0*

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
cache_disk_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheReadTime 1000

The "CacheReadTime" on page 282 directive sets the minimum amount of elapsed time that should pass before making an attempt to send data downstream to the client. During the time period, data will be buffered before sending the result to the client. This can improve performance when caching content from a reverse proxy.

The default of zero disables this option.

This directive only takes effect when the data is being saved to the cache, as opposed to data being served from the cache. It is recommended that this option be used alongside the "CacheReadSize" on page 282 directive to ensure that the server does not buffer excessively should data arrive faster than expected.

CacheDirLevels

Module: mod_cache_disk

Syntax: CacheDirLevels *levels*

Default: CacheDirLevels *2*

Context: server, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_disk_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheDirLevels 3

The "CacheDirLevels" on page 283 directive specifies the number of directory levels used by the disk cache function to store data.

Parameter One:*levels*

The levels parameter accepts an integer value between 1 and 20 to specify the number of directory levels used by the disk cache function. The specified value multiplied by the value specified for the CacheDirLength directive must be less than or equal to 20.

A hash algorithm is used to generate unique and seemingly random character strings from hash keys (or URLs) provided for data stored in cache. These character strings are used to build unique file system path names. Data is stored in the file system using these path names, relative to the directory root specified by the CacheRoot directive. This setting specifies how many directory levels are used, while the CacheDirLength directives specifies the length of each subdirectory name, with remaining characters simply used for file names. The server uses the hash algorithm and directory levels to improve the performance of the server when working with potentially large numbers data files.

See the CacheRoot directive for more information on the disk cache function.

Example 1:

```
          CacheRoot /QOpenSys/QIBM/UserData/HTTPA/CacheRoot/MyCache
          CacheDirLevels 3
          CacheDirLength 1
```

This example (example 1) indicates that a hash key such as ftp://ibm.com/document.html may be used to build a directory path such as /x/3/_/9sj4t2svBA where x, 3, and _ are three subdirectory names (CacheDirLevels 3) each having a length of one character (CacheDirLength 1). The remaining characters, 9sj4t2svBA, are used for file names.

Example 2:

```
CacheRoot /QOpenSys/QIBM/UserData/HTTPA/CacheRoot/MyCache
CacheDirLevels 5
CacheDirLength 2
```

This example (example 2) indicates that the same hash key described for example 1 ("ftp://ibm.com/document.html") may be used to build a directory path such as /x3/_9/sj/4t/2s/vBA where x3, _9, sj, 4t, and 2s are five subdirectory names (CacheDirLevels 5) each having a length of two characters (CacheDirLength 2).The remaining characters, vBA , are used for file names.

Directory paths generated in this process are made relative to the directory root defined by the CacheRoot directive. Therefore, for example 1 (above), two files, one named 9sj4t2svBA.data and the other named 9sj4t2svBA.header will be created to store data using the hash key ftp://ibm.com/document.html. Both files will reside within the /QOpenSys/QIBM/UserData/HTTPA/CacheRoot/MyCache/x/3/_ directory. For example 2 (above), the two files will be named vBA.data and vBA.header and will reside within the /QOpenSys/QIBM/UserData/HTTPA/CacheRoot/MyCache/x3/_9/sj/4t/2s directory using the same hash key.

Directory length and level limits:

Since this process generates an exponential number of directories using this schema, a limit is set upon the values that may be specified for the CacheDirLevels and CacheDirLength directives. The limit is described as such:

CacheDirLevels * CacheDirLength <= 20

In other words, the maximum number of directory levels multiplied by the maximum length of each subdirectory name must be less than or equal to 20. If not, the server will fail to activate at startup.

A high value for CacheDirLevels combined with a low value for CacheDirLength will result in a relatively deep hierarchy, with a small number of subdirectories at each level.

If the values specified for the CacheDirLevels and CacheDirLength directives are changed once they have been used to cache data, the server will discard all existing cache data when it runs disk cache maintenance since the file paths used to store data no longer adhere to the new values. See the CacheGcDaily or CacheGcInterval directives for more details on disk cache maintenance.

The following conditions will negate this directive:

CacheRoot is not specified

Note: The HTTP Server does not support inheritance for the CacheDirLevels directive.

CacheMaxFileSize

Module: mod_cache_disk

Syntax: CacheMaxFileSize *size*

Default: none

Context: server, virtual host, directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule cache_disk_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheMaxFileSize 4000000

The "CacheMaxFileSize" on page 284 directive specifies the maximum amount of data that may be stored in the proxy disk cache for a single URL, in bytes. This setting effectively placing a maximum data size limit on individual cache entries. If the disk cache function is disabled (see CacheRoot), this setting has no affect.

Notes for local proxy cache:

When the disk cache function is used to support a local proxy cache, this setting places a maximum data size limit on HTTP proxy responses which remain in the cache after cache maintenance has run. See the CacheGCDaily and the CacheGCInterval directives for more information on how the disk cache maintenance function is used to support a local proxy cache.

Example: :

```
            ProxyRequests  on
            CacheOn on
            CacheRoot  proxyCache
            CacheMaxFileSize  5000000
            CacheMinFileSize  400000
```

For this example, if 7.2 megabytes of cacheable HTTP proxy response data is available for a single proxy request, the data will be served (by proxy), and cached for subsequent proxy requests, but will be removed during the next cache maintenance cycle since it is larger than the 5000000 byte maximum data size limit imposed by CacheMaxFileSize. A 3.8 megabyte HTTP proxy response will be cached for subsequent proxy requests and will remain in the cache after the cache maintenance cycle has run, since it is smaller than the 5000000 byte maximum data size limit and larger than the 400000 byte minimum data size limit (set by CacheMinFileSize).

CacheMinFileSize

Module: mod_cache_disk

Syntax: CacheMinFileSize *size*

Default: CacheMinFileSize 1

Context: Server, Virtual Host, directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule cache_disk_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheMinFileSize 40

The CacheMinFileSize directive specifies the minimum amount of data that may be stored in the proxy disk cache for a single URL, in bytes. This setting effectively placing a minimum data size limit on individual cache entries. If the disk cache function is disabled (see CacheRoot), this setting has no affect.

Parameter: *size*

- The *size* parameter accepts a value between 0 and 2147483647 to specify the minimum number of bytes allowed for cache data entries.

A maximum document size limits specified using CacheMaxFileSize.

Notes for local proxy cache:

When the disk cache function is used to support a local proxy cache, this setting places a minimum data size limit on HTTP proxy responses which remain in the cache after cache maintenance has run. See CachGcDaily and CacheGcInterval directives for more details on the how the disk cache maintenance function is used to support a local proxy cache.

Example

```
ProxyRequests on
CacheRoot proxyCache
CacheMaxFileSize 5000000
CacheMinFileSize 400000
```

For this example, if 240 kilobytes of cacheable HTTP proxy response data is available for a single proxy request, but will be removed during the next cache maintenance cycle since it is less than the 400000 byte minimum data size limit imposed by CacheMinFileSize. A 2.7 megabyte HTTP proxy response may be cached for subsequent proxy requests and will remain in the cache after the cache maintenance cycle has run since it is larger than the 400000 byte minimum data size limit and smaller than the 5000000 byte maximum data size limit (set by CacheMaxFileSize).

Module mod_cgi

Module mod_cgi supports directives for the IBM HTTP Server for i Web server.

Summary

The module mod_cgi provides for execution of CGI scripts. Any file that has the handler cgi-script will be treated as a CGI script, and run by the server, with its output being returned to the client. Files acquire this type either by having a name containing an extension defined by the "AddHandler" on page 493 directive, or by being in a "ScriptAlias" on page 222 directory.

When the server invokes a CGI script, it will add a variable called DOCUMENT_ROOT to the environment. This variable will contain the value of the "DocumentRoot " on page 313 configuration variable.

For backward-compatibility, the cgi-script handler will also be activated for any file with the mime-type application/x-httpd-cgi. The use of the magic mime-type is deprecated.

CGI Environment variables

The server will set the CGI environment variables as described in the CGI specification with the following provisions. See "Environment variables set by HTTP Server" on page 634 for a list of environment variables.

REMOTE_HOST
This will only be set if "HostNameLookups " on page 325 is set to *double* (it is *off* by default), and if a reverse DNS lookup of the accessing hosts address indeed finds a host name.

REMOTE_IDENT
This will only be set if "IdentityCheck" on page 607 is set to *on* and the accessing host supports the ident protocol.

Note: The contents of this variable cannot be relied upon because it can easily be faked. If there is a proxy between the client and the server, the variable is not useful.

REMOTE_USER
This will only be set if the CGI script is subject to authentication.

This module also leverages the core functions ap_add_common_vars and ap_add_cgi_vars to add environment variables like:

DOCUMENT_ROOT
Set with the content of the related "DocumentRoot " on page 313 directive.

SERVER_NAME
The fully qualified domain name related to the request.

SERVER_ADDR
The IP address of the Virtual Host serving the request.

SERVER_ADMIN
Set with the content of the related "ServerAdmin " on page 354 directive.

For an exhaustive list it is suggested to write a basic CGI script that dumps all the environment variables passed by HTTP Server in a convenient format.

CGI Debug

Debugging CGI scripts has traditionally been difficult, mainly because it has not been possible to study the output (standard output and error) for scripts which are failing to run properly. However, the HTTP Server runs CGI programs in previously started jobs (not prestart jobs) and it also reuses these jobs to run many CGI program invocations. Therefore, debugging your CGI program is simple. You simply need to find the job that runs CGI programs. It will have a jobname the same as the server instance name. The joblog will contain either HTP2001 or HTP2002 indicating whether it is a CGI single threaded only job, or a CGI multi-thread capable job. If you use a dedicated server instance, when you invoke your CGI from a browser, the first job in the WRKACTJOB list for CGI, will be the job chosen to run the CGI request. Therefore, you can use STRSRVJOB against this job and STRDBG against your CGI program. From here, you have full debug capabilities provided with the IBM i debugger. You can also use standard error (stderr) for debug information. The debug information written to STDERR is written to the ScriptLog if one is configured or to the ErrorLog if a ScriptLog is not configured. The ScriptLog and ErrorLog are both created with CCSID 1208 UTF-8. For CGI conversion mode EBCDIC, debug information is assumed to be in the CCSID of the CGI job. The logging process handles the conversion from CGI job CCSID to UTF-8. For CGI converison mode BINARY, debug information is written as is.

ScriptLog Format

When configured, the ScriptLog logs any CGI that does not execute properly. Each CGI script that fails to operate causes several lines of information to be logged. The first two lines are always of the format:

```
%% [time] request-line
%% HTTP-status CGI-script-filename
```

If the error is that CGI script cannot be run, the log file will contain an extra two lines:

```
%%error
error-message
```

Alternatively, if the error is the result of the script returning incorrect header information (often due to a bug in the script), the following information is logged:

```
%request
All HTTP request headers received
POST or PUT entity (if any)
%response
All headers output by the CGI script
%stdout
CGI standard output
%stderr
CGI standard error
```

Note: The `%stdout` and `%stderr` parts may be missing if the script did not output anything on standard output or standard error

Directives

- "CGIConvMode" on page 288
- "CgiInitialUrl" on page 290

- "CGIJobCCSID" on page 291
- "CGIJobLocale" on page 292
- "CGIMultiThreaded" on page 293
- "CGIRecyclePersist" on page 293
- "MaxCGIJobs" on page 294
- "MaxPersistentCGI" on page 294
- "MaxPersistentCGITimeout" on page 295
- "MaxThreadedCGIJobs" on page 295
- "PersistentCGITimeout" on page 295
- "ScriptLog" on page 296
- "ScriptLogBuffer" on page 296
- "ScriptLogLength" on page 297
- "StartCGI" on page 297
- "StartThreadedCGI" on page 298
- "ThreadedCgiInitialUrl" on page 299
- "UseUserJobdLibraryList" on page 299

CGIConvMode

Module: mod_cgi

Syntax: CGIConvMode *mode*

Default: CGIConvMode EBCDIC

Context: server config, virtual host, directory, .htaccess, Not in Limit

Override: FileInfo

Origin: IBM

Example: CGIConvMode BINARY

The CGIConvMode directive is used to specify the conversion mode that your server will use when processing CGI programs.

Parameter: *mode*

- Valid modes include the following:

Table 17. Valid conversion modes

Mode	Description
EBCDIC	The server converts everything into the EBCDIC CCSID of the CGI job. If the directive CGIJobCCSID exists, it has precedence in its context over the job CCSID of the server. The server assumes the header output and encoded characters "%xx" are in the EBCDIC CCSID of the CGI job. The server assumes that the body output is in the EBCDIC CCSID of the CGI job unless specified otherwise using the Content-type header.
EBCDIC_JCD	The server will use the Japanese Codepage Detection utility to determine which Japanese ASCII CCSID to convert from. Otherwise, this option is the same as the EBCDIC option.

Table 17. Valid conversion modes (continued)

Mode	Description
BINARY	The server performs no conversion on QUERY_STRING or STDIN data. Environment variables are encoded in the CGI job's EBCDIC CCSID. The server expects the header output and encoded characters "%xx" in ASCII. The server assumes that the body output is in ASCII unless specified otherwise using the Content-type header. This differs from no parse header CGI in that the server will still build the HTTP headers and perform conversion on the body output if necessary.

- The following modes are used for compatibility with IBM HTTP Server (original).

Table 18. Legacy conversion modes

Mode	Description
%%MIXED/MIXED%%	The server converts CGI environment variables to EBCDIC CCSID 37, including QUERY_STRING. The server converts STDIN data to the CCSID of the server job. However, the encoded characters "%xx" are still represented by the EBCDIC 37 representation of the ASCII 819 octet. The server expects the header output to be in EBCDIC CCSID 37. However, the encoded characters "%xx" must be represented by the EBCDIC 37 representation of the ASCII 819 octet. The server assumes that the body output is in the default CCSID of the server job unless specified otherwise using the Content-type header. The header most affected by this value is the location header (for example, to send a plus sign '+' in the location header you would send %).
%%EBCDIC/MIXED%%	The server converts everything into the EBCDIC CCSID of the job. In addition, the server converts escaped octets from ASCII to EBCDIC. The server expects the header output to be in EBCDIC CCSID 37. However, the encoded characters "%xx" must be represented by the EBCDIC 37 representation of the ASCII 819 octet. The server assumes that the body output is in the default CCSID of the server job unless specified otherwise using the Content-type header. The header most affected by this value is the location header (for example, to send a plus sign '+' in the location header you would send %).
%%BINARY/MIXED%%	The server converts environment variables into the EBCDIC CCSID of the job, but performs no conversions on either QUERY_STRING or STDIN data. The server expects the header output to be in EBCDIC CCSID 37. However, the encoded characters "%xx" must be represented by the EBCDIC 37 representation of the ASCII 819 octet. The server assumes that the body output is in the default CCSID of the server job unless specified otherwise using the Content-type header. The header most affected by this value is the location header (for example, to send a plus sign '+' in the location header you would send %).
%%EBCDIC_JCD/ MIXED%%	The server uses the Japanese Codepage Detection utility to determine which Japanese CCSID to convert from. Otherwise, this option is the same as the %%EBCDIC/MIXED%% option.

Table 18. Legacy conversion modes (continued)

Mode	Description
%%EBCDIC/EBCDIC%%	The server converts everything into the EBCDIC CCSID of the job. In addition, the server converts escaped octets from ASCII to EBCDIC. The server expects the header output and encoded characters "%xx" to be in EBCDIC CCSID 37. The server assumes that the body output is in the default CCSID of the server job unless specified otherwise using the Content-type header. The header most affected by this value is the location header (for example, to send a plus sign '+' in the location header you would send %).
%%BINARY/BINARY%%	The server converts environment variables into the EBCDIC CCSID of the job, but performs no conversions on either QUERY_STRING or STDIN data. The server expects the header output and encoded characters "%xx" to be in ASCII 819. The server assumes that the body output is in ASCII 819 unless specified otherwise using the Content-type header. The header most affected by this value is the location header (for example, to send a plus sign '+' in the location header you would send %).
%%BINARY/EBCDIC%%	The server converts environment variables into the EBCDIC CCSID of the job, but performs no conversions on either QUERY_STRING or STDIN data. The server expects the header output and the encoded characters "%xx" to be in EBCDIC CCSID 37. The server assumes that the body output is in the default CCSID of the server job unless specified otherwise using the Content-type header.
%%EBCDIC_JCD/ EBCDIC%%	The server uses the Japanese Codepage Detection utility to determine which Japanese CCSID to convert from. Otherwise, this option is the same as the %%EBCDIC/EBCDIC%% option.

CgiInitialUrl

Module: mod_cgi

Syntax: CgiInitialUrl *url userid*

Default: none

Context: server config

Override: none

Origin: IBM

Example: CgiInitialUrl /qsys.lib/qsyscgi.lib/db2www.pgm/mymacros/macro.ndm/initial *

Example: CgiInitialUrl /qsys.lib/cgi.lib/mycgi.pgm QTMHHTP1

Example: CgiInitialUrl /QOpenSys/mypacedir/pacecgi USER1

Example: CgiInitialUrl /qsys.lib/cgi.lib/mycgi.pgm?init=yes

Example: /IASP1/qsys.lib/cgi.lib/mycgi.pgm USER2

This directive is used to load and initialize CGI programs when the server starts. At server startup, when we are processing the StartCgi directive, we are starting jobs to run CGI programs in. This new directive will enable the server to run a CGI request to the CGI job enabling the CGI program to be loaded and initialized. This is beneficial for Net.Data users and other CGI programs built to use "named" activation groups. The initialization of the "named" activation group is a performance issue that the first user of the CGI job has to endure. This function will enable the performance issue to be moved to when the server starts, so the first user does not have to pay the performance penalty.

If there are no StartCgi directives, an error will be posted and the server will not start.

Parameter One: *url*

- The *url* parameter value is actually the physical path URL, not the logical path URL. It should not be fully qualified (do not use `http://system:port/`). It must start with a / and contains the physical path to the CGI program and any path info needed by the CGI program, including query-string. If a URL is specified that is not valid, the server will not start.

Parameter Two: *userid*

- The *userid* parameter value is either a valid IBM i userid or `*` where `*` means all of the userids specified on the StartCgi directive. To check for valid values, follow the rules for IBM i user profiles. The userid is optional.

CGIJobCCSID

Module: mod_cgi

Syntax: CGIJobCCSID *cgi-job-character-set-identification-number*

Default: CGIJobCCSID *Dependent upon server-character-set-identification-number*

Context: server config, virtual host, directory, not in limit, .htaccess

Override: none

Origin: IBM

Example: CGIJobCCSID 37

Example: To run one CGI program in CCSID 37 (English):

```
ScriptAlias /cgi-english/ /QSYS.LIB/ENGLISH.LIB/
<Directory  /QSYS.LIB/ENGLISH.LIB/>
   Allow From all
   Options +ExecCGI
   DefaultNetCCSID 819
   CGIJobCCSID  37
  CGIConvMode EBCDIC
</Directory>
```

Example: To run a different CGI program in CCSID 284 (Spanish):

```
ScriptAlias /cgi-spanish/ /QSYS.LIB/SPANISH.LIB/
<Directory /QSYS.LIB/SPANISH.LIB/>
   Allow From all
   Options +ExecCGI
   DefaultNetCCSID 819
   CGIJobCCSID  284
   CGIConvMode EBCDIC
</Directory>
```

Example: For GET and POST – Use the URI to determine the language of the user:

```
Enter: http://www.mydomain.com/cgi-bin/ENG/819/...
The configuration file would have this container configuration:
<Location  /cgi-bin/ENG/819/>
   DefaultNetCCSID 819
   CGIJobCCSID  37
</Location>
ScriptAlias /cgi-bin/ /QSYS.LIB/CGI.LIB/
<Directory  /QSYS.LIB/CGI.LIB/>
    Allow From all
    Options +ExecCGI
    CGIConvMode EBCDIC
</Directory>

The same configuration can handle this URI for a Japanese speaking user.
Enter: http://www.mydomain.com/cgi-bin/JAP/942/

The configuration file would also have this container configuration:
<Location /cgi-bin/JAP/942/>
    DefaultNetCCSID 942
    CGIJobCCSID  5035
    CGIConvMode EBCDIC_JCD
</Location>
ScriptAlias /cgi-bin/ /QSYS.LIB/CGI.LIB/
<Directory /QSYS.LIB/CGI.LIB/>
    Allow From all
       Options +ExecCGI
       CGIConvMode EBCDIC
</Directory>
```

The CGIJobCCSID directive specifies the CCSID under which CGI jobs run, the CGI job character set environment, and the EBCDIC CCSID that is used when the server converts:

- Input request data for user CGI programs
- Output response data from user CGI programs to be sent back to the requester (client browser)

If this directive is not specified, the default behavior is to have the CGI job run under the same CCSID as the main server jobs. See the DefaultFsCCSID directive for detailed information on how this is determined.

CGIJobLocale

Module: mod_cgi

Syntax: CGILocale *locale_path_name*

Default: none

Context: server config, virtual host, directory, not in limit, .htaccess

Override: none

Origin: IBM

Example: CGIJobLocale /QSYS.LIB/LOCALELIB.LIB/EN_US.LOCALE

Example: To run one CGI program in CCSID 37 with an English based locale (English):

```
ScriptAlias /cgi-english/ /QSYS.LIB/ENGLISH.LIB/

<Directory /QSYS.LIB/ENGLISH.LIB/>
   Allow From all
   Options +ExecCGI
   DefaultNetCCSID 819
   CGIJobCCSID  37
           CGIJobLocale /QSYS.LIB/LOCALELIB.LIB/EN_US.LOCALE
  CGIConvMode EBCDIC
</Directory>
```

Example: To run a different CGI program in CCSID 273 and with a German based locale (German):

```
ScriptAlias /cgi-german/ /QSYS.LIB/GERMAN.LIB/
<Directory /QSYS.LIB/GERMAN.LIB/>
   Allow From all
   Options +ExecCGI
   DefaultNetCCSID 819
   CGIJobCCSID  273
           CGIJobLocale /QSYS.LIB/LOCALELIB.LIB/DE_DE.LOCALE
  CGIConvMode EBCDIC
</Directory>
```

Applications can be created independent of language, cultural data, or specific characters. Locales can be accessed to provide this type of support to any integrated language environment-based application. The CGIJobLocale directive allows a locale to be set globally or for a specific CGI job. After the locale is set, region specific information such as date or time format can be accessed. Some ILE C/C++ run time functions such as `ctime()` and `localtime()` are locale sensitive. The environment variable CGI_JOB_LOCALE is set from the CGIJobLocale directive.

CGIMultiThreaded

Module: mod_cgi

Syntax: CGIMultiThreaded *on | off*

Default: CGIMultiThreaded off

Context: server config, virtual host, directory, .htaccess, Not in Limit

Override: FileInfo

Origin: IBM

Example: CGIMultiThreaded on

Parameter: *on | off*

- The *on* value indicates that your CGI programs will be run in a job that is multiple thread capable.
- The *off* value indicates that your CGI programs will not be run in a job that is multiple thread capable.

The CGIMultiThreaded directive is used to specify whether your CGI programs should be run in a job that is multiple thread capable. HTTP Server uses a pool of pre-started jobs for handling CGI requests. Multiple threaded programs must run in a multiple thread-capable job. The job pool that the job runs in is specified at job startup time. Once the job has started, it cannot be changed to another job pool. Not all IBM i APIs are thread safe, some will issue an error if used in a multiple thread-capable job. This happens even if the program does not actually have multiple threads running. Because of this, HTTP Server must default to non-multiple thread capable jobs for CGI programs for compatibility reasons. If your CGI program uses multiple threads, it must run in a multiple thread capable job. If your CGI does not need multiple threads, you should run it in the single threaded CGI job for performance reasons.

CGIRecyclePersist

Module: mod_cgi

Syntax: CGIRecyclePersist *on | off*

Default: CGIRecyclePersist off

Context: server config, virtual host, directory, .htaccess, Not in Limit

Override: FileInfo

Origin: IBM

Example: CGIRecyclePersist on

The CGIRecyclePersist directive instructs the server what should be done with the job that was being used by a persistent CGI when the persistent CGI exits persistence normally.

Parameter: *on | off*

- The *on* value indicates that the server can reuse this job for other CGI requests. When this is used, the persistent CGI program is responsible for cleaning up any static data from the persistent CGI transaction. The server will not perform any action other than to remove all environment variables, to clean up any static data. Before using this setting, the CGI programmer need to verify that it does indeed clean up its static data.
- The *off* value indicates that the server will not reuse this job for other CGI requests. This is the default behavior.

MaxCGIJobs

Module: mod_cgi

Syntax: MaxCGIJobs *number*

Default: Value used for the ThreadsPerChild directive

Context: server config

Override: none

Origin: IBM

Example: MaxCGIJobs 50

The MaxCGIJobs directive is used to set the maximum number of CGI jobs that the server will concurrently use. The server will only run CGI programs in jobs where the user profile for the CGI job matches the user profile that the request is to run under. If you protect your CGI programs with many different dummy IBM i profiles (profiles with no password) or use %%CLIENT%% (each user has their own IBM i profile and it is used to run the CGI program), then you may want to use this directive to allow the server to start more CGI jobs to handle the CGI programs. The server does reuse the CGI jobs, but only when the profile for the CGI program matches the profile for the CGI job. If you see the server ending and starting CGI jobs regularly, then you may want to use this directive to allow the server to use more CGI jobs. This would improve the capacity and performance of your system and server.

Parameter: *number*

- The *number* parameter accepts any positive number. If an invalid value is used, or the number is smaller than the value used for the ThreadsPerChild directive, then the server will use the value used for the ThreadsPerChild directive.

MaxPersistentCGI

Module: mod_cgi

Syntax: MaxPersistentCGI *number*

Default: Value used for the ThreadsPerChild directive

Context: server config

Override: none

Origin: IBM

Example: MaxPersistentCGI 50

The MaxPersistentCGI directive is used to set the maximum number of active persistent CGI jobs that you want to have active at one time.

Parameter: *number*

- The *number* parameter sets the maximum number of active persistent CGI jobs that are active at any one time.

MaxPersistentCGITimeout

Module: mod_cgi

Syntax: MaxPersistentCGITimeout *number*

Default: MaxPersistentCGITimeout 1200

Context: server config

Override: none

Origin: IBM

Example: MaxPersistentCGITimeout 1800

The MaxPersistentCGITimeout directive specifies the maximum number of seconds that a CGI program can use when overriding the PersistentCGITimeout directive.

Parameter: *number*

- The *number* parameter value must be greater than 1 second.

MaxThreadedCGIJobs

Module: mod_cgi

Syntax: MaxThreadedCGIJobs *number*

Default: Value used for the ThreadsPerChild directive

Context: server config

Override: none

Origin: IBM

Example: MaxThreadedCGIJobs 50

The MaxThreadedCGIJobs directive is used to set the maximum number of multiple thread capable CGI jobs that the server will concurrently use. The server will only run multiple thread capable CGI programs in jobs where the user profile for the multiple thread capable CGI job matches the user profile that the request is to run under. If you protect your multiple thread capable CGI programs with many different dummy IBM i profiles (profiles with no password) or use %%CLIENT%% (each user has their own IBM i profile and it is used to run the multiple thread capable CGI program), then you may want to use this directive to allow the server to start more multiple thread capable CGI jobs to handle the multiple thread capable CGI programs. The server does reuse the CGI jobs, but only when the profile for the multiple thread capable CGI program matches the profile for the multiple thread capable CGI job. If you see the server ending and starting multiple thread capable CGI jobs regularly, then you may want to use this directive to allow the server to use more multiple thread capable CGI jobs. This would improve the capacity and performance of your system and server.

Parameter: *number*

- The *number* parameter value can be any positive number. If an invalid value is used, or the number is smaller than the value used for the ThreadsPerChild directive, then the server will use the value used for the ThreadsPerChild directive.

PersistentCGITimeout

Module: mod_cgi

Syntax: PersistentCGITimeout *number*

Default: PersistentCGITimeout 300

Context: server config

Override: none

Origin: IBM

Example: PersistentCGITimeout 120

This directive specifies the number of seconds that your server waits for a client response before ending a persistent CGI session. The CGI program can override the value that you specify on a request-by-request basis.

Parameter: *number*

- The *number* parameter can be any amount of time greater than 1 second.

ScriptLog

Module: mod_cgi

Syntax: ScriptLog *filename*

Default: none

Context: server config

Override: none

Origin: Modified

Example: ScriptLog /QIBM/userdata/httpa/(instance name)

The ScriptLog directive sets the Common Gateway Interface (CGI) script error logfile. If no ScriptLog is given, no CGI error log is created. If a ScriptLog is given, any CGI errors are logged into the filename given as the argument. If this is a relative file or path, it is taken relative to the server root.

This log will be opened as the user the child processes run as, for example the user specified in the main User directive. This means that either the directory the script log is in needs to be writable by that user or the file needs to be manually created and set to be writable by that user. If you place the script log in your main logs directory, do not change the directory permissions to make it writable by the user the child processes run as.

Note: The script logging is meant to be a debugging feature when writing CGI scripts, and is not meant to be activated continuously on running servers. It is not optimized for speed or efficiency, and may have security problems if used in a manner other than that for which it was designed.

Behavior

If the filename does not begin with a slash ('/') then it is assumed to be relative to the ServerRoot.

If the path ends with a '/' character, then the path is considered to be the directory that will contain the log file.

The ScriptLog file will be created with CCSID 1208 (UTF8). Customer data written to the script log is assumed to be in the CGI job CCSID and will automatically be converted to CCSID 1208. The data will be written to the log file in binary. Therefore, the customer's data will be written to the ScriptLog without conversion. Information from the CGI request will not need to be translated, as the data will already be in the defaultFSCCSID.

ScriptLogBuffer

Module: mod_cgi

Syntax: ScriptLogBuffer *size*

Default: ScriptLogBuffer 1024

Context: server config

Override: none

Origin: Apache

Example: ScriptLogBuffer 512

The ScriptLogBuffer directive limits the size of any PUT or POST entity body that is logged to the file. This prevents the log file from growing too big too quickly (the case if large bodies are being received).

Parameter: *size*

- The *size* parameter is measured in bytes and consists of any positive integer. By default, up to 1024 bytes are logged, but the value can be changed with this directive.

ScriptLogLength

Module: mod_cgi

Syntax: ScriptLogLength *size*

Default: ScriptLogLength 10385760

Context: server config

Override: none

Origin: IBM

Example: ScriptLogLength 1024000

The ScriptLogLength directive can be used to limit the size in bytes of the Common Gateway Interface (CGI) script log file. Since the log file logs a significant amount of information per CGI error (all request headers, all script output) it can grow to be quite large. To prevent problems due to unbounded growth, this directive can be used to set a maximum file-size for the CGI logfile. If the file exceeds this size, no more information will be written to it.

Parameter: *size*

- The *size* parameter is measured in bytes. This is any positive number.

StartCGI

Module: mod_cgi

Syntax: StartCGI *number userid IASP*

Default: none

Context: server config

Override: none

Origin: IBM

Example:

StartCGI 5 USER1

StartCGI 8 QTMHHTP1 IASP1

The StartCGI directive specifies the number of CGI jobs that are spawned by the server when it starts up, the IBM i user profile to use in these jobs. This allows you to have the server prestart CGI jobs when the server starts so the users do not incur the performance hit of starting a new job. It also allows you to start up jobs for different user profiles. The userid is optional and should only be used to protect your CGI programs so that they run under the %%CLIENT%% profile or under a dummy IBM i profile (a profile with no password). The IASP is optional and should only be used when your CGI programs are in IASP rather than in the system ASP.

The cumulative number from all occurrences of this directive cannot exceed MaxCGIJobs, if it does, the server will not start. If the user profile parameter is not specified, the default server profile (QTMHHTP1) or the value from the global ServerUserID directive is used. If the third IASP parameter is specified, the second userid parameter must be also explicitly specified even using the default QTMHHTP1.

If you are using %%CLIENT%% as the profile in the protection of the CGI programs (meaning that each user authenticates with an IBM i user profile), then it should be noted that %%CLIENT%% is not a valid value on this directive. Using IBM i profiles like this should only be done in an intranet or highly secure server because you would not want to give just anyone an IBM i user profile. Therefore, you would know how many users and also their user profile name, thus you would need to decide how many users will be doing CGI requests and how many concurrent CGI requests you want each user to be able to do. Then you could specify multiple StartCGI directives, one for each user, specifying the number of concurrent CGI requests you expect that user to do.

Note: This will NOT limit the number of concurrent CGI requests. This will simply allow CGI jobs to be started at server startup time so the user does not have to incur the performance hit of starting up a new job when they run their first CGI program.

StartThreadedCGI

Module: mod_cgi

Syntax: StartThreadedCGI *number userid IASP*

Default: none

Context: server config

Override: none

Origin: IBM

Example: StartThreadedCGI 3

Example: StartThreadedCGI 5 USER1

Example: StartThreadedCGI 8 QTMHHTP1 IASP1

The Start ThreadedCGI directive specifies the number of multiple thread capable CGI jobs that are spawned by the server when it starts up, the IBM i user profile and the IASP name to use in these jobs. This allows you to have the server prestart CGI jobs when the server starts so the users do not incur the performance hit of starting a new job. It also allows you to start up jobs for different user profiles and IASPs. The userid is optional and should only be used to protect your multiple thread capable CGI programs so that they run under the %%CLIENT%% profile or under a dummy iSeries profile (a profile with no password). The IASP is optional and should only be used when your CGI programs are in IASP rather than in the system ASP.

The cumulative number from all occurrences of this directive cannot exceed MaxThreadedCGIJobs, if it does, the server will not start. If the user profile parameter is not specified, the default server profile (QTMHHTP1) or the value from the global ServerUserID directive is used. If the third IASP parameter is specified, the second userid parameter must be also explicitly specified even using the default QTMHHTP1.

If you are using %%CLIENT%% as the profile in the protection of the multiple thread capable CGI programs (meaning that each user authenticates with an IBM i user profile), then it should be noted that %%CLIENT%% is not a valid value on this directive. Using IBM i profiles like this should only be done in an intranet or highly secure server because you would not want to give just anyone an IBM i user profile. Therefore, you would know how many users and also their user profile name, thus you would need to decide how many users will be doing CGI requests and how many concurrent multiple thread capable

CGI requests you want each user to be able to do. Then you could specify multiple StartThreadedCGI directives, one for each user, specifying the number of concurrent multiple thread capable CGI requests you expect that user to do.

Note: This will NOT limit the number of concurrent multiple thread capable CGI requests. This will simply allow multiple thread capable CGI jobs to be started at server startup time so the user does not have to incur the performance hit of starting up a new job when they run their first multiple thread capable CGI program.

ThreadedCgiInitialUrl

Module: mod_cgi

Syntax: ThreadedCgiInitialUrl *url userid*

Default: none

Context: server

Override: none

Origin: IBM

Example: ThreadedCgiInitialUrl /qsys.lib/cgi.lib/mycgi.pgm QTMHHTTP

Example: ThreadedCgiInitialUrl /QOpenSys/mypacedir/pacecgi

Example: ThreadedCgiInitialUrl /qsys.lib/cgi.lib/mycgi.pgm?init=yes USER1

Example: ThreadedCgiInitialUrl /IASP1/qsys.lib/cgi.lib/mycgi.pgm USER2

This directive is used to load and initialize threaded CGI programs when the server starts. At server startup, when processing the StartThreadedCgi directive, jobs are started to run CGI programs in. This directive enables the server to run a CGI request to the CGI job enabling the CGI program to be loaded and initialized. This function enables performance issues to be moved to when the server starts, so the first user does not have diminished performance.

If there are no StartThreadedCgi directives, an error is posted and the server does not start.

UseUserJobdLibraryList

Module: mod_cgi

Syntax: UseUserJobdLibraryList *On/Off*

Default: UseUserJobdLibraryList Off

Context: Server, Virtual Host, Directory, Not in Limit, .htaccess

Override: FileInfo

Origin: IBM

Example: UseUserJobdLibraryList On

The UseUserJobdLibraryList directive specifies whether the job description library list of a user profile that the CGI job runs under can be used for CGI programs.

Parameter One: ***on | off***

- The *on* value indicates that your CGI programs library list will be changed to use the job description library list of the CGI job user profile.
- The *off* value indicates that your CGI programs library list will not be changed to use the job description library list of the CGI job user profile.

Note:

- The job description library list of HTTP server default user profiles QTMHHTTP and QTMHHTP1 will be not used for CGI programs.
- The user profile's job description library list must have a explicit library list set in order to make HTTP server to pick it up for CGI programs.
- If both "SetEnv QIBM_CGI_LIBRARY_LIST" and "UseUserJobdLibraryList on" are configured, the two library lists will be merged first before changing the library list of CGI programs.

Example 1

The User1's job description library list will be used to replace the library list of CGI programs under MYPROGRAM library.

```
<Directory /QSYS.LIB/MYPROGRAM.LIB/>
  Options all
  Require all granted
  SetHandler cgi-script
  ServerUserID  User1
  UseUserJobdLibraryList on
</Directory>
```

Example 2

The job description library list of user profile that passed authentication will be used to replace the library list of CGI programs under MYPROGRAM library.

```
<Directory /QSYS.LIB/MYPROGRAM.LIB/>
  Options all
  SetHandler cgi-script
  AuthType Basic
  AuthName "IBMi"
  Require valid-user
  PasswdFile %%SYSTEM%%
  UserID %%CLIENT%%
  UseUserJobdLibraryList on
</Directory>
```

Module core

Module core supports directives for the IBM HTTP Server for i Web server.

Summary

These directives control the core function of HTTP Server.

Directives

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- “MaxRanges” on page 347
- “MergeTrailers” on page 348
- “MergeSlashes” on page 347
- “NameVirtualHost” on page 348
- “Options” on page 348
- “ProfileToken” on page 350
- “QualifyRedirectURL” on page 350
- “ReceiveBufferSize” on page 351
- “RegisterHttpMethod” on page 351
- “Require” on page 351
- “RuleCaseSense” on page 352
- “SendBufferSize” on page 353
- “SendFileMinSize” on page 353
- “ServerAdmin ” on page 354
- “ServerAlias ” on page 354
- “ServerName ” on page 355
- “ServerPath ” on page 356
- “ServerRoot ” on page 356
- “ServerSignature” on page 357
- “ServerTokens” on page 357
- “ServerUserID” on page 358
- “SetHandler” on page 359
- “SetInputFilter” on page 359
- “SetOutputFilter” on page 360
- “ThreadsPerChild” on page 360
- “TimeOut” on page 361
- “TraceEnable” on page 361
- “UnDefine” on page 362
- “UseCanonicalName” on page 362
- “UseShutdown” on page 363
- “<VirtualHost> ” on page 363

AcceptPathInfo

Module: core

Syntax: AcceptPathInfo *On | Off | Default*

Default: AcceptPathInfo Default

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Example: AcceptPathInfo On

The AcceptPathInfo directive controls whether requests that contain trailing pathname information, that follows an actual filename or nonexistent file in an existing directory, are accepted or rejected. The trailing pathname information can be made available to scripts in the PATH_INFO environment variable.

For example, assume the location /test/ points to a directory that contains only the single file here.html. Requests for /test/here.html/more and /test/nothere.html/more both collect /more as PATH_INFO.

Parameter: *On | Off | Default*

- When set to *On*, a request will be accepted if a leading path component maps to a file that exists. The above example /test/here.html/more will be accepted if /test/here.html maps to a valid file.
- When set to *Off*, a request will only be accepted if it maps to a literal path that exists. Therefore a request with trailing pathname information after the true filename such as /test/here.html/more in the above example will return a 404 NOT FOUND error.
- When set to *Default*, the treatment of requests with trailing pathname information is determined by the handler responsible for the request. The core handler for normal files defaults to rejecting PATH_INFO. Handlers that serve scripts, such as cgi-script and isapi-isa, generally accept PATH_INFO by default.

The primary purpose of the AcceptPathInfo directive is to allow you to override the handler's choice of accepting or rejecting PATH_INFO. This override is required, for example, when you use a filter (such as INCLUDES) to generate content based on PATH_INFO. The core handler would usually reject the request. You can use the following configuration to enable such a script:

```
<Files "mypaths.shtml">
Options +Includes
SetOutputFilter INCLUDES
AcceptPathInfo on
</Files>
```

AcceptThreads

Module: core

Syntax: AcceptThreads *number*

Default: AcceptThreads 4

Context: server config

Override: none

Origin: IBM

Example: AcceptThreads 5

The AcceptThreads directive specifies the maximum number of accept threads per server child process. If a value is not specified, the server will use a limit of four accept threads. The accept threads are used to accept new connections from the client. This number may need to be changed to reflect the number of concurrent connections which are being accepted. If a large number of connections to the Web server start at approximately the same time, the number of accept threads may need to be adjusted to a higher value.

Note: The accept threads are created one time, and that is at startup time.

Parameter: *number*

- The *number* value specifies the maximum number of accept threads per server child process. Valid values include 1 through 20.

AccessFileName

Module: core

Syntax: AccessFileName *filename [filename ...]*

Default: AccessFileName .htaccess

Context: server config, virtual host, Not in Limit

Override: none

Origin: Apache

Example: AccessFileName index.html

When returning a document to the client, the server looks for the first access control file in the list of names in every document directory path. This only happens if the access control files are enabled for the directory. For example:

```
AccessFileName .acl
```

Before returning the document /QIBM/UserData/web/index.html, the server will read /.acl, /QIBM/.acl, /QIBM/UserData/.acl and /QIBM/UserData/web/.acl for directives, unless they have been disabled with the following:

```
<Directory/>
   AllowOverride None
</Directory>
```

Parameter: *filename*

- *Filename* is any valid filename on the IBM i server.

If multiple occurrences of this directive are configured in a container, only the last occurrence is processed. All other occurrences are ignored.

See also "AllowOverride" on page 306.

AddDefaultCharset

Module: core

Syntax: AddDefaultCharset *on | off | charset*

Default: AddDefaultCharset off

Context: server config, virtual host, directory, .htaccess, Not in Limit

Override: FileInfo

Origin: IBM

Example: AddDefaultCharset off

The AddDefaultCharset directive specifies the character set name that will be added to any response that does not have a parameter on the content type in the HTTP headers. This will override any character set specified, in the document body, by a META tag.

Parameter: *on | off | charset*

- AddDefaultCharset *on* enables HTTP Server's internal default charset of iso-8859-1 as required by the directive.

- AddDefaultCharset *off* disables this functionality.
- Alternate *charset* can be specified, for example, AddDefaultCharset on utf-8.

AddServerHeader

Module: core

Syntax: AddServerHeader *on|off*

Default: AddServerHeader on

Context: server config, virtual host

Override: none

Origin: IBM

Example: AddServerHeader off

The Server response-header field contains information about the software used by the origin server to handle the request, sometimes including information about specific modules that are loaded. Some security policies may dictate that such identifying information be removed from all network daemons.

Setting "AddServerHeader" on page 305 to off prevents IBM HTTP Server for i from adding the Server header to outgoing responses.

The value of the outgoing Server header can be logged by adding the string %{Server}o to whichever "LogFormat" on page 487 is referenced by your "CustomLog" on page 482 directives.

AllowEncodedSlashes

Module: core

Syntax: AllowEncodedSlashes *on | off | NoDecode*

Default: AllowEncodedSlashes off

Context: server config, virtual host

Override: none

Origin: Apache

Example: AllowEncodedSlashes on

The AllowEncodedSlashes directive allows URLs which contain encoded path separators (%2F for / and additionally %5C for \ on according systems) to be used. Normally, such URLs are refused with a 404 (Not found) error. Turning AllowEncodedSlashes *on* is useful when used in conjunction with PATH_INFO environment variable.

Note: Allowing encoded slashes does not imply decoding. Occurrences of %2F or %5C (only on according systems) will be left as such in the otherwise decoded URL string.

If encoded slashes are needed in path info, use of NoDecode is strongly recommended as a security measure. Allowing slashes to be decoded could potentially allow unsafe paths.

Parameter: *on | off*

- The *on* parameter value specifies that URLs with encoded path separators can be used.
- The *off* parameter value specifies that URLs with encoded path separators will result in a 404 (Not found) error.
- The NoDecode parameter value specifies that URLs with encoded path separators can be used but encoded slashes are not decoded but left in their encoded state.

AllowOverride

Module: core

Syntax: AllowOverride *override [override ..]*

Default: AllowOverride none

Context: Directory

Override: none

Origin: Apache

Example: AllowOverride all

Example: AllowOverride AuthConfig Indexes

When the server finds an .htaccess file (as specified by "AccessFileName" on page 304) it needs to know which directives declared in that file can override earlier configuration directives.

Parameter: *override*

- *Override* can be set to one or more of the following

Override	Description
None	If "AllowOverrideList" on page 307 is also set to None, the server will not read the file.
All	The server will allow all directives.
AuthConfig	Allow use of the authorization directives such as "AuthName" on page 610, "AuthType" on page 610, "PasswdFile" on page 233, "Require" on page 351, "<RequireAll>" on page 228, "<RequireAny>" on page 229, "<RequireNone>" on page 229.
FileInfo	Allow use of the directives controlling document types ("ErrorDocument " on page 315, "ForceType " on page 324, LanguagePriority, "SetHandler" on page 359, "SetInputFilter" on page 359, "SetOutputFilter" on page 360, and mod_mime Add* and Remove* directives), document meta data ("Header" on page 403, "RequestHeader" on page 406, "SetEnvIf" on page 584, "SetEnvIfNoCase" on page 586, "BrowserMatch" on page 582, "CookieExpires" on page 590, "CookieDomain" on page 590,"CookieStyle" on page 591,"CookieTracking" on page 591,"CookieName" on page 590), mod_rewrite directives ("RewriteEngine" on page 572, "RewriteOptions" on page 574, "RewriteBase" on page 567, "RewriteCond" on page 568, "RewriteRule" on page 576), mod_alias directives ("Redirect" on page 219, "RedirectTemp" on page 222, "RedirectPermanent" on page 222, "RedirectMatch" on page 220), and "Action" on page 215 from mod_actions.
Indexes	Allow use of the directives controlling directory indexing such as AddDescription , AddIcon, AddIconByEncoding, AddIconByType, DefaultIcon, DirectoryIndex, IndexOptions, HeaderName, IndexIgnore, IndexOptions and ReadmeName.
Limit	Allow use of the directives controlling host access such as "Allow" on page 612, "Deny" on page 613 and "Order" on page 614.

Override	Description
Nonfatal=[Override|Unknown|All]	Allow use of AllowOverride option to treat syntax errors in .htaccess as non-fatal: instead of causing an Internal Server Error, disallowed or unrecognized directives will be ignored and a warning logged:
	Nonfatal=Override treats directives forbidden by AllowOverride as non-fatal. Nonfatal=Unknown treats unknown directives as non-fatal. This covers typos and directives implemented by a module that's not present. Nonfatal=All treats both the above as non-fatal **Note:** Note that a syntax error in a valid directive will still cause an internal server error. Security: Nonfatal errors may have security implications for .htaccess users. For example, if AllowOverride disallows AuthConfig, users' configuration designed to restrict access to a site will be disabled.
Options [=Option,...]	Allow use of the directives controlling specific directory features such as "Options" on page 348. An equal sign may be given followed by a comma-separated list, without spaces, of options that may be set using the "Options" on page 348 command.

Note:

AllowOverride is valid only in Directory sections specified without regular expressions, not in Location, DirectoryMatch or Files sections.

The use of .htaccess is not supported in QDLS and QSYS. For these file systems the AllowOverride override value needs to be None to avoid errors that keep a page from being served.

AllowOverrideList

Module: core

Syntax: AllowOverrideList *None|directive [directive-type] ...*

Default: AllowOverrideList None

Context: directory

Override: none

Origin: Apache

Example: AllowOverrideList Redirect RedirectMatch

When the server finds an .htaccess file (as specified by AccessFileName) it needs to know which directives declared in that file can override earlier configuration directives.

When this directive is set to None and "AllowOverride" on page 306 is set to None, then .htaccess files are completely ignored. In this case, the server will not even attempt to read .htaccess files in the filesystem.

Example:

AllowOverride None

AllowOverrideList Redirect RedirectMatch

In the example above only the Redirect and RedirectMatch directives are allowed. All others will cause an internal server error.

Example:

AllowOverride AuthConfig

AllowOverrideList CookieTracking CookieName

In the example above "AllowOverride" on page 306 grants permission to the AuthConfig directive grouping and AllowOverrideList grants permission to only two directives from the FileInfo directive grouping. All others will cause an internal server error.

Note: AllowOverrideList is valid only in "<Directory> " on page 311 sections specified without regular expressions, not in "<Location> " on page 339, "<DirectoryMatch>" on page 312 or "<Files>" on page 323 sections.

See also"AccessFileName" on page 304 , "AllowOverride" on page 306.

CGIPassAuth

Module: core

Syntax: CGIPassAuth On|Off

Default: CGIPassAuth Off

Context: Directory, .htaccess

Override: AuthConfig

Origin: Apache

Example: CGIPassAuth On

CGIPassAuth allows scripts access to HTTP authorization headers such as Authorization, which is required for scripts that implement HTTP Basic authentication. Normally these HTTP headers are hidden from scripts. This is to disallow scripts from seeing user ids and passwords used to access the server when HTTP Basic authentication is enabled in the web server. This directive should be used when scripts are allowed to implement HTTP Basic authentication.

The setting is respected by any modules which use ap_add_common_vars(), such as mod_cgi. Notably, it affects modules which don't handle the request in the usual sense but still use this API; example of this is mod_include. Third-party modules that don't use ap_add_common_vars() may choose to respect the setting as well.

DefaultFsCCSID

Module: ap_charset

Syntax: DefaultFsCCSID *server-character-set-identification-number*

Default: dependent on server settings

Context: server config

Override: none

Origin: IBM

Example: DefaultFsCCSID 37

The DefaultFsCCSID directive specifies the CCSID that your server runs under, the server character set environment, and the EBCDIC CCSID that is used when the server converts:

- Input request data for user CGI programs or Apache modules.
- Output response data from user CGI programs, or Apache modules, to be sent back to the requester (client browser).

A configuration file can contain more than one DefaultFsCCSID directive, but the last directive in the configuration file determines the CCSID.

If the HTTP Server startup value *-fsccsid* is specified on the STRTCPSVR command or as a parameter on the HTTP Administration's start server , the value specified overrides all other settings and is used for the server CCSID.

If there is no startup value specified, but there is a DefaultFsCCSID directive in the configuration file, the directive value will be used for the server CCSID.

If there is no startup value specified and there is no DefaultFsCCSID directive in the configuration file, then the QCCSID system value is used. If the QCCSID system value is set to *65535*, then the server job will be started with that CCSID. However, the CCSID that the server actually uses for conversions will be the job default *ccsid* which is set to an appropriate value based on the language (LANGID) of the server job.

To display the CCSID of the server, complete the following task:

1. Start a 5250 session on your IBM i server.
2. Type `WRKACTJOB` (Work Active Job).
3. Type a 5 (Work with...) next to your server job.
4. Type a 2 (Display job definition attributes) on the **Work with Job** screen.
5. Page down until you see the job CCSID fields.

Example

In this case, the QCCSID system value was used to start the server job. We see that the Coded character set identifier is *65535*. However, the Default coded character set identifier has been set to *37* because the Language identifier is ENU (United States English). The server will use CCSID 37 as the EBCDIC CCSID.

```
Language identifier . . . . . . . . . . . . . . . :   ENU
Country or region identifier  . . . . . . . . . . :   US
Coded character set identifier  . . . . . . . . . :   65535
Default coded character set identifier  . . . . . :   37
```

DefaultNetCCSID

Module: mod_cgi

Syntax: DefaultNetCCSID *client-character-set-identification-number*

Default: Global HTTP Server setting for coded character set identifier.

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: IBM

Example: DefaultNetCCSID 819

The DefaultNetCCSID directive specifies the client character set environment and defines the ASCII or UTF-8 CCSID that is used when converting:

- Input request data for user CGI programs or Apache modules.
- When serving EBCDIC documents and no ASCII CCSID can be deduced from the file CCSID.
- Output response data from user CGI programs, or Apache modules, to be sent back to the requester (client browser).

A configuration file can contain more than one DefaultNetCCSID directive, but the last directive in the configuration file determines the CCSID. Starting in IBM i 5.4, the use of this directive is expanded to help you configure a single server to handle requests in more than one language. The directive is now allowed in a virtual host container and in directory containers. This directive is supported in the global scope. If the directive is not specified, the global HTTP Server setting for coded character set identifier is used. The shipped value is 00819 (ISO 8859-1 8-bit ASCII). You can view and change global HTTP Server settings using the Change HTTP Attributes (CHGHTTPA) command.

DefaultType

Module: core

Syntax: DefaultType *media-type* |none

Default: DefaultType none

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: DefaultType image/gif

This directive has been disabled. For backwards compatibility of configuration files, it may be specified with the value none, meaning no default media type.

Parameter: *MIME-type*

- The *MIME-type* value specifies the document content-type.

For example:

```
DefaultType None
```

Use the /QIBM/UserData/HTTPA/conf/mime.types configuration file and the "AddType" on page 495 to configure media type assignments via file extensions, or the "ForceType " on page 324 directive to configure the media type for specific resources. Otherwise, the server will send the response without a Content-Type header field and the recipient may attempt to guess the media type.

Define

Module: core

Syntax: Define parameter-name [parameter-value]

Default: None

Context: server, virtual host, directory

Override: none

Origin: Apache

Example: Define SSL

Example: Define servername www.example.com

In its one parameter form, Define is equivalent to passing the -D argument to STRTCPSVR command. For example: STRTCPSVR SERVER(*HTTP) HTTPSVR(instanceName '-t -D DUMP_VHOSTS'). It can be used to toggle the use of "<IfDefine>" on page 330 sections without needing to alter -D arguments in the HTTP server STRTCPSVR command.

In addition to that, if the second parameter is given, a config variable is set to this value. The variable can be used in the configuration using the ${VAR} syntax. The variable is always globally defined and not limited to the scope of the surrounding config section.

```
<IfDefine TEST>
  Define servername test.example.com
</IfDefine>
<IfDefine !TEST>
  Define servername www.example.com
  Define SSL
</IfDefine>
```

DocumentRoot /var/www/${servername}/htdocs

Variable names may not contain colon ":" characters, to avoid clashes with http://httpd.apache.org/docs/2.4/mod/mod_rewrite.html#rewritemap 's syntax.

<Directory>

Module: core

Syntax: <Directory *directory*> ... </Directory>

Default: none

Context: server config, virtual host, Not in Limit

Override: none

Origin: Apache

Example: <Directory /usr/local/httpd/htdocs>

<Directory> and </Directory> are used to enclose a group of directives that only apply to the named directory and subdirectories of that directory. Any directive that is allowed in a directory context may be used.

Parameter: *directory*

- A *directory* is either the full path to a directory or a wildcard string. Refer to "<DirectoryMatch>" on page 312 for details regarding wildcard strings. Full path directory example:

  ```
  <Directory /usr/local/httpd/htdocs>
  Options Indexes
  FollowSymLinks
  </Directory>
  ```

If multiple (non-regular expression) directory sections match the directory (or its parents) containing a document, then the directives are applied in the order of shortest match first, interspersed with the directives from the .htaccess files. See "AccessFileName" on page 304 for more information. For example:

```
<Directory />
   AllowOverride None
</Directory>

<Directory /home/*>
   AllowOverride FileInfo
</Directory>
```

For access to the document /home/web/dir/doc.html the steps are:

- Apply directive AllowOverride None (disabling .htaccess files).
- Apply directive AllowOverride FileInfo (for directory /home/web).
- Apply any FileInfo directives in /home/web/.htaccess.

Regular expressions are not considered until all of the normal sections have been applied. Then all of the regular expressions are tested in the order they appeared in the configuration file. For example:

```
<Directory ~ abc$>
... directives here ..
</Directory>
```

Suppose that the filename being accessed is /home/ABC/public_html/ABC/index.html. The server considers each of /, /home, /home/ABC, /home/ABC/public_html and /home/ABC/public_html/ABC in that order. The regular expression would not be considered until all normal <Directory> and .htaccess files have been applied. Then the regular expression will match on /home/ABC/public_html/ABC and be applied.

Notes:

- The default HTTP Server access for <Directory /> is Allow from *All*. This means that HTTP Server will serve any file mapped from a URL. The GUI directory wizard automatically creates a root directory that denies access to all and doesn't allow htaccess file usage:

  ```
  <Directory />
     Options None
     AllowOverride None
     Require all denied
  </Directory>
  ```

  Then override this for directories you want accessible. See the "Security tips for HTTP Server" on page 30 or "User profiles and required authorities for HTTP Server" on page 31 pages for more details. <Directory> directives can only be in virtual host and the server configuration see context above.

  Previously, <Directory> containers were used to enclose groups of directives that applied to proxy requests by appending the prefix "proxy:" to the beginning of the specified directory name. This is no longer supported. The server now has proxy containers for this purpose. The proxy now ignores directives enclosed in directory (or file) containers, and uses proxy containers. See <Proxy> and <ProxyMatch> for more information.
- Directives within location containers (if matched) take precedence over directives within directory containers. See "<Location> " on page 339 and "<LocationMatch>" on page 340 directives for more information on location containers.

<DirectoryMatch>

Module: core

Syntax: <DirectoryMatch *regex*> ... </DirectoryMatch>

Default: none

Context: Server config, Virtual host

Override: none

Origin: Apache

Example: <DirectoryMatch "^/www/.*/[0-9]{3}">

<DirectoryMatch> and </DirectoryMatch> are used to enclose a group of directives that only apply to the named directory and the files within that directory. It is the same as <Directory>; however, it takes an argument as a regular expression. For example:

```
<DirectoryMatch "^/www/.*/[0-9]{3}">
```

This matches directories in /www/ (or any subdirectory thereof) that consist of three numbers.

Note: The argument to DirectoryMatch does not need to be in quotes unless the regular expression includes a space character.

Parameter: *regex*

- *Regex* is a UNIX-style regular expression that is matched against the URL. Subexpressions are grouped within parentheses. Then, parenthetically enclosed regular expressions will be substituted in a subsequent $n statement.

Compatability

Prior to IBM i 7.2, this directive implicitly applied to sub-directories (like "<Directory> " on page 311) and could not match the end of line symbol ($). In IBM i 7.2 and later, only directories that match the expression are affected by the enclosed directives.

Trailing Slash

This directive applies to requests for directories that may or may not end in a trailing slash, so expressions that are anchored to the end of line ($) must be written with care.

Named groups and backreferences are captured and written to the environment with the corresponding name prefixed with "MATCH_" and in upper case. This allows elements of paths to be referenced from within expressions and modules like mod_rewrite. In order to prevent confusion, numbered (unnamed) backreferences are ignored. Use named groups instead.

For example:

```
<DirectoryMatch "^/www/webserver/htdocs/(?<sitename>host\d)$">
    Options Indexes FollowSymLinks
    RewriteEngine On
    RewriteCond "%{env:MATCH_SITENAME}"  "^host1"
    RewriteRule .* success.html
    Require all granted
</DirectoryMatch>
```

See also“<Directory> ” on page 311 .

DocumentRoot

Module: core

Syntax: DocumentRoot *directory-path*

Default: DocumentRoot /QIBM/UserData/HTTPA/htdocs

Context: server config, virtual host, Not in Limit

Override: none

Origin: Apache

Example: DocumentRoot /QIBM/UserData/mydocs

The DocumentRoot directive sets the directory from which HTTP Server will serve files. If the URL is not matched by a directive like Alias, the server appends the path from the requested URL to the document root and makes the path to the document.

Parameter: *directory-path*

- *Directory-path* is any valid directory path on the IBM i server.

For example:

```
DocumentRoot /usr/web
```

An access to http://www.my.host.com/index.html refers to /usr/web/index.html.

If the DocumentRoot directive is used in the server context and the directory does not exist, the server will not start. If the DocumentRoot directive is used in a virtual host context and the directory does not exist, that virtual host will inherit the document root from the server context (the server will start).

<Else>

Module: core

Syntax:<Else>...</Else>

Default: None

Context: Server config, Virtual Host, directory, .htaccess

Override: All

Origin: Apache

The <Else> applies the enclosed directives if and only if the most recent <If> or <ElseIf> section in the same scope has not been applied. For example:

<If "-z req('Host')">

...

</If>

<Else>

...

</Else>

The <If> would match HTTP/1.0 requests without a Host: header and the <Else> would match requests with a Host: header.

See also

"<If>" on page 329

"<ElseIf>" on page 314

<ElseIf>

Module: core

Syntax:<ElseIf expression>...</ElseIf>

Default: None

Context: server config, Virtual Host, directory, .htaccess

Override: All

Origin: Apache

The <ElseIf> applies the enclosed directives if and only if both the given condition evaluates to true and the most recent <If> or <ElseIf> section in the same scope has not been applied. For example:

<If "-R '10.1.0.0/16'">

...

</If>

<ElseIf "-R '10.0.0.0/8'">

...

</ElseIf>

<Else>

...

</Else>

The <ElseIf> would match if the remote address of a request belongs to the subnet 10.0.0.0/8 but not to the subnet 10.1.0.0/16.

See also

"<If>" on page 329

"<ElseIf>" on page 314

Error

Module: core

Syntax: Error message

Default: None

Context: Server, Virtual Host, directory, .htaccess

Override: none

Origin: Apache

If an error can be detected within the configuration, this directive can be used to generate a custom error message, and halt configuration parsing. The typical use is for reporting required modules which are missing from the configuration.

# Example

# ensure that mod_include is loaded

<IfModule !include_module>

Error "mod_include is required by mod_foo. Load it with LoadModule."

</IfModule>

# ensure that exactly one of SSL,NOSSL is defined

<IfDefine SSL>

<IfDefine NOSSL>

Error "Both SSL and NOSSL are defined. Define only one of them."

</IfDefine>

</IfDefine>

<IfDefine !SSL>

<IfDefine !NOSSL>

Error "Either SSL or NOSSL must be defined."

</IfDefine>

</IfDefine>

EnableSendfile

Module: core

Syntax: EnableSendfile *on|off*

Default: EnableSendfile on

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: EnableSendfile off

This directive controls whether httpd may use the sendfile support from the kernel to transmit file contents to the client. By default, when the handling of a request requires no access to the data within a file (for example, when delivering a static file) Apache uses sendfile to deliver the file contents without ever reading the file if the operating system supports it. This sendfile mechanism avoids separate read and send operations, and buffer allocations.

ErrorDocument

Module: core

Syntax: ErrorDocument *error-code document*

Default: none

Context: server config, virtual host, directory, .htaccess, Not in Limit

Override: FileInfo

Origin: Modified

Example: ErrorDocument 404 /cgi-bin/bad_urls.html

Example: ErrorDocument 500 http://QIBM.example.com/cgi-bin/tester

Example: ErrorDocument 401 /subscription_info.html

Example: ErrorDocument 403 "Sorry, cannot allow you access today."

In the event of a problem or error, HTTP Server can be configured to do one of four things:

1. Output a simple hard coded error message.
2. Output a customized message.
3. Internally redirect to a local URL to handle the problem/error.
4. Redirect to an external URL to handle the problem/error.

The first option is the default, while options 2 through 4 are configured using the ErrorDocument directive, which is followed by HTTP Server response code and a message or URL.

expression syntax can be used inside the directive to produce dynamic strings and URLs.

For option 3, the document parameter must begin with a '/' character and it is assumed to be relative to DocumentRoot. If the document parameter contains a ':' character it is assumed to be an external URL (option 4). If neither of these are true, option 2 is assumed.

Parameter One: *error-code*

- The *error-code* parameter specifies the error code associated with a hard coded error message, a customized message, a local URL, or an external URL that handles the problem/error.

Parameter Two: *document*

- The *document* parameter specifies a hard coded error message, a customized message, a local URL, or an external URL that handles the problem/error.

Messages in this context begin with a single quote ("), which does not form part of the message itself. The server will sometimes offer additional information regarding the problem/error.

URLs must begin with a slash (/) for local URLs, or be a full URL which the client can resolve. Alternatively, a message can be provided to be displayed by the browser. Note that deciding whether the parameter is an URL, a path or a message is performed before any expression is parsed. For example:

```
ErrorDocument 500 http://QIBM.example.com/cgi-bin/tester
ErrorDocument 404 /cgi-bin/bad_urls.html
ErrorDocument 401 /subscription_info.html
ErrorDocument 403 "Sorry cannot allow you access today.
ErrorDocument 403 Forbidden!
ErrorDocument 403 /cgi-bin/forbidden.pgm?referrer=%{escape:%{HTTP_REFERER}}
```

Note: When you specify an ErrorDocument that points to a remote URL (for example, anything with a method such as "http" in front of it) the server will send a redirect to the client to tell it where to find the document, even if the document ends up being on the same server. This has several implications, the most important being that if you use an "ErrorDocument 401" directive then it must refer to a local document. This results from the nature of the HTTP basic authentication scheme.

Apache on the IBM i allows error code keywords on this directive, in addition to HTTP response codes. This will allow customers more granularity in their error page customization. To do this, the syntax for ErrorDocument was enhanced to also allow one of these key words as the error_code. Valid keywords, their equivalent HTTP response codes and the cause are as follows:

Error code	Error meaning
okredirect 302	The document has moved.
badrequest 400	The request is not valid.
badscript 400	The requested script file could not be processed; the request was invalid in some way.
connectfail 400	The server could not connect to the requested partner on the requested port.
nopartner 400	The server could not connect to the requested host name due to bad syntax or an unknown host.
proxyfail 400 or 502	The client tried to use the server as a proxy and, although this is allowed, it did not work. Possibly the destination server doesn't exist or is busy.
proxyrmterror (any code >= 400)	The server received a response code from a remote server that indicates a remote server problem and the proxy error override function has been invoked (see ProxyErrorOverride for more details).
unknownmethod 400	The request did not include a recognized method.
notauthorized 401	The request requires a user ID and password. Either the user ID and password sent by the client are not valid for this request or the client did not send a user ID and password.
notmember 401	The requested file has a protection rule listing valid user IDs and passwords and the user ID of the requesting client is not included in the list.
pwchanged 401	The password is invalid.
pwexpired 401	The password for the user ID has expired.
badredirect 403	The server is trying to redirect the request and the Redirect directive is invalid or contains a loop.
baduser 403	The client requested a user's home directory that does not exist.
byrule 403	A directive (such as deny or allow directive) or rule was specified that will not allow this request.
dirbrowse 403	The request specified a directory that is turned off for browsing.
dotdot 403	The client request specified a parent (/.../) directory which is not allowed.
ipmask 403	The client's IP address is not a vlid IP address for the request.
ipmaskproxy 403	The client is trying to use the server as a proxy, however the client is not included in the list of host names or IP addresses that are allowed to do so.
methoddisabled 403	The method requested has been disabled.
noacl 403	Cannot access the .htaccess file.
noentry 403	The user is not included in the list of valid users for this request.
notallowed 403	The server found the requested file but the protection setup of the server prevented access.
openfailed 403	The file or directory has access restrictions for the current user.
multifail 404	The requested file could not be found on the server.
proxynotauth 407	The request requires a user ID and password for the proxy. Either the user ID and password sent by the client are not valid for this request or the client did not send a user ID and password.

Error code	Error meaning
proxynotmember 407	The requested file has a protection rule listing valid user IDs and passwords and the user ID sent by the client is not included in that list.
proxypwchanged 407	The password sent by the client is not valid for the proxy.
proxypwexpired 407	The password sent by the client has expired.
preconfail 412	A precondition specified by the client on this request was not met. For example, this could result from HTTP/1.1 request that contains a condition "if-not-modified-since xxx".
badrange 416	The request either has an invalid content range header or it has incorrect information in the content range header for the file being processed.
upgrade 426	The request was received for a file which must be accessed through SSL. An upgrade to SSL is required before accessing this resource.
scriptio 500	The client requested a CGI script but the server cannot get it to process input or output. The script may contain invalid code.
scriptnotfound 500	The client requested a CGI script that cannot be found.
scriptstart 500	The client requested a CGI script that the server can find but cannot be started. The script may contain invalid code.
systemerror 500	An internal error occurred.
noformat 501	The server cannot interpret the format of the file it is trying to serve. The file may be corrupted or have an unknown or invalid file extension.

An example - a customer puts the following into their configuration file:

```
ErrorDocument byrule "Sorry cannot allow you access."
ErrorDocument openfailed "You do not have authority to this file."
```

When an HTTP response code of 403 (FORBIDDEN) occurs and it is determined that the reason is the client is on the deny list, the response back to the browser will be "Sorry cannot allow you access". If, however, the 403 response code is a result of the user not having authority to the file, the message will be "You do not have authority to this file". This gives the user more granularity to customize error responses to the client.

ErrorLog

Module: core

Syntax: ErrorLog *filename-or-pipe | off | *off*

Default: ErrorLog logs/error_log

Context: server config, virtual host

Override: none

Origin: Apache

Example: IFS example relative to server root: ErrorLog logs/errorlog

Example: Piped log example: ErrorLog |/QSYS.LIB/MYLIB.LIB/ERRPIPE.PGM

Example: QSYS example: ErrorLog /QSYS.LIB/MYLIB.LIB/MYLOGS.FILE

The ErrorLog directive sets the name of the file to which the server will log any errors it may encounter. If the filename does not begin with a slash (/) then it is assumed to be relative to the "ServerRoot " on page 356. Specifying a value of *off* or **off* will cause the server to not log errors.

Parameter: *filename-or-pipe | off | *off*

- The *filename* parameter is relative to the ServerRoot or a full path to the file.
- A pipe (|) followed by a program to spawn to handle the error log information. Data written to the pipe from the server will be in the FSCCSID that is in use by the server.
- The *off* or **off* value turns off error reading.

Note: A new program will not be started for a VirtualHost if it inherits the ErrorLog from the main server. The program is specified in the form "qsys.lib/xxx.lib/xxx.pgm".

All messages logged to the Error log will be logged in the primary language installed for the IBM HTTP Server. The error log file will be created with a coded character set identifier (CCSID) that is compatible with the language. The CCSID value is an ASCII CCSID.

It is recommended that you allow the server to create the log file. Specifically:

- For IFS files, the user must create the directories that contain the log file and must grant the QTMHHTTP user write access to the directory. The server will create the log file.
- For QSYS.LIB logs, the user must create the library that contains the logs. The server will create the file and members in the specified library.
- If the filename does not begin with a slash (/) then it is assumed to be relative to the ServerRoot.
- If "LogCycle" on page 341 is active and if the path ends without a '/' character, then the path is considered to be the complete log file name. In that case, the server will add an extension in the format QCYYMMDDHH, where these variables have the following values:
  - Q is a default value that indicates to the server that this is a log file.
  - C is the century indicator (0 for pre-2000, 1 for post-2000)
  - YY is the year indicator
  - MM is the month indicator
  - DD is the day indicator HH is the hour indicator (00 = 00:00 (midnight), 23=23:00)

    Note: Will not be generated for file system QDL.

    For example, a path of "/logs/errorlog" results in a file such as "/logs/errorlog.Q100030300".
- If "LogCycle" on page 341 is active and if the path ends with a '/' character, then the path is considered to be the directory that will contain the log file. In that case, the server will create log files named in the QCYYMMDDHH format. For example, a path of "/logs/errorlog/" results in a file such as "/logs/errorlog/Q100030300".
- If "LogCycle" on page 341 is active and the log file is in the QSYS file system, the name must end it the file component of the IFS path. Example:

  ```
  # Config file directives
  LogCycle Daily
  ErrorLog /QSYS.LIB/MYLIB.LIB/MYLOGS.FILE
  ```

  The resulting daily log rollover files will be of the form /QSYS.LIB/MYLIB.LIB/MYLOGS.FILE/Qcyymmddhh.MBR
- "LogCycle" on page 341 Hourly is not valid if the log file is in the QDLS file system as that file system only supports 8 character file names and 3 character extensions.
- If "LogCycle" on page 341 is not active, no special naming is used. The name of the log file given on the ErrorLog directive is used as given for the name of the log file. If the name is a directory, a default name of http.log will be concatenated to the directory name to create the log file. For example:

  ```
  # Config file directives
  LogCycle Off
  LogFormat "%h %l %u %t \"%r\" %>s %b" common
  CustomLog /logs/path/ common
  ```

  The resulting log file will be /logs/path/http.log.

Security:

See “Security tips for HTTP Server” on page 30 details on why your security could be compromised if the directory where log files are stored is writable by anyone other than the user that starts the server. If a program is used, then it will be run under the user who started httpd. This will be root if the server was started by root (be sure that the program is secure).

See also “LogLevel” on page 342.

ErrorLogFormat

Module: core

Syntax: ErrorLogFormat [connection|request] format

Default: None

Context: server config, Virtual host

Override: none

Origin: Apache

Example: ErrorLogFormat "[%t] [%l] [pid %P] %F: %E: [client %a] %M"

ErrorLogFormat allows to specify what supplementary information is logged in the error log in addition to the actual log message.

Specifying connection or request as first parameter allows to specify additional formats, causing additional information to be logged when the first message is logged for a specific connection or request, respectively. This additional information is only logged once per connection/request. If a connection or request is processed without causing any log message, the additional information is not logged either.

It can happen that some format string items do not produce output. For example, the Referer header is only present if the log message is associated to a request and the log message happens at a time when the Referer header has already been read from the client. If no output is produced, the default behavior is to delete everything from the preceding space character to the next space character. This means the log line is implicitly divided into fields on non-whitespace to whitespace transitions. If a format string item does not produce output, the whole field is omitted. For example, if the remote address %a in the log format [%t] [%l] [%a] %M is not available, the surrounding brackets are not logged either. Space characters can be escaped with a backslash to prevent them from delimiting a field. The combination '% ' (percent space) is a zero-width field delimiter that does not produce any output.

The above behavior can be changed by adding modifiers to the format string item. A - (minus) modifier causes a minus to be logged if the respective item does not produce any output. In once-per-connection/request formats, it is also possible to use the + (plus) modifier. If an item with the plus modifier does not produce any output, the whole line is omitted.

A number as modifier can be used to assign a log severity level to a format item. The item will only be logged if the severity of the log message is not higher than the specified log severity level. The number can range from 1 (alert) over 4 (warn) and 7 (debug) to 15 (trace8).

For example, here's what would happen if you added modifiers to the %{Referer}i token, which logs the Referer request header.

Modified Token	**Meaning**
%-{Referer}i	Logs a - if Referer is not set.

Modified Token	Meaning
%+{Referer}i	Omits the entire line if Referer is not set.
%4{Referer}i	%4{Referer}i Logs the Referer only if the log message severity is higher than 4.

Some format string items accept additional parameters in braces.

Format String	Description
%%	The percent sign
%a	Client IP address and port of the request
%{c}a	Underlying peer IP address and port of the connection (see the mod_remoteip module)
%A	Local IP-address and port
%{name}e	Request environment variable *name*
%E	APR/OS error status code and string
%F	Source file name and line number of the log call
%{name}i	Request header *name*
%k	Number of keep-alive requests on this connection
%l	Loglevel of the message
%L	Log ID of the request
%{c}L	Log ID of the connection
%{C}L	Log ID of the connection if used in connection scope, empty otherwise
%m	Name of the module logging the message
%M	The actual log message
%{name}n	Request note *name*
%P	Process ID of current process
%T	Thread ID of current thread
%t	The current time
%{u}t	The current time including micro-seconds
%{cu}t	The current time in compact ISO 8601 format, including micro-seconds
%v	The canonical "ServerName " on page 355 of the current server.
%V	The server name of the server serving the request according to the "UseCanonicalName" on page 362 setting.
\ (backslash space)	Non-field delimiting space

Format String	Description
% (percent space)	Field delimiter (no output)

The log ID format %L produces a unique id for a connection or request. This can be used to correlate which log lines belong to the same connection or request, which request happens on which connection. A %L format string is also available in mod_log_config, to allow to correlate access log entries with error log lines. If mod_unique_id is loaded, its unique id will be used as log ID for requests.

Example 1

ErrorLogFormat "[%t] [%l] %7F: %E: [client\ %a] %M% ,\ referer\ %{Referer}i"

Example 2

#Advanced example with request/connection log IDs

- ErrorLogFormat "[%{uc}t] [%-m:%-l] [R:%L] [C:%{C}L] %7F: %E: %M"
- ErrorLogFormat request "[%{uc}t] [R:%L] Request %k on C:%{c}L pid:%P tid:%T"
- ErrorLogFormat request "[%{uc}t] [R:%L] UA:'%+{User-Agent}i'"
- ErrorLogFormat request "[%{uc}t] [R:%L] Referer:'%+{Referer}i'"
- ErrorLogFormat connection "[%{uc}t] [C:%{c}L] local\ %a remote\ %A"

FileETag

Module: core

Syntax: FileETag *component ...*

Default: FileETag MTime Size

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: FileETag INode MTime Size

The FileETag directive configures the file attributes that are used to create the ETag (entity tag) response header field when the document is based on a static file. (The ETag value is used in cache management to save network bandwidth.) The FileETag directive allows you to choose which of these -- if any -- should be used. The recognized keywords are:

Parameter: *component*

- **INode** indicates the file's inode number will be included in the calculation.

  Note: INode is the file ID number for the object. This number uniquely identifies the object within a file system. It is part of the stat structure (the st_ino field of the stat structure).
- **MTime** indicates the date and time the file was last modified will be included.
- **Size** indicates the number of bytes in the file will be included.
- **All** indicates all available fields will be used (equivalent to 'FileETag INode MTime Size').
- **None** indicates that if a document is file-based, no ETag field will be included in the response.

The **INode**, **MTime**, and **Size** keywords may be prefixed with either '+' or '-', which allow changes to be made to the default setting inherited from a higher level context. Any keyword appearing without such a prefix immediately and completely cancels the inherited setting.

If a directory's configuration includes 'FileETag INode MTime Size', and a subdirectory's includes 'FileETag -INode', the setting for that subdirectory (which will be inherited by any sub-subdirectories that don't override it) will be equivalent to 'FileETag MTime Size'.

The **MTime** attribute (if specified) may be used by remote proxy servers to calculate cache expiry times in the event that document expiry times are not available or provided.

See CacheLastModifiedFactor for more information.

<Files>

Module: core

Syntax: <Files *filename*> ... </Files>

Default: none

Context: server config, virtual host, .htaccess, Not in Limit

Override: none

Origin: Apache

Example: <Files index.html>

The <Files> directive provides for access control by filename. It is comparable to the "<Directory> " on page 311 directive and "<Location> " on page 339 directives. It should be matched with a </Files>. Directives given within this section will be applied to any object with a base-name (last component of filename) matching the specified filename. <Files> sections are processed in the order they appear in the configuration file, after the <Directory> sections and .htaccess files are read, but before <Location> sections. Note that <Files> can be nested inside <Directory> sections to restrict the portion of the file system.

Parameter: *filename*

- The *filename* parameter should include a filename or a wildcard string where '?' matches any single character and '*' matches any sequences of characters. For example:

  ```
  <Files "cat.html">
     # Insert stuff that applies to cat.html here
  </Files>
  ```

  ```
  <Files "?at.*">
     # This would apply to cat.html, bat.html, hat.php and so on.
  </Files>
  ```

- Regular expressions can also be used, with the addition of the '~' character. For example:

  ```
   <Files ~ "\.(gif|jpe?g|png)$">
     #...
  </Files>
  ```

  would match most common Internet graphics formats. <FilesMatch> is preferred.

Note: Unlike <Directory> and <Location> sections, <Files> sections can be used inside .htaccess files. This allows users to control access to their own files, at a file-by-file level. See "Security tips for HTTP Server" on page 30 and "User profiles and required authorities for HTTP Server" on page 31 for more details.

<FilesMatch>

Module: core

Syntax: <FilesMatch *regex*> ... </FilesMatch>

Default: none

Context: server config, virtual host, .htaccess, Not in Limit

Override: none

Origin: Apache

Example: <FilesMatch "\.(gif|jpe?g|png)$">

The <FilesMatch> directive provides for access control by filename, in the same way "<Files>" on page 323 directive does. The <FilesMatch> directive, however, accepts a regular expression. For example:

```
<FilesMatch ".+\.(gif|jpe?g|png)$">
    # ...
</FilesMatch>
```

This would match most common Internet graphic formats. (Note: The argument to <FilesMatch> does not need to be in quotes unless the regular expression includes a space character.)

The .+ at the start of the regex ensures that files named .png, or .gif, for example, are not matched.

Named groups and backreferences are captured and written to the environment with the corresponding name prefixed with "MATCH_" and in upper case. This allows elements of files to be referenced from within expressions and modules like mod_rewrite . In order to prevent confusion, numbered (unnamed) backreferences are ignored. Use named groups instead.

For example:

```
<FilesMatch "^(?<sitename>\w+)\.html$">
     Options Indexes FollowSymLinks
     Require all granted
     RewriteEngine On
     RewriteCond "%{env:MATCH_SITENAME}"  "^host"
     RewriteRule .* success.html
</FilesMatch>
```

Parameter: *regex*

- A UNIX-style regular expression that is matched against the URL. Subexpressions are grouped within parentheses. Then, parenthetically enclosed regular expressions will be substituted in a subsequent $n statement.

ForceType

Module: core

Syntax: ForceType *media_ type | None*

Default: none

Context: directory, .htaccess

Override: FileInfo

Origin: Apache

Example: ForceType image/gif (forces all files in the container to be treated as a GIF file)

The ForceType directive forces all matching files to be served with the content type identification given by media-type when they are placed into an .htaccess file, a <Directory>, or <Location> section.

Parameter: *media_type*

- The *media_type* parameter is a MIME type/subtype to which all files in the directory will be forced.

Note: This directive overrides other indirect media type associations defined in */qibm/proddata/HTTPA/conf/mime*. Types or via the AddType.

You can also override more general ForceType settings by using the value of None:

```
# force all files to be image/gif:
<Location "/images">
  ForceType image/gif
</Location>
```

```
# but normal mime-type associations here:
 <Location "/images/mixed">
  ForceType None
</Location>
```

This directive primarily overrides the content types generated for static files served out of the filesystem. For resources other than static files, where the generator of the response typically specifies a Content-Type, this directive has no effect.

Note: When explicit directives such as "SetHandler" on page 359 or AddHandler do not apply to the current request, the internal handler name normally set by those directives is set to match the content type specified by this directive. This is a historical behavior that some third-party modules (such as mod_php) may use "magic" content types used only to signal the module to take responsibility for the matching request. Configurations that rely on such "magic" types should be avoided by the use of "SetHandler" on page 359 or AddHandler.

HostNameLookups

Module: core

Syntax: HostNameLookups *on | off | double*

Default: HostNameLookups off

Context: server config, virtual host, directory, Not in Limit

Override: none

Origin: Apache

Example: HostNameLookups on

The HostNameLookups directive enables DNS lookups so the host names can be logged (and passed to CGIs/SSIs in the REMOTE_HOST environment variable).

Parameter: *on | off | double*

- The *on* value enables DNS lookups so the host names can be logged (and passed to CGIs/SSIs in the REMOTE_HOST environment variable).
- The default *off* value saves on the network traffic for those sites that do not truly need the reverse lookup. Heavily loaded sites should leave this directive set to off, since DNS lookups can take a considerable amount of time.
- The value *double* refers to doing double-reverse DNS. That is, after a reverse lookup is performed, a forward lookup is then performed on that command. At least one of the IP addresses in the forward lookup must match the Original address. When mod_access is used for controlling access by hostname, regardless of the setting, a double reverse lookup will be performed. This is necessary for security.

Note: The result of this double-reverse isn't generally available unless you set HostnameLookups double. For example, if you only set HostnameLookups on and a request is made to an object that is protected by hostname restrictions, regardless of whether the double-reverse fails or not, CGIs will still be passed to the single-reverse result in `REMOTE_HOST`.

HotBackup

Module: core

Syntax: HotBackup *on | off*

Default: HotBackup on

Context: server config

Override: none

Origin: IBM

Example: HotBackup on

The HotBackup directive is used to specify whether or not a hot backup server should be started at the server startup time. With the hot backup server active, if the primary server job abnormally terminates, the hot backup will immediately take over and act as the primary and continue servicing requests. A new hot backup is automatically created, in the background, within one minute. However, if more than five consecutive server failures occur within a ten minute time period, no additional hot backups will be created and the server will fail. The server is allowed to fail in this situation to avoid system degradation, since the hot backup processing can consume system resources.

If the primary server process failure is not due to the network, all user connections remain active during the hot backup take over and the end users do not detect the loss of server; however, some HTTP requests in transient may be lost. If the failure is due to the loss of network, the server must be restarted.

For a full backup recovery, including system and network failures, refer to highly available Web server.

Parameter: *on | off*

- When set to *on*, if the primary server job abnormally terminates, the hot backup will immediately take over and act as the primary and continue servicing requests.
- With HotBackup *off*, only one multithreaded server child process is started.

Note: When a server is configured as highly available (HAModel directive is specified), HotBackup behaves as if it is set to '*off*' and can not be overwritten.

HttpProtocolOptions

Module: core

Syntax: HttpProtocolOptions *[Strict|Unsafe] [RegisteredMethods|LenientMethods] [Allow0.9|Require1.0]*

Default: HttpProtocolOptions Strict LenientMethods Allow0.9

Context: server config, virtual host

Override: none

Origin: Apache

Example: HttpProtocolOptions Unsafe LenientMethods Allow0.9

This directive changes the rules applied to the HTTP Request Line (RFC 7230 §3.1.1) and the HTTP Request Header Fields (RFC 7230 §3.2), which are now applied by default or using the Strict option. Due to legacy modules, applications or custom user-agents which must be deprecated the Unsafe option has been added to revert to the legacy behaviors.

These rules are applied prior to request processing, so must be configured at the global or default (first) matching virtual host section, by IP/port interface (and not by name) to be honored.

The directive accepts three parameters from the following list of choices, applying the default to the ones not specified:

Strict | Unsafe

Prior to the introduction of this directive, the Apache HTTP Server request message parsers were tolerant of a number of forms of input which did not conform to the protocol. RFC 7230 §9.4 Request Splitting and §9.5 Response Smuggling call out only two of the potential risks of accepting non-conformant request messages, while RFC 7230 §3.5 "Message Parsing Robustness" identify the risks of accepting obscure whitespace and request message formatting. As of the introduction of this directive, all grammar rules of the specification are enforced in the default Strict operating mode, and the strict whitespace suggested by section 3.5 is enforced and cannot be relaxed.

Security risks of Unsafe

Users are strongly cautioned against toggling the Unsafe mode of operation, particularly on outward-facing, publicly accessible server deployments. If an interface is required for faulty monitoring or other custom service consumers running on an intranet, users should toggle the Unsafe option only on a specific virtual host configured to service their internal private network.

Example of a request leading to HTTP 400 with Strict mode

```
# Missing CRLF
GET / HTTP/1.0\n\n
```

Command line tools and CRLF

Some tools need to be forced to use CRLF, otherwise httpd will return a HTTP 400 response like described in the above use case. For example, the **OpenSSL s_client needs the -crlf parameter to work properly**.

RegisteredMethods | LenientMethods

RFC 7231 §4.1 "Request Methods" "Overview" requires that origin servers shall respond with a HTTP 501 status code when an unsupported method is encountered in the request line. This already happens when the LenientMethods option is used, but administrators may wish to toggle the RegisteredMethods option and register any non-standard methods using the RegisterHttpMethod directive, particularly if the Unsafe option has been toggled.

Forward Proxy compatibility

The RegisteredMethods option should not be toggled for forward proxy hosts, as the methods supported by the origin servers are unknown to the proxy server.

Example of a request leading to HTTP 501 with LenientMethods mode

```
# Unknown HTTP method
WOW / HTTP/1.0\r\n\r\n
```

```
# Lowercase HTTP method
get / HTTP/1.0\r\n\r\n
```

Allow0.9 | Require1.0

RFC 2616 §19.6 "Compatibility With Previous Versions" had encouraged HTTP servers to support legacy HTTP/0.9 requests. RFC 7230 supersedes this with "The expectation to support HTTP/0.9 requests has been removed" and offers additional comments in RFC 7230 Appendix A. The Require1.0 option allows the user to remove support of the default Allow0.9 option's behavior.

Example of a request leading to HTTP 400 with Require1.0 mode

```
# Unsupported HTTP version
GET /\r\n\r\n
```

Users should pay particular attention to the 400 responses in the access log for invalid requests which were unexpectedly rejected.

HTTPSubsystemDesc

Module: core

Syntax: HTTPSubsystemDesc *library / subsystem*

Default: HTTPSubsystemDesc QHTTPSVR/QHTTPSVR

Context: server config

Override: none

Origin: IBM

Example: HTTPSubsystemDesc HTTPTEST/HTTPSBS

The HTTPSubsystemDesc directive specifies the user created subsystem that the HTTP server runs in. By default HTTP server runs under QHTTPSVR/QHTTPSVR subsystem.

The subsystem must already exist before using this directive, otherwise HTTP server will fail to start. The subsystem can be automatically started if it's not active when starting HTTP server but will not be ended when stopping the HTTP server

Note: To make HTTP server run in subsystem other than QHTTPSVR, at least "HTTPStartJobQueue" on page 328 directive is required to be specified and the desired subsystem is MUST in active status before starting HTTP server. If only HTTPSubsystemDesc directive is specified, only the specified subsystem is started and HTTP server jobs still run under QHTTPSVR. If only "HTTPStartJobQueue" on page 328 is specified but the desired subsystem is not active at that moment, the HTTP server jobs will not be started until the subsystem is started

HTTPStartJobQueue

Module: core

Syntax: HTTPStartJobQueue *library | jobqueue*

Default: HTTPStartJobQueue QHTTPSVR/QZHBHTTP

Context: server config

Override: none

Origin: IBM

Example: HTTPStartJobQueue HTTPTEST/HTTPJOBQ

The HTTPStartJobQueue directive specifies the user created job queue to which the HTTP server jobs will be submitted. The default HTTP server job queue is QHTTPSVR/QZHBHTTP.

The job queue must already exist before using this directive, otherwise HTTP server will fail to start.

Note: To make HTTP server run in subsystem other than QHTTPSVR, at least HTTPStartJobQueue directive is required to be specified and the desired subsystem is MUST in active status before starting HTTP server. If only HTTPSubsystemDesc directive is specified, only the specified subsystem is started and HTTP server jobs still run under QHTTPSVR. If only HTTPStartJobQueue is specified but the desired subsystem is not active at that moment, the HTTP server jobs will not be started until the subsystem is started.

HTTPStartJobDesc

Module: core

Syntax: HTTPStartJobDesc *library | jobdescription*

Default: HTTPStartJobDesc QHTTPSVR/QZHBHTTP

Context: server config

Override: none

Origin: IBM

Example: HTTPStartJobDesc HTTPTEST/HTTPJOBD

The HTTPStartJobDesc directive specifies the user created job description which defines how HTTP server jobs should be run. The default HTTP server job description is QHTTPSVR/QZHBHTTP.

The job description must already exist before using this directive, otherwise HTTP server will fail to start.

Note: To make HTTP server run in subsystem other than QHTTPSVR, at least "HTTPStartJobQueue" on page 328 directive is required to be specified and the desired subsystem is MUST in active status before starting HTTP server. If only HTTPSubsystemDesc directive is specified, only the specified subsystem is started and HTTP server jobs still run under QHTTPSVR. If only "HTTPStartJobQueue" on page 328 is specified but the desired subsystem is not active at that moment, the HTTP server jobs will not be started until the subsystem is started.

HTTPRoutingData

Module: core

Syntax: HTTPRoutingData *name*

Default: HTTPRoutingData HTTPWWW

Context: server config

Override: none

Origin: IBM

Example: HTTPRoutingData HTTPSVR

The HTTPRoutingData directive specifies the user defined routing data for HTTP server jobs. The default value is HTTPWWW. A maximum of 80 characters can be specified.

The routing entry must be already added to the HTTP subsystem before using this directive, otherwise HTTP server will fail to start.

Note: To make HTTP server run in subsystem other than QHTTPSVR, at least "HTTPStartJobQueue" on page 328 directive is required to be specified and the desired subsystem is MUST in active status before starting HTTP server. If only HTTPSubsystemDesc directive is specified, only the specified subsystem is started and HTTP server jobs still run under QHTTPSVR. If only "HTTPStartJobQueue" on page 328 is specified but the desired subsystem is not active at that moment, the HTTP server jobs will not be started until the subsystem is started.

<If>

Module: core

Syntax: <If expression> ... </If>

Default: none

Context: Server config, Virtual Host, directory, .htaccess

Override: All

Origin: Apache

Example: <If "-z req('Host')">

The <If> directive evaluates an expression at runtime, and applies the enclosed directives if and only if the expression evaluates to true. For example:

<If "-z req('Host')">

would match HTTP/1.0 requests without a Host: header. Expressions may contain various shell-like operators for string comparison (=, !=, <, ...), integer comparison (-eq, -ne, ...), and others (-n, -z, -f, ...). It is also possible to use regular expressions,

<If "%{QUERY_STRING} =~ /(delete|commit)=.*?elem/">

shell-like pattern matches and many other operations. These operations can be done on request headers (req), environment variables (env), and a large number of other properties. The full documentation is available in ap_expr expressions parser.

Only directives that support the directory context can be used within this configuration section.

See also

"<ElseIf>" on page 314

"<Else>" on page 313

Note: Certain variables, such as CONTENT_TYPE and other response headers, are set after <If> conditions have already been evaluated, and so will not be available to use in this directive.

<IfDefine>

Module: core

Syntax: <IfDefine [!]parameter-name> ... </IfDefine>

Default: none

Context: server config

Override: All

Origin: Apache

Example: <IfDefine LDAP>

The <IfDefine *test*> ... </IfDefine> section is used to mark directives that are conditional. The directives within an IfDefine section are only processed if the test is true. If the test is false, everything between the start and end markers is ignored.

The *test* in the <IfDefine> section directive can be one of the two forms:

- *parameter-name*
- *!parameter-name*

In the former case, the directives between the start and end markers are only processed if the parameter named *parameter-name* is defined. The second format reverses the test, and only processes the directives if *parameter-name* is not defined.

Parameter: *parameter-name*

- The *parameter-name* parameter is defined as given on the STRTCPSVR command line vie `-D Dparameter`, at the time the server was started. <IfDefine> sections are nestable, which can be used to implement simple mutliple-parameter tests. For example:

  ```
  STRTCPSVR SERVER(*HTTP) HTTPSVR(instanceName '-D LDAP')
  # in the instance configuration
  <IfDefine LDAP>
     LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM
  </IfDefine>
  ```

  If customer has included "<IfDefine keyword> ... </IfDefine> in http.conf file, the directives that are in context will be only valid if the command "STRTCPSVR" has included this directive, in this case " STRTCPSVR '-Dkeyword' ", if not, the server will ignored then.

<IfModule>

Module: core

Syntax: <IfModule [*!*]*module-name*> ... </IfModule>

Default: none

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Example: <IfModule test>

The <IfModule> directive is used to mark directives that are conditional. The directives within an <IfModule> section are only processed if the test is true. If the test is false, everything between the start and end markers is ignored.

The *test* in <IfModule> section directive can be one of two forms:

- *module-name*
- *!module-name*

Parameter: *module-name*

- The *module-name* parameter is a module name as given as the file name of the module at the time it was compiled. For example:

  ```
  mod_rewrite.c
  ```

<IfModule> sections are nestable which can be used to implement simple multiple-module tests.

Include

Module: core

Syntax: Include *filename|wildcard*

Default: none

Context: server config, virtual host, directory

Override: none

Origin: Apache

Example: Include conf/mydirectory/myfile

Example: Include conf/vhosts/*.conf

The "Include " on page 331 directive allows inclusion of other configuration files from within the server configuration files. The filename can be either a relative or absolute path.

Parameter: *filename|wildcard*

- The *filename* value identifies other configuration files from within the server configuration files.
- The *wildcard* value identifies other configuration files that match a particular pattern from within the server configuration files.

Wildcard characters can be used in the filename or directory parts of the path to include several files at once, in alphabetical order. In addition, if Include points to a directory, rather than a file, HTTP server will read all files in that directory and any subdirectory. However, including entire directories is not recommended, because it is easy to accidentally leave temporary files in a directory that can cause HTTP server to fail. Instead, we encourage you to use the wildcard syntax to include files that match a particular pattern, such as Include conf/vhosts/*.conf, for example.

The "Include " on page 331 directive will fail with an error if a wildcard expression does not match any file. The "IncludeOptional" on page 332 directive can be used if non-matching wildcards should be ignored.

Wildcards may be included in the directory or file portion of the path. This example will fail if there is no subdirectory in conf/vhosts that contains at least one *.conf file:

Include conf/vhosts/*/*.conf

Alternatively, the following command will just be ignored in case of missing files or directories:

IncludeOptional conf/vhosts/*/*.conf

Note: The filename specified with this directive must be in a file in the Root or QOpenSys file systems. Other file systems are not supported.

See also “IncludeOptional” on page 332

IncludeOptional

Module: core

Syntax: Include *filename|wildcard*

Default: None

Context: server config, Virtual Host, directory

Override: none

Origin: Apache

This directive allows inclusion of other configuration files from within the server configuration files. It works identically to the “Include ” on page 331 directive, with the exception that if wildcards do not match any file or directory, the “IncludeOptional” on page 332 directive will be silently ignored instead of causing an error.

Parameter: *filename|wildcard*

- The *filename* value identifies other configuration files from within the server configuration files.
- The *wildcard* value identifies other configuration files that match a particular pattern from within the server configuration files.

See also “Include ” on page 331

KeepAlive

Module: core

Syntax: KeepAlive *on | off*

Default: KeepAlive on

Context: server config, virtual host, Not in Limit

Override: none

Origin: Apache

Example: KeepAlive off

The KeepAlive directive enables keep-alive support (also known as persistent connections).

Parameter: *on | off*

- When set to *on*, the directive enables keep-alive support (also known as persistent connections).
- When set to *off*, keep-alive support (also known as persistent connections) is disabled.

Persistent connections enable a single TCP connection to be used for multiple HTTP requests. Normally, each HTTP request uses a separate connection. Reusing a single connection reduces the connection open/close overhead, thereby improving performance for that client. However with dynamic content, depending on your Web applications, using persistent connections can reserve server resources for each client, thereby reducing the throughput of your server as a whole. Therefore, care should be taken when modifying persistent connection related settings.

Set to *off* to disable persistent connections, on to enable. If the KeepAlive directive value is not *off* or zero, *on* is assumed.

See also “KeepAliveTimeout” on page 332 and “MaxKeepAliveRequests” on page 346.

KeepAliveTimeout

Module: core

Syntax: KeepAliveTimeout *num[ms]*

Default: KeepAliveTimeout 300

Context: server config, virtual host

Override: none

Origin: Apache

Example: KeepAliveTimeout 500

The KeepAliveTimeout directive is related to persistent connections and determines the number of seconds HTTP Server waits for a subsequent request before closing the connection. By adding a postfix of ms the timeout can be also set in milliseconds. The KeepAlive directive must be set to *on*, enabling persistent connections, for this directive to take effect. It is recommended that this value be set high enough to prevent time outs. Note that this is related to the time between requests and not during requests. Once a request is received, the connection timeout setting (set by the TimeOut directive) applies. The connection time-out applies until request processing is complete and (until the next request is received) the persistent connections related timer setting is applied.

Parameter: *num[ms]*

- The *num* value determines the number of seconds or milliseconds if it ends with 'ms' that HTTP Server waits for a subsequent request before closing the connection.

If KeepAliveTimeout is **not** set for a name-based virtual host, the value of the first defined virtual host best matching the local IP and port will be used.

See also "KeepAlive " on page 332, "MaxKeepAliveRequests" on page 346, and "TimeOut" on page 361.

<Limit>

Module: core

Syntax: <Limit *method [method]...* > ... </Limit>

Default: none

Context: directory, .htaccess

Override: AuthConfig, Limit

Origin: Apache

Example: <Limit GET PUT>

The purpose of the <Limit> directive is to restrict the effect of the access controls to the nominated HTTP methods. For all other methods, the access restrictions that are enclosed in the <Limit> bracket will have no effect. The following example applies the access control only to the methods POST, PUT, and DELETE, leaving all other methods unprotected:

```
<Limit POST PUT DELETE>
   require valid-user
</Limit>
```

Access controls are normally effective for all access methods, and this is the usual desired behavior. In the general case, access control directives should not be placed within a <Limit> section.

Parameter: *method*

- *Method* names listed can be one or more of the following: **GET**, **POST**, **PUT**, **DELETE**, **CONNECT**, **OPTIONS**, **PATCH**, **PROPFIND**, **PROPPATCH**, **MKCOL**, **COPY**, **MOVE**, **LOCK** and **UNLOCK**. The method name is case sensitive. If GET is used it will also restrict HEAD requests. The TRACE method cannot be limited.

A “<LimitExcept>” on page 334 section should always be used in preference to a “<Limit>” on page 333 section when restricting access, since a “<LimitExcept>” on page 334 section provides protection against arbitrary methods.

The “<Limit>” on page 333 and “<LimitExcept>” on page 334 directives may be nested. In this case, each successive level of “<Limit>” on page 333 or “<LimitExcept>” on page 334 directives must further restrict the set of methods to which access controls apply.

When using “<Limit>” on page 333 or “<LimitExcept>” on page 334 directives with the Require directive, note that the first Require to succeed authorizes the request, regardless of the presence of other Require directives.

For example, given the following configuration, all users will be authorized for POST requests, and the Require group editors directive will be ignored in all cases:

```
<LimitExcept GET>
  Require valid-user
</LimitExcept GET>
```

```
<LimitExcept POST>
  Require group editors
</LimitExcept POST>
```

<LimitExcept>

Module: core

Syntax: <LimitExcept *method [method] ...* > ... </LimitExcept>

Default: none

Context: directory, .htaccess

Override: AuthConfig, Limit

Origin: Apache

Example: <LimitExcept GET >... </LimitExcept>

<LimitExcept> and </LimitExcept> are used to enclose a group of access control directives which will then apply to any HTTP access method not listed in the arguments; for example, it is the opposite of a “<Limit>” on page 333 section and can be used to control both standard and nonstandard-unrecognized methods. See “<Limit>” on page 333 for more details.

For example:

```
<LimitExcept POST GET>
  Require valid-user
</LimitExcept>
```

Parameter: *method*

- *Method* names listed can be one or more of the following: **GET**, **POST**, **PUT**, **DELETE**, **CONNECT**, **OPTIONS**, **TRACE**, **PATCH**, **PROPFIND**, **PROPPATCH**, **MKCOL**, **COPY**, **MOVE**, **LOCK** and **UNLOCK**. The method name is case sensitive. If GET is specified, HEAD is also allowed (not restricted).

LimitRequestBody

Module: core

Syntax: LimitRequestBody *number*

Default: LimitRequestBody 0

Context: serve config, virtual host, directory, .htaccess

Override: All

Origin: Apache

Example: LimitRequestBody 100

The LimitRequestBody directive allows the user to set a limit on the allowed size (in bytes) of an HTTP Request message body within the context in which the directive is given (server, per-directory, per-file or per-location). If the client Request exceeds that limit, the server will return an error response instead of servicing the Request. The size of a normal Request message body will vary greatly depending on the nature of the resource and the methods allowed on that resource. CGI scripts typically use the message body for passing form information to the server. Implementations of the PUT method will require a value at least as large as any representation that the server wants to accept for that resource.

This directive gives the server administrator greater control over abnormal client Request behavior, which may be useful for avoiding some forms of denial-of-service attacks.

Parameter: ***number***

- The *number* parameter is an integer which represents the set limit on the allowed size (in bytes) of an HTTP Request message body within the context in which the directive is given (server, per-directory, per-file or per-location). The default value of '0' (zero) indicated unlimited allowed size.

For example, to limit the size of an uploaded file to 100K use the following:

```
LimitRequestBody 10240
```

LimitInternalRecursion

Module: core

Syntax: LimitInternalRecursion *number [number]*

Default: LimitInternalRecursion 10

Context: server, virtual host

Override: none

Origin: Apache

Example: LimitInternalRecursion 5

An internal redirect happens, for example, when using the Action directive, which internally redirects the original request to a CGI script. A subrequest is Apache's mechanism to find out what would happen for some URI if it were requested. For example, mod_dir uses subrequests to look for the files listed in the DirectoryIndex directive.

LimitInternalRecursion prevents the server from crashing when entering an infinite loop of internal redirects or subrequests. Such loops are usually caused by misconfigurations.

The directive stores two different limits, which are evaluated on per-request basis. The first number is the maximum number of internal redirects that may follow each other. The second number determines how deeply subrequests may be nested. If you specify only one number, it will be assigned to both limits.

LimitRequestFields

Module: core

Syntax: LimitRequestFields *number*

Default: LimitRequestFields 100

Context: server config, Not in Limit

Override: none

Origin: Apache

Example: LimitRequestFields 800

The LimitRequestFields directive allows the server administrator to modify the limit on the number of Request header fields allowed in an HTTP Request. A server needs this value to be larger than the number of fields that a normal client Request might include. The number of Request header fields used by a client rarely exceeds 20, but this may vary among different client implementations, often depending upon the extent to which a user has configured their browser to support detailed content negotiation. Optional HTTP extensions are often expressed using Request header fields.

This directive gives the server administrator greater control over abnormal client Request behavior, which may be useful for avoiding some forms of denial-of-service attacks. The value should be increased if normal clients see an error response from the server that indicates too many fields were sent in the Request.

Parameter: *number*

- The *number* parameter is an integer from 0 (meaning unlimited) to 32767 bytes. The default value is 100.

LimitRequestFieldsize

Module: core

Syntax: LimitRequestFieldsize *number*

Default: LimitRequestFieldsize 32766

Context: server config, Not in Limit

Override: none

Origin: Apache

Example: LimitRequestFieldsize 8000

The LimitRequestFieldsize directive allows the server administrator to reduce the limit on the allowed size of an HTTP Request header field below the normal input buffer size compiled with the server. A server needs this value to be large enough to hold any one header field from a normal client Request. The size of a normal Request header field will vary greatly among different client implementations, often depending upon the extent to which a user has configured their browser to support detailed content negotiation.

This directive gives the server administrator greater control over abnormal client Request behavior, which may be useful for avoiding some forms of denial-of-service attacks. Under normal conditions, the value should not be changed from the default.

Parameter: *number*

- A *number* is an integer from 0 to 32766 (in bytes).

Note: When name-based virtual hosting is used, the value for this directive is taken from the default (first-listed) virtual host best matching the current IP address and port combination.

LimitRequestLine

Module: core

Syntax: LimitRequestLine *number*

Default: LimitRequestLine 8190

Context: server config, Not in Limit

Override: none

Origin: Apache

Example: LimitRequestLine 8000

The LimitRequestLine directive allows the server administrator to reduce the limit on the allowed size of a client's HTTP Request-line below the normal input buffer size compiled with the server. Since the Request-line consists of the HTTP method, URI, and protocol version, the LimitRequestLine directive places a restriction on the length of a Request-URI allowed for a Request on the server. A server needs this value to be large enough to hold any of its resource names, including any information that might be passed in the query part of a GET Request.

This directive gives the server administrator greater control over abnormal client Request behavior, which may be useful for avoiding some forms of denial-of-service attacks. Under normal conditions, the value should not be changed from the default.

Parameter: *number*

- A *number* is an integer from 0 to 8190 (in bytes).

LimitXMLRequestBody

Module: core

Syntax: LimitXMLRequestBody *number*

Default: LimitXMLRequestBody 1000000

Context: server config, virtual host, directory (but not location), .htaccess, Not in Limit

Override: none

Origin: Apache

Example: LimitXMLRequestBody 1000000

The LimitXMLRequestBody directive limits (in bytes) the maximum size of an XML-based request body.

Parameter: *number*

- A *number* is an integer from 0 (meaning unlimited) to 715827881.

Listen

Module: core

Syntax: Listen [*IP address:*] *port number [protocol]*

Default: Listen 80

Context: server config

Override: none

Origin: Apache

Example: Listen 8000

Example: Listen 8000 FRCA

Note: FRCA support for the Listen directive is not available for V5R1 and earlier releases of HTTP Server.

The Listen directive instructs HTTP Server to listen to more than one IP address or port; by default the server responds to requests on all IP interfaces. It tells the server to accept incoming requests on the specified IP address or address-and-port combinations. If the first format is used, with an IP address number only, the server listens to the given IP address. If an IP address is given as well as a port, the server will listen on the given port and interface.

Parameter One: *IP address*

- The *IP address* parameter specifies a fully qualified IP address.

Parameter Two: *port number*

- The *port number* parameter is optional and if specified as word "FRCA", implies the incoming connections on the specified IP address and port are eligible to be monitored and served by FRCA cache support.

  Note: FRCA does not support SSL. Therefore, do not specify FRCA option for IP addresses and ports that are used for SSL connections.

Parameter Three: *[protocol]*

- The *[protocol]* parameter is optional and if specified as word "FRCA", implies the incoming connections on the specified IP address and port are eligible to be monitored and served by FRCA cache support.

  Note: FRCA does not support SSL. Therefore, do not specify FRCA option for IP addresses and ports that are used for SSL connections.

Multiple Listen directives may be used to specify a number of addresses and ports to listen to. The server will respond to requests from any of the listed addresses and ports.

To make the server accept connections on both port 80 and port 8000, use:

```
Listen 80
Listen 8000
```

To make the server accept connections on two specified interfaces and port numbers, use:

```
Listen 194.170.2.1:80
Listen 194.170.2.5:8000
```

IPv6 addresses must be surrounded in square brackets, as in the following example:

```
Listen [2001:db8::a00:20ff:fea7:ccea]:80
```

To make the FRCA monitor and intercept connections on a specified interface and port numbers, use:

```
Listen 194.170.2.5:8000 FRCA
```

In the above example, since the optional parameter *FRCA* is specified, FRCA will be enabled for the specified IP address and port.

The optional protocol argument is not required for most configurations. If not specified, https is the default for port 443 and http the default for all other ports.

You only need to set the protocol if you are running on non-standard ports. For example, running an https site on port 8443:

```
Listen 192.170.2.1:8443 https
```

Error condition: Multiple Listen directives for the same ip address and port will result in an Address already in use error message.

ListenBacklog

Module: core

Syntax: ListenBacklog *backlog*

Default: ListenBacklog 511

Context: server config, Not in Limit

Override: none

Origin: Apache

Example: ListenBacklog 400

The ListenBacklog sets the maximum length of the queue for pending connections. Generally no tuning is needed; however, on some systems it is desirable to increase this when under a TCP SYN flood attack.

Parameter: *backlog*

- The *backlog* parameter is an integer value that sets the maximum length of the queue for pending connections.

<Location>

Module: core

Syntax: <Location *url*> ... </Location>

Default: none

Context: server config, virtual host, Not in Limit

Override: none

Origin: Apache

Example:

```
Alias /a /b
<Location /a>
```

The <Location> directive limits the scope of the enclosed directives by URL (the URL is the virtual path used to access a resource), and is similar to the “<Directory> ” on page 311 and <Proxy> directives, and starts a subsection which is terminated with a </Location> directive. Everything that is syntactically allowed in <Directory> is also allowed in <Location> (except a sub-“<Files>” on page 323 section). However some directives, most notably the “AllowOverride” on page 306 directive and two of its options (FollowSymLinks and SymLinksIfOwnerMatch) do not belong in <Location>. <Location> sections are processed in the order they appear in the configuration file (as opposed to <Directory> sections which are processed from the least match to the best match). They are processed after the <Directory> and <Proxy> sections, after .htaccess files are read, and after the <Files> sections. See “<Directory> ” on page 311, <Proxy>, “<Files>” on page 323, and “AllowOverride” on page 306 directives for more information on <Directory>, <Proxy>, and <Files> containers and access files.

Parameter : *url*

- The *url* parameter consists of a URL.

  For all origin (non-proxy) requests, the URL to be matched is of the form /path/. The URL should not include the `http://servername prefix`. For proxy requests, the matched URL is of the form `http://servername/path` (you must include the prefix).

  The URL may use wildcards in a wildcard string. '?' matches any single character; '*' matches any sequence of characters.

Note: URLs do not have to line up with the file system. <Location> operates completely outside the file system.

Extended regular expressions can also be used, with the addition of the ~ character. For example:

```
<Location ~ "/(extra|special)/data">
```

This would match URLs that contained the substring "/extra/data" or "/special/data". The directive “<LocationMatch>” on page 340 behaves identical to the regex version of <Location>. The <Location>

functionality is especially useful when combined with the “SetHandler” on page 359 directive. For example, to enable origin requests, but allow them only from browsers at QIBM.com, you might use:

```
<Location /Origin>
   SetHandler server-Origin
   Require host .QIBM.com
</Location>
```

Note: The slash character has special meaning depending on where in a URL it appears. People may be used to its behavior in the file system where multiple adjacent slashes are frequently collapsed to a single slash (for example, `/home///QIBM` is the same as /home/QIBM). For <Location> this is not necessarily true. The <LocationMatch> directive and the regex version of <Location> require you to explicitly specify multiple slashes if that is your intention. For example, `<LocationMatch ^/ABC>` would match the request URL /ABC but not the request URL //ABC. The (non-regex) <Location> directive behaves similarly when used for proxy requests. But when (non-regex) <Location> is used for non-proxy requests it will implicitly match multiple slashes with a single slash. For example, if you specify `<Location /ABC/def>` and the request is to `/ABC//def`, the request will match the location.

<LocationMatch>

Module: core

Syntax: <LocationMatch *regex*> ... </LocationMatch>

Default: none

Context: server config, virtual host, Not in Limit

Override: none

Origin: Apache

Example: <LocationMatch "/(extra|special)/data">

The <LocationMatch> directive provides for access control by URL. This directive works in an identical manner to the “<Location> ” on page 339 directive. However, it takes a regular expression as an argument instead of a simple string. For example:

```
<LocationMatch "/(extra|special)/data">
    # ...
</LocationMatch>
```

This would match URLs that contained the substring "/extra/data" or "/special/data". (NOTE: the argument to LocationMatch does not need to be in quotes unless the regular expression includes a space character.)

If the intent is that a URL **starts with** /extra/data, rather than merely **contains** /extra/data, prefix the regular expression with a ^ to require this.

```
<LocationMatch "^/(extra|special)/data">
```

Named groups and backreferences are captured and written to the environment with the corresponding name prefixed with "MATCH_" and in upper case. This allows elements of URLs to be referenced from within expressions and modules like mod_rewrite. In order to prevent confusion, numbered (unnamed) backreferences are ignored. Use named groups instead.

For example:

```
<LocationMatch "^/combined/(?<sitename>host\d)/$">
    Options Indexes FollowSymLinks
    RewriteEngine On
    RewriteCond "%{env:MATCH_SITENAME}"  "^host1"
    RewriteRule .* success.html
    Require all granted
</LocationMatch>
```

LogCycle

Module: core

Syntax: LogCycle *Off | Hourly | Daily | Weekly | Monthly*

Default: LogCycle Daily

Context: server config, Not in Limit

Override: none

Origin: IBM

Example: LogCycle Monthly

The LogCycle directive controls the server's log cycle. This refers to how often the server will close all log files and open new files with a new date/time stamp.

Parameter: *Off | Hourly | Daily | Weekly | Monthly*

- If *Off* is specified, one continuous log file is generated. Log files are not rolled over.
- If *Hourly* is specified, log files are closed and a new one created at the end of each hour.
- If *Daily* is specified, log files are closed and a new one created at midnight each day.
- If *Weekly* is specified, log files are closed and a new one created at midnight each Sunday morning. Weekly may not work correctly if the system is not using the Gregorian calendar (this would be similar to the help behind system value QDAYOFWEEK).
- If *Monthly* is specified, log files are closed and a new one created at midnight on the first day of the month.

Note: Daily and monthly log rollovers will always occur at midnight. Hourly rollovers will occur at the top of the hour. At the end of a log cycle, HTTP Server will roll over all logs. That means that it will flush all entries to the log file, close the current logs, and create a log file with a timestamp for the next log cycle.

If LogCycle is active and the path defined on an ErrorLog, CustomLog, TransferLog, or FRCACustomLog directive ends without a (/) character, then the path is considered to be the complete log file name. In that case, the server will add an extension to the given file with the format QCYYMMDDHH, where these variables have the following values:

- Q is a default value that indicates to the server that this is a log file.
- C is the century indicator (0 for pre-2000, 1 for post-2000)
- YY is the year indicator
- MM is the month indicator
- DD is the day indicator
- HH is the hour indicator (00 = 00:00 (midnight), 23=23:00)

  Note: HH will not be generated for file system QDLS.

For example, a path of "`/logs/errorlog`" results in a file such as "`/logs/errorlog.Q100030300`".

If LogCycle is active and the path defined on an ErrorLog, CustomLog, TransferLog, or FRCACustomLog directive ends with a (/) character, then the path is considered to be the directory that will contain the log file. In that case, the server will create log files named in the QCYYMMDDHH format. For example, a path of "/logs/errorlog/" created on March 3, 2001 results in a file such as "/logs/errorlog/Q101030300".

If LogCycle is active and the path defined on an ErrorLog, CustomLog, TransferLog, or FRCACustomLog directive is in the QSYS file system, the name must end with the file component of the IFS path. Fore example:

```
# Config file directives
LogCycle Daily
LogFormat "%h %l %u %t \"%r\" %>s %b" common
CustomLog /QSYS.LIB/MYLIB.LIB/MYLOGS.FILE common
```

The resulting daily log rollovers will be of the form /QSYS.LIB/MYLIB.LIB/MYLOGS.FILE/Qcyymmddhh.MBR.

If LogCycle is not active, no special naming is used. The name of the log file given on an ErrorLog, CustomLog, TransferLog, or FRCACustomLog directive is used as given for the name of the log file.

If LogCycle *Weekly* is specified, rollover will occur when QDAYOFWEEK is equal to *SUN. However, if the system is not using the Gregorian calendar, this value may not be set correctly and the logs may not get rolled over as expected.

LogCycle *Hourly* is not valid if the log file is in the QDLS file system as that file system only supports 8 character file names and 3 character extensions.

LogLength

Module: core

Syntax: LogLength *number-of-bytes*

Default: LogLength 0

Context: server config, Not in Limit

Override: none

Origin: IBM

Example: LogLength 1000000

The LogLength directive limits the size of any defined log file. To prevent problems due to unbounded growth of log files, this directive can be used to set an maximum file-size for log files. If the file exceeds this size, no more information will be written to it until logs and alertable message HTP8433 will be sent to QSYSOPR. The server will automatically restart logging requests when the logs are rolled over to the next log cycle. This directive can be specified multiple times in the configuration file.

Parameter: *number-of-bytes*

- The *number-of-bytes* parameter is an integer value that sets the maximum size limit of the log file. When any defined log file (those defined with CustomLog, TransferLog, FRCACustomLog, or ErrorLog directives) exceeds this value, no more information will be logged until log rollover occurs. An alertable message TCP7201 will be sent to QSYSOPR. A value of 0 means there is no limit. If 'LogCycle Off' is specified and a non-zero value is specified for LogLength, when the LogLength size is reached no more logging will be done (even on starts and restarts of the server instance) since the same file will be used every time.

Security notes:

- Security could be compromised if the directory where log files are stored is writable by anyone other than the user that starts the server.
- If a program is used, then it will be run under the user who started httpd. Be sure that the program is secure.

LogLevel

Module: core

Syntax: LogLevel *[module:]level [module:level] ...*

Default: LogLevel warn

Context: server config, virtual host, directory

Override: none

Origin: Apache

Example: LogLevel debug

Example: LogLevel info ibm_ssl_module:warn

The LogLevel directive adjusts the verbosity of the messages recorded in the error logs. See the "ErrorLog " on page 318 directive for more information. The following levels are available, in order of decreasing significance:

Parameter: *[module:]level [module:level] ...*

Level can be one of the following values:

- If *emerg*, system is unusable messages ("Child cannot open lock file. Exiting.").
- If *alert*, action must be taken immediately messages ("getpwuid: couldn't determine user name from uid.").
- If *crit*, critical conditions messages ("Socket: Failed to get socket, exiting child.").
- If *error*, error conditions messages ("Premature end of script headers.").
- If *warn*, warning conditions messages ("Child process 1234 did not exit, sending another SIGHUP."). If notice, normal but significant conditions messages ("httpd: caught SIGBUS, attempting to dump core in...").
- If *info*, informational messages ("Server seems busy, (you may need to increase ThreadPerChild)...").
- If *debug*, debug-level messages ("Opening config file...").
- If *trace1*, trace messages ("proxy: FTP: control connection complete").
- If *trace2*, trace messages (""proxy: CONNECT: sending the CONNECT request to the remote proxy"").
- If *trace3*, trace messages ("openssl: Handshake: start").
- If *trace4*, trace messages ("read from buffered SSL brigade, mode 0, 17 bytes").
- If *trace5*, trace messages ("map lookup FAILED: map=rewritemap key=keyname").
- If *trace6*, trace messages ("cache lookup FAILED, forcing new map lookup").
- If *trace7*, trace messages , dumping large amounts of data ("| 0000: 02 23 44 30 13 40 ac 34 df 3d bf 9a 19 49 39 15 |").
- If *trace8*, trace messages , dumping large amounts of data ("| 0000: 02 23 44 30 13 40 ac 34 df 3d bf 9a 19 49 39 15 |").

When a particular level is specified, messages from all other levels of higher significance will be reported as well. For example, when LogLevel *info* is specified, then messages with log levels of *notice* and *warn* will also be posted. Using a level of at least *crit* is recommended.

Specifying a level without a module name will reset the level for all modules to that level.

Specifying a level with a module name will set the level for that module only. It is possible to use the module source file name, the module identifier, or the module identifier with the trailing _module omitted as module specification. This means the following three specifications are equivalent:

LogLevel info ibm_ssl:warn

LogLevel info mod_ssl.c:warn

LogLevel info ibm_ssl_module:warn

It is also possible to change the level per directory:

```
<Directory "/www/apache/htdocs/app">
  LogLevel debug
</Directory>
```

Per directory loglevel configuration only affects messages that are logged after the request has been parsed and that are associated with the request. Log messages which are associated with the connection or the server are not affected.

See also "ErrorLog " on page 318, "ErrorLogFormat" on page 320

LogMaint

Module: core

Syntax: LogMaint *path_to_file expire size_limit*

Default: none

Context: server config, virtual host

Override: none

Origin: IBM

Example: LogMaint logs/access_log 10 2000000

Note: If this directive is not present, log maintenance is not performed. If the directive is present, all parameters are required. Values of 0 for *expire* and *size_limit* have a special meaning of *no limit*. If a LogMaint directive with values of 0 for both *expire* and *size_limits* specified, no log maintenance will be done on the specified file.

The LogMaint directive allows you perform log maintenance on the specified file and its derivatives. When log maintenance is performed on a file, it is purged from the system. Derivatives consist of either the path_to_file name provided, concatenated with the extension ".Qcyymmdd", or "Qcyymmdd" if the provided path_to_file value was a directory. LogCycle must be active in order to enable derivatives.

A separate LogMaint directive is required in the server configuration for each CustomLog or ErrorLog that requires log maintenance. The recommended way to configure maintenance is to match the path configured on the LogMaint directive with the path specified on the associated CustomLog or ErrorLog directive.

Parameter One: *path_to_file*

- The *path_to_file* value specifies the IFS-style path (for example, /QSYS.LIB/MYHTTP.LIB/MYLOGS.FILE) of the log file to be included in log maintenance. Refer to the "LogCycle" on page 341 directive for more information on log file names and extensions.

Parameter Two: *expire*

- The *expire* value specifies an integer value indicating the number of days before a log file expires. Files older than this value are to be removed. A value of 0 means the log file will never expire. The age of the error log file is determined by the file creation date (as reported by the operating system). The file name suffix, such as errorlog.Q100082213, is not used to determine the age of the file. Files that are currently open and active in the server instance will not be removed.

Parameter Three: *size_limit*

- The *size_limit* value specifies an integer value indicating the maximum aggregate size of log files with the name path_to_file. When the combined size of the log files exceeds this value in bytes, files are deleted starting with the oldest file. Eligible files are deleted until the collective size is less than or equal to the value specified on this directive. A value of 0 means there is no size limit. Note that it is possible for the aggregate size of log files to exceed the total size_limit. This is possible due to the fact that the size of any open log files are not included in the size_limit total. Users should take this into account when they are calculating a value for size limit, and when setting a maximum value for the LogLength directive.

If both *expire* and *size_limit* are configured to non-zero values, the expired files are purged first. If the size_limits still exceeded after expired files are purged, the server continues purging files (oldest files first) until the collective log size is equal to or less than the size_limit.

Note: If invalid values are used for *expire* or *size_limit*, an error message will be placed into the job log and the HTTP Server will not start.

The following example of log maintenance will be performed on the logs/access_log file and its derivatives (see below for details). The files will expire after 10 days. In addition, if the total limit exceeds 2,000,000 bytes, log maintenance will be performed.

```
LogFormat "%h %l %u %t \"%r\" %>s %b" common
CustomLog logs/access_log common
LogMaint logs/access_log 10 2000000
```

The following example of log maintenance will be performed on the /QSYS.LIB/MYHTTP.LIB/MYLOGS.FILE/Q* files. The files will expire after 25 days and there is no total limit on the size of the files.

```
LogFormat "%h %l %u %t \"%r\" %>s %b" common
CustomLog /QSYS.LIB/MYHTTP.LIB/MYLOGS.FILE common
LogMaint /QSYS.LIB/MYHTTP.LIB/MYLOGS.FILE 25 0
```

Only one occurrence of this directive can exist per server or virtual host container. If the directive occurs more than once, the last one specified in the server or virtual host is used.

Note: If LogCycle is configured to Off, then log maintenance is not performed.

LogMaintHour

Module: core

Syntax: LogMaintHour *variable*

Default: LogMaintHour 0

Context: server config, virtual host

Override: none

Origin: IBM

Example: LogMaintHour 3

The LogMaintHour directive may be used to control which hour of the day log maintenance occurs. The default is for log maintenance to occur at midnight. Log maintenance always occurs at the beginning of the hour. By using this directive, which hour of the day maintenance will occur can be controlled, to do maintenance in the early morning or in the evening after the normal work day is done.

LogTime

Module: core

Syntax: LogTime *LocalTime | GMT*

Default: LogTime LocalTime

Context: server config, virtual host, Not in Limit

Override: none

Origin: IBM

Example: LogTime GMT

The LogTime directive specifies whether your log should record entrees using local time or Greenwich Mean Time (GMT). This directive affects timestamps for log entries only.

Parameter: *LocalTime | GMT*

- *LocalTime* indicates the local time for log entry timestamps.
- *GMT* indicates the Greenwich Mean Time for log entry timestamp.

MaxKeepAliveRequests

Module: core

Syntax: MaxKeepAliveRequests *number*

Default: MaxKeepAliveRequests 100

Context: server config, virtual host, Not in Limit

Override: none

Origin: Apache

Example: MaxKeepAliveRequests 50

The MaxKeepAliveRequests directive limits the number of requests allowed per connection when "KeepAlive " on page 332 is on. If it is set to 0, unlimited requests will be allowed.

Parameter: *number*

- The *number* parameter specifies an integer value that limits the number of requests allowed per connection when KeepAlive is on.

See "KeepAlive " on page 332, and "KeepAliveTimeout" on page 332.

MaxRangeOverlaps

Module: core

Syntax: MaxRangeOverlaps *default | unlimited | none | number-of-ranges*

Default: MaxRangeOverlaps 20

Context: Server config, Virtual Host, directory

Override: none

Origin: Apache

The MaxRangeOverlaps directive limits the number of overlapping HTTP ranges the server is willing to return to the client. If more overlapping ranges than permitted are requested, the complete resource is returned instead.

Parameter: *default | unlimited | none | number-of-ranges*

- *default* indicates the number of overlapping ranges is limited to a compile-time default of 20.
- *none* indicates no overlapping Range headers are allowed.
- *unlimited* indicates the server does not limit the number of overlapping ranges it is willing to satisfy.
- The *number-of-ranges* parameter specifies a positive number representing the maximum number of overlapping ranges the server is willing to satisfy.

MaxRangeReversals

Module: core

Syntax: MaxRangeReversals *default | unlimited | none | number-of-ranges*

Default: MaxRangeReversals 20

Context: Server config, Virtual Host, directory

Override: none

Origin: Apache

The MaxRangeReversals directive limits the number of HTTP Range reversals the server is willing to return to the client. If more ranges reversals than permitted are requested, the complete resource is returned instead.

Parameter: *default | unlimited | none | number-of-ranges*

- *default* indicates the number of range reversals is limited to a compile-time default of 20.
- *none* indicates no Range reversals headers are allowed.
- *unlimited* indicates the server does not limit the number of range reversals it is willing to satisfy.
- The *number-of-ranges* parameter specifies a positive number representing the maximum number of range reversals the server is willing to satisfy.

MaxRanges

Module: core

Syntax: MaxRanges *default | unlimited | none | number-of-ranges*

Default: MaxRanges 200

Context: Server config, Virtual Host, directory

Override: none

Origin: Apache

The MaxRanges directive limits the number of HTTP ranges the server is willing to return to the client. If more ranges than permitted are requested, the complete resource is returned instead.

Parameter: *default | unlimited | none | number-of-ranges*

- *default* indicates the number of ranges is limited to a compile-time default of 200.
- *none* indicates Range headers are ignored.
- *unlimited* indicates the server does not limit the number of ranges it is willing to satisfy.
- The *number-of-ranges* parameter specifies a positive number representing the maximum number of ranges the server is willing to satisfy.

MergeSlashes

Module: core

Syntax: MergeSlashes *on | off*

Default: MergeSlashes on

Context: Server, Virtual Host

Override: none

Origin: Apache

Example: MergeSlashes Off

By default, the server merges (or collapses) multiple consecutive slash ('/') characters in the path component of the request URL.

When mapping URL's to the filesystem, these multiple slashes are not significant. However, URL's handled other ways, such as by CGI or proxy, might prefer to retain the significance of multiple consecutive slashes. In these cases MergeSlashes can be set to OFF to retain the multiple consecutive slashes. In these configurations, regular expressions used in the configuration file that match the path component of the URL (LocationMatch, RewriteRule, ...) need to take into account multiple consecutive slashes.

MergeTrailers

Module: core

Syntax: MergeTrailers *on | off*

Default: MergeTrailers off

Context: Server Config, Virtual Host

Override: none

Origin: Apache

Example: MergeTrailers on

This directive controls whether HTTP trailers are copied into the internal representation of HTTP headers. This merging occurs when the request body has been completely consumed, long after most header processing would have a chance to examine or modify request headers.

The option on is provided for compatibility with previous releases of HTTP server, where trailers were always merged.

NameVirtualHost

Module: core

Syntax: NameVirtualHost *address*[*:port*]

Default: none

Context: server config

Override: none

Origin: Apache

Example: NameVirtualHost 10.1.1.1

Prior to i 7.2, NameVirtualHost was required to instruct the server that a particular IP address and port combination was usable as a name-based virtual host. In i 7.2 and later, any time an IP address and port combination is used in multiple virtual hosts, name-based virtual hosting is automatically enabled for that address.

This directive currently has no effect.

Options

Module: core

Syntax: Options [*+/-*]*option* [[*+/-*]*option ...*]

Default: Options FollowSymlinks

Context: server config, Virtual Host, directory, .htaccess

Override: Options

Origin: Apache

Example: Options +Indexes +FollowSymLinks

The Options directive controls which server features are available in a particular directory.

Parameter : *option*

- The option parameter can be set to one or more of the following:

Option	Description
None	None of the extra features are enabled.
All	All options except for MultiViews.
ExecCGI	Execution of CGI scripts is permitted.
FollowSymLinks	The server will follow symbolic links in this directory. This is the default setting. **Note:** Even though the server follow the SymLink, it does not change the pathname used to match against "<Directory> " on page 311 sections. This option gets ignored if set inside "<Location> " on page 339 sections. The FollowSymLinks and SymLinksIfOwnerMatch Options work only in "<Directory> " on page 311 sections or .htaccess files. Omitting this option should not be considered a security restriction, since symlink testing is subject to race conditions that make it circumventable.
Includes	Server-side includes are permitted.
IncludesNOEXEC	Server-side includes are permitted, but the #exec command and #include of CGI scripts are disabled.
Indexes	If a URL which maps to a directory is requested and there is no DirectoyIndex (for example, index.html) in that directory, then the server will return a formatted listing of the directory.
MultiViews	Content negotiated MultiViews are allowed. **Note:** This option gets ignored if set anywhere other than "<Directory> " on page 311, as mod_negotiation needs real resources to compare against and evaluate from.
SymLinksIfOwnerMatch	The server will only follow symbolic links for which the target file or directory is owned by the same user id as the link. **Note:** The FollowSymLinks and SymLinksIfOwnerMatch "Options" on page 348 work only in "<Directory> " on page 311 sections or .htaccess files. This option should not be considered a security restriction, since symlink testing is subject to race conditions that make it circumventable.

Normally, if multiple *Options* could apply to a directory, then the most specific one is taken complete; the options are not merged. However if all the options on the Options directive are preceded by a + or - symbol, the options are merged. Any options preceded by a + are added to the options currently in force; any options preceded by a - are removed from the options currently in force.

For example, without any + and - symbols:

```
<Directory /web/docs>
   Options Indexes FollowSymLinks
</Directory>
<Directory /web/docs/spec>
   Options Includes
</Directory>
```

Then only `Includes` will be set for the `/web/docs/spec` directory. However if the second Options directive uses the + and - symbols:

```
<Directory /web/docs>
   Options Indexes FollowSymLinks
</Directory>
<Directory /web/docs/spec>
   Options +Includes -Indexes
</Directory>
```

Then the options `FollowSymLinks` and `Includes` are set for the `/web/docs/spec` directory.

Note: Using `-IncludesNOEXEC` or `-Includes` disables server-side includes completely regardless of the previous setting. The default in the absence of any other settings is FollowSymlinks.

The *option* `+IncludesNOEXEC` can be used instead of `+Includes`. If the previous is specified, then the SSI Exec tag is not processed during SSI processing.

ProfileToken

Module: core

Syntax: ProfileToken *on* | *off*

Default: ProfileToken off

Context: directory

Override: AuthConfig

Origin: IBM

Example: ProfileToken on

The ProfileToken directive creates a 32-byte value called the ProfileToken. This token is used the same way as a userid/password combination to identify/authenticate a user, and prevents passing these values in the clear. The ProfileToken value can be used on any of the IBM i security APIs that accept a ProfileToken as input.

Parameter: *on* | *off*

- If *on* is specified, and basic authentication is performed successfully, the userid/password is passed in by the user (only an IBM i user) to generate a ProfileToken. A ProfileToken is not generated if this parameter is set to off, or if basic authentication was not successful.

  The ProfileToken is accessible in a CGI program via the HTTP_AS_AUTH_PROFILETKN environment variable. The HTTP_AS_AUTH_PRFILETKN environment variable is not set if a ProfileToken is not generated.

  The ProfileToken is accessible in HTTP Server modules via the headers section (r->headers_in field), which is an internal representation of the HTTP request structure. The profile token is stored as the AS_Auth_ProfileTkn header in the headers section. HTTP Server modules can then retrieve this ProfileToken and either use it, or pass it on to another application. The AS_Auth_ProfileTkn header is not created if a ProfileToken is not generated.

QualifyRedirectURL

Module: core

Syntax: QualifyRedirectURL *ON | OFF*

Default: QualifyRedirectURL OFF

Context: server config, Virtual Host, Directory

Override: FileInfo

Origin: Apache

Example: QualifyRedirectURL ON

This directive controls whether the server will ensure that the REDIRECT_URL environment variable is fully qualified. By default, the variable contains the verbatim URL requested by the client, such as "`/index.html`". With QualifyRedirectURL ON, the same request would result in a value such as "`http://www.example.com/index.html`".

Even without this directive set, when a request is issued against a fully qualified URL, REDIRECT_URL will remain fully qualified.

ReceiveBufferSize

Module: core

Syntax: ReceiveBufferSize *bytes*

Default: ReceiveBufferSize 0

Context: server config

Override: none

Origin: Apache

The ReceiveBufferSize directive can be used to control the TCP receive buffer size for the server. The server will set the TCP receive buffer size to the number of bytes specified.

Parameter: *bytes*

- The *bytes* value is an integer that must be set to 0 or a value that is greater or equal to 512 (in bytes). If 0 is specified, the server will use the default TCP receive buffer size that is configured for the IBM i server.

RegisterHttpMethod

Module: core

Syntax: RegisterHttpMethod method [method [...]]

Default: None

Context: server config

Override: None

Origin: Apache

Example: RegisterHttpMethod UserMeth

HTTP Methods that are not conforming to the relevant RFCs are normally rejected by request processing in Apache HTTP Server. To avoid this, modules can register non-standard HTTP methods they support. The RegisterHttpMethod allows to register such methods manually. This can be useful for if such methods are forwarded for external processing, e.g. to a CGI script.

Require

Module: core

Syntax: require *entity-name entity entity...*

Default: none

Context: directory, .htaccess

Override: AuthConfig

Origin: Apache

Example: require group admin

This directive selects which authenticated users can access a directory.

Parameter: *entity-name entity entity...*

- If *require user userid userid*, then only the named users can access the directory.
- If *require group groupname groupname*, then only users in the named groups can access the directory.
- If *require valid-user*, then all valid users can access the directory.

Require must be accompanied by AuthName and AuthType directives, and directives such as PasswdFile and GroupFile (to define users and groups) in order to work correctly. For example:

```
AuthType Basic
AuthName "Restricted Directory"
PasswdFile web/users
GroupFile /web/groups
require group admin
```

Access controls which are applied in this way are effective for all methods. This is what is normally desired. If you want to apply access controls only to specific methods, while leaving other methods unprotected, then place the require statement into a <Limit> section.

Access controls can be used in a named protection setup. To implement a named protection setup, place all of the access control directives in a file. Use the Include directive to include the file in your <Directory>, <File>, or <Location> context. This allows users that want to use the same type of protection setup within multiple contexts to add an include statement inside of each context.

Note: The *require valid-user* directive parameter should NOT be configured in the same context as any *require user* or *require group* directive parameters. The require directives are processed in order (from top to bottom) as they appear in the configuration file. Since *require valid-user* allows access to any authenticated user, the *require valid-user* directive parameter effectively overrides the presence of any *require user* or *require group* directives.

RuleCaseSense

Module: core

Syntax: RuleCaseSense *on | off*

Default: RuleCaseSense off

Context: server config

Override: none

Origin: IBM

Example: RuleCaseSense on

The RuleCaseSense directive is used to control how requested URLs are handled.

Parameter: *on | off*

- When *on* is specified, the URLs are treated as case sensitive. This means that an exact match with case is required.

- When *off* is specified, the URLs are treated as case insensitive. Paths on directives and requested URLs are internally converted to upper case before they are compared.

The default value for the case sensitivity is *off*. Rules that map the same value in different cases to different things, for example ABC to XYZ, will not work correctly when RuleCaseSense is *off*. This type of mapping is not recommended.

When using protection for any URL, it is recommended that you set this directive to *off*. This ensures that all variations in case for your URLs are protected. If you do not protect any of your site, then this directive can be either *on* or *off*. Setting it to *Off* allows your users to specify any case on their URLs and enables them to see your site.

If you use the QOpenSys file system, you will have to be careful to match the case of your file system in your directives. You will also need to be aware that case differences matter when serving files from the case sensitive file system. You should only turn this directive on when absolutely necessary.

RuleCaseSense affects the processing of the incoming URL in the "URL Fixup" and "URL translation" server phases. These phases manipulate the incoming URL and do not necessarily relate to other directives. RuleCaseSense affects the following directives: Alias, AliasMatch, RewriteBase, RewriteCond, RewriteMap, RewriteRule, ScriptAlias, and ScriptAliasMatch

SendBufferSize

Module: core

Syntax: SendBufferSize *bytes*

Default: SendBufferSize 0

Context: server config

Override: none

Origin: Apache

Example: SendBufferSize 4000

The SendBufferSize directive tells the server to set the TCP buffer size to the number of specified bytes. The TCP send buffer size provides a limit on the number of outgoing bytes that are buffered by TCP. Once this limits reached, attempts to send additional bytes may result in the application blocking until the number of outgoing bytes buffered drops below this limit. The number of outgoing buffered bytes is decremented when the remote system acknowledges the sent data.

Parameter: *bytes*

- The *bytes* value is an integer that must be set to 0 or a value that is greater or equal to 512 (in bytes). If 0 is specified, the server will use the default TCP send buffer size that is configured for the IBM i server.

SendFileMinSize

Module: core

Syntax: SendFileMinSize *bytes*

Default: SendBufferSize 16000

Context: server

Override: none

Origin: Apache

Example: SendBufferSize 150

This directive specifies the minimum size of a file that is allowed to be sent via sendfile. SendFileMinSize is an IBM i specific directive. This directive may also limit the caching of local files when using the

CacheLocalFD. A file that is Cached using CacheLocalFD must be served using sendfile. Because of this, when using CacheLocalFD, a file is only cached when its size is greater than SendFileMinSize.

Note: Files larger than SendFileMinSize will not be cached dynamically.

ServerAdmin

Module: core

Syntax: ServerAdmin *email-address*

Default: none

Context: server config, Not in Limit

Override: none

Origin: Apache

Example: ServerAdmin www-admin@myserver.com

The ServerAdmin directive specifies the e-mail address to be used in trailing footer lines for hard coded error messages returned to clients. The specified value is used in hypertext link references generated by the server when "email" is specified for the "ServerSignature" on page 357 directive.

Parameter: *email-address*

- The *email-address* parameter specifies a valid email address.

For example,

```
ServerAdmin www-admin@server.ibm.com
```

Note: This setting is not used if ServerSignature is not set to "email", or for errors handled by custom error messaging (see "ErrorDocument " on page 315 for more details on custom error messaging).

ServerAlias

Module: core

Syntax: ServerAlias *host1* [*host2 ...*]

Default: none

Context: virtual host

Override: none

Origin: Apache

Example: ServerAlias ibm.com® * .ibm.com

The ServerAlias directive sets the alternate names for a host, for use with name-based virtual hosts. The ServerAlias may include wildcards, if appropriate.

The directive allows servers to be accessible by more than one name. For example, HTTP Server might want to be accessible as `ibm.org`, or `ftp.ibm.org`, assuming the IP addresses pointed to the same server. In fact, one might want it so that all addresses at ibm.org were picked up by the server. This is possible with the ServerAlias directive placed inside the "<VirtualHost> " on page 363 section.

For example,

```
<VirtualHost 10.22.33.55>
   ServerAdmin webmaster@host.QIBM.com
   DocumentRoot /usr/web/host.QIBM.com
   ServerName host.QIBM.com
   ServerAlias ibm.com *.ibm.org
   ErrorLog logs/host.QIBM.com-error_log
   TransferLog logs/host.QIBM.com-access_log
</VirtualHost>
```

Note that you can use '*' and '?' as wildcard characters. You also might need ServerAlias if you are serving local users who do not always include the domain name. For example, if local users are familiar with typing "www" or "www.physics" then you will need to add ServerAlias www www.physics. It isn't possible for the server to know what domain the client uses for their name resolution because the client doesn't provide that information in the request.

Name-based virtual hosts for the best-matching set of “<VirtualHost> ” on page 363s are processed in the order they appear in the configuration. The first matching “ServerName ” on page 355 or “ServerAlias ” on page 354 is used, with no different precedence for wildcards (nor for ServerName vs. ServerAlias).

The complete list of names in the VirtualHost directive are treated just like a (non wildcard) ServerAlias.

If multiple occurrences of this directive are configured in a container, only the last occurrence is processed. The other occurrences are ignored.

ServerName

Module: core

Syntax: ServerName *[scheme://]domain-name | ip-address[:port]*

Default: none

Context: server config, virtual host, Not in Limit

Override: none

Origin: Apache

Example: ServerName www.example.com

The ServerName directive sets the request scheme, hostname and port that the server uses to identify itself. ServerName is used (possibly in conjunction with ServerAlias) to uniquely identify a virtual host, when using name-based virtual hosts. Additionally, this is used when creating self-referential URLs when UseCanonicalName is set to a non-default value.

The ServerName directive may appear anywhere within the definition of a server. However, each appearance overrides the previous appearance (within that server). If ServerNamenot specified, the server attempts to deduce the client visible hostname by first asking the operating system for the system hostname, and if that fails, performing a reverse lookup on an IP address present on the system. however, this may not work reliably or may not return the preferred hostname.

Parameter: *fully-qualified-domain-name*

- The *fully-qualified-domain-name* parameter sets the server hostname.

For example,

```
ServerName simple.example.com:80
<VirtualHost 10.1.2.3>
   ServerAdmin webmaster@host.QIBM.com
   DocumentRoot /usr/web/host.QIBM.com
   ServerName host.QIBM.com
   ErrorLog logs/host.QIBM.com-error_log
   TransferLog logs/host.QIBM.com-access_log
</VirutalHost>
```

This would be used if the canonical (main) name of the actual machine were simple.example.com. If you are using name-based virtual hosts, the ServerName inside a “<VirtualHost> ” on page 363 section specifies what hostname must appear in the request's `Host:` header to match this virtual host.

This directive allows a port to be added to the server name. This allows an administrator to assign the canonical port at the same time that the canonical name is assigned. If no port is specified, HTTP Server implies `port 80` for `http://` and `port 443` for `https://` requests. If no port is specified in the ServerName, then the server will use the port from the incoming request. For optimal reliability and predictability, you should specify an explicit hostname and port using the ServerName directive.

This setting also specifies the server name used when trailing footer lines are added to hard coded error messages (see “ServerSignature” on page 357).

If the server runs behind a device that processes SSL, such as a reverse proxy, load balancer or SSL offload appliance, specify the `https://` scheme and the port number to which the clients connect in the ServerName directive to make sure that the server generates the correct self-referential URLs.

Note: TCP/IP must be properly configured to recognize all possible server host names.

See also “UseCanonicalName” on page 362, “NameVirtualHost” on page 348 and “ServerAlias ” on page 354.

ServerPath

Module: core

Syntax: ServerPath *pathname*

Default: none

Context: virtual host, Not in Limit

Override: none

Origin: Apache

Example: ServerPath /sub1/

The ServerPath directive sets the legacy URL pathname for a host, for use with name-based virtual hosts.

Parameter: *pathname*

- The *pathname* parameter sets the legacy URL pathname for a host, for use with name-based virtual hosts.

For example, an HTTP server exists with two name-based virtual hosts. In order to match the correct virtual host a client must send the correct `Host:` header. Old HTTP/1.0 clients do not send such a header and the server has no clue what virtual host the client tried to reach (and serves the request from the primary virtual host). To provide as much backward compatibility as possible, create a primary virtual host that returns a single page containing links with an URL prefix to the name-based virtual hosts.

A request to the URL http://www.sub1.domain.tld/sub1/ is always served from the sub1-virtual host. A request to the URL http://www.sub1.domain.tld/ is only served from the sub1-virtual host if the client sent a correct Host: header. If no `Host:` header is sent, the client gets the information page from the primary host. Note that there is one exception: a request to http://www.sub2.domain.tld/sub1/ is also served from the sub1-virtual host if the client did not send a `Host:` header. The RewriteRule directives are used to make sure that a client who sent a correct `Host:` header can use both URL variants (for example, with or without the URL prefix).

ServerRoot

Module: core

Syntax: ServerRoot *directory-path*

Default: none

Context: server config

Override: none

Origin: Apache

Example: ServerRoot /www/webserver

The ServerRoot directive sets the directory in which the server lives. Typically it will contain the subdirectories conf/ and logs/. Relative paths for other configuration files are taken as relative to this directory.

The directory-path parameter must specify a path in either the root ('/') or QOpenSys file system.

Parameter: *directory-path*

- The *directory-path* parameter sets the directory in which the server lives.

ServerSignature

Module: core

Syntax: ServerSignature *on | off | email*

Default: ServerSignature off

Context: server config, virtual host, directory, .htaccess, Not in Limit

Override: none

Origin: Apache

Example: ServerSignature on

The ServerSignature directive specifies if trailing footer lines are to be generated for hard coded error messages returned to clients. When requests pass through a chain of servers, this feature is useful to identify which server generated the error message. The default value is *off*.

Parameter: *on | off | email*

- If *on* is specified, trailing footer lines containing the server name and version information are added to hard coded error messages.
- If *off* is specified (the default), trailing footer lines are suppressed and only hard coded error messages are returned.
- If *email* is specified, trailing footer lines are added and look identical to those generated when on is specified, however the server name is also a hypertext link that references the server administrator's e-mail address.

The value used for server name is that specified by the "ServerName " on page 355 directive of the serving virtual host or server. The value used for version information is that specified by the "ServerTokens" on page 357 directive. The value used for server administrator's e-mail address is that specified by the "ServerAdmin " on page 354 directive.

For example, the value used for server name is that specified by the ServerName directive of the serving virtual host or server. The value used for version information is that specified by the ServerTokens directive. The value used for server administrator's e-mail address is that specified by the ServerAdmin directive.

For example,

```
ServerAdmin www-admin@myserver.com
ServerSignature email
```

Note: This setting is not used for errors handled by custom error messaging (see "ErrorDocument " on page 315 for more details on custom error messaging).

ServerTokens

Module: core

Syntax: ServerTokens *Major | Minor | Minimal | OS | Full | Prod*

Default: ServerTokens Prod

Context: server config

Override: none

Origin: Apache

Example: ServerTokens *Full*

The ServerTokens directive specifies which form of the `Server: header` value is included in response headers sent to clients. The value may consist of a minimal description of the server, a description with a generic OS-type included, a description that includes information about compiled-in modules, or a simple product description.

Parameter: *Major | Minor | Minimal | OS | Full | Prod*

- If *Major* is specified, the server sends: "Server : Apache/2"
- If *Minor* is specified, the server sends: "Server : Apache/2.4"
- If *Minimal* is specified, the server sends: "Server: Apache/2.4.12"
- If *OS* is specified, the server sends: "Server: Apache /2.4.12 (IBM i)"
- If *Full* is specified, the server sends: "Server: Apache /2.4.12 (IBM i) MymMod/1.2"
- If *Prod* is specified, the server sends: "Server: Apache"

This setting also specifies the version information used when trailing footer lines are added to hard coded error messages (see "ServerSignature" on page 357).

Note: This setting applies to the entire server, and cannot be enabled or disabled on a virtualhost-by-virtualhost basis.

ServerUserID

Module: core

Syntax: ServerUserID *user_profile*

Default: ServerUserID QTMHHTTP

Context: All

Override: AuthConfig

Origin: IBM

Example: ServerUserID webmaster

The ServerUserID directive specifies the user profile that the HTTP Server will run under. This directive tells what user profile to use when starting the worker threads under the child process.

Parameter: *user_profile*

- The *user_profile* parameter must be a valid user profile. This profile must be authorized to all the directories, files, and other server resources accessed by the Web server unless the server is configured to swap to another profile for specific requests or directories.

  This directive is now valid in all contexts. If userid is set and authentication is performed in a context, and the UserID value is set to %%SERVER%%, then ServerUserID will be used for that context. The ServerUserID is inherited through all contexts unlike UserID. If authentication is performed and the UserID directive is set to something other than %%SERVER%%, then ServerUserID is overridden by the UserID. If authentication is not performed at all, then ServerUserID is used from the correct context. This allows for specific and unique user id security models for separate virtual hosts, locations, directories, files or .htaccess, allowing for more security control (specific access versus "global") over the resources served by the HTTP Server.

Note: To start the server you must have authority to the specified profile.

See also "UserID" on page 234.

SetHandler

Module: core

Syntax: SetHandler *handler-name| None| expression*

Default: none

Context: server config, virtual host, directory, .htaccess

Override:FileInfo

Origin: Apache

Example: SetHandler imap-file

The SetHandler directive forces all matching files to be parsed through the handler given by handler-name. . This happens when it is placed into an .htaccess file or a "<Directory> " on page 311 or "<Location> " on page 339 section. For example, if you had a directory you wanted to be parsed entirely as imagemap rule files, regardless of extension, you might put the following into an .htaccess file in that directory: See "Handler for HTTP Server" on page 196 for more information

```
SetHandler imap-file
```

Parameter: *handler-name | None | expression*

- The *handler-name* parameter is the name of the handler that will parse files in this directory.
- If value None is specified, an earlier defined SetHandler directive is overridden.
- Specify string-valued expressions to reference per-request variables, including backreferences to named regular expressions.

You could also use this directive to configure a particular handler for files with a particular file extension. For example:

```
<FilesMatch \.php$>
   SetHandler application/x-httpd-php
</FilesMatch>
```

String-valued expressions can be used to reference per-request variables, including backreferences to named regular expressions.

Note: The core directives ForceType and SetHandler are used to associate all the files in a given container (<Location>, <Directory>, or <Files>) with a particular MIME-type or handler. These settings override any filename extension mappings defined in mod_mime.

Note: Because SetHandler overrides default handlers, normal behavior such as handling of URLs ending in a slash (/) as directories or index files is suppressed.

SetInputFilter

Module: core

Syntax: SetInputFilter *filter* [*filter* ...]

Default: none

Context: directory, .htaccess

Override: none

Origin: Apache

Example: SetInputFilter gzip

The SetInputFilter directive sets the filters that process client requests when they are received by the server. Parameter One: filter

Parameter: *filter*

- The *filter* parameter sets the filters that process client requests when they are received by the server.

For example,

```
<Directory /www/data/>
  SetInputFilter gzip
</Directory>
```

If more than one filter is specified, they must be separated by semicolons in the order in which they should process the content.

The order of the arguments determines the order in which the filters process the content. The first filter in the list processes content first, followed by the second in the list, and so on until all filters in the list have processed the content.

See the Apache HTTP Server Version 2.0 Filters documentation for more information regarding filters.

SetOutputFilter

Module: core

Syntax: SetOuputFilter *filter* [*filter* ...]

Default: none

Context: directory, .htaccess

Override: none

Origin: Apache

Example: SetOutputFilter INCLUDES

The SetOutputFilter directive sets the filters that process responses from the server before they are sent to the client.

Parameter: *filter*

- The *filter* parameter sets the filters that process responses from the server before they are sent to the client.

For example, the following configuration will process all files in the /www/data/ directory for server-side includes:

```
<Directory /www/data/>
  SetOutputFilter INCLUDES
</Directory>
```

If more than one filter is specified, they must be separated by semicolons in the order in which they should process the content.

The order of the arguments determines the order in which the filters process the content. The first filter in the list processes content first, followed by the second in the list, and so on until all filters in the list have processed the content.

See the Apache HTTP Server Version 2.0 Filters documentation for more information regarding filters.

ThreadsPerChild

Module: core

Syntax: ThreadsPerChild *number*

Default: Global HTTP Server setting for maximum number of servers.

Context: server config

Override: none

Origin: Apache

Example: ThreadsPerChild 20

Use this directive to specify the maximum number of threads per server child process. If the directive is not specified, the global HTTP Server setting for maximum number of servers is used. The shipped value is 40. You can view and change global HTTP Server settings using the Change HTTP Attributes (CHGHTTPA) command.

Parameter: *number*

- The *number* value is an integer value that specifies the maximum number of threads per server child process.

TimeOut

Module: core

Syntax: TimeOut *number*

Default: TimeOut 300

Context: server config, virtual host

Override: none

Origin: Apache

Example: TimeOut 500

The TimeOut directive defines the length of time HTTP Server will wait for I/O in various circumstances:

1. When reading data from the client, the length of time to wait for a TCP packet to arrive if the read buffer is empty.
2. When writing data to the client, the length of time to wait for an acknowledgement of a packet if the send buffer is full.
3. In mod_cgi, the length of time to wait for output from a CGI script.
4. In mod_proxy , the default timeout value if "ProxyTimeout" on page 545 is not configured.

Parameter: *number*

- The *number* value is an integer value that specifies defines the amount of time (in seconds) HTTP Server will wait.

TraceEnable

Module: core

Syntax: TraceEnable *on | off | extended*

Default: TraceEnable off

Context: server config

Override: none

Origin: Apache

Example: TraceEnable on

This directive overrides the behavior of TRACE for both the core server and mod_proxy. When "on" is specified for the TraceEnable directive, TRACE requests are permitted per RFC 2616, which disallows any request body to accompany the request. Setting the TraceEnable directive to "off" causes the core server and mod_proxy to return a 405 (Method not allowed) error response to the client.

For testing and diagnostic purposes only, request bodies may be allowed by specifying "extended" for the TraceEnable directive. The core will restrict the request body to 64 KB (plus 8 KB for chunk headers if `Transfer-Encoding: chunked` is used). The core will reflect the full headers and all chunk headers with the response body. As a proxy server, the request body is not restricted to 64 KB.

Parameter: *on | off | extended*

- A value of *on* permits TRACE requests.
- A value of *off* causes TRACE requests to return a 405 (Method not allowed) error response to the client.
- A value of *extended* permits TRACE requests that are not compliant for testing and diagnostic purposes.

Parameter: *number*

- The *number* value is an integer value that specifies defines the amount of time (in seconds) HTTP Server will wait.

UnDefine

Module: core

Syntax: *UnDefine parameter-name*

Default: none

Context: server config

Override: none

Origin: Apache

Example: UnDefine SSL

Undoes the effect of a “Define” on page 310 or of passing a -D argument to STRTCPSVR command.

This directive can be used to toggle the use of “<IfDefine>” on page 330 sections without needing to alter -D arguments in HTTP server startup STRTCPSVR command.

While this directive is supported in virtual host context, the changes it makes are visible to any later configuration directives, beyond any enclosing virtual host.

UseCanonicalName

Module: core

Syntax: UseCanonicalName *on | off | DNS*

Default: UseCanonicalName on

Context: server config, virtual host, directory, Not in Limit

Override: Options

Origin: Apache

Example: UseCanonicalName off

In many situations HTTP Server has to construct a self-referential URL. That is, a URL that refers back to the same server.

Parameter: *on | off | DNS*

- When set to *on*, HTTP Server will use the ServerName directive to construct a canonical name for the server. This name is used in all self-referential URLs, and for the values of SERVER_NAME and SERVER_PORT environment variables in CGIs.
- When set to *off*, HTTP Server will form self-referential URLs using the hostname and port supplied by the client if any are supplied (otherwise it will use the canonical name). These values are the same that are used to implement name based virtual hosts, and are available with the same clients. The CGI variables SERVER_NAME and SERVER_PORT will be constructed from the client supplied values as well.

  An example where this may be useful is on an intranet server where you have users connecting to the machine using short names such as www. You'll notice that if the users type a shortname, and a URL which is a directory, such as http://www/splat, without the trailing slash then HTTP Server will redirect them to http://www.domain.com/splat/. If you have authentication enabled, this will cause the user to have to reauthenticate twice (once for www and once again for www.domain.com). But if UseCanonicalName is set *off*, then HTTP Server will redirect to http://www/splat/.
- The *DNS* setting is intended for use with mass IP-based virtual hosting to support clients that do not provide a Host: header. With this option HTTP Server does a reverse DNS lookup on the server IP address that the client connected to in order to work out self-referential URLs.

Important: If CGIs make assumptions about the values of SERVER_NAME they may be broken by this option. The client is essentially free to give whatever value they want as a hostname. But if the CGI is only using SERVER_NAME to construct self-referential URLs then it should be fine.

See also "ServerName " on page 355.

UseShutdown

Module: core

Syntax: UseShutdown *On | Off*

Default: UseShutdown Off

Context: server config

Override: none

Origin: Apache

Example: UseShutdown On

This directive instructs the HTTP Server to use shutdown on the socket connections.

<VirtualHost>

Module: core

Syntax: <VirtualHost *addr*[:*port*] [*addr*[:*port*]]...> ... </VirtualHost>

Default: none

Context: server config, Not in Limit

Override: none

Origin: Apache

Example 1: Using an IPv4 address:

```
<VirtualHost 10.1.2.3>
ServerAdmin webmaster@host.foo.com
DocumentRoot /www/docs/host.foo.com
ServerName host.foo.com
ErrorLog logs/host.foo.com-error_log
TransferLog logs/host.foo.com-access_log
</VirtualHost>
```

Example 2: Using an IPv6 address:

```
<VirtualHost [2001:db8::a00:20ff:fea7:ccea]>
ServerAdmin webmaster@host.example.com
DocumentRoot /www/docs/host.example.com
ServerName host.example.com
ErrorLog logs/host.example.com-error_log
TransferLog logs/host.example.com-access_log
</VirtualHost>
```

The term Virtual Host refers to the practice of running more than one web site (such as www.company1.com and www.company2.com) on a single machine. Virtual hosts can be "IP-based", meaning that you have a different IP address for every web site, or "name-based", meaning that you have multiple names running on each IP address. The fact that they are running on the same physical server is not apparent to the end user.

Parameter One: *address*

- The *address* parameter specifies a fully qualified IP address or hostname.

Parameter Two: *port*

- The *port* parameter specifies a port number. This parameter is optional. If a port is not specified the server port will be used.

<VirtualHost> and </VirtualHost> are used to enclose directives that apply only to a particular virtual host. Any directive that is allowed in a virtual host context may be used. When the server receives a document request on a particular virtual host, it uses the configuration directives enclosed in the <VirtualHost> section. The *address* parameter may be one of the following:

- The IP address of the virtual host.
- A fully qualified domain name for the IP address of the virtual host.
- The character *, which is used to match all IP addresses.
- The string _default_, which is used only with IP virtual hosting to catch unmatched IP addresses.

Each Virtual Host must correspond to a different IP address, different port number or a different host name for the server. In the former case, the server machine must be configured to accept IP packets for multiple addresses.

IPv6 addresses must be specified in square brackets because the optional port number could not be determined otherwise.

Note: The use of <VirtualHost> does not affect what addresses the server listens on. You may need to ensure that HTTP Server is listening on the correct addresses using the Listen directive.

When using IP-based virtual hosting, the special name _default_ can be specified in which case this virtual host will match any IP address that is not explicitly listed in another virtual host. In the absence of any _default_ virtual host the "main" server config, consisting of all those definitions outside any VirtualHost section, is used when no IP-match occurs.

You can specify a :port to change the port that is matched. If unspecified then it defaults to the same port as the most recent Listen statement of the main server. You may also specify :* to match all ports on that address, which is recommended when used with _default_.

Name-based vs IP-based Virtual Hosts

IP-based virtual hosts use the IP address of the connection to determine the correct virtual host to serve. Therefore you need to have a separate IP address for each host. With name-based virtual hosting, the server relies on the client to report the hostname as part of the HTTP headers. Using this technique, many different hosts can share the same IP address. Name-based virtual hosting is usually simpler, since you need only configure your DNS server to map each hostname to the correct IP address and then configure the Apache HTTP Server to recognize the different hostnames. Name-based virtual hosting also eases the demand for scarce IP addresses. Therefore you should use name-based virtual hosting unless there is a specific reason to choose IP-based virtual hosting. Some reasons why you might consider using IP-based virtual hosting:

- Some ancient clients are not compatible with name-based virtual hosting. For name-based virtual hosting to work, the client must send the HTTP Host header. This is required by HTTP/1.1, and is implemented by all modern HTTP/1.0 browsers as an extension. If you need to support obsolete clients and still use name-based virtual hosting, a possible technique is discussed at the end of this document.
- Name-based virtual hosting cannot be used with SSL secure servers because of the nature of the SSL protocol.
- Some operating systems and network equipment implement bandwidth management techniques that cannot differentiate between hosts unless they are on separate IP addresses.

Using Name-based Virtual Hosts

To use name-based virtual hosting, you must designate the IP address (and possibly port) on the server that will be accepting requests for the hosts. In the normal case where any and all IP addresses on the server should be used, you can use * as the argument to <VirtualHost>. If you're planning to use multiple ports (e.g. running SSL) you should add a Port to the argument, such as *:80. In addition, any IP address specified here must be associated with a network interface on the server.

The next step is to create a <VirtualHost> each different host that you would like to serve. Inside each <VirtualHost> block, you will need at minimum a ServerName directive to designate which host is served and a DocumentRoot directive to show where in the filesystem the content for that host lives.

Main host goes away

If you are adding virtual hosts to an existing web server, you must also create a <VirtualHost> block for the existing host. The ServerName and DocumentRoot included in this virtual host should be the same as the global ServerName and DocumentRoot. List this virtual host first in the configuration file so that it will act as the default host. For example, suppose that you are serving the domain www.domain.tld and you wish to add the virtual host www.otherdomain.tld, which points at the same IP address. Then you simply add the following to httpd.conf:

```
<VirtualHost *:80>
  ServerName www.domain.tld
  ServerAlias domain.tld *.domain.tld
  DocumentRoot /www/domain
</VirtualHost>

<VirtualHost *:80>
  ServerName www.otherdomain.tld
  DocumentRoot /www/otherdomain
</VirtualHost>
```

You can alternatively specify an explicit IP address in place of the * in the <VirtualHost> directives. For example, you might want to do this in order to run some name-based virtual hosts on one IP address, and either IP-based, or another set of name-based virtual hosts on another address.

Many servers want to be accessible by more than one name. This is possible with the ServerAlias directive, placed inside the <VirtualHost> section. For example in the first <VirtualHost> block above, the ServerAlias directive indicates that the listed names are other names which people can use to see that same web site:

```
ServerAlias domain.tld *.domain.tld
```

Requests for all hosts in the domain.tld domain will be served by the www.domain.tld virtual host. The wildcard characters * and ? can be used to match names. Of course, you can't just make up names and place them in ServerName or ServerAlias. You must first have your DNS server properly configured to map those names to an IP address associated with your server. Finally, you can fine-tune the configuration of the virtual hosts by placing other directives inside the <VirtualHost> containers. Most directives can be placed in these containers and will then change the configuration only of the relevant virtual host. To find out if a particular directive is allowed, check the Context of the directive. Configuration directives set in the main server context (outside any <VirtualHost> container) will be used only if they are not overridden by the virtual host settings.

When a request is received, the server first maps it to the best matching <VirtualHost> based on the local IP address and port combination only. Non-wildcards have a higher precedence. If no match based on IP and port occurs at all, the "main" server configuration is used.

If multiple virtual hosts contain the best matching IP address and port, the server selects from these virtual hosts the best match based on the requested hostname. If no matching name-based virtual host is found, then the first listed virtual host that matched the IP address will be used. As a consequence, the first listed virtual host for a given IP address and port combination is the default virtual host for that IP and port combination. If you would like to have a special configuration for requests that do not match any particular virtual host, simply put that configuration in a <VirtualHost> container and list it first in the configuration file.

Module mod_dav

Module mod_dav supports directives for the IBM HTTP Server for i Web server.

Summary

This module provides class 1 and class 2 WebDAV (Web-based Distributed Authoring and Versioning) functionality for HTTP Server. This extension to the HTTP protocol allows creating, moving, copying, and deleting resources and collections on a remote web server.

In order for WebDAV to function, you have to have your LoadModules, Dav provider, and either DavLockDB or DavQsysLockDB (depending on your provider) in your configuration file. If any of these elements are missing, your server will not start.

To use DAV at all, your configuration file must include:

```
LoadModule dav_module /QSYS.LIB/QHTTPSVR.LIB/QZSRDAV.SRVPGM
```

To use DAV for root, QOpenSys, or other UNIX-like filesystems, in addition to the above, your configuration file must include:

```
LoadModule dav_fs_module /QSYS.LIB/QHTTPSVR.LIB/QZSRDAVF.SRVPGM
```

To use DAV in QSYS, your configuration file must include:

```
LoadModule dav_qsys_module /QSYS.LIB/QHTTPSVR.LIB/QZSRDAVQS.SRVPGM
```

Note: You'll need two LoadModules to use DAV. If you want to DAV-enable both IFS and QSYS, you'll need three LoadModules.

Directives

- “Dav” on page 367
- “DavDepthInfinity” on page 368
- “DavLockDB” on page 368
- “DavMinTimeout” on page 369
- “DavQsysLockDB” on page 369

Dav

Module: mod_dav

Syntax: Dav *on | off | [provider name]*

Default: Dav off

Context: directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule dav_module /QSYS.LIB/QHTTPSVR.LIB/QZSRDAV.SRVPGM

Example: Dav on

The Dav directive enables the WebDAV HTTP methods for the given container. You may want to add a <Limit> clause inside the location directive to limit access to Dav-enabled locations.

Parameter: *on | off | [provider name]*

- When *on* is specified, WebDAV HTTP methods are enabled for the given container, using the default provider "filesystem".
- When *off* is specified, WebDAV HTTP methods are disabled for the given container.
- The optional *provider name* parameter is used to specify the Dav provider for a directory or location. There are no Server restrictions on the number or types of characters in the provider name. The provider name used on the Dav directive is case sensitive.

The values on and off are not case sensitive.

Example 1:

```
DavLockDB /tmp/DavLock
LoadModule dav_module /qsys.lib/qhttpsvr.lib/qzsrdav.srvpgm
LoadModule dav_fs_module /qsys.lib/qhttpsvr.lib/qzsrdavf.srvpgm
<Location /foo>
   Dav on
</Location>
```

Example 2:

```
DavQsysLockDB mylib/DavLock
LoadModule dav_module /qsys.lib/qhttpsvr.lib/qzsrdav.srvpgm
LoadModule dav_qsys_module /qsys.lib/qhttpsvr.lib/qzsrdavqs.srvpgm

<Directory /qsys.lib/webserver.lib*>
   Dav qsys
</Directory>
```

If you specify "Dav on" in a directory, you will get the default provider "filesystem".

The Dav directive does not override like other directory-scoped directives. You cannot turn Dav on in one directory, and then turn it off in a sub-directory. You also cannot change providers in a sub-directory. You will receive runtime errors if this happens. The following examples are invalid and will cause the HTTP Server to generate a runtime error:

```
<Directory />
   AllowOverride None
   Order Deny,Allow
   Deny From all
   Dav filesystem
   </Files>
      Dav off
   </Files>
</Directory>
```

Another invalid example:

```
<Directory /www/parentDirectory>
   Dav filesystem
<Directory>
<Directory /www/parentDirectory/childDirectory>
   Dav off
</Directory>
```

Note: If you want to Dav-enable file systems other than root or QOpenSys, you will have to specify your provider's name on the directive to get the desired behavior. As the server is shipped, the only valid provider names are "filesystem" and "qsys". Filesystem supports root, QOpenSys (and other UNIX-like file systems); qsys supports QSYS objects.

DavDepthInfinity

Module: mod_dav

Syntax: DavDepthInfinity *on | off*

Default: DavDepthInfinity off

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule dav_module /QSYS.LIB/QHTTPSVR.LIB/QZSRDAV.SRVPGM

Example: DavDepthInfinity on

The DavDepthInfinity directive allows the processing of PROPFIND requests containing the header 'Depth: Infinity'. Because this type of request could constitute a denial-of-service attack, by default it is not allowed.

Parameter: *on | off*

- When *on* is specified, processing of PROPFIND requests containing the header 'Depth: Infinity' is allowed.
- When *off* is specified, processing of PROPFIND requests containing the header 'Depth: Infinity' is not allowed.

DavLockDB

Module: mod_dav

Syntax: DavLockDB *filename*

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule dav_fs_module /QSYS.LIB/QHTTPSVR.LIB/QZSRDAVF.SRVPGM

Example: DavLockDB /tmp/DavLock

The DavLockDB directive specifies the full path to the lock database, excluding an extension. The default (file system) implementation of mod_dav uses a SDBM database to track user locks.

Parameter: *filename*

- The *filename* parameter specifies the full path to the lock database, excluding an extension.

This directive is required if you are using Dav with the default (filesystem) provider. For example,

```
DavLockDB /tmp/DavLock
```

DavMinTimeout

Module: mod_dav

Syntax: DavMinTimeout *seconds*

Default: DavMinTimeout 0

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule dav_module /QSYS.LIB/QHTTPSVR.LIB/QZSRDAV.SRVPGM

Example: DavMinTimeout 600

The DavMinTimeout directive specifies, in seconds, the minimum lock timeout to return to a client. Microsoft Web Folders defaults to a timeout of 120 seconds; the DavMinTimeout can override this to a higher value (like 600 seconds) to reduce the chance of the client losing the lock due to network latency.

When a client requests a DAV resource lock, it can also specify a time when the lock will be automatically removed by the server. This value is only a request, and the server can ignore it or inform the client of an arbitrary value. The maximum value for minutes is 166; the maximum value for seconds is 9999.

Parameter: *seconds*

- The *seconds* parameter is any integer value from 0 to 9999.

DavQsysLockDB

Module: mod_dav

Syntax: DAVQsysLockDB *library/filename*

Default: none

Context: server config, virtual host

Override: none

Origin: Modified

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule dav_qsys_module /QSYS.LIB/QHTTPSVR.LIB/QZSRDAVQS.SRVPGM

Example: DAVQsysLockDB mylib/LockDB

The DAVQsysLockDB directive specifies the library qualified database file that the QSYS repository manager uses to track user locks of QSYS resources. The library must exist. The names of the library and file must follow the QSYS file system naming rules.

Parameter: *library/filename*

- The *library/filename* parameter specifies the library qualified database file that the QSYS repository manager uses to track user locks of QSYS resources.

Module mod_deflate

Module mod_deflate supports directives for the IBM HTTP Server for i Web server.

Summary

Module mod_deflate specifies compression and decompression functions using filters, MIME types, environment variables, and HTTP responses. Compressed output is transferred to requesting client browsers at a higher rate of speed than output that is not compressed. Compression and decompression is implemented by the DEFLATE filter, located in module mod_deflate. See Apache HTTP Server Version 2.4 Documentation for additional information and examples on configuring the Apache server to use compression.

Directives

- "DeflateBufferSize" on page 370
- "DeflateCompressionLevel" on page 370
- "DeflateFilterNote" on page 371
- "DeflateInflateLimitRequestBody" on page 372
- "DeflateInflateRatioBurst" on page 372
- "DeflateInflateRatioLimit" on page 372
- "DeflateMemLevel" on page 373
- "DeflateWindowSize" on page 373

DeflateBufferSize

Module: mod_deflate

Syntax: DeflateBufferSize *value*

Default: DeflateBufferSize 8096

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: deflate_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Example: DeflateBufferSize 8096

The DeflateBufferSize directive specifies the size of the fragments that zlib should compress at one time. If the compressed response size is bigger than the one specified by this directive then HTTP Server will switch to chunked encoding (HTTP header Transfer-Encoding set to Chunked), with the side effect of not setting any Content-Length HTTP header. This is particularly important when HTTP Server works behind reverse caching proxies or when HTTP Server is configured with mod_cache and mod_cache_disk because HTTP responses without any Content-Length header might not be cached.

Parameter: *value*

- The *value* parameter specifies the size, in bytes, of the fragments that zlib should compress at one time.

DeflateCompressionLevel

Module: mod_deflate

Syntax: DeflateCompressionLevel *value*

Default: DeflateCompressionLevel 6

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: deflate_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Example: DeflateCompressionLevel 5

The DeflateCompressionLevel directive specifies what level of compression should be used.

Parameter: *value*

- The *value* parameter value specifies the level of compression. The higher the value, the greater the compression.

  Note: Higher compression levels require additional CPU time.

DeflateFilterNote

Module: mod_deflate

Syntax: DeflateFilterNote *[type] notename*

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: deflate_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Example: DeflateFilterNote ratio

Example: DeflateFilterNote Ratio ratio

Example: DeflateFilterNote Input input

Example: DeflateFilterNote input input

The DeflateFilterNote directive specifies that a note about compression ratios should be attached to the request. The note is used for statistical purposes by adding a value to your access log.

Parameter One: *type*

- The *type* parameter value specifies what type of data is added to the note for logging. The parameter value is not case-sensitive. Possible values include:

  Input
  Store the byte count of the filter's input stream in the note.

  Output
  Store the byte count of the filter's output stream in the note.

  Ratio
  Store the compression ratio (output/input * 100) in the note. This is the default, if the type argument is omitted.

Parameter Two: *notename*

- The *notename* parameter value specifies the note name entered in the log. The *notename* value is not required to match the *type* value. Blank characters are not valid.

Example: accurate logging

```
DeflateFilterNote Input instream
DeflateFilterNote Output outstream
DeflateFilterNote Ratio ratio

LogFormat '"%r" %{outstream}n/%{instream}n (%{ratio}n%%)' deflate
CustomLog logs/deflate_log deflate
```

DeflateInflateLimitRequestBody

Module: mod_deflate

Syntax: DeflateInflateLimitRequestBody *value*

Default: None, but LimitRequestBody applies after deflation

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `deflate_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM`

Example: DeflateInflateLimitRequestBody 2048

The DeflateInflateLimitRequestBody directive specifies the maximum size of an inflated request body. If it is unset,“LimitRequestBody” on page 334 is applied to the inflated body.

DeflateInflateRatioBurst

Module: mod_deflate

Syntax: DeflateInflateLimitRequestBody *value*

Default: 3

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `deflate_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM`

Example: DeflateInflateRatioBurst 5

The DeflateInflateRatioBurst directive specifies the maximum number of times the DeflateInflateRatioLimit cab be crossed before terminating the request.

DeflateInflateRatioLimit

Module: mod_deflate

Syntax: DeflateInflateRatioLimit *value*

Default: 200

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `deflate_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM`

Example: DeflateInflateRatioLimit 300

The DeflateInflateRatioLimit directive specifies the maximum ratio of deflated to inflated size of an inflated request body. This ratio is checked as the body is streamed in, and if crossed more than DeflateInflateRatioBurst times the request will be terminated.

DeflateMemLevel

Module: mod_deflate

Syntax: DeflateMemLevel *value*

Default: DeflateMemLevel 9

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: deflate_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Example: DeflateMemLevel 8

The DeflateMemLevel directive specifies how much memory should be used for zlib for compression.

Parameter: *value*

- The *value* parameter value specifies how much memory should be used for zlib compression. Each value is equal to 16K. For example, a value of 1 equates to 16K, while a value of 8 equates to 128K.

DeflateWindowSize

Module: mod_deflate

Syntax: DeflateWindowSize *value*

Default: DeflateWindowSize 15

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: deflate_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Example: DeflateWindowSize 14

The DeflateWindowSize directive specifies the zlib compression window size.

Parameter: *value*

- The *value* parameter value specifies the level of compression window size. The higher the value, the greater the compression window size.

  Note: Higher compression levels require additional CPU time.

Module mod_dir

Module mod_dir supports directives for the IBM HTTP Server for i Web server.

Summary

The module mod_dir provides "trailing slash" redirects and serving directory index files. The index of a directory can come from one of two sources:

- A file written by the user, typically called index.html. The name of this file is set by the DirectoryIndex directive . This directive is controlled by module mod_dir.
- A list generated by the server through mod_auto_index. See mod_auto_index for more information.

The two functions are separated so you can completely remove (or replace) automatic index generation.

By default, a trailing slash ('/') redirect is issued when the server receives a request for a URL http://servername/QIBM/dirname where dirname is a directory. Directories require a trailing slash, so mod_dir issues a redirect to http://servername/QIBM/dirname/.

The AlwaysDirectoryIndex directive controls how the server will respond to directory requests.

Directives

- "AlwaysDirectoryIndex" on page 374
- "DirectoryIndex" on page 375
- "DirectoryIndexRedirect" on page 376
- "DirectoryCheckHandler" on page 375
- "DirectorySlash" on page 377
- "FallbackResource" on page 377

AlwaysDirectoryIndex

Module: mod_dir

Syntax: AlwaysDirectoryIndex *disabled | local-url [local-url] ...*

Default: Always DirectoryIndex on

Context: server config, virtual host, directory, .htaccess

Override: Indexes

Origin: IBM

Example: AlwaysDirectoryIndex off

The DirectoryIndex directive sets the list of resources to look for, when the client requests an index of the directory by specifying a / at the end of the a directory name. Local-URL is the (%-encoded) URL of a document on the server relative to the requested directory; it is usually the name of a file in the directory. Several URLs may be given, in which case the server will return the first one that it finds. If none of the resources exist and the Indexes option is set, the server will generate its own listing of the directory. For example:

DirectoryIndex index.html

A request for http://myserver/docs/ would return http://myserver/docs/index.html if it exists, or it would list the directory if it did not exist.

Note: The documents do not need to be relative to the directory. For example: DirectoryIndex index.html index.txt /cgi-bin/index.pl

This would cause the CGI script /cgi-bin/index.pl to be run if neither index.html or index.txt existed in a directory. This same idea will also work for QSYS.LIB files. For example, if the directory index is stored in /QSYS.LIB/MYLIB.LIB/MYFILE.FILE/INDEX.MBR, you would need to specify **DirectoryIndex Index.mbr** .

A single argument of *"disabled"* prevents mod_dir from searching for an index. An argument of "disabled" will be interpreted literally if it has any arguments before or after it, even if they are "disabled" as well.

The directive may be configured multiple times in a container. The directives are processed from the first to the last occurrence in the container.

DirectoryCheckHandler

Module: mod_dir

Syntax: DirectoryCheckHandler*On*/ *Off*

Default: DirectoryCheckHandler Off

Context: server config, virtual host, directory, .htaccess

Override: Indexes

Origin: Apache

Example: DirectoryCheckHandler On

The DirectoryCheckHandler directive determines whether mod_dir should check for directory indexes or add trailing slashes when some other handler has been configured for the current URL. Handlers can be set by directives such as "SetHandler" on page 359 or by other modules, such as mod_rewrite during per-directory substitutions.

In releases prior to IBM i 7.2, this module did not take any action if any other handler was configured for a URL(implicitly act as if "DirectoryCheckHandler ON" was specified).

Start from i 7.2, the default behavior allows directory indexes to be served even when a SetHandler directive is specified for an entire directory, but it can also result in some conflicts with modules such as mod_rewrite.

DirectoryIndex

Module: mod_dir

Syntax: DirectoryIndex *disabled | local-url [local-URL ...]*

Default: DirectoryIndex index.html

Context: server config, virtual host, directory, .htaccess

Override: Indexes

Origin: Apache

Example: DirectoryIndex bob.html index.html

The DirectoryIndex directive sets the list of resources to look for, when the client requests an index of the directory by specifying a / at the end of the a directory name. Local-URL is the (%-encoded) URL of a document on the server relative to the requested directory; it is usually the name of a file in the directory. Several URLs may be given, in which case the server will return the first one that it finds. If none of the resources exist and the Indexes option is set, the server will generate its own listing of the directory.

Parameter: *disabled | local-url*

- The *local-url* parameter is the (%-encoded) URL of a document on the server relative to the requested directory; it is usually the name of a file in the directory. For example:

  ```
  DirectoryIndex index.html
  ```

- The *disabled* parameter prevents mod_dir from searching for an index.

A request for `http://myserver/docs/` would return `http://myserver/docs/index.html` if it exists, or it would list the directory if it did not exist.

The documents do not need to be relative to the directory. For example:

```
DirectoryIndex index.html index.txt /cgi-bin/index.pl
```

This would cause the CGI script /cgi-bin/index.pl to be run if neither index.html or index.txt existed in a directory. This same idea will also work for QSYS.LIB files. For example, if the directory index is stored in /QSYS.LIB/MYLIB.LIB/MYFILE.FILE/INDEX.MBR, you would need to specify **DirectoryIndex Index.mbr**.

A single argument of "disabled" prevents mod_dir from searching for an index. An argument of "disabled" will be interpreted literally if it has any arguments before or after it, even if they are "disabled" as well.

Note: Multiple DirectoryIndex directives within the same context will add to the list of resources to look for rather than replace:

Example 1:

# Set index.html as an index page, then add index.php to that list as well.

```
<Directory /foo>
    DirectoryIndex index.html
    DirectoryIndex index.php
</Directory>
```

Example 2:

# This is identical to example A, except it's done with a single directive.

```
<Directory /foo>
   DirectoryIndex index.html index.php
</Directory>
```

Example 3:

# To replace the list, you must explicitly reset it first

# In this example, only index.php will remain as an index resource.

```
<Directory /foo>
    DirectoryIndex index.html
    DirectoryIndex disabled
    DirectoryIndex index.php
</Directory>
```

DirectoryIndexRedirect

Module: mod_dir

Syntax: DirectoryIndexRedirect *on | off | permanent | temp | seeother | 3xx-code*

Default: DirectoryIndexRedirect *off*

Context: server config, virtual host, directory, .htaccess

Override: Indexes

Origin: Apache

Example: DirectoryIndexRedirect on

By default, the DirectoryIndex is selected and returned transparently to the client. The DirectoryIndexRedirect directive configures an external redirect for directory indexes.

Parameter: *on | off | permanent | temp | seeother | 3xx-code*

- The *on* parameter issues a 302 redirection to the index resource:
- The *off* parameter does not issue a redirection. This is the legacy behaviour of mod_dir.
- The *permanent* parameter issues a 301 (permanent) redirection to the index resource.
- The *temp* parameter has the same effect as on:
- The *seeother* parameter issues a 303 redirection (also known as "See Other") to the index resource.
- The *3xx-code* parameter issues a redirection marked by the chosen 3xx code.

Example

```
DirectoryIndexRedirect on
```

A request for http://example.com/docs/ would return a temporary redirect to http://example.com/docs/index.html if it exists.

DirectorySlash

Module: mod_dir

Syntax: DirectorySlash *on | off*

Default: DirectorySlash on

Context: Server, Virtual Host, Directory, .htaccess

Override: Indexes

Origin: Apache

The DirectorySlash directive determines, whether mod_dir should fixup URLs pointing to a directory or not. Typically if a user requests a resource without a trailing slash, which points to a directory, mod_dir redirects him to the same resource, but with trailing slash for the following reasons:

- The user is finally requesting the canonical URL of the resource
- The directive mod_autoindex works correctly. Since mod_autoindex doesn't emit the path in the link, it would point to the wrong path.
- The DirectoryIndex directive will be evaluated only for directories requested with trailing slash.
- The relative URL references inside HTML pages will work correctly.

If you don't want this effect and the reasons above don't apply to you, you can turn off the redirect with the following:

```
# see security warning below!
<Location /some/path>
DirectorySlash Off
SetHandler some-handler
</Location>
```

Security Warning: Turning off the trailing slash redirect may result in an information disclosure. Consider a situation where mod_autoindex is active (Options +Indexes) and DirectoryIndex is set to a valid resource (say, index.html) and there's no other special handler defined for that URL. In this case a request with a trailing slash would show the index.html file. But a request without trailing slash would list the directory contents.

FallbackResource

Module: mod_dir

Syntax: FallbackResource *disabled | local-url*

Default: *disabled* - HTTP server will return 404 (Not Found)

Context: Server config, Virtual Host, Directory, .htaccess

Override: Indexes

Origin: Apache

Examples: FallbackResource /not-404.html

The FallbackResource directive sets a handler for any URL that doesn't map to anything in your filesystem, and would otherwise return HTTP 404 (Not Found).

```
FallbackResource /not-404.php
```

will cause requests for non-existent files to be handled by not-404.php, while requests for files that exist are unaffected.

It is frequently desirable to have a single file or resource handle all requests to a particular directory, except those requests that correspond to an existing file or script. This is often referred to as a 'front controller.'

In earlier versions of Apache, this effect typically required mod_rewrite, and the use of the -f and -d tests for file and directory existence. This now requires only one line of configuration.

```
FallbackResource /index.php
```

Existing files, such as images, css files, and so on, will be served normally.

Use the disabled argument to disable that feature if inheritance from a parent directory is not desired. In a sub-URI, such as http://system:port/blog/ this sub-URI has to be supplied as local-url:

Example:

```
<Directory /www/webserver/htdocs/blog>
   FallbackResource /blog/index.php
</Directory>
```

```
<Directory /www/webserver/htdocs/blog/images>
   FallbackResource disabled
</Directory>
```

Module mod_cache_disk

Module mod_cache_disk supports directives for the IBM HTTP Server for i server.

Two Phase Disk Cache Maintenance

The server may take each iteration of the disk cache maintenance process through one or two phases, depending on how much maintenance is needed. In the first phase, the server will examine the file system directories for the disk cache function and discard data that no longer complies with the current server configuration settings. It will also discard unused or unmodified data according to the criteria set by CacheGcClean or CacheGcUnused directives. File names and expiration times for the remaining data will be collected and the total amount of space allocated for them will be tallied. If the tally is above the maximum disk storage limit (set by CacheSize), the server will go into phase two. If the tally is at or below the maximum disk storage limit, the server will stop the current iteration of the maintenance process. If the server takes the current iteration into the second phase, information collected in the first phase for the remaining data is sorted according to cache expiry time. The server will then discard remaining data, by order of expiration (soonest to latest), until the amount of allocated space is at or below the maximum disk storage limit.

The following steps summarize the disk cache maintenance process:

Phase One:

1. Data files are examined, one by one, starting at the directory root specified by CacheRoot.
2. Data files not complying with settings specified for CacheDirLevels, CacheDirLength, CacheMinFileSize, and CacheMaxFileSize are discarded.
3. Unused or unmodified data matching the criteria set by CacheGcClean and CacheGcUnused directives is discarded.
4. File names and expiration times for remaining data is collected.
5. The total amount of space allocated for remaining data is determined. Phase two is entered if this total is greater than that specified by CacheSize. If not, phase two is skipped and maintenance completes (until the next iteration).

Phase Two:

1. Information collected in phase one for remaining data is sorted according to cache expiry times.
2. Data is discarded, by order of expiration (soonest to latest), until the total amount of allocated space is at or below that specified by CacheSize.

Note: The server stops collecting information for remaining data when it reaches the maximum amount of memory allowed for disk cache maintenance (set by CacheGcMemUsage). If the server reaches this limit in phase one, it may not have recorded enough information for phase two to bring the total amount of space allocated for the cache down to the limit specified by the CacheSize directive in one iteration of the disk cache maintenance process. In this case, a warning message is written to the server log and the server completes maintenance and waits for the next disk cache maintenance iteration.

Directives

- "CacheDirLength" on page 379
- "CacheDirLevels" on page 380
- "CacheGcClean" on page 381
- "CacheGcDaily" on page 383
- "CacheGcInterval" on page 384
- "CacheGcMemUsage" on page 385
- "CacheGcUnused" on page 386
- "CacheRoot" on page 389
- "CacheSize" on page 390
- "CacheReadSize" on page 391
- "CacheReadTime" on page 391
- "CacheMaxFileSize" on page 387
- "CacheMinFileSize" on page 388

CacheDirLength

Module: mod_cache_disk

Syntax: CacheDirLength *length*

Default: CacheDirLength 2

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule cache_disk_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM`

Example: CacheDirLength 4

The CacheDirLength directive specifies the number of characters in subdirectory names used by the disk cache function to store data.

Parameter: *length*

- The *length* parameter specifies the number of characters in subdirectory names used by the disk cache function. The specified value multiplied by the value specified for the CacheDirLevels directive must be less than or equal to 20.

If the values specified for CacheDirLevels and CacheDirLength are changed once they have been used to cache data, the server will discard all existing cache data when it runs disk cache maintenance since the file paths used to store data no longer adhere to the new values. See the CacheGcDaily or CacheGcInterval directives for more details on disk cache maintenance.

- This directive is used only if CacheRoot is set.

Note: HTTP Server does not support inheritance for the CacheDirLength directive.

CacheDirLevels

Module: mod_cache_disk

Syntax: CacheDirLevels *levels*

Default: CacheDirLevels 2

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule cache_disk_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM`

Example: CacheDirLevels 3

The CacheDirLevels directive specifies the number of directory levels used by the disk cache function to store data.

Parameter: *levels*

- The *length* parameter specifies the number of directory levels used by the disk cache function. The specified value multiplied by the value specified for the CacheDirLength directive must be less than or equal to 20.

A hash algorithm is used to generate unique and seemingly random character strings from hash keys (or URLs) provided for data stored in cache. These character strings are used to build unique file system path names. Data is stored in the file system using these path names, relative to the directory root specified by the CacheRoot directive. This setting specifies how many directory levels are used, while the CacheDirLength directives specifies the length of each subdirectory name, with remaining characters simply used for file names. The server uses the hash algorithm and directory levels to improve the performance of the server when working with a potentially large number of data files.

Example 1

```
CacheRoot /QIBM/UserData/HTTPA/CacheRoot/MyCache
CacheDirLevels 3
CacheDirLength 1
```

The above example indicates that a hash key such as ftp://ibm.com/document.html may be used to build a directory path such as `/x/3/_/9sj4t2svBA` where `x`, 3, and `_` are three subdirectory names (CacheDirLevels 3) each having a length of one character (CacheDirLength 1). The remaining characters, `9sj4t2svBA`, are used for file names.

Example 2

```
CacheRoot /QIBM/UserData/HTTPA/CacheRoot/MyCache
CacheDirLevels 5
CacheDirLength 2
```

The above example indicates that the same hash key described for example one (ftp://ibm.com/document.html) may be used to build a directory path such as /x3/_9/sj/4t/2s/vBA where `x3`, `_9`, `sj`, `4t`, and `2s` are five subdirectory names (CacheDirLevels 5) each having a length of two characters (CacheDirLength 2). The remaining characters, `vBA`, are used for file names.

Directory paths generated in this process are relative to the directory root defined by the CacheRoot directive. Therefore, for example one (above), two files, one named `9sj4t2svBA.data` and the other named `9sj4t2svBA.header` will be created to store data using the hash key `ftp://ibm.com/document.html`. Both files will reside within the `/QIBM/UserData/HTTPA/CacheRoot/MyCache/x/3/_` directory. For example two (above), the two files will be named `vBA.data` and `vBA.header` and will reside within the `/QIBM/UserData/HTTPA/CacheRoot/MyCache/x3/_9/sj/4t/2s` directory using the same hash key.

Directory length and level limits:

Since the hash algorithm generates an exponential number of directories using this schema, a limit must be set upon the values that CacheDirLevels and CacheDirLength may have. The limits described as such:

```
CacheDirLevels * CacheDirLength <= 20
```

The maximum number of directory levels multiplied by the maximum length of each subdirectory must be less than or equal to 20. If not, the server will fail to activate at startup.

If the values specified for CacheDirLevels and CacheDirLength are changed once they have been used to cache data, the server will discard all existing cache data when it runs disk cache maintenance since the file paths used to store data no longer adhere to the new values. See the CacheGcDaily or CacheGcInterval directives for more details on disk cache maintenance.

- This directive is used only if CacheRoot is set.

Note: HTTP Server does not support inheritance for the CacheDirLevels directive.

CacheGcClean

Module: mod_cache_disk

Syntax: CacheGcClean *hash-key-criteria period*

Default: CacheGcClean *2592000 (seconds, or 30 days)

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule cache_disk_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM`

Example: CacheGcClean http://www.ibm.com /* 1296000

The CacheGcClean directive specifies a complete URL or URL match expression and a maximum period value used to identify and remove data from cache that has not been updated (or written to cache) within the number of specified seconds. Multiple CacheGcClean directives are allowed. If disk cache maintenance is disabled, this setting has no affect and the cache may grow without bound, unless managed by some application or process other than the server.

This directive is similar to the CacheGcUnused directive, however the former distinguishes when data was last written (or saved) to cache, not when it was last served from cache.

Parameter One: *hash-key-criteria*

- The *hash-key-criteria* parameter accepts a complete URL or URL match expression used to identify cached data by hash key. Complete URLs do not contain asterisks (*) or question marks (?) and must match hash keys URLs completely (see example two). URL match expressions contain one or more asterisks (*) or question marks (?) used as wildcards to match multiple hash keys. For example: `http://ibm.com/*`, `*://ibm.com/*`, or `ftp://server?.ibm.com/*` (see example one).

Parameter Two: *period*

- The *period* parameter specifies the maximum amount of time (in seconds) that matched data may remain cached.

Cached data for the disk caching function is identified by comparing hash keys with the value specified for the hash-key-criteria parameter. Matched data that has not been updated (or written to cache) within the number of seconds specified by the corresponding period parameter is discarded by the server during phase one of the disk cache maintenance process. Matched data that has been updated within the number of specified seconds is not affected. Unmatched data is not affected. See "Two Phase Disk Cache Maintenance" on page 378 for details concerning the disk cache maintenance process.

Example 1: URL match expressions

```
CacheRoot serverCache
CacheGcClean *://ibm.com/* 2592000
CacheGcClean ftp://server?.ibm.com/* 1209600
```

For this example, the first CacheGcClean directive ensures cached data with hash keys (or URLs) that match the expression `*://ibm.com/*` and has not been updated within the past 2592000 seconds (or 30 days) is discarded during phase one of the cache maintenance process. The second CacheGcClean directive ensures cached data with hash keys (or URLs) that match the expression `ftp://server?.ibm.com/*` and has not been updated within the past 1209600 seconds (or 2 weeks) is discarded.

Example one uses CacheGcClean directives with URL match expressions to manage data stored in cached using the disk cache function (CacheRoot serverCache). For the expression `*://ibm.com/*`, the first wildcard (*) is used to match one or more characters in hash keys preceding the characters `//ibm.com/`. The second wildcard (*) is used to match one or more characters succeeding the characters `//ibm.com/`. Hash keys that match this expression, for example, include http://ibm.com/public/welcome.html and ftp://ibm.com/patch.zip. For the expression `ftp://server?.ibm.com/*`, the first wildcard (?) is used to match any single character between ftp://server and .ibm.com/. The second wildcard (*) is used to match one or more characters succeeding the characters .ibm.com/. Hash keys that match this expression, for example, include ftp://server1.ibm.com/whitepaper.pdf and ftp://server5.ibm.com/downloads/driver.exe.

Example Two: Complete URL

```
CacheRoot serverCache
CacheGcClean ftp://server5.ibm.com/downloads/application.zip 432000
```

For this example, the CacheGcClean directive uses a complete URL to ensure cached data with the hash key `ftp://server5.ibm.com/downloads/application.zip` is discarded during phase one of the disk cache maintenance process if it has not been updated within the past 432000 seconds (or 5 days). No other data will be matched since complete URLs identify a single hash key.

The server detects updates to cached data for the disk caching function by comparing the "Data change date/time" values of data file attributes. These are commonly referred to as last-modified times. When data is updated within cache, the corresponding last-modified times record the date and time that the last update was made.

- This directive is negated when off is specified for CacheGcDaily and CacheGcInterval is not specified.
- This directive is used only if CacheRoot is set.
- Disk cache maintenance may occur at regular time periods for CacheGcInterval and at a particular time of day for CacheGcDaily if both are set.

Note: HTTP Server does not support inheritance for the CacheGcClean directive.

CacheGcDaily

Module: mod_cache_disk

Syntax: CacheGcDaily *time-of-day | off*

Default: CacheGcDaily 03:00

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule cache_disk_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM`

Example: CacheGcDaily 23

The CacheGcDaily directives specifies whether the server is to perform disk cache maintenance, at a particular time, when the disk cache function is enabled. If the disk cache function is disabled (the default), this setting has no affect and the server does not perform disk cache maintenance. The default value is 3:00 (3:00 am local system time).

Parameter: *time-of-day | off*

- The *time-of-day* parameter accepts a value in the `HH:MM:SS` format (24 hour clock) where HH is an hour value (0 to 23), MM is a minute value (0 to 59), and SS is a second value (0 to 59). A minute (MM) or second (SS) value is not required. If a minute value is not specified, maintenance will commence at the beginning of the hour specified by the hour value (see example two). Likewise, if a second value is not specified, maintenance will commence at the specified number of minutes past the hour (see example one).
- If *off* is specified, maintenance will not be performed based on a particular time of day (see example three).

If *off* is not specified, the server will perform cache maintenance every day, starting at the specified local system time (if disk caching is enabled, see examples one and two). If *off* is specified, the server will not perform disk cache maintenance at a specific time of day, however it may perform disk cache maintenance at regular time intervals, if a maintenance period is set using the CacheGcInterval directive. If *off* is specified, and a maintenance period is not specified using CacheGcInterval, the server will never perform disk cache maintenance (see example three).

Example 1

```
    CacheRoot dataCache
    CacheGcDaily 15:55
```

Example 2

```
CacheRoot dataCache
CacheGcDaily 9
```

Example 3

```
CacheRoot dataCache
CacheGcDaily off
```

For example one, the server will perform cache maintenance every day at 15:55 (or 3:55 pm local system time). For example two, the server will perform cache maintenance every day at 9:00 (or 9:00 am local system time). For example three, the server will not perform disk cache maintenance since CacheGcDaily is set to off, and CacheGcInterval is not specified.

See “Two Phase Disk Cache Maintenance” on page 378 for details concerning the disk cache maintenance process.

- Disk cache maintenance may occur at time intervals for CacheGcInterval and at a particular time of day for CacheGcDaily if both are set.
- This directive is used only if CacheRoot is set.

Note: HTTP Server does not support inheritance for the CacheGcDaily directive. For the configuration shown below, garbage collection is performed at 1:30 AM and again at 2:30 AM.

Example:

```
CacheRoot dataCache
CacheGcDaily 01:30:00
 <VirtualHost ...>
  CacheGcDaily 02:30 00
 </Virtual Host>
```

CacheGcInterval

Module: mod_cache_disk

Syntax: CacheGcInterval *period*

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule cache_disk_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM`

Example: CacheGcInterval 8100

The CacheGcInterval directive specifies whether the server is to perform disk cache maintenance, at regular time intervals, when the disk cache function is enabled. Maintenance for this setting will commence at the time the server is started, and repeat every number of specified seconds, until the server is ended. If the disk cache function is disabled (the default), this setting has no affect and the server does not perform disk cache maintenance.

Parameter: *period*

- The *period* parameter specifies a period for cache maintenance cycles, in seconds. The value may include a decimal to indicate fractional hours. For example, use CacheGcInterval 5400 to perform cache maintenance every 5400 seconds (every 90 minutes).

If this directive is not used (not specified), the server will not perform disk cache maintenance at regular time intervals, however it may at a particular time of day, if such a time is specified using the CacheGcDaily directive. If this directive is not used (not specified), and CacheGcDaily is set to *off*, the server will never perform disk cache maintenance (see example two).

Example 1

```
CacheRoot dataCache
CacheGcInterval 9900
```

Example 2

```
CacheRoot dataCache
CacheGcDaily offexample
```

For example one, the server will perform disk cache maintenance every 9900 seconds (every 2 hours and 45 minutes), starting from the time the server is started. For example two, the server will not perform disk cache maintenance since CacheGcDaily is set to off, and CacheGcInterval is not specified.

See "Two Phase Disk Cache Maintenance" on page 378 for details concerning the disk cache maintenance process.

- Disk cache maintenance may start at regular time intervals for CacheGcInterval and at a particular time of day for CacheGcDaily if both are set.
- This directive is used only if CacheRoot is set.

Note: HTTP Server does not support inheritance for the CacheGcInterval directive.

CacheGcMemUsage

Module: mod_cache_disk

Syntax: CacheGcMemUsage *size*

Default: CacheGcMemUsage 5000000

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule cache_disk_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM`

Example: CacheGcMemUsage 3000000

The CacheGcMemUsage directive specifies the maximum amount of system memory, in bytes, the server is to use to collect information for phase two of the disk cache maintenance process. See Two Phase Disk Cache Maintenance for details concerning the disk cache maintenance process.

Parameter: *size*

- The *size* parameter specifies, in bytes, the amount of main store memory that the server may use for phase two of the disk cache maintenance process.

When the amount of system memory consumed for phase two of the disk cache maintenance process reaches the value specified for the size parameter, the server stops collecting information for remaining data in cache but continues to do the other tasks for phase one until finished. If the server takes disk cache maintenance into phase two, only the information collected in phase one is used. This will not include information for all remaining cached data if the size parameter is not large enough.

Example

```
CacheRoot dataCache
CacheGcDaily 5:00
CacheGcMemUsage 200000
```

For this example, the server will perform disk cache maintenance every day at 5:00 (CacheGcDaily 5:00). During phase one maintenance, the server records file names and expiration times for data remaining cached, until it consumes 200000 bytes of memory (CacheGcMemUsage 200000). After this limits reached, the server continues to perform the other phase one tasks. After all phase one tasks are complete, the server performs phase two maintenance (if needed) using whatever information it was able to collect in phase one.

- This directive is negated when *off* is specified for CacheGcDaily and CacheGcInterval is not specified.
- Cache maintenance may occur at time intervals for CacheGcInterval and at a particular time of day for CacheGcDaily if both are set.

- This directive is used only if CacheRoot is set, and cache maintenance is enabled.

Note: HTTP Server does not support inheritance for the CacheGcMemUsage directive.

CacheGcUnused

Module: mod_cache_disk

Syntax: CacheGcUnused *hash-key-criteria period*

Default: CacheGcUnused * 1209600 (seconds, or 2 weeks)

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule cache_disk_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM`

Example: CacheGcUnused http://www.ibm.com/* 432000

The CacheGcUnused directive specifies a complete URL or URL match expression and a maximum period value used to identify and remove data from cache that has not been used (or served from cache) within the number of specified seconds. Multiple CacheGcUnused directives are allowed. If disk cache maintenance is disabled (see "CacheGcDaily" on page 383 or "CacheGcInterval" on page 384), this setting has no affect and the cache may grow without bound, unless managed by some application or process other than the server itself.

This directive is similar to the "CacheGcClean" on page 381 directive, however the latter does not distinguish when data was last served from cache, but rather when it was last written (or saved) to cache.

Parameter One: *hash-key-criteria*

- The *hash-key-criteria* parameter accepts a complete URL or URL match expression used to identify cache data by hash key. Complete URLs do not contain asterisks (*) or question marks (?) and must match hash keys completely (see example two). URL match expressions contain one or more asterisks (*) or question marks (?) as wildcards to match multiple hash keys. For example, `http://*` or `ftp://server?.ibm.com/*` (see example one).

Parameter Two: *period*

- The *period* parameter specifies the maximum amount of time (in seconds) that matched data may remain cached.

Cached data for the disk caching function is identified for this setting by comparing hash keys with the value specified for the hash-key-criteria parameter. Matched data that has not been used (or served from cache) within the number of seconds specified by the corresponding period parameter are discarded by the server during phase one of the disk cache maintenance process. Matched data that has been used within the number of specified seconds is not affected. Unmatched documents are not affected. See "Two Phase Disk Cache Maintenance" on page 378 for details concerning the disk cache maintenance process.

Example 1: URL match expressions

```
CacheRoot serverCache
CacheGcUnused http://* 25929000
CacheGcUnused ftp://server?.ibm.com/* 1209600
```

For this example, the first CacheGcUnused directive ensures that cached data with hash keys (or URLs) that match the expression `http://*` and has not been updated within the past 25929000 seconds (or 30 days) are discarded during phase one of the disk cache maintenance process. The second CacheGcClean directive ensures that cached data with hash keys (or URLs) that match the expression `ftp://server?.ibm.com/*` and has not been updated within the past 1209600 seconds (or 2 weeks) is discarded.

Example one uses CacheGcUnused directives with URL match expressions to manage data stored in cache using the disk caching function (CacheRoot serverCache). For the expression `http://*`, the wildcard (*) is used to match one or more characters in hash keys preceding the characters http://. This expression matches all hash keys starting with the characters `http://`. For the expression `ftp://server?.ibm.com/*`, the first wildcard (?) is used to match any single character in hash keys between `ftp://server and .ibm.com/`. The second wildcard (*) is used to match one or more characters in hash keys succeeding the characters .ibm.com/. Hash keys that match this expression, for example, include ftp://server1.ibm.com/whitepaper.pdf and `ftp://server5.ibm.com/downloads/driver.exe`.

Example 2: Complete URL

```
ProxyRequests on
CacheRoot serverCache
CacheGcUnused ftp://server5.ibm.com/downloads/application.zip 432000
```

For this example, the CacheGcUnused directive uses a complete URL to ensure cached data with the hash key `ftp://ftpserver.ibm.com/downloads/application.zip` is discarded during phase one of the disk cache maintenance process if it has not been requested within the past 432000 seconds (or 5 days). No other data will be matched since complete URLs identify a single hash key.

The server detects requests for cached data for the disk caching function by comparing the "Last access date/time" values of data file attributes. These are commonly referred to as last-accessed times. When data is served from cache, the corresponding last-accessed times record the date and time that the last request was served.

- This directive is negated when off is specified for CacheGcDaily and CacheGcInterval is not specified.
- Cache maintenance may occur at regular time periods for CacheGcInterval and at a particular time of day for CacheGcDaily if both are set.
- This directive is used only if CacheRoot is set.

Note: HTTP Server does not support inheritance for the CacheGcUnused directive.

CacheMaxFileSize

Module: mod_cache_disk

Syntax: CacheMaxFileSize *size*

Default: none

Context: server, virtual host, directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule cache_disk_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheMaxFileSize 4000000

The "CacheMaxFileSize" on page 387 directive specifies the maximum amount of data that may be stored in the proxy disk cache for a single URL, in bytes. This setting effectively placing a maximum data size limit on individual cache entries. If the disk cache function is disabled (see CacheRoot), this setting has no affect.

Notes for local proxy cache:

When the disk cache function is used to support a local proxy cache, this setting places a maximum data size limit on HTTP proxy responses which remain in the cache after cache maintenance has run. See the CacheGCDaily and the CacheGCInterval directives for more information on how the disk cache maintenance function is used to support a local proxy cache.

Example: :

```
          ProxyRequests  on
          CacheOn on
          CacheRoot  proxyCache
          CacheMaxFileSize  5000000
          CacheMinFileSize  400000
```

For this example, if 7.2 megabytes of cacheable HTTP proxy response data is available for a single proxy request, the data will be served (by proxy), and cached for subsequent proxy requests, but will be removed during the next cache maintenance cycle since it is larger than the 5000000 byte maximum data size limit imposed by CacheMaxFileSize. A 3.8 megabyte HTTP proxy response will be cached for subsequent proxy requests and will remain in the cache after the cache maintenance cycle has run, since it is smaller than the 5000000 byte maximum data size limit and larger than the 400000 byte minimum data size limit (set by CacheMinFileSize).

CacheMinFileSize

Module: mod_cache_disk

Syntax: CacheMinFileSize *size*

Default: CacheMinFileSize 1

Context: Server, Virtual Host, directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule cache_disk_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheMinFileSize 40

The CacheMinFileSize directive specifies the minimum amount of data that may be stored in the proxy disk cache for a single URL, in bytes. This setting effectively placing a minimum data size limit on individual cache entries. If the disk cache function is disabled (see CacheRoot), this setting has no affect.

Parameter: *size*

- The *size* parameter accepts a value between 0 and 2147483647 to specify the minimum number of bytes allowed for cache data entries.

  A maximum document size limits specified using CacheMaxFileSize.

Notes for local proxy cache:

When the disk cache function is used to support a local proxy cache, this setting places a minimum data size limit on HTTP proxy responses which remain in the cache after cache maintenance has run. See CachGcDaily and CacheGcInterval directives for more details on the how the disk cache maintenance function is used to support a local proxy cache.

Example

```
ProxyRequests on
CacheRoot proxyCache
```

```
CacheMaxFileSize 5000000
CacheMinFileSize 400000
```

For this example, if 240 kilobytes of cacheable HTTP proxy response data is available for a single proxy request, but will be removed during the next cache maintenance cycle since it is less than the 400000 byte minimum data size limit imposed by CacheMinFileSize. A 2.7 megabyte HTTP proxy response may be cached for subsequent proxy requests and will remain in the cache after the cache maintenance cycle has run since it is larger than the 400000 byte minimum data size limit and smaller than the 5000000 byte maximum data size limit (set by CacheMaxFileSize).

CacheRoot

Module: mod_cache_disk

Syntax: CacheRoot *directory*

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule cache_disk_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM`

Example: CacheRoot webProxyCache

The CacheRoot directive enables the disk cache function and specifies the name of the file system directory root. Setting this directive also enables disk cache maintenance for the CacheGcDaily directive, by default, and the CacheGcInterval directive. See the "CacheGcDaily" on page 383 or "CacheGcInterval" on page 384 directives for more details on disk cache maintenance.

Parameter: *directory*

- The *directory* parameter accepts a file system path name to specify the file system directory root for the disk cache function (see directory root limits below).

The disk cache function provides underlying cache support for a local proxy cache and user written modules, using local file system space (disk space). The server must have *RWX data authorities and *ALL object authorities to the specified directory.

A hash algorithm is used to generate unique and seemingly random file system path names based on hash keys (or URLs) provided for data stored in cache (see also CacheDirLength and CacheDirLevels). Data is stored in the local file system using these path names, relative to the specified directory root. The following limits are placed on the directory root:

Directory root limits:

- If the directory parameter specifies an absolute path it must start with /QIBM/UserData/HTTPA/CacheRoot, otherwise the proxy will fail to activate at startup.
- If the directory parameter does not specify an absolute path (does not start with a '/'), it will be assumed to be relative to the following: /QIBM/UserData/HTTPA/CacheRoot

The directory will be created if it does not exist prior to server startup. Only the last directory in the path will be created. All other directories in the path must previously exist. For example, if "CacheRoot abc/def" is configured, the server will create directory "/QIBM/UserData/HTTPA/CacheRoot/ABC/def".

Example 1: Absolute Path

```
CacheRoot /QIBM/UserData/HTTPA/CacheRoot/proxyCache
ProxyRequests on
```

Example 2: Relative Path

```
CacheRoot proxyCache
CacheEnable %%PROXY%%
ProxyRequests on
```

Example 3: Relative Path (with disk cache function unavailable for proxy data)

```
CacheRoot cache
CacheEnable disk /
ProxyRequests on
```

Example 4: Bad Path

```
CacheRoot /MyServerCache
```

For example one, CacheRoot enables the disk cache function (CacheRoot /QIBM/UserData/HTTPA/CacheRoot/proxyCache) , ProxyRequests specifies that the proxy function is enabled to handle forward proxy requests (ProxyRequests on). With these directive settings, HTTP proxy response data is cached and maintained within the /QIBM/UserData/HTTPA/CacheRoot/proxyCache directory using disk cache function support. See the ProxyRequests directive for more information on handling proxy requests and caching HTTP proxy response data.

For example two, the disk cache function is enabled (CacheRoot proxyCache), the proxy function is enabled (ProxyRequests on), and the local proxy cache is enabled. With these directive settings, HTTP proxy response data is cached and maintained within the proxyCache directory, relative to the /QIBM/UserData/HTTPA/CacheRoot/ directory. This directory is the same one described in example one, simply specified as a relative path name rather than an absolute path name. Either specification is acceptable.

For example three, the disk cache function is enabled (CacheRoot cache), and the proxy function is enabled (ProxyRequests on), however the local proxy cache is disabled. With these directive settings, the disk cache function is not used to cache data for the proxy function, but may be used to cache data for user written modules.

For example four, the directory specified for CacheRoot is not valid since an absolute path within /QIBM/UserData/HTTPA/CacheRoot/ is not specified. With this configuration the server will generate an error message(s) at startup and fail to activate.

- This directive is required when ProxyNoConnect is set to on.

Note: HTTP Server does not support inheritance for the CacheRoot directive.

CacheSize

Module: mod_cache_disk

Syntax: CacheSize *size*

Default: CacheSize 5000000

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule cache_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule cache_disk_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheSize 8550

The CacheSize directive specifies the maximum amount of system storage space allocated for the disk cache function (in kilobytes). Although actual usage may exceed this setting, the server will discard data when it runs disk cache maintenance until the total allocated cache space is at or below this setting. If disk cache maintenance is disabled, this setting has no affect and the cache may grow without bound, unless managed by some application or process other than the server itself. See "CacheGcDaily" on page 383 or "CacheGcInterval" on page 384 for more details on the disk cache maintenance process.

Parameter: *size*

- The *size* parameter specifies the maximum number of kilobytes allocated for the disk cache function. Depending on the expected server traffic volume, and values set for CacheGcInterval or CacheGcDaily, use a size value that is at least twenty to forty percent lower than the available space.

The disk cache function uses the local file system to store data. Therefore, space allocated for this cache is used to maintain directory structures and file attributes as well as to store cache data. It also includes unused space within file system storage blocks allocated to files and directories. Therefore, the total amount of system storage allocated for the cache will always be greater than the total amount of actual cache data. This setting sets a limit for the total amount of allocated space, not a limit for the total amount of actual cache data.

- This directive is negated when off is specified for CacheGcDaily and CacheGcInterval is not specified.
- This directive is used only if CacheRoot is set.

Note: HTTP Server does not support inheritance for the CacheSize directive.

CacheReadSize

Module: mod_cache_disk

Syntax: CacheReadSize *bytes*

Default: CacheReadSize *0*

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
cache_disk_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheReadSize 102400

The "CacheReadSize" on page 391 directive sets the minimum amount of data, in bytes, to be read from the backend before the data is sent to the client. The default of zero causes all data read of any size to be passed downstream to the client immediately as it arrives. Setting this to a higher value causes the disk cache to buffer at least this amount before sending the result to the client. This can improve performance when caching content from a reverse proxy.

This directive only takes effect when the data is being saved to the cache, as opposed to data being served from the cache.

CacheReadTime

Module: mod_cache_disk

Syntax: CacheReadTime *milliseconds*

Default: CacheReadTime *0*

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
cache_disk_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheReadTime 1000

The "CacheReadTime" on page 391 directive sets the minimum amount of elapsed time that should pass before making an attempt to send data downstream to the client. During the time period, data will be buffered before sending the result to the client. This can improve performance when caching content from a reverse proxy.

The default of zero disables this option.

This directive only takes effect when the data is being saved to the cache, as opposed to data being served from the cache. It is recommended that this option be used alongside the "CacheReadSize" on page 391 directive to ensure that the server does not buffer excessively should data arrive faster than expected.

Module mod_env

Module mod_env supports directives for the IBM HTTP Server for i Web server.

Summary

This module allows the HTTP Server CGI and SSI environment to inherit environment variables.

Directives

- "PassEnv" on page 392
- "SetEnv" on page 392
- "UnsetEnv" on page 393

PassEnv

Module: mod_env

Syntax: PassEnv *variable [variable ...]*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Example: PassEnv LD_LIBRARY_PATH

The PassEnv directive specifies one or more environment variables to pass to the CGI scripts. The variables originate from the server's own environment. See "Environment variables set by HTTP Server" on page 634 for more information.

Parameter: *variable*

- The *variable* parameter is any valid environment variable.

SetEnv

Module: mod_env

Syntax: SetEnv *variable [value]*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Examples:

- SetEnv SPECIAL_PATH /QIBM/bin
- SetEnv QIBM_CGI_LIBRARY_LIST "MIME;CGIURL;CGILIBL"

The SetEnv directive allows you to set an internal environment variable that is passed on to CGI scripts and SSI pages.

If you omit the *value* argument, the variable is set to an empty string.

The internal environment variables set by this directive are set after most early request processing directives are run, such as access control and URI-to-filename mapping. If the environment variable you're setting is meant as input into this early phase of processing such as the "RewriteRule" on page 576 directive, you should instead set the environment variable with "SetEnvIf" on page 584.

UnsetEnv

Module: mod_env

Syntax: UnsetEnv *variable [variable ...]*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Example: UnsetEnv LD_LIBRARY_PATH

The UnsetEnv directive removes one or more environment variables from those passed on to CGI scripts. See "Environment variables set by HTTP Server" on page 634 for more information.

Parameter: *variable*

- The *variable* parameter is any valid environment variable.

Module mod_example

Module mod_example supports directives for the IBM HTTP Server for i Web server.

Summary

The module mod_example provides a simple example to demonstrate the use of the Apache APIs.

Directive

- "Example" on page 393

Example

Module: mod_example

Syntax: Example

Default: none

Context: server config, virtual host, directory, .htaccess

Override: Options

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule example_module /QSYS.LIB/QHTTPSVR.LIB/QZSREXAMPL.SRVPGM
```

Example: Example

This directive sets a demonstration flag. The example module's content handler displays the flag. There are no arguments. If you browse a URL to which the example content-handler applies, the routines within the module and how and in what order they were called to service the document request are displayed.

Module mod_expires

Module mod_expires supports directives for the IBM HTTP Server for i Web server.

Summary

This module controls the setting of the Expires HTTP header in server responses. The expiration date can be set relative to either the time that the source file was last modified, or relative to the time that the client accessed the server.

The Expires HTTP header is an instruction to the client regarding the document's validity and persistence. If cached, the document may be retrieved from the cache rather than from the source until the allocated time has passed. After this occurs, the cache copy is considered "expired" and a new copy must be obtained from the source.

Alternate Interval Syntax

The ExpiresDefault and ExpiresByType directives can also be defined in a more readable syntax of the form:

```
ExpiresDefault "<base> [plus] {<num> <type>}*"
ExpiresByType type|encoding "<base> [plus] {<num> <type>}*"
```

The *<base>* argument is one of the following:

- access
- now (equivalent to 'access')
- modification

The *[plus]* keyword is optional. The *<num>* argument should be an integer value [acceptable to atoi()], and *<type>* is one of the following:

- years
- months
- weeks
- days
- hours
- minutes
- seconds

For example, any of the following directives can be used to make documents expire 1 month after being accessed, by default:

```
ExpiresDefault "access plus 1 month"
ExpiresDefault "access plus 4 weeks"
ExpiresDefault "access plus 30 days"
```

Note: Time is stored in seconds. The value month is actually calculated as 60*60*24*30 seconds. Keep in mind that one month is equal 30 days, and 4 weeks is only equal to 28 days. If you specify 52 weeks, it is calculated as 362 days instead of 365 days.

The expiry time can be fine-tuned by adding several <num> and <type> arguments. For example:

```
ExpiresByType text/html"access plus 1 month 15 days 2 hours"
ExpiresByType image/gif "modification plus 5 hours 3 minutes"
```

Note: If you use a modification date based setting, the Expires header is added only to content that comes from a file on a disk, because there is no modification time for content that does not come from a file on a disk.

Directives

- "ExpiresActive" on page 395
- "ExpiresByType" on page 395
- "ExpiresDefault" on page 396

ExpiresActive

Module: mod_expires

Syntax: ExpiresActive *on | off*

Default: ExpiresActive off

Context: server config, virtual host, directory, .htaccess

Override: Indexes

Origin: Apache

Example: ExpiresActive on

The ExpiresActive directive enables or disables the generation of the Expires header for the document realm in question. If this directive is found in an .htaccess file it only applies to documents generated from that directory.

Parameter: *on | off*

- If set to *on*, an Expires header will be added to served documents according to criteria set by the ExpiresByType and ExpiresDefault directives.
- If set to *off*, an Expires header will not be generated for any document in the realm (unless overridden at a lower level, such as an .htaccess file overriding a server config file).

Note: This directive does not guarantee that an Expires header will be generated. If the criteria is not met, no header will be sent, and the effect will be as though this directive was never specified.

ExpiresByType

Module: mod_expires

Syntax: ExpiresByType *MIME-type code seconds | "<base> [plus] <num> <type>"*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: Indexes

Origin: Apache

Example: ExpiresByType image/gif A2592000

Example: ExpiresByType text/html "access plus 30 days"

The ExpiresByType directive defines the value of the Expires header generated for documents of the specified type (for example, text/html). The second argument sets the number of seconds that will be added to a base time to construct the expiration date.

The base time is either the last modification time of the file, or the time of the client's access to the document. Whether access time or modification time should be used is specified by the code field. *M* means that the file's last modification time should be used as the base time, and *A* means the client's access time should be used.

The difference in effect between the *A* and the *M* is minimal. If *M* is used, all current copies of the document in all caches will expire at the same time. This could be useful for something like a weekly notice that is always found at the same URL. If *A* is used, the date of expiration is different for each client. This could be useful for image files that do not change very often, particularly for a set of related documents that all refer to the same images (for example, the images will be accessed repeatedly within a relatively short time span).

Parameter One: *MIME-type*

- The document type for which an Expires header should be generated.

Parameter Two: *code*

- The *code* parameter specifies one of two possible choices. Specify *A* if the expiration time should be calculated from the time the resource was accessed. Specify *M* if the expiration time should be calculated from the last modified date of the resource.

Parameter Three: *seconds*

- The *seconds* parameter is a number of seconds until the resource expires.

Here is an example to specify the expiration time calculation. For examples using alternate syntax, see the beginning of this topic.

```
#enable expirations
ExpiresActive on
#expire GIF images after a month in the clients cache
ExpiresByType image/fig A2592000
#HTML documents are good for a week from the time they were changed
ExpiresByType text/html M604800
```

Note: This directive only has effect if ExpiresActive On has been specified. It overrides, for the specified MIME type only, any expiration date set by the ExpiresDefault directive. If you use a modification date based setting, the Expires header will not be added to content that does not come from a file on disk. This is due to the fact that there is no modification time for such content.

ExpiresDefault

Module: mod_expires

Syntax: ExpiresDefault *code seconds| "<base> [plus] <num> <type>"*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: Indexes

Origin: Apache

Example: ExpiresDefault A2592000

Example: ExpiresDefault "access plus 1 month"

The ExpiresDefault directive sets the default algorithm for calculating the expiration time for all documents in the affected realm. It can be overridden on a type-by-type basis by the ExpiresByType directive. See the description of the ExpiresByType directive for details about the syntax of the argument, and the alternate syntax description as well.

Parameter One: *code*

- The code parameter specifies has two arguments. Specify *A* if the expiration time should be calculated from the time the resource was accessed. Specify *M* if the expiration time should be calculated from the last modified date of the resource.

Parameter Two: *seconds*

- The *seconds* parameter is a number of seconds until the resource expires.

Note:

- If you use a modification date based setting, the Expires header will not be added to content that does not come from a file on disk. This is due to the fact that there is no modification time for such content.
- You can also specify the expiration time calculation using the alternate interval syntax. For examples using alternate syntax, see the beginning of this topic.

Module mod_ha

Module mod_ha supports directives for the IBM HTTP Server for i Web server.

Summary

The module mod_ha contains directives that define support for the highly available HTTP Server function.

Directives

- "HACGI" on page 397
- "HAModel" on page 398
- "LmExitProgram" on page 398
- "LmIntervalTime" on page 399
- "LmMaxReactivation" on page 400
- "LmResponseTime" on page 400
- "LmUrlCheck" on page 401
- "LmUrlCheckBackup" on page 402

HACGI

Module: mod_ha

Syntax: HACGI *on | off*

Default: HACGI off

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule ha_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Example: HACGI on

The HACGI directive specifies if CGI programs in a directory can be highly available. The CGI programs in the specified directory must use the highly available HTTP Server APIs.

Parameter: *on | off*

- The *on* parameter value specifies CGI programs in a directory can be highly available.
- The *off* parameter value specifies CGI programs in a directory are not high available.

HAModel

Module: mod_ha

Syntax: HAModel *model*

Default: none

Context: server config

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule ha_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Example: HAModel PrimaryBackupWithIpTakeover

Example: HAModel PrimaryBackupWithDispatcher

Example: HAModel PurePeer

The HAModel directive establishes which highly available model is to be used (PrimaryBackupWithIpTakeover, PrimaryBackupWithDispatcher, or PurePeer).

Parameter: *model*

- The *PrimaryBackupWithIpTakeover* parameter value specifies that the highly available Web server runs on the primary and all backup nodes. The backup node or nodes are in a idle state, ready to become the primary Web server should the primary Web server fail (failover), or a switchover takes place.
- The *PrimaryBackupWithDispatcher* parameter value specifies that the highly available Web server runs on the primary and all backup nodes. The backup nodes are in an idle state and all client requests are served by the primary node. A network dispatcher (for example the IBM WebSphere Edge Server) sends client requests to the Web server.
- The *PurePeer* parameter value specifies that all highly available nodes are in an active state and serve client requests. A network dispatcher (for example the IBM WebSphere Edge Server) evenly distributes requests to different cluster nodes. This guarantees distribution of resources in case of heavy load. Linear scalability is not guaranteed beyond a small number of nodes. After some number of nodes are added, scalability can disappear, and the cluster performance can deteriorate.

See "Highly available HTTP Server" on page 43 for more information regarding highly available Web server models.

Example

```
LoadModule ha_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
HAModel PrimaryBackupWithIPTakeover
LmUrlCheck http://hostname/web/docs/spec/wscheck.html
LmIntervalTime 100
LmMaxReactivation 5
LmResponseTime 300
```

Note: When a server is configured as highly available (HAModel directive is specified), "HotBackup" on page 325 behaves as if it is set to 'off' and can not be overwritten.

LmExitProgram

Module: mod_ha

Syntax: LmExitProgram *libraryname programname [userprofile]*

Default: none

Context: server config

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule ha_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Example: LmExitProgram httptest exitpgm joeuser

The LmExitProgram directive is used to specify a user-defined program in the QSYS file system that is started by the Liveness Monitor whenever it initiates a change in the HA model of a server instance from the primary model or to the primary model. When the server instance is going to become the primary HA server instance, then this program is called with a parameter of '1'. When the current HA primary server instance is no longer going to be the primary instance, then this program is called with a parameter of '0'. For example a program can be created which will start or end a job, depending on the role of the server.

Parameter One: *libraryname*

- The *libraryname* parameter value specifies the name of the library to be used. The parameter value can be up to 10 characters and must follow the rules for IBM i library names.

Parameter Two: *programname*

- The *programname* parameter value specifies the name of the program to be used. The parameter value can be up to 10 characters and must follow the IBM i rules for program names in a library.

Parameter Three: *userprofile*

- The *userprofile* parameter value is optional and specifies which user profile the named program should run under. If the *userprofile* parameter is not specified, user profile QTMHHTTP is used.

LmIntervalTime

Module: mod_ha

Syntax: LmIntervalTime *interval*

Default: LmIntervalTime 15

Context: server config

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule ha_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Example: LmIntervalTime 30

The LmIntervalTime directive is used by the Liveness Monitor to specify how often (in seconds, between performing Web server Liveness checks (HEAD or GET)) a liveness check should be performed on the server. The LmResponseTime and LmIntervalTime directives are independent. One sends out checks (LmIntervalTime), while the other tests for responses (LmResponseTime). The LmResponseTime value should always be larger than the LmIntervalTime value. It is recommended that LmResponseTime be at least 3 times larger than LmIntervalTime.

Parameter: *integer*

- The *interval* parameter value specifies how often (in seconds, between performing Web server Liveness checks (HEAD or GET)) a liveness check should be performed on the server. Valid values include integers between 0 and 4,294,967,295.

Example

```
LoadModule ha_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
HAModel PrimaryBackupWithIPTakeover
LmUrlCheck http://hostname/web/docs/spec/wscheck.html
LmIntervalTime 100
LmMaxReactivation 5
LmResponseTime 300
```

LmMaxReactivation

Module: mod_ha

Syntax: LmMaxReactivation *integer*

Default: LmMaxReactivation 3

Context: server config

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule ha_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Example: LmMaxReactivation 5

The LmMaxReactivation directive specifies how many times the Liveness Monitor should attempt to reactivate the Web server after a detected failure.

Parameter: *integer*

- The *integer* parameter value specifies how many times the Liveness Monitor should attempt to reactivate the Web server after a detected failure. Valid values include integers between 0 and 2,147,483,647

Example

```
LoadModule ha_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
HAModel PrimaryBackupWithIPTakeover
LmUrlCheck http://hostname/web/docs/spec/wscheck.html
LmIntervalTime 100
LmMaxReactivation 5
LmResponseTime 300
```

LmResponseTime

Module: mod_ha

Syntax: LmResponseTime *interval*

Default: LmResponseTime 120

Context: server config

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule ha_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Example: LmResponseTime 60

The LmResponseTime directive specifies how long the Liveness Monitor should wait for a response from the Web server before taking appropriate action (based on the other Liveness Monitor directive settings). The LmResponseTime and LmIntervalTime directives are independent. One sends out checks (LmIntervalTime), while the other tests for responses (LmResponseTime). The LmResponseTime value should always be larger than the LmIntervalTime value. It is recommended that LmResponseTime be at least 3 times larger than LmIntervalTime.

Parameter: *interval*

- The *interval* parameter value specifies how long the Liveness Monitor should wait for a response from the Web server before taking appropriate action (based on the other Liveness Monitor directive settings).

Example

```
LoadModule ha_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
HAModel PrimaryBackupWithIPTakeover
LmUrlCheck http://hostname/web/docs/spec/wscheck.html
LmIntervalTime 100
LmMaxReactivation 5
LmResponseTime 300
```

LmUrlCheck

Module: mod_ha

Syntax: LmUrlCheck *URL*

Default: LmUrlCheck http://

Context: server config

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule ha_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Example: LmUrlCheck http://194.170.2.5:8000/web/docs/spec/wscheck.html

The LmUrlCheck directive specifies a fully qualified URL that is used by the Liveness Monitor to perform liveness checks on HTTP Server. Specifying a domain name is not valid for this directive. Only one IP address can be specified in a highly available HTTP Server configuration.

Note: This is a required directive for highly available and must exist in the global server configuration context and not in a container. See “HAModel” on page 398 and “Highly available HTTP Server” on page 43 for additional details.

Parameter: *URL*

- The *URL* parameter value specifies a fully qualified URL that is used by the Liveness Monitor to perform liveness checks on the server. Only one IP address can be specified in a highly available server configuration. Specifying a domain name is not valid for this parameter. The IP Address must be the same address as specified with the Listen directive. The default port number is 80

Example

```
LoadModule ha_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
HAModel PrimaryBackupWithIPTakeover
LmUrlCheck http://194.170.2.5:8000/web/docs/spec/wscheck.html
LmIntervalTime 20
LmMaxReactivation 3
LmResponseTime 60
```

Specify *https* when the HTTP Server instance is configured to receive client requests using only secure sockets. The IP address must be the same as the IP address that was specified in the virtual host container for the SSL application. The default port number for SSL is 443.

Example

```
LoadModule ha_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
HAModel PrimaryBackupWithIPTakeover
LmUrlCheck https://194.170.2.5:8008/web/docs/spec/wscheck.html
LmIntervalTime 20
LmMaxReactivation 3
LmResponseTime 60
```

LmUrlCheckBackup

Module: mod_ha

Syntax: LmUrlCheckBackup *URL*

Default: none

Context: server config

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule ha_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Example: LmUrlCheckBackup http://194.170.2.5:8008/web/docs/spec/wscheck.html

The LmUrlCheckBackup directive specifies a fully qualified URL that is used by the Liveness Monitor to perform liveness checks on the HA backup server instance. If this directive is not configured, then the URL passed is the URL parameter value specified on the LmUrlCheck directive.

For example, if the server is configured to run Payment Manager, only one instance of Payment Manager can be active in the cluster at any given time. If the URL on the LmUrlCheck directive specifies a URL for the Payment Manager, then this same URL will not work for the HA backup server instance, so the LmUrlCheckBackup directive needs to be configured to use a non-Payment Manager URL.

Note: This directive is ignored when HAModel *PurePeer* is configured.

Parameter: *URL*

- The *URL* parameter value specifies a fully qualified URL that is used by the Liveness Monitor to perform liveness checks on the HTTP Server when the server is currently the HA backup server. The use of a domain name is not a valid parameter with this directive. Only one IP address can be specified in a High Availability server configuration (i.e. Listen 194.170.2.5:xxxxxx <virtual host 194.170.2.5:yyyyyy>). The IP Address must be the same address as specified with the Listen directive. The default port number is 80.

Example

```
LoadModule ha_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
HAModel Primary/BackupWithIPTakeover
LmUrlCheck http://194.170.2.5:8008/web/docs/spec/wscheck.html
LmUrlCheckBackup http://194.170.2.5:8008/web/docs/spec/wscheckbackup.html
LmIntervalTime 20
```

```
LmMaxReactivation 3
LmResponseTime 60
```

Specify *https* when the HTTP Server instance is configured to receive client requests using only secure sockets. The IP address must be the same as the IP address that was specified in the virtual host container for the SSL application. The default port number for SSL is 443.

Example

```
LoadModule ha_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
HAModel Primary/BackupWithIPTakeover
LmUrlCheck http://194.170.2.5:8008/web/docs/spec/wscheck.html
LmUrlCheckBackup https://194.170.2.5:8008/web/docs/spec/wscheckbackup.html
LmIntervalTime 20
LmMaxReactivation 3
LmResponseTime 60
```

Note: This directive is ignored when HAModel *PurePeer* is configured.

Module mod_headers

Module mod_headers supports directives for the IBM HTTP Server for i Web server.

Summary

The headers module allows for the customization of HTTP request and response headers. The module allows headers to be merged, replaced or removed.

Directives

- “Header” on page 403
- “RequestHeader” on page 406

Header

Module: mod_headers

Syntax: Header [*condition*] add|append|echo|edit|edit*|merge|set|setifempty|unset|note *header* [[expr=]*value* [*replacement*] [early|env=[!]*varname*|expr=*expression*]]

Default: none

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: Header append Author "John P. Doe"

Example: Header unset Author

Example: Header echo ^TS*

Example: Header echo Host

Example: Header merge Cache-Control no-cache env=CGI

The Header directive can replace, merge or remove HTTP response headers. The header is modified just after the content handler and output filters are run, allowing outgoing headers to be modified. The action performed by this module is determined by the action parameter. This parameter is followed by a header name, which can include the final colon, but it is not required. Case is also ignored for set, append, merge, add, unset and edit. The header name for echo is case sensitive and may be a regular expression. For add, append, merge and set, a value is given as the next parameter. If this value contains spaces, it should be surrounded by double quotes. For "echo" and "unset", no value should be given.

Order of Processing

The Header directive can occur almost anywhere within the server configuration. It is valid in the main server config and virtual host contexts, inside <Directory>, <Location>, and <Files> contexts and within .htaccess files.

The Header directives are processed in the following order:

1. main server
2. virtual host
3. <Directory> sections and .htaccess
4. <Location>
5. <Files>

Order is important. These two headers have a different effect if reversed. For example:

```
Header append Author "John P. Doe"
Header unset Author
```

This way the Author header is not set. If reversed, the Author header is set to "John P. Doe". The Header directives are processed just before the response is sent by its handler. This means that some headers, that are added just before the response is sent, cannot be changed or overridden. This includes headers such as Date and Server.

Parameter One: *condition*

- The condition parameter is an optional parameter which can be one of the following values:

Condition	Description
onsuccess	The Header directive will only effect responses with a status code of 2xx.
always	The Header directive will effect all responses, including 2xx.

Parameter Two: *action*

- The action parameter can be one of the following values:

Action	Description
set	The response header is set, replacing any previous header with this name. The value may be a format string.
setifempty	The request header is set, but only if there is no previous header with this name.
append	The response header is appended to any existing header of the same name. When a new value is merged onto an existing header it is separated from the existing header with a comma. This is the HTTP standard way of giving a header multiple values.
add	The response header is added to the existing set of headers, even if this header already exists. This can result in two (or more) headers having the same name. This can lead to unforeseen consequence, and in general, "set", "append" or "merge" should be used instead.
unset	The response header of this name is removed, if it exists. If there are multiple headers of the same name, all will be removed.
echo	Request headers with this name are echoed back in the response headers. *Header* may be a regular expression. Echo without any parameters echoes back all the request headers in the response.

Action	Description
note	The value of the named response header is copied into an internal note whose name is given by value. This is useful if a header sent by a CGI or proxied resource is configured to be unset but should also be logged.
edit edit *	If this response header exists, its value is transformed according to a regular expression search-and-replace. The value argument is a regular expression, and the replacement is a replacement string, which may contain back references or format specifiers. The edit form will match and replace exactly once in a header value, whereas the edit* form will replace every instance of the search pattern if it appears more than once.
merge	The response header is appended to any existing header of the same name, unless the value to be appended already appears in the header's comma-delimited list of values. When a new value is merged onto an existing header it is separated from the existing header with a comma. This is the HTTP standard way of giving a header multiple values. Values are compared in a case sensitive manner, and after all format specifiers have been processed. Values in double quotes are considered different from otherwise identical unquoted values.

Parameter Three: *header*

- The HTTP Response *header* parameter to be set, appended, or unset with this directive. There is no validity checking of the header, which allows the use of experimental headers. Case is ignored for set, append, merge, add, unset and edit. The header name for echo is case sensitive and may be a regular expression.

Parameter Four: *value*

- The *value* parameter may be a character string, a string containing format specifiers or a combination of both and specifies the value of the header to be set. It is only valid for set or an ap_expr expression prefixed with expr=. There is no validity checking of the value specified, which allows the use of experimental headers values. All characters and escaped characters, such as '\n', are allowed in the value string. If value contains spaces, it should be surrounded by double quotes. The following format specifiers are supported in value:

Format	Description
%%	The percent sign
%t	The time the request was received in Universal Coordinated Time since the epoch (Jan. 1, 1970) measured in microseconds. The value is preceded by "t=". The time the request was received in Universal Coordinated Time since the epoch (Jan. 1, 1970) measured in microseconds. The value is preceded by "t=".
%D	The time from when the request was received to the time the headers are sent on the wire. This is a measure of the duration of the request. The value is preceded by D=. The value is measured in microseconds.
%l	The current load averages of the actual server itself. It is designed to expose the values obtained by getloadavg() and this represents the current load average, the 5 minute average, and the 15 minute average. The value is preceded by l= with each average separated by /.

Format	Description
%i	The current idle percentage of httpd (0 to 100) based on available processes and threads. The value is preceded by i=.
%b	The current busy percentage of httpd (0 to 100) based on available processes and threads. The value is preceded by b=.
%{ENVVAR}e	The contents of the environment variable ENVVAR.

Note: Other format strings, such as %s, will receive an error and the server will not start. For edit there is both a value argument which is a regular expression, and an additional replacement string.

Parameter Five: *early|env=[!]variable] | expr=expression*

- Optional: It may be any of:

early

Specifies early processing.

env=[!]varname

The directive is applied if and only if the environment variable varname exists. A ! in front of varname reverses the test, so the directive applies only if varname is unset.

expr=expression

The directive is applied if and only if expression evaluates to true. Details of expression syntax and evaluation are documented in the ap_expr documentation.

```
# This delays the evaluation of the condition clause compared to <If>
Header always set CustomHeader my-value "expr=%{REQUEST_URI} =~ m#^/
special_path.php$#"
```

Except in early mode, the Header directives are processed just before the response is sent to the network. These means that it is possible to set and/or override most headers, except for those headers added by the HTTP header filter, such as Content-Type.

RequestHeader

Module: mod_headers

Syntax: RequestHeader add|append|edit|edit*|merge|set|setifempty|unset *header* [[expr=]value [*replacement*] [early|env=[!]varname|expr=*expression*]]

Default: none

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: RequestHeader set Accept-Encoding "gzip

Example: RequestHeader unset Referer

Example: RequestHeader edit Destination ^https: http: early

This argument is followed by a header name, which can include the final colon, but it is not required. Case is ignored. For set, append, merge and add, a value is given as the third argument. If this value contains spaces, it should be surrounded by double quotes. For unset, no value should be given.

Parameter one: *action*

- The action parameter can be one of the following values:

Action	Description
set	The request header is set, replacing any previous header with this name.
setifempty	The request header is set, but only if there is no previous header with this name.
append	The request header is appended to any existing header of the same name. When a new value is merged into an existing header, it is separated from the existing header with a comma. This is the HTTP standard way of giving a header multiple values.
add	The request header is added to the existing set of headers, even if this header already exists. This can result in two (or more) headers having the same name. This can lead to unforeseen consequences, and in general set, append or merge should be used instead.
unset	The request header of this name is removed, if it exists. If there are multiple headers of the same name, all will be removed.
echo	Request headers with this name are echoed back in the response headers. *Header* may be a regular expression. Echo without any parameters echoes back all the request headers in the response.
edit edit *	If this request header exists, its value is transformed according to a regular expression search-and-replace. The value argument is a regular expression, and the replacement is a replacement string, which may contain backreferences or format specifiers. The edit form will match and replace exactly once in a header value, whereas the edit* form will replace every instance of the search pattern if it appears more than once.
merge	The request header is appended to any existing header of the same name, unless the value to be appended already appears in the existing header's comma-delimited list of values. When a new value is merged onto an existing header it is separated from the existing header with a comma. This is the HTTP standard way of giving a header multiple values. Values are compared in a case sensitive manner, and after all format specifiers have been processed. Values in double quotes are considered different from otherwise identical unquoted values.

Parameter Two: *header*

- The HTTP Request *header* parameter to be set, appended, or unset with this directive. There is no validity checking of the header, which allows the use of experimental headers.

Parameter Three: *value*

- The *value* parameter may be a character string, a string containing format specifiers or a combination of both and specifies the value of the header to be set. It is only valid for set, add, append and merge. There is no validity checking of the value specified, which allows the use of experimental headers values. All characters and escaped characters, such as '\n', are allowed in the value string. If value contains spaces, it should be surrounded by double quotes. The following format specifiers are supported in value:

Format	Description
%%	The percent sign

Format	Description
%t	The time the request was received in Universal Coordinated Time since the epoch (Jan. 1, 1970) measured in microseconds. The value is preceded by "t=". The time the request was received in Universal Coordinated Time since the epoch (Jan. 1, 1970) measured in microseconds. The value is preceded by "t=".
%D	The time from when the request was received to the time the headers are sent on the wire. This is a measure of the duration of the request. The value is preceded by D=. The value is measured in microseconds.
%l	The current load averages of the actual server itself. It is designed to expose the values obtained by getloadavg() and this represents the current load average, the 5 minute average, and the 15 minute average. The value is preceded by l= with each average separated by /.
%i	The current idle percentage of httpd (0 to 100) based on available processes and threads. The value is preceded by i=.
%b	The current busy percentage of httpd (0 to 100) based on available processes and threads. The value is preceded by b=.
%{ENVVAR}e	The contents of the environment variable ENVVAR.

Note: Other format strings, such as %s, will receive an error and the server will not start. For edit both a value and a replacement are required, and are a regular expression and a replacement string respectively.

Parameter Four: ***early|env=[!]variable] | expr=expression***

- Optional: It may be any of:

early

Specifies early processing.

env=[!]varname

The directive is applied if and only if the environment variable varname exists. A ! in front of varname reverses the test, so the directive applies only if varname is unset.

expr=expression

The directive is applied if and only if expression evaluates to true. Details of expression syntax and evaluation are documented in the ap_expr documentation.

Except in early mode, the RequestHeader directive is processed just before the request is run by its handler in the fixup phase. This should allow headers generated by the browser, or by HTTP server input filters to be overridden or modified.

Module mod_ibm_linc

Module mod_ibm_linc supports directives for the IBM HTTP Server for i Web server.

Summary

The module mod_ibm_linc supports the LDAPInclude directive that allows HTTP Server to access a Lightweight Directory Access Protocol (LDAP) directory and to query the directory in a database fashion to obtain HTTP configuration information. The LDAPInclude directive requires a file that contains the directives necessary to contact the LDAP server. This can be the same filename that is used on the LdapConfigFile directive. See the mod_ibm_ldap module for details on the directives necessary to contact an LDAP server.

If the LDAPInclude directive is placed in the server configuration file, the following directive must be specified prior to its use:

```
LoadModule ibm_ldap_include /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM
```

Directive

- "LDAPInclude" on page 409

LDAPInclude

Module: mod_ibm_linc

Syntax: LDAPInclude *filename filter attribute*

Default: none

Context: server config, virtual host, directory

Override: none

Origin: IBM

Example: LDAPInclude /QIBM/UserData/HTTPA/LDAP/ldap.prop (cn=web) binProperty

LDAPInclude directive is used to retrieve HTTP configuration information that is stored in an LDAP directory. The LDAP server is contacted using information from the configuration file provided, and an LDAP search is performed using the filter. Once information is returned from the LDAP search, the values of the attributes are then used as part of the HTTP configuration file.

The same filename that is used on an LDAPConfigFile directive may also be used for the LDAPInclude directive.

Parameter One: *filename*

- The *filename* parameter is the name of the file that contains LDAP directives required to connect to an LDAP server.

Parameter Two: *filter*

- The *filter* parameter is the search string that is passed from HTTP Server to the LDAP server to return an LDAP entry.

Parameter Three: *attribute*

- The *attribute* parameter is the name of the LDAP attribute whose value is some arbitrary part of HTTP Server configuration file.

Module mod_ibm_ldap

This module supports directives that allow IBM HTTP Server for i Web servers to access an Lightweight Directory Access Protocol (LDAP) directory and to query the directory in a database fashion to obtain authentication information.

These directives provide the server with information regarding the LDAP Servers in which HTTP Server configuration (see mod_ibm_linc) and authentication information may be stored. You can put these directives in a file and then include that file in your server configuration file using the LdapConfigFile directive. If these directives are placed in the configuration file, the following directive must be specified prior to their use:

```
LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM
```

Directives

- "ldap.AppId" on page 410
- "ldap.application.authType" on page 411

- “ldap.application.DN” on page 411
- “ldap.application.password.stashFile” on page 412
- “ldap.cache.timeout” on page 412
- “ldap.group.memberAttributes” on page 412
- “ldap.group.name.filter” on page 413
- “ldap.group.url” on page 413
- “ldap.idleConnection.timeout” on page 414
- “ldap.NTDomain” on page 415
- “ldap.ObjectClass” on page 415
- “ldap.realm” on page 416
- “ldap.search.timeout” on page 416
- “ldap.transport” on page 417
- “ldap.url” on page 417
- “ldap.user.authType” on page 418
- “ldap.user.name.fieldSep” on page 418
- “ldap.user.name.filter” on page 419
- “ldap.version” on page 419
- “ldap.waitToRetryConnection.interval” on page 420
- “LDAPConfigFile” on page 420
- “LDAPRequire” on page 420
- “LDAPReferrals” on page 421
- “LDAPReferralHopLimit” on page 422

ldap.AppId

Module: mod_ibm_ldap

Syntax: ldap.AppId *application_ID*

Default: none

Context: directory, .htaccess

Override: AuthCfg

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM`

Example: ldap.AppId QIBM_HTTP_SERVER_SRVINST1

The ldap.AppId directive is used to enable SSL connections to the LDAP server. An Application ID that has been obtained and associated with a certificate through Digital Certificate Manager (DCM) is supplied with this directive. The application ID is then used when making an SSL connection to the LDAP server to validate that the server can make a secure connection. The Application ID provided may be the same Application ID that is used elsewhere in HTTP Server.

The ldap.AppId directive is required if ldap.transport is SSL.

Parameter: *application_ID*

- The *application_ID* parameter is an application ID obtained from DCM for this HTTP Server instance.

ldap.application.authType

Module: mod_ibm_ldap

Syntax: ldap.application.authType *authtype*

Default: ldap.application.authType Basic

Context: directory, .htaccess

Override: AuthCfg

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM`

Example: ldap.application.authType None

The ldap.application.authtype directive is used to specify the method used to authenticate HTTP Server application to the LDAP server. The possible values are None and Basic.

For Basic authentication, the ldap.application.DN and the ldap.application.password.stashFile directives are required to identify HTTP Server.

Parameter: *authtype*

- The *authtype* parameter specifies the method used to authenticate HTTP Server application to the LDAP server. Valid values are *Basic*, or *None*.
  1. If *None* is selected, HTTP Server connects using anonymous access, if permitted by the LDAP server.
  2. If *Basic* authentication is chosen, HTTP Server is required to identify itself to the LDAP server by using a Distinguished Name and password.

ldap.application.DN

Module: mod_ibm_ldap

Syntax: ldap.application.DN *Distinguished_Name*

Default: none

Context: directory, .htaccess

Override: AuthCfg

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM`

Example: ldap.application.DN cn=Administrator

The ldap.application.DN directive specifies the Distinguished Name (DN) HTTP Server uses to authenticate to the LDAP server.

When using ldap.application.authType Basic, the directive ldap.application.password.stashFile should be used with ldap.application.DN. Unless the LDAP server allows anonymous access, the connection between HTTP Server and the LDAP server will not be made without a valid password.

Parameter: *Distinguished_Name*

- The *Distinguished_Name* parameter is a character string representing the Distinguished Name used by HTTP Server to authenticate to the LDAP server.

ldap.application.password.stashFile

Module: mod_ibm_ldap

Syntax: ldap.application.password.stashFile *filename*

Default: none

Context: directory, .htaccess

Override: AuthCfg

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM`

Example: ldap.application.password.stashFile /QIBM/UserData/HTTPA/LDAP/websrv1/lcfg1.stash

The ldap.application.password.stashFile directive specifies the file that contains the encoded password used by HTTP Server to authenticate to the LDAP server when ldap.application.authType is Basic. The configuration tools create, encode, and name the filename.

Parameter: *filename*

- The *filename* parameter is the name of a file containing the encoded password used to authenticate HTTP Server to the LDAP server.

ldap.cache.timeout

Module: mod_ibm_ldap

Syntax: ldap.cache.timeout *seconds*

Default: ldap.cache.timeout 600 (10 minutes)

Context: directory, .htaccess

Override: AuthCfg

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM`

Example: ldap.cache.timeout 300

The ldap.cache.timeout directive specifies the maximum length of time (in seconds) that these cached results may be used. After ldap.cache.timeout seconds, the cache elements are discarded, and subsequent requests cause a search of the LDAP server. Results of a search of an LDAP server are cached in local HTTP Server storage to save the time of executing another LDAP search in a short period of time.

Parameter: *seconds*

- The *seconds* parameter is the length of time, in seconds, for the server to retain the results of successful LDAP searches.

ldap.group.memberAttributes

Module: mod_ibm_ldap

Syntax: ldap.group.memberAttributes "*attributes*"

Default: ldap.group.memberAttributes "member uniquemember"

Context: directory, .htaccess

Override: AuthCfg

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM`

Example: ldap.group.memberAttributes "member"

The ldap.group.memberAttributes directive specifies the attribute names that are used to extract members from a group entry in an LDAP directory. The values of these attributes must be the distinguished names of the members of the group.

This directive is used in conjunction with the ldap.group.name.filter and the LDAPRequire directives to allow users in specific groups access to a resource.

Parameter One: *attributes*

- The *attributes* parameter is the group attribute names used to extract users from an LDAP group entry. Beginning in IBM i 5.4, if the attributes parameter is the operational attribute ibm-allMembers, then group membership is checked for all forms of groups: static, dynamic, nested, and hybrid. Otherwise, group membership is checked only for a static group.

If multiple occurrences of this directive are configured in a container, only the last occurrence is processed. All other occurrences are ignored.

ldap.group.name.filter

Module: mod_ibm_ldap

Syntax: ldap.group.name.filter *filter*

Default: ldap.group.name.filter (&(cn=%v)(|(objectclass=groupofnames)(objectclass=groupofuniquenames)))

Context: directory, .htaccess

Override: AuthCfg

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM

Example: ldap.group.name.filter (&(cn=%v)(objectclass=groupofnames))

The ldap.group.name.filter directive specifies the filter that is used to convert, via an LDAP search request, a group name to a unique DN. The unique DN for the group is then used to allow individual users who are members of the group to access their source. The default value is "(&(cn=%v)(|(objectclass=groupofnames)(objectclass=groupofuniquenames)))", where %v is a substitution variable for the group name.

This directive is used in conjunction with the ldap.group.memberAttributes and the LDAPRequire directives to allow users in specific groups access to a resource.

Parameter: *filter*

- The *filter* parameter is a valid LDAP search filter that will return a unique DN for a given group name.

ldap.group.url

Module: mod_ibm_ldap

Syntax: ldap.group.url ldap://*hostname:port/BaseDN*

Default: none

Context: directory, .htaccess

Override: AuthCfg

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM`

Example: ldap.group.url ldap://www-5.ibm.com/o=deltawing,c=au

The ldap.group.url directive tells HTTP Server the location of the LDAP server that is being used for authentication of users in groups. Hostname is the hostname of the LDAP server. The DNS name or the IP address is used to identify the host where the LDAP server resides. The port is optional. If not specified, port 389 will be assumed if using TCP/IP connections, and 636 will be used for SSL connections to the LDAP server. The BaseDN provides the starting point for searches of the LDAP directory.

If the ldap.group.url is not present in the configuration file, the ldap.url value is used. If the same host, port and BaseDN are the same for group searches, as they are for user searches, you do not need to specify ldap.group.url.

Parameter One: *hostname*

- The *hostname* parameter is the DNS name or IP address of the host where the LDAP server is located.

Parameter Two: *port*

- The *port* parameter is the port on which the LDAP server listens. It is optional. If not present, and the transport is TCP, the well-known LDAP port 389 is assumed. If the transport is SSL, the well-known LDAP SSL port 636 will be assumed.

Parameter Three: *BaseDN*

- The *BaseDN* parameter is the starting point for searches of the LDAP directory for group information.

Note: The ldap.group.url value is case sensitive. For example, the following value is not valid: `ldap.group.url LdaP://www-5.ibm.com/o=deltawing,c=au`. However, the following value is valid: `ldap.group.url ldap://www-5.ibm.com/o=deltawing,c=au`.

ldap.idleConnection.timeout

Module: mod_ibm_ldap

Syntax: ldap.idleConnection.timeout *seconds*

Default: ldap.idleConnection.timeout 600 (10 minutes)

Context: directory, .htaccess

Override: AuthCfg

Origin: IBM

Usage Considerations: LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM`

Example: ldap.idleConnection.timeout 900

The ldap.idleConnection.timeout directive is used to determine the time that idle connections to the LDAP server are kept open. This improves performance by saving the path length necessary to open connections if there are several requests of the LDAP server in a short period of time.

Parameter: *seconds*

- The seconds parameter is the length of time, in seconds, that an idle connection should remain open.

ldap.NTDomain

Module: mod_ibm_ldap

Syntax: ldap.NTDomain *domainname*

Default: none

Context: directory, .htaccess

Override: AuthCfg

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM`

Example: ldap.NTDomain "cn=myexchServer"

Since Microsoft Windows NT authenticates differently than the other industry LDAP servers, this directive was added to configure the Microsoft Windows NT domain name. This directive should only be used when a Microsoft Exchange Server is being used and the authentication requires that ldap.NTDomain be specified. This directive should not be used in other cases.

Use of this directive allows an HTTP Server to access a Microsoft Exchange Server version 5.0 or 5.5 by means of Lightweight Directory Access Protocol (LDAP). It may be necessary to use this directive if this product is used to perform LDAP authentication of HTTP requests.

Directive ldap.NTDomain can be specified two different ways. The format may be dependent on the Microsoft Exchange Server.

If the Exchange Server requires the account to look like "cn=NTAccount, cn=NTDomain", use the format:

```
ldap.NTDomain "cn=exchServer"
```

If the Exchange Server requires the account in the form ("dc=NTDomain, cn=NTAccount"), use the format:

```
ldap.NTDomain "dc=exchServer"
```

When this directive is present, HTTP Server appends or precedes the information in the ldap.NTDomain directive to the DN used when authenticating a user to the LDAP server.

ldap.ObjectClass

Module: mod_ibm_ldap

Syntax: ldap.ObjectClass *objectclass*

Default: ldap.ObjectClass eProperty

Context: directory, .htaccess

Override: AuthCfg

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule IBM_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM`

Example: ldap.ObjectClass applicationProcess

The ldap.ObjectClass directive is used to publish configuration information to the LDAP server. The object class is used as an entry to the LDAP server and describes the content and purpose of an object in the LDAP directory tree. The configuration information may then be retrieved using the LDAPInclude directive.

Parameter: *objectclass*

- The *objectclass* parameter is the name of the object class to be used as the entry in the LDAP directory. The object class used should have a binary file attribute value.

ldap.realm

Module: mod_ibm_ldap

Syntax: ldap.realm *"label"*

Default: none

Context: directory, .htaccess

Override: AuthCfg

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM`

Example: ldap.realm "HTTP Auth Server"

The ldap.realm directive is used to identify the LDAP configuration in error log messages. If a server uses different LDAP servers or different LDAP base DNs for different directories, ldap.realm will identify this particular LDAP configuration.

Parameter: *label*

- The *label* parameter can be a character string describing this LDAP configuration.

ldap.search.timeout

Module: mod_ibm_ldap

Syntax: ldap.search.timeout *seconds*

Default: ldap.search.timeout 10

Context: directory, .htaccess

Override: AuthCfg

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM`

Example: ldap.search.timeout 30

The ldap.search.timeout directive supplies the maximum amount of time (in seconds) to wait for an LDAP search request to complete. This prevents HTTP Server from waiting on a request to a slow LDAP server.

Parameter: *seconds*

- The *seconds* parameter is the length of time, in seconds, for the server to wait for an LDAP search request to complete.

ldap.transport

Module: mod_ibm_ldap

Syntax: ldap.transport *transport*

Default: ldap.transport TCP

Context: directory, .htaccess

Override: AuthCfg

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM`

Example: ldap.transport SSL

The ldap.transport directive is used to specify the transport used to communicate with the LDAP server. The LDAP server can communicate over either TCP/IP or SSL connections.

If ldap.transport is set to SSL, then the ldap.AppId directive must be set, or HTTP Server will be unable to make the connection to the LDAP server.

Parameter: *transport*

- The *transport* parameter specifies the transport to be used for communication with the LDAP server. Valid values are 'TCP' or 'SSL'.

ldap.url

Module: mod_ibm_ldap

Syntax: ldap.url ldap://*hostname:port/baseDN*

Default: none

Context: directory, .htaccess

Override: AuthCfg

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM`

Example: ldap.url ldap://www-6.ibm.com:1636/ou=Payroll,o=Company,c=US

The ldap.url directive tells HTTP Server the location of the LDAP server that is being used for authentication or configuration. Hostname is the hostname of the LDAP server. The DNS name or the IP address is used to identify the host where the LDAP server resides. The port is optional. If not specified, port 389 will be assumed if using TCP/IP connections, and 636 will be used for SSL connections to the LDAP server. The BaseDN provides the starting point for searches of the LDAP directory.

This directive is required when using LDAP for authentication or configuration.

The ldap.url directive will be used for all searches, unless a different value is provided with the ldap.group.url directive. If an ldap.group.url directive is present, its value is used to search for groups.

Parameter One: *hostname*

- The *hostname* parameter is the DNS name or IP address of the host where the LDAP server is located.

Parameter Two: *port*

- The *port* parameter is the port on which the LDAP server listens. It is optional. If not present, and the transport is TCP, the well-known LDAP port 389 is assumed. If the transport is SSL, the well-known LDAP SSL port 636 will be assumed.

Parameter Three: *baseDN*

- The *baseDN* parameter is the starting point for searches of the LDAP directory.

Note: The ldap.url value is case sensitive. For example, the following value is not valid: `ldap.url LdaP://www-5.ibm.com/o=deltawing,c= au`. However, the following value is valid: `ldap.url ldap://www-5.ibm.com/o=deltawing,c= au`.

ldap.user.authType

Module: mod_ibm_ldap

Syntax: ldap.user.authType *authtype*

Default: ldap.user.authType Basic

Context: directory, .htaccess

Override: AuthCfg

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM`

Example: ldap.user.authType Basic

The ldap.user.authtype directive is used to specify the method used to authenticate the user requesting an HTTP resource to the LDAP server. Basic is the only possible value. During basic authentication, the user is prompted to enter a username and password.

Parameter: *authtype*

- The *authtype* parameter specifies the method used to authenticate the user requesting an HTTP resource to the LDAP server. 'Basic' is the only valid value.

ldap.user.name.fieldSep

Module: mod_ibm_ldap

Syntax: ldap.user.name.fieldSep *"separators"*

Default: ldap.user.name.fieldSep " \t,"

Context: directory, .htaccess

Override: AuthCfg

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM`

Example: ldap.user.name.fieldSep " \t,/"

The ldap.user.name.fieldSep directive specifies the characters that are considered valid field separator characters when parsing the user name into fields. The fields are then put into a filter and used on an LDAP search request. For example, if '/' is the only valid field separator, and the user entered "Joe Smith/ Acme", then the first field is set to "Joe Smith" and the second field is set to "Acme".

Parameter: *separators*

- The *separators* parameter is the valid separator characters used to delimit fields.

If multiple occurrences of this directive are configured in a container, only the last occurrence is processed. All other occurrences are ignored.

ldap.user.name.filter

Module: mod_ibm_ldap

Syntax: ldap.user.name.filter *filter*

Default: ldap.user.name.filter(&(objectclass=person)(|(cn=%v1 %v2)(uid=%v1)))

Context: directory, .htaccess

Override: AuthCfg

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM`

Example: ldap.user.name.filter (&(objectclass=person)(uid=%v1))

The ldap.user.name.filter directive specifies the filter that is used to convert, via an LDAP search request, a user name to a unique DN. The DN is then used to authenticate the user making the HTTP request. The default value is "(&(objectclass=person)(|(cn=%v1 %v2)(uid=%v1))", where %v1 and %v2 are substitution variables for the words the user entered at the browser.

This directive is used when ldap.user.authType is Basic.

Parameter: *filter*

- The *filter* parameter is a valid LDAP search filter that will return a unique DN for a given user name.

ldap.version

Module: mod_ibm_ldap

Syntax: ldap.version *version*

Default: ldap.version 3

Context: directory, .htaccess

Override: AuthCfg

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM`

Example: ldap.version 2

The ldap.version directive is used to specify the version of LDAP to use to communicate with the LDAP server. The default version used by HTTP Server is version 3. If your LDAP server is not at version 3, use this directive to set it to 2.

Parameter: *version*

- The *version* parameter specifies the version of the LDAP to be used. Valid versions are '2' or '3'.

ldap.waitToRetryConnection.interval

Module: mod_ibm_ldap

Syntax: ldap.waitToRetryConnection.interval *seconds*

Default: ldap.waitToRetryConnection.interval 30

Context: directory, .htaccess

Override: AuthCfg

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM`

Example: ldap.waitToRetryConnection.interval 60

If an LDAP server is down, HTTP Server may have degraded performance because it will be continually trying to connect. The ldap.waitToRetryConnection.interval directive gives the length of time (in seconds) to wait between failed attempts to connect to the LDAP server.

Parameter: *seconds*

- The *seconds* parameter is the length of time, in seconds, for the server to wait between attempts to connect to the LDAP server.

LDAPConfigFile

Module: mod_ibm_ldap

Syntax: LDAPConfigFile *filename*

Default: none

Context: directory, .htaccess

Override: AuthCfg

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM`

Example: LDAPConfigFile /QIBM/UserData/HTTPA/ldap/ldapSvr1.conf

The LDAPConfigFile directive provides a filename that contains the LDAP directives necessary to access an LDAP server. It allows the LDAP directives to be grouped into a file so they may easily be referenced in any container in HTTP Server configuration file by using the LDAPConfigFile directive. An example file can be found in /QIBM/ProdData/HTTPA/conf/ldap.prop

All LDAP directives except LDAPRequire may be put into the file.

Parameter: *filename*

- The *filename* parameter is the filename that contains other LDAP directives.

LDAPRequire

Module: mod_ibm_ldap

Syntax: LDAPRequire *type [groupname | filter]*

Default: none

Context: directory, .htaccess

Override: AuthCfg

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM`

Example: LDAPRequire filter (&(objectclass=person)(ou=Payroll)(cn=*))

The LDAPRequire directive is used to restrict access to a resource controlled by LDAP authentication to members of a group. It can either use groups defined in LDAP by using the "group" parameter, or it can use an LDAP filter to assemble a group of users with a similar quality.

The LDAPRequire directive may not be put into an LDAP configuration file, it must be in the server configuration file. For LDAP, this can be used instead of the GroupFile directive. For more information, see the“GroupFile” on page 233 directive.

Parameter One: *type*

- Valid values for the *type* parameter include 'group' or 'filter'.
- Group should be used for LDAP group entries.
- Filter should be used when grouping users by other qualities.

Parameter Two: *groupname | filter*

- The *groupname* parameter is the name of a group as defined in the LDAP directory.
- The *filter* parameter is a valid filter that may be used to determine if a user meets qualifications to be authenticated.

LDAPReferrals

Module: mod_ibm_ldap

Syntax: LDAPReferrals*On|Off|default*

Default: LDAPReferrals *On*

Context: Directory, .htaccess

Override: AuthCfg

Origin: iSeries

Example: LDAPReferrals off

The LDAPReferrals directive enables/disables referral chasing during queries to the LDAP server. Some LDAP servers divide their directory among multiple domains and use referrals to direct a client when a domain boundary is crossed. This is similar to a HTTP redirect. LDAP client libraries may or may not chase referrals by default.

LDAPReferrals takes the following values:

- "on" When set to "on", the referral chasing state is enabled, LDAPReferralHopLimit is used to override the hop limit, and an LDAP rebind callback is registered.
- "off" When set to "off", the referral chasing state is disabled completely.
- "default" When set to "default", the referral chasing state is not changed, LDAPReferralHopLimit is not used to override the hop limit.

The directive LDAPReferralHopLimit works in conjunction with this directive to limit the number of referral hops to follow before terminating the LDAP query. When referral processing is enabled by a value of "On", client credentials will be provided, via a rebind callback, for any LDAP server requiring them.

LDAPReferralHopLimit

Module: mod_ibm_ldap

Syntax: LDAPReferralHopLimit*number*

Default: LDAPReferralHopLimit *10*

Context: Directory, .htaccess

Override: AuthCfg

Origin: iSeries

Example: LDAPReferralHopLimit 5

The LDAPReferralHopLimit directive specifies the maximum number of referral hops to chase before terminating an LDAP query. This directive, if enabled by the LDAPReferrals directive, limits the number of referral hops that are followed before terminating an LDAP query.

The default value is 10. An LDAPReferralHopLimit value of 0 can result in infinite referral hop loops. So the minimum value of LDAPReferralHopLimit is 1. We recommend using a value between 1 and 10. A large number of referrals may indicate an LDAP server configuration issue and may affect server performance.

Module mod_log_forensic

Module mod_log_forensic supports directives for the IBM HTTP Server for i Web server.

Summary

The mod_log_forensic module provides for forensic logging of client requests. Logging is done before and after processing a request, so the forensic log contains two log lines for each request. The forensic logger is very strict, which means:

- The format is fixed. You cannot modify the logging format at runtime.
- If it cannot write its data, the child process exits immediately.

Forensic Log Format

Each request is logged two times. The first time is before it's processed further (that is, after receiving the headers). The second log entry is written after the request processing at the same time where normal logging occurs.

In order to identify each request, a unique request ID is assigned. This forensic ID can be cross logged in the normal transfer log using the %{forensic-id}n format string. If you're using mod_unique_id, its generated ID will be used.

The first line logs the forensic ID, the request line and all received headers, separated by pipe characters (|). A sample line looks like the following (all on one line):

```
+yQtJf8CoAB4AAFNXBIEAAAAA|GET /manual/de/images/down.gif HTTP/1.1|
Host:localhost%3a8080|User-Agent:Mozilla/5.0 (X11; U; Linux i686; en-US;
rv%3a1.6) Gecko/20040216 Firefox/0.8|Accept:image/png, etc...
```

The plus character at the beginning indicates that this is the first log line of this request. The second line just contains a minus character and the ID again:

```
-yQtJf8CoAB4AAFNXBIEAAAAA
```

Note: The log files may contain sensitive data such as the contents of Authorization: headers (which can contain passwords), so they should not be readable by anyone except the user that starts the server.

Directives

- “ForensicLog” on page 423

ForensicLog

Module: core

Syntax: ForensicLog *filename|pipe*

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Example: ForensicLog logs/forensic_log

Example: ForensicLog | /QSYS.LIB/MYLIB.LIB/FORENSICPIPE.PGM

The ForensicLog directive is used to log requests to the server for forensic analysis. Each log entry is assigned a unique ID which can be associated with the request using the normal “CustomLog” on page 482 directive.mod_log_forensic creates a token called forensic-id, which can be added to the transfer log using the %{forensic-id}n format string.

Parameter: *filename|pipe*

- A filename relative to the ServerRoot
- The pipe character "|", followed by the path to a program to receive the log information on its standard input.

  Note: data written to the pipe from the server will be in the FSCCSID that is in use by the server. The program must be specified in the form "/QSYS.LIB/xxx.LIB/xxx.PGM".

Module mod_ibm_si

Module mod_ibm_si supports directives for the IBM HTTP Server for i Web server.

Summary

This module enables the association of WebSphere Application Server instances to an HTTP Server Web server, which allows users to start and stop application servers by starting and stopping the associated Web server.

Directives

- “AppServer” on page 423
- “WASInstance” on page 424

AppServer

Module: mod_ibm_si

Syntax: AppServer *serverName startOption endOption*

Default: none

Context: server config

Override: none

Origin: IBM

Usage Considerations: The server must be restarted prior to using the directive. A `LoadModule` is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule mod_ibm_si /QSYS.LIB/QHTTPSVR.LIB/QZISI.SRVPGM`.

Examples:

- `AppServer *ALL start end`
- `AppServer server1 start end`
- `AppServer server1 nostart noend`

The `AppServer` directive instructs the load module how to handle the WebSphere application servers associated with the WebSphere application server profile when the HTTP server is started and ended. More than one directive is allowed, where each directive is used to specify an application server contained in the WebSphere Application Server profile. If multiple `AppServer` directives is specified that contain the same server name, the last one is the directive that is used.

Note: This directive is only effective if directive "WASInstance" on page 424 is specified in the HTTP configuration file.

Parameter: *serverName*
The *serverName* parameter value specifies the WebSphere application server name for which the AppServer directive applies . A special value of `*ALL` indicates all servers associated with the WebSphere profile specified on the `WASInstance` directive.

Parameter: *startOption*
The *startOption* parameter value specifies whether or not to start the WebSphere application server(s) for the profile specified on the `WASInstance` directive when the associated Web server is started. Valid values include:

- **start** - WebSphere application server(s) are started when the associated Web server is started.
- **nostart** - WebSphere application server(s) are not started when the associated Web server is started.

Parameter: *endOption*
The *endOption* parameter value specifies whether or not to end the WebSphere application server(s) for the profile specified on the `WASInstance` directive when the associated Web server is ended. Valid values include:

- **end** - WebSphere application server(s) are ended when the associated Web server is ended.
- **noend** - WebSphere application server(s) are not ended when the associated Web server is ended.

WASInstance

Module: mod_ibm_si

Syntax: WASInstance *profilePath productID productOption*

Default: none

Context: server config

Override: none

Origin: IBM

Usage Considerations: The server must be restarted prior to using the directive. A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule mod_ibm_si /QSYS.LIB/QHTTPSVR.LIB/QZISI.SRVPGM`.

Example: `WASInstance /QIBM/UserData/WebSphere/AppServer/V61/Base/profiles/default 5733W61 2`

The `WASInstance` directive specifies the WebSphere application profile that is associated with the HTTP server. The `WASInstance` directive must be specified in order to specify the "AppServer" on page 423 directive.

Parameter: *profilePath*

The *profilePath* parameter is the path to a WebSphere application server profile.

Parameter: *productID*

The *ProductID* parameter is a WebSphere Application Server licensed program identifier that is associated with the specified *profilePath*.

Parameter: *productOption*

The *productOption* parameter is a number associated with the part of the *productID* that contains the *profilePath*.

Module mod_ibm_ssl

Module mod_ibm_ssl supports directives for the IBM HTTP Server for i Web server.

Configuration details

The module mod_ibm_ssl directives provide the server with information on the extent of the SSL authentication required for access to the server by the client. When configuring the server for SSL, it is best to use virtual hosts if the server is to be both SSL and non-SSL. The default behavior for SSL is SSLDisable, which causes the server to not do any SSL processing for each server or virtual host which does not specify SSLEnable. If SSL processing is required, then a SSL Virtual Host should be set up to handle this. The SSL port should be specified on the <Virtual Host> directive, with the SSLEnable and SSLAppName located inside the virtual host container. Each resource for which SSL processing is desired should be located inside the SSL virtual host container. This prevents the resource from being accessed through a non-SSL port and served when SSL is not used. If the resource is located outside the SSL virtual host container, and is located in the main server, it is still possible to access the resource through SSL. Any SSL directives are handled if the resource is requested on a SSL port, but the SSL directives, with the exception of the SSLRequireSSL directive, are ignored if the resource is requested on a non-SSL port. Unless the resource is configured to handle both SSL authentication and non-SSL authentication, the results in this case may not be what is desired. If a resource must be accessed only through a SSL port the SSLRequireSSL directive can be placed in the resource container, and any request for that resource that is received from a non_SSL port is rejected.

When configuring a resource for SSL authentication, the behavior of other directives affects how the SSL directives behave. The primary concerns are when SSLAuthType is configured. There are other directives that need to be set in order for SSL to behave as expected. If SSLAuthType Cert is specified, this tells the server to check for a certificate, and authenticate the user based on the information in that certificate. This should be the only authentication necessary for this resource. In order to ensure this, AuthType SSL and Satisfy Any needs to be configured in the resource container. This results in the desired behavior.

When configuring a resource for SSLAuthType CertOrBasic, this tells the server to check for a certificate and authenticate the user based on the information in that certificate. If this authentication fails, then the server authenticates the user based on any other type of authentication that is configured for that resource. In most cases, this is Basic authentication, which requests a user ID and password from the client, and the user is authenticated based on this information received from the client, but may also be LDAP authentication if indicated in the configuration of that resource. In order for the SSLAuthType CertOrBasic to function properly, Satisfy Any, AuthType Basic, and Require needs to be configured in the resource container.

If there are CGI programs that will be using SSL, the environment variable HTTPS_PORT must be set in the configuration file. The SetEnv HTTPS_PORT port-number directive is used for this.

Directives SSLCipherSpec and SSLProxyCipherSpec has been enhanced to add a new syntax which is more flexible for user to specify SSL protocol and it's related ciphers specification. For example:

```
    SSLCipherSpec ALL +TLS_RSA_WITH_AES_256_CBC_SHA
```

Online Certificate Status Protocol(OCSP) provides applications a way to determine the revocation status for a digital certificate. Certificate revocation status that is checked via OCSP provides more up-to-date status information than is available through CRLs. OCSP support has been added to HTTP server via two new SSLOCSPResponderURL and SSLOCSPEnable directives.

Server Name Indication(SNI) is an extension to the SSL and TLS protocols that indicates what hostname the client is attempting to connect to at the start of the handshaking process. This allows a server to present multiple certificates on the same IP address and port number and hence allows multiple secure (HTTPS) websites to be served off the same IP address without requiring all those sites to use the same certificate. It is the conceptual equivalent to HTTP/1.1 virtual hosting for HTTPS.

SNI support has been added to HTTP server and with SNI, user can have many virtual hosts sharing the same IP address and port, and each one can have its own unique certificate (and the rest of the configuration). If the browser also supports SNI, then the hostname is included in the original SSL request, and the web server can select the correct SSL virtual host. Specify both SSLServerCert and ServerName directives in each name based virtual hosts to have the support.

Directives

- "SSLAppName" on page 427
- "SSLAuthType" on page 427
- "SSLCacheDisable" on page 428
- "SSLCacheEnable" on page 429
- "SSLCipherBan" on page 429
- "SSLCipherRequire" on page 435
- "SSLCipherSpec" on page 442
- "SSLClientAuth" on page 448
- "SSLClientAuthGroup" on page 449
- "SSLClientAuthRequire" on page 451
- "SSLClientAuthVerify" on page 452
- "SSLClientCertDisable" on page 453
- "SSLClientCertEnable" on page 453
- "SSLDenySSL" on page 454
- "SSLDisable" on page 454
- "SSLEnable" on page 455
- "SSLEngine" on page 455
- "SSLHandshakeTimeout" on page 456
- "SSLFallbackProtection" on page 456
- "SSLOCSPResponderURL" on page 457
- "SSLOCSPEnable" on page 458
- "SSLProtocolDisable" on page 465
- "SSLProxyProtocolDisable" on page 466
- "SSLProxyAppName" on page 457
- "SSLProxyCipherSpec" on page 458
- "SSLProxyEngine" on page 466
- "SSLProxyVerify" on page 467
- "SSLProxyVersion" on page 467
- "SSLRenegotiation" on page 469
- "SSLRequireSSL" on page 468
- "SSLServerCert" on page 469
- "SSLUpgrade" on page 470
- "SSLUnknownRevocationStatus" on page 471
- "SSLVersion" on page 472

- “SSLV2Timeout” on page 472
- “SSLV3Timeout” on page 473

SSLAppName

Module: mod_ibm_ssl

Syntax: SSLAppName *server_application_name*

Default: none

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM

Example: SSLAppName QIBM_HTTP_SERVER_APACHE

The SSLAppName directive is used for the following reasons:

- unique label to identify the server as an application that intends to use SSL
- to keep track of the registered name used by the server
- to identify the server when association of a server certificate with a secure application is done in the Digital Certificate Manager (DCM)
- to identify the server to the SSL API's so that the SSL API's can use the certificate that is associated with the server

This registration of the secure application and the creation of the SSLAppName is done automatically when the system administrator enables SSL for the server using the IBM Web Administration for i interface. The association of a server certificate with the application is accomplished by the system administrator using DCM. After a secure application is registered, and before attempting to start the server with SSL enabled, the user must use DCM to assign a server certificate to the corresponding secure application. Since this directive is valid at the virtual host level, the server may have more than one certificate assigned, with each virtual host having a different application name. The specified value on this directive is the name of the application that the server or virtual host is known as. If the server certificate association for the application name is not configured through DCM, then the SSL connection cannot be initialized and the server will not start.

Note:

Please leave the SSL fields to the default if creating an application ID via DCM for Apache Server as those settings override the same settings used by Apache server directives in the HTTP Server configuration file.

There is a configured limit of 64 secure application environments (SSLAppName's) that can be active at once. To increase this limit contact customer support.

Parameter: *server_application_name*

- The *server_application_name* parameter value specifies the name of the application that the server or virtual host.

SSLAuthType

Module: mod_ibm_ssl

Syntax: SSLAuthType *option*

Default: none

Context: directory, .htaccess

Override: AuthConfig

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM

Example: SSLAuthType cert

The SSLAuthType directive is used to specify the type certificate validation/authentication required for access to a directory. This option is used to ensure that a certificate received from the client is associated with a user ID or an Internet User validation list. If this is not the case, the client may be prompted for the user ID.

Parameter: *option*

- The *option* parameter value can be one of the following:

  Cert
  This option indicates to the server that the certificate received from the client must be in an Internet User list or be associated with an IBM i user ID convention. Note : If SSLAuthType Cert is specified, then AuthType should be set to SSL.

  CertOrBasic
  This option indicates to the server that the certificate, if there is one, that is received from the client may be associated with a user ID or may be in an Internet User validation list. If it is not, then the client is authenticated based on the value of HTTP Server AuthType directive. In order to simulate HTTP Server (original) behavior of AuthType CertOrBasic , HTTP Server AuthType directive must be Basic. This will cause the client to be prompted for a user ID and password, and this provided user ID and password will then be used to access the directory/file. If SSLAuthType CertOrBasic is used, then AuthType should be set to Basic.

The certificate does not need to be valid. This directive only refers to the existence of a certificate. If the certificate must be valid, then the SSLClientCertEnable directive must also be specified.

There are no default values for this directive. If the directive is not used, then if a certificate is present, association with a user ID or Internet User validation list is not checked. This directive's scope is the directory level. This directive is only to be specified once for a directory. Any subsequent uses of this directive override any previously specified values.

This directive may be used in conjunction with the SSLClientCertEnable directive. This will cause very specific behavior to occur, depending on the value specified on the SSLAuthType directive. If the SSLClientCert directive is used in addition to SSLAuthType Cert, the certificate received from the client must be valid, as well as associated with a user ID or in an Internet User validation list. If the SSLClientCert directive is used in addition to SSLAuthType CertOrBasic, a certificate must be received from the client, but does not need to be associated with a user ID or in an Internet User validation list. If the association is not present, the client will be authenticated based on the protection setup (basic or ldap).

This directive also interacts with the PasswdFile directive. This directive is used to help determine the type of certificate authentication to be used. If the PasswdFile directive is set to %%SYSTEM%%, then the certificate received from the client must be associated with an IBM i user profile in order for it the client to be authenticated. If the PasswdFile directive is set to an internet user list, then the certificate received must be in the internet user list in order for the client to be authenticated. Again, this authentication is only required if the Cert option is selected on the SSLAuthType directive. Otherwise it is only optional.

SSLCacheDisable

Module: mod_ibm_ssl

Syntax: SSLCacheDisable

Default: none

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM

Example: SSLCacheDisable

The SSLCacheDisable directive will cause SSL session ID caching to be disabled. The effect of this directive will depend on the location of the directive. If the directive is located in the configuration file for the main server, SSL session ID caching will not be done for the server. If the directive is located in a <Virtual Host> container, then SSL session ID caching will not be done for the virtual host. The directive located at the server level can be overridden for a particular virtual host using the SSLCacheEnable directive. Directives SSLV2Timeout and SSLV3Timeout will be ignored when SSLCacheDisable is set.

Note: This directive does not contain parameters.

SSLCacheEnable

Module: mod_ibm_ssl

Syntax: SSLCacheEnable

Default: SSLCacheEnable

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM

Example: SSLCacheEnable

The SSLCacheEnable directive will cause SSL session ID caching to be enabled. The effect of this directive will depend on the location of the directive. If the directive is located in the configuration file for the main server, SSL session ID caching will be done for the server. If the directive is located in a <Virtual Host> container, then SSL session ID caching will be done for the virtual host. The directive located at the server level can be overridden for a particular virtual host using the SSLCacheDisable directive. A abbreviated handshake will be done whenever a handshake is necessary. Directives SSLV2Timeout and SSLV3Timeout will be ignored.

Note: This directive does not contain parameters.

SSLCipherBan

Module: mod_ibm_ssl

Syntax: SSLCipherBan *string*

Default: none

Context: directory, .htaccess

Override: AuthConfig

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM

Example: SSLCipherBan 3A

Example: TLS_RSA_WITH_3DES_EDE_CBC_SHA

The SSLCipherBan directive allows for banning access to a directory based on the cipher that is negotiated during the SSL handshake. A set of ciphers can either be defaulted or specified using the SSLCipherSpec directive. The cipher list then can be shortened for a specific directory. This directive will enforce a greater level of security through the use of cipher specs.

The SSLCipherBan directive will directly interact with the SSLCipherRequire directive. If a negotiated cipher is listed on the ban list, then the request will be rejected, even if the cipher is also on the require list.

Parameter: *string*

- The *string* parameter value specifies the cipher to be used. Either the short name or the long name in the table below may be specified.

Table 19.

HEX	Short Name	Key Size	Long Name	SSLv3	TLSv10	TLSv11	TLSv12
0x01	31	0	TLS_RSA_WITH_NULL_MD5 (*)	X	X	X	X
0x02	32	0	TLS_RSA_WITH_NULL_SHA (*)	X	X	X	X
0x03	33	40	TLS_RSA_WITH_NULL_SHA (*)	X	X		
0x04	34	128	TLS_RSA_WITH_RC4_128_MD5 (*)	X	X	X	X
0x05	35	128	TLS_RSA_WITH_RC4_128_SHA (*)	X	X	X	X
0x06	36	40	TLS_RSA_EXPORT_WITH_RC2_CBC_40_MD5 (*)	X	X		
0x09	39	56	TLS_RSA_WITH_DES_CBC_SHA (*)	X	X	X	X

Table 19. (continued)

HEX	Short Name	Key Size	Long Name	SSLv3	TLSv10	TLSv11	TLSv12
0x0A	3A	168	TLS_RSA_WITH_3DES_EDE_CBC_SHA (*)		X	X	X
0x2F	X2F	128	TLS_RSA_WITH_AES_128_CBC_SHA		X	X	X
0x35	X35	256	TLS_RSA_WITH_AES_256_CBC_SHA		X	X	X
0x3B	X3B	0	TLS_RSA_WITH_NULL_SHA256				X
0x3C	X3C	128	TLS_RSA_WITH_AES_128_CBC_SHA256				X
0x3D	X3D	256	TLS_RSA_WITH_AES_256_CBC_SHA256				X
0x9C	X9C	128	TLS_RSA_WITH_AES_128_GCM_SHA256				X
0x9D	X9D	256	TLS_RSA_WITH_AES_256_GCM_SHA384				X
0xC006	N/A	0	TLS_ECDHE_ECDSA_WITH_NULL_SHA				X
0xC007	N/A	128	TLS_ECDHE_ECDSA_WITH_RC4_128_SHA				X
0xC008	N/A	168	TLS_ECDHE_ECDSA_WITH_3DES_EDE_CBC_SHA				X

Table 19. (continued)

HEX	Short Name	Key Size	Long Name	SSLv3	TLSv10	TLSv11	TLSv12
0xC010	N/A	0	TLS_ECDHE_RSA_WITH_NULL_SHA				X
0xC011	N/A	128	TLS_ECDHE_RSA_WITH_RC4_128_SHA				X
0xC012	N/A	168	TLS_ECDHE_RSA_WITH_3DES_EDE_CBC_SHA				X
0xC023	N/A	128	TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA256				X
0xC024	N/A	256	TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA384				X
0xC027	N/A	128	TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256				X
0xC028	N/A	256	TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384				X
0xC02B	N/A	128	TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256				X
0xC02C	N/A	256	TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384				X
0xC02F	N/A	128	TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256				X

Table 19. (continued)

HEX	Short Name	Key Size	Long Name	SSLv3	TLSv10	TLSv11	TLSv12
0xC030	N/A	256	TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384				X

Note: (*) indicates the long name can also be named by starting with "SSL_" in order to be compatible with older releases.

Version 3 Ciphers:

Table 20.

Long Name	Short name
SSL_RSA_WITH_3DES_EDE_CBC_SHA / TLS_RSA_WITH_3DES_EDE_CBC_SHA	3A
SSL_RSA_WITH_RC4_128_SHA / TLS_RSA_WITH_RC4_128_SHA	35
SSL_RSA_WITH_RC4_128_MD5 / TLS_RSA_WITH_RC4_128_MD5	34
SSL_RSA_WITH_DES_CBC_SHA / TLS_RSA_WITH_DES_CBC_SHA	39
SSL_RSA_EXPORT_WITH_RC4_40_MD5 / TLS_RSA_EXPORT_WITH_RC4_40_MD5	33
SSL_RSA_EXPORT_WITH_RC2_CBC_40_MD5 / TLS_RSA_EXPORT_WITH_RC2_CBC_40_MD5	36
SSL_RSA_WITH_NULL_SHA / TLS_RSA_WITH_NULL_SHA	32
SSL_RSA_WITH_NULL_MD5 / TLS_RSA_WITH_NULL_MD5	31

Note: SSLV3 is disabled by default on i 7.2

TLS 1.0 Ciphers:

Table 21.

Long Name	Short name
SSL_RSA_WITH_3DES_EDE_CBC_SHA / TLS_RSA_WITH_3DES_EDE_CBC_SHA	3A
SSL_RSA_WITH_RC4_128_SHA / TLS_RSA_WITH_RC4_128_SHA	35
SSL_RSA_WITH_RC4_128_MD5 / TLS_RSA_WITH_RC4_128_MD5	34
SSL_RSA_WITH_DES_CBC_SHA / TLS_RSA_WITH_DES_CBC_SHA	39

Table 21. (continued)	
Long Name	**Short name**
SSL_RSA_EXPORT_WITH_RC4_40_MD5 / TLS_RSA_EXPORT_WITH_RC4_40_MD5	33
SSL_RSA_EXPORT_WITH_RC2_CBC_40_MD5 / TLS_RSA_EXPORT_WITH_RC2_CBC_40_MD5	36
SSL_RSA_WITH_NULL_SHA / TLS_RSA_WITH_NULL_SHA	32
SSL_RSA_WITH_NULL_MD5 / TLS_RSA_WITH_NULL_MD5	31
TLS_RSA_WITH_AES_128_CBC_SHA	X2F
TLS_RSA_WITH_AES_256_CBC_SHA	X35

TLS 1.1 Ciphers:

Table 22.	
Long Name	**Short name**
SSL_RSA_WITH_3DES_EDE_CBC_SHA	3A
SSL_RSA_WITH_RC4_128_SHA / TLS_RSA_WITH_RC4_128_SHA	35
SSL_RSA_WITH_RC4_128_MD5 / TLS_RSA_WITH_RC4_128_MD5	34
SSL_RSA_WITH_DES_CBC_SHA / TLS_RSA_WITH_DES_CBC_SHA	39
SSL_RSA_WITH_NULL_SHA / TLS_RSA_WITH_NULL_SHA	32
SSL_RSA_WITH_NULL_MD5 / TLS_RSA_WITH_NULL_MD5	31
TLS_RSA_WITH_AES_128_CBC_SHA	X2F
TLS_RSA_WITH_AES_256_CBC_SHA	X35

TLS 1.2 Ciphers:

Table 23.	
Long Name	**Short name**
SSL_RSA_WITH_3DES_EDE_CBC_SHA	3A
SSL_RSA_WITH_RC4_128_SHA / TLS_RSA_WITH_RC4_128_SHA	35
SSL_RSA_WITH_RC4_128_MD5 / TLS_RSA_WITH_RC4_128_MD5	34
SSL_RSA_WITH_NULL_SHA / TLS_RSA_WITH_NULL_SHA	32
SSL_RSA_WITH_NULL_MD5 / TLS_RSA_WITH_NULL_MD5	31

Table 23. (continued)

Long Name	Short name
TLS_RSA_WITH_AES_128_CBC_SHA	X2F
TLS_RSA_WITH_AES_256_CBC_SHA	X35
TLS_RSA_WITH_NULL_SHA256	X3B
TLS_RSA_WITH_AES_128_CBC_SHA256	X3C
TLS_RSA_WITH_AES_256_CBC_SHA256	X3D
TLS_RSA_WITH_AES_128_GCM_SHA256	X9C
TLS_RSA_WITH_AES_256_GCM_SHA384	X9D
TLS_ECDHE_ECDSA_WITH_NULL_SHA	N/A
TLS_ECDHE_ECDSA_WITH_RC4_128_SHA	N/A
TLS_ECDHE_ECDSA_WITH_3DES_EDE_CBC_SHA	N/A
TLS_ECDHE_RSA_WITH_NULL_SHA	N/A
TLS_ECDHE_RSA_WITH_RC4_128_SHA	N/A
TLS_ECDHE_RSA_WITH_3DES_EDE_CBC_SHA	N/A
TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA256	N/A
TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA384	N/A
TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256	N/A
TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384	N/A
TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256	N/A
TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384	N/A
TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256	N/A
TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384	N/A

SSLCipherRequire

Module: mod_ibm_ssl

Syntax: SSLCipherRequire *string*

Default: none

Context: directory, .htaccess

Override: AuthConfig

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM

Example: SSLCipherRequire "3A"

Example: SSLCipherRequire TLS_RSA_WITH_3DES_EDE_CBC_SHA

The SSLCipherRequire directive allows for the user to require that certain ciphers to be negotiated with the client during the SSL handshake. Specifying that a subset of ciphers are required will force a greater level of security for a particular directory which may not be required for all directories. The ciphers listed here may or may not be listed using the SSLCipherSpec directive.

Parameter: *string*

- The *string* parameter value specifies the cipher to be used. Either the short name or the long name in the table below may be specified.

Table 24.

HEX	Short Name	Key Size	Long Name	SSLv3	TLSv10	TLSv11	TLSv12
0x01	31	0	TLS_RSA_WITH_NULL_MD5 (*)	X	X	X	X
0x02	32	0	TLS_RSA_WITH_NULL_SHA (*)	X	X	X	X
0x03	33	40	TLS_RSA_WITH_NULL_SHA (*)	X	X		
0x04	34	128	TLS_RSA_WITH_RC4_128_MD5 (*)	X	X	X	X
0x05	35	128	TLS_RSA_WITH_RC4_128_SHA (*)	X	X	X	X
0x06	36	40	TLS_RSA_EXPORT_WITH_RC2_CBC_40_MD5 (*)	X	X		
0x09	39	56	TLS_RSA_WITH_DES_CBC_SHA (*)	X	X	X	X
0x0A	3A	168	TLS_RSA_WITH_3DES_EDE_CBC_SHA (*)		X	X	X

Table 24. (continued)

HEX	Short Name	Key Size	Long Name	SSLv3	TLSv10	TLSv11	TLSv12
0x2F	X2F	128	TLS_RSA_WITH_AES_128_CBC_SHA		X	X	X
0x35	X35	256	TLS_RSA_WITH_AES_256_CBC_SHA		X	X	X
0x3B	X3B	0	TLS_RSA_WITH_NULL_SHA256				X
0x3C	X3C	128	TLS_RSA_WITH_AES_128_CBC_SHA256				X
0x3D	X3D	256	TLS_RSA_WITH_AES_256_CBC_SHA256				X
0x9C	X9C	128	TLS_RSA_WITH_AES_128_GCM_SHA256				X
0x9D	X9D	256	TLS_RSA_WITH_AES_256_GCM_SHA384				X
0xC006	N/A	0	TLS_ECDHE_ECDSA_WITH_NULL_SHA				X
0xC007	N/A	128	TLS_ECDHE_ECDSA_WITH_RC4_128_SHA				X
0xC008	N/A	168	TLS_ECDHE_ECDSA_WITH_3DES_EDE_CBC_SHA				X

Table 24. (continued)

HEX	Short Name	Key Size	Long Name	SSLv3	TLSv10	TLSv11	TLSv12
0xC010	N/A	0	TLS_ECDHE_RSA_WITH_NULL_SHA				X
0xC011	N/A	128	TLS_ECDHE_RSA_WITH_RC4_128_SHA				X
0xC012	N/A	168	TLS_ECDHE_RSA_WITH_3DES_EDE_CBC_SHA				X
0xC023	N/A	128	TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA256				X
0xC024	N/A	256	TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA384				X
0xC027	N/A	128	TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256				X
0xC028	N/A	256	TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384				X
0xC02B	N/A	128	TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256				X

Table 24. (continued)

HEX	Short Name	Key Size	Long Name	SSLv3	TLSv10	TLSv11	TLSv12
0xC02C	N/A	256	TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384				X
0xC02F	N/A	128	TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256				X
0xC030	N/A	256	TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384				X

Note: (*) indicates the long name can also be named by starting with "SSL_" in order to be compatible with older releases.

Version 3 Ciphers:

Table 25.

Long Name	Short name
SSL_RSA_WITH_3DES_EDE_CBC_SHA / TLS_RSA_WITH_3DES_EDE_CBC_SHA	3A
SSL_RSA_WITH_RC4_128_SHA / TLS_RSA_WITH_RC4_128_SHA	35
SSL_RSA_WITH_RC4_128_MD5 / TLS_RSA_WITH_RC4_128_MD5	34
SSL_RSA_WITH_DES_CBC_SHA / TLS_RSA_WITH_DES_CBC_SHA	39
SSL_RSA_EXPORT_WITH_RC4_40_MD5 / TLS_RSA_EXPORT_WITH_RC4_40_MD5	33
SSL_RSA_EXPORT_WITH_RC2_CBC_40_MD5 / TLS_RSA_EXPORT_WITH_RC2_CBC_40_MD5	36
SSL_RSA_WITH_NULL_SHA / TLS_RSA_WITH_NULL_SHA	32
SSL_RSA_WITH_NULL_MD5 / TLS_RSA_WITH_NULL_MD5	31

Note: SSLV3 is disabled by default on i 7.2

TLS 1.0 Ciphers:

Table 26.

Long Name	Short name
SSL_RSA_WITH_3DES_EDE_CBC_SHA / TLS_RSA_WITH_3DES_EDE_CBC_SHA	3A
SSL_RSA_WITH_RC4_128_SHA / TLS_RSA_WITH_RC4_128_SHA	35
SSL_RSA_WITH_RC4_128_MD5 / TLS_RSA_WITH_RC4_128_MD5	34
SSL_RSA_WITH_DES_CBC_SHA / TLS_RSA_WITH_DES_CBC_SHA	39
SSL_RSA_EXPORT_WITH_RC4_40_MD5 / TLS_RSA_EXPORT_WITH_RC4_40_MD5	33
SSL_RSA_EXPORT_WITH_RC2_CBC_40_MD5 / TLS_RSA_EXPORT_WITH_RC2_CBC_40_MD5	36
SSL_RSA_WITH_NULL_SHA / TLS_RSA_WITH_NULL_SHA	32
SSL_RSA_WITH_NULL_MD5 / TLS_RSA_WITH_NULL_MD5	31
TLS_RSA_WITH_AES_128_CBC_SHA	X2F
TLS_RSA_WITH_AES_256_CBC_SHA	X35

TLS 1.1 Ciphers:

Table 27.

Long Name	Short name
SSL_RSA_WITH_3DES_EDE_CBC_SHA	3A
SSL_RSA_WITH_RC4_128_SHA / TLS_RSA_WITH_RC4_128_SHA	35
SSL_RSA_WITH_RC4_128_MD5 / TLS_RSA_WITH_RC4_128_MD5	34
SSL_RSA_WITH_DES_CBC_SHA / TLS_RSA_WITH_DES_CBC_SHA	39
SSL_RSA_WITH_NULL_SHA / TLS_RSA_WITH_NULL_SHA	32
SSL_RSA_WITH_NULL_MD5 / TLS_RSA_WITH_NULL_MD5	31
TLS_RSA_WITH_AES_128_CBC_SHA	X2F
TLS_RSA_WITH_AES_256_CBC_SHA	X35

TLS 1.2 Ciphers:

Table 28.

Long Name	**Short name**
SSL_RSA_WITH_3DES_EDE_CBC_SHA	3A
SSL_RSA_WITH_RC4_128_SHA / TLS_RSA_WITH_RC4_128_SHA	35
SSL_RSA_WITH_RC4_128_MD5 / TLS_RSA_WITH_RC4_128_MD5	34
SSL_RSA_WITH_NULL_SHA / TLS_RSA_WITH_NULL_SHA	32
SSL_RSA_WITH_NULL_MD5 / TLS_RSA_WITH_NULL_MD5	31
TLS_RSA_WITH_AES_128_CBC_SHA	X2F
TLS_RSA_WITH_AES_256_CBC_SHA	X35
TLS_RSA_WITH_NULL_SHA256	X3B
TLS_RSA_WITH_AES_128_CBC_SHA256	X3C
TLS_RSA_WITH_AES_256_CBC_SHA256	X3D
TLS_RSA_WITH_AES_128_GCM_SHA256	X9C
TLS_RSA_WITH_AES_256_GCM_SHA384	X9D
TLS_ECDHE_ECDSA_WITH_NULL_SHA	N/A
TLS_ECDHE_ECDSA_WITH_RC4_128_SHA	N/A
TLS_ECDHE_ECDSA_WITH_3DES_EDE_CBC_SHA	N/A
TLS_ECDHE_RSA_WITH_NULL_SHA	N/A
TLS_ECDHE_RSA_WITH_RC4_128_SHA	N/A
TLS_ECDHE_RSA_WITH_3DES_EDE_CBC_SHA	N/A
TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA256	N/A
TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA384	N/A
TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256	N/A
TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384	N/A
TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256	N/A
TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384	N/A
TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256	N/A

Table 28. (continued)

Long Name	Short name
TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384	N/A

SSLCipherSpec

Module: mod_ibm_ssl

Syntax: SSLCipherSpec *cipher*, *[protocol_name] [+|-]cipher [[+|-]cipher...]*

Default: none

Context: server, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM

Example:

SSLCipherSpec *"3A"*

SSLCipherSpec *SSL_RSA_WITH_3DES_EDE_CBC_SHA*

SSLCipherSpec *3A*

SSLCipherSpec *"SSL_RSA_WITH_3DES_EDE_CBC_SHA"*

SSLCipherSpec *ALL +SSL_RSA_WITH_3DES_EDE_CBC_SHA*

SSLCipherSpec *ALL -SSL_RSA_WITH_RC4_128_MD5*

The SSLCipherSpec directive allows for specifying a cipher spec to be used for the SSL connection. Each occurrence of this directive will add the associated cipher spec to that context's existing cipher suite list. The cipher spec is used on the SSL handshake, which then uses the cipher suite list to negotiate the cipher used for communications between the server and the client.

There are two syntaxes can be used for this directive:

- SSLCipherSpec *cipher*.

  For the single-argument form, the given cipher is enabled in all protocols for which it is valid.
- SSLCipherSpec *[protocol_name] [+|-]cipher [[+|-]cipher...]*.

  For the multiple-argument form, specifying the name of an SSL protocol (SSLv2, SSLv3, TLSv10, TLSv11, TLSv12, ALL) as the first argument, the directive can add or remove the specific cipher from the SSL protocol cipher suite list.

The following cipher specs are allowed for this directive. Either the short name or the long name may be specified.

Table 29.

HEX	Short Name	Key Size	Long Name	SSLv3	TLSv10	TLSv11	TLSv12
0x01	31	0	TLS_RSA_WITH_NULL_MD5 (*)	X	X	X	X

Table 29. (continued)							
HEX	**Short Name**	**Key Size**	**Long Name**	**SSLv3**	**TLSv10**	**TLSv11**	**TLSv12**
0x02	32	0	TLS_RSA_ WITH_NUL L_SHA (*)	X	X	X	X
0x03	33	40	TLS_RSA_ WITH_NUL L_SHA (*)	X	X		
0x04	34	128	TLS_RSA_ WITH_RC4 _128_MD5 (*)	X	X	X	X
0x05	35	128	TLS_RSA_ WITH_RC4 _128_SHA (*)	X	X	X	X
0x06	36	40	TLS_RSA_E XPORT_WI TH_RC2_C BC_40_MD 5 (*)	X	X		
0x09	39	56	TLS_RSA_ WITH_DES _CBC_SHA (*)	X	X	X	X
0x0A	3A	168	TLS_RSA_ WITH_3DE S_EDE_CB C_SHA (*)		X	X	X
0x2F	X2F	128	TLS_RSA_ WITH_AES _128_CBC _SHA		X	X	X
0x35	X35	256	TLS_RSA_ WITH_AES _256_CBC _SHA		X	X	X
0x3B	X3B	0	TLS_RSA_ WITH_NUL L_SHA256				X
0x3C	X3C	128	TLS_RSA_ WITH_AES _128_CBC _SHA256				X
0x3D	X3D	256	TLS_RSA_ WITH_AES _256_CBC _SHA256				X

Table 29. (continued)

HEX	Short Name	Key Size	Long Name	SSLv3	TLSv10	TLSv11	TLSv12
0x9C	X9C	128	TLS_RSA_WITH_AES_128_GCM_SHA256				X
0x9D	X9D	256	TLS_RSA_WITH_AES_256_GCM_SHA384				X
0xC006	N/A	0	TLS_ECDHE_ECDSA_WITH_NULL_SHA				X
0xC007	N/A	128	TLS_ECDHE_ECDSA_WITH_RC4_128_SHA				X
0xC008	N/A	168	TLS_ECDHE_ECDSA_WITH_3DES_EDE_CBC_SHA				X
0xC010	N/A	0	TLS_ECDHE_RSA_WITH_NULL_SHA				X
0xC011	N/A	128	TLS_ECDHE_RSA_WITH_RC4_128_SHA				X
0xC012	N/A	168	TLS_ECDHE_RSA_WITH_3DES_EDE_CBC_SHA				X
0xC023	N/A	128	TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA256				X
0xC024	N/A	256	TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA384				X

Table 29. (continued)

HEX	Short Name	Key Size	Long Name	SSLv3	TLSv10	TLSv11	TLSv12
0xC027	N/A	128	TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256				X
0xC028	N/A	256	TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384				X
0xC02B	N/A	128	TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256				X
0xC02C	N/A	256	TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384				X
0xC02F	N/A	128	TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256				X
0xC030	N/A	256	TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384				X

Note: (*) indicates the long name can also be named by starting with "SSL_" in order to be compatible with older releases.

Version 3 Ciphers:

Table 30.

Long Name	Short name
SSL_RSA_WITH_3DES_EDE_CBC_SHA / TLS_RSA_WITH_3DES_EDE_CBC_SHA	3A
SSL_RSA_WITH_RC4_128_SHA / TLS_RSA_WITH_RC4_128_SHA	35
SSL_RSA_WITH_RC4_128_MD5 / TLS_RSA_WITH_RC4_128_MD5	34
SSL_RSA_WITH_DES_CBC_SHA / TLS_RSA_WITH_DES_CBC_SHA	39

Table 30. (continued)	
Long Name	**Short name**
SSL_RSA_EXPORT_WITH_RC4_40_MD5 / TLS_RSA_EXPORT_WITH_RC4_40_MD5	33
SSL_RSA_EXPORT_WITH_RC2_CBC_40_MD5 / TLS_RSA_EXPORT_WITH_RC2_CBC_40_MD5	36
SSL_RSA_WITH_NULL_SHA / TLS_RSA_WITH_NULL_SHA	32
SSL_RSA_WITH_NULL_MD5 / TLS_RSA_WITH_NULL_MD5	31

Note: SSLV3 is disabled by default on i 7.2

TLS 1.0 Ciphers:

Table 31.	
Long Name	**Short name**
SSL_RSA_WITH_3DES_EDE_CBC_SHA / TLS_RSA_WITH_3DES_EDE_CBC_SHA	3A
SSL_RSA_WITH_RC4_128_SHA / TLS_RSA_WITH_RC4_128_SHA	35
SSL_RSA_WITH_RC4_128_MD5 / TLS_RSA_WITH_RC4_128_MD5	34
SSL_RSA_WITH_DES_CBC_SHA / TLS_RSA_WITH_DES_CBC_SHA	39
SSL_RSA_EXPORT_WITH_RC4_40_MD5 / TLS_RSA_EXPORT_WITH_RC4_40_MD5	33
SSL_RSA_EXPORT_WITH_RC2_CBC_40_MD5 / TLS_RSA_EXPORT_WITH_RC2_CBC_40_MD5	36
SSL_RSA_WITH_NULL_SHA / TLS_RSA_WITH_NULL_SHA	32
SSL_RSA_WITH_NULL_MD5 / TLS_RSA_WITH_NULL_MD5	31
TLS_RSA_WITH_AES_128_CBC_SHA	X2F
TLS_RSA_WITH_AES_256_CBC_SHA	X35

TLS 1.1 Ciphers:

Table 32.	
Long Name	**Short name**
SSL_RSA_WITH_3DES_EDE_CBC_SHA	3A
SSL_RSA_WITH_RC4_128_SHA / TLS_RSA_WITH_RC4_128_SHA	35
SSL_RSA_WITH_RC4_128_MD5 / TLS_RSA_WITH_RC4_128_MD5	34

Table 32. (continued)

Long Name	**Short name**
SSL_RSA_WITH_DES_CBC_SHA / TLS_RSA_WITH_DES_CBC_SHA	39
SSL_RSA_WITH_NULL_SHA / TLS_RSA_WITH_NULL_SHA	32
SSL_RSA_WITH_NULL_MD5 / TLS_RSA_WITH_NULL_MD5	31
TLS_RSA_WITH_AES_128_CBC_SHA	X2F
TLS_RSA_WITH_AES_256_CBC_SHA	X35

TLS 1.2 Ciphers:

Table 33.

Long Name	**Short name**
SSL_RSA_WITH_3DES_EDE_CBC_SHA	3A
SSL_RSA_WITH_RC4_128_SHA / TLS_RSA_WITH_RC4_128_SHA	35
SSL_RSA_WITH_RC4_128_MD5 / TLS_RSA_WITH_RC4_128_MD5	34
SSL_RSA_WITH_NULL_SHA / TLS_RSA_WITH_NULL_SHA	32
SSL_RSA_WITH_NULL_MD5 / TLS_RSA_WITH_NULL_MD5	31
TLS_RSA_WITH_AES_128_CBC_SHA	X2F
TLS_RSA_WITH_AES_256_CBC_SHA	X35
TLS_RSA_WITH_NULL_SHA256	X3B
TLS_RSA_WITH_AES_128_CBC_SHA256	X3C
TLS_RSA_WITH_AES_256_CBC_SHA256	X3D
TLS_RSA_WITH_AES_128_GCM_SHA256	X9C
TLS_RSA_WITH_AES_256_GCM_SHA384	X9D
TLS_ECDHE_ECDSA_WITH_NULL_SHA	N/A
TLS_ECDHE_ECDSA_WITH_RC4_128_SHA	N/A
TLS_ECDHE_ECDSA_WITH_3DES_EDE_CBC_SHA	N/A
TLS_ECDHE_RSA_WITH_NULL_SHA	N/A
TLS_ECDHE_RSA_WITH_RC4_128_SHA	N/A
TLS_ECDHE_RSA_WITH_3DES_EDE_CBC_SHA	N/A
TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA256	N/A
TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA384	N/A

Table 33. (continued)

Long Name	Short name
TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256	N/A
TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384	N/A
TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256	N/A
TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384	N/A
TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256	N/A
TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384	N/A

Note: The following 6 ciphers are weak ciphers, most popular browsers like IE7, IE8, Opera do not support those ciphers, so they are not recommended to be used at all.

TLS_RSA_WITH_NULL_SHA

TLS_RSA_WITH_NULL_MD5

TLS_RSA_WITH_DES_CBC_SHA

TLS_RSA_EXPORT_WITH_RC2_CBC_40_MD5

TLS_RSA_EXPORT_WITH_RC4_40_MD5

TLS_RSA_WITH_NULL_SHA256

Note: The short and long names can be quoted. For example, SSLCipherSpec "3A"

See also SSLVersion.

SSLClientAuth

Module: mod_ibm_ssl

Syntax: SSLClientAuth *level [noverify]*

Default: SSLClientAuth none

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM
```

Example:

SSLClientAuth 2

SSLClientAuth required

SSLClientAuth Optional noverify

The SSLClientAuth directive is used to indicate the type of client-side SSL certificate validation is required for the server.

Parameter: *level*

- The level parameter value specifies the client-side SSL certificate validation required for the server. Valid values include:

0 or none

```
        No client certificate is required.
```

1 or optional

```
        The client may present a valid certificate.
```

2 or required

```
       The client must present a valid certificate.
```

Required_reset

```
       The server requires a valid certificate from all clients, and if no certificate is 
available, the server sends an 
       SSL alert to the client. This alert enables the client to understand that the SSL 
failure is client-certificate 
       related, and causes browsers to re-prompt for client certificate information about 
subsequent access.
```

SSLProxyProtocolDisable

Note: The optional parameter noverify can only be used with level 1 or optional, for example: SSLClientAuth Optional noverify

The default value of this directive is *0* or *none*, indicating that no certificate is requested or required from the client. If an incorrect value is specified, an error message is issued and the server will not start.

A value of *1* or *optional*, will cause the server to request a certificate from the client, and the SSL connection will be made even if a certificate is not received. A value of *1* or *optional* does not require the certificate received from the client to be valid. With *noverify* parameter, the HTTP server enables SSL handshake to succeed and establish a connection, even if the certificate provided by the client fails validation (for example, the certificate is expired or revoked). Use this directive with "SSLClientAuthVerify" on page 452 to provide a user-friendly web page, instead of the default browser error message.

A value of *2* or *required*, will cause the server to request a certificate from the client. If a valid certificate is not received, the client request will be rejected.

A value of *require_reset*, will cause the server to request a certificate from the client. If no certificate is available, the server sends an SSL alert to the client. This enables the client to understand that the SSL failure is client-certificate related, and causes browsers to re-prompt for client certificate information about subsequent access.

SSLClientAuthGroup

Module: mod_ibm_ssl

Syntax: SSLClientAuthGroup *groupname attribute-expression*

Default: none

Context: server , virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM
```

Example: SSLClientAuthGroup IBMpeople Org = IBM

The SSLClientAuthGroup directive is used to define a group name to a set of specific client certificate attributes to be used on the SSLClientAuthRequire directive. To indicate the attributes, a validated certificate must be presented before the server will allow access to the directory.

Parameter One: *groupname*

- The *groupname* parameter value specifies the group name for the client certificate. A group name cannot include spaces.

Parameter Two: *attribute-expression*

- The attribute-expression parameter value specifies the attribute for a validated certificate to be used for client authentication. Either the long name or the short name may be used in this directive. Valid values include:

Table 34. Attribute values

Long name	**Short name**
IssuerStateOrProvince	IST
IssuerCommonName	ICN
IssuerOrgUnit	IOU
IssuerCountry	IC
IssuerLocality	IL
IssuerOrg	IO
IssuerEmail	IE
IssuerPostalCode	IPC
StateOrProvince	ST
CommonName	CN
OrgUnit	OU
Country	C
Locality	L
Org	O
PostalCode	PC
SerialNumber	SN
Email	E
IssuerEmail	IE

Note: The short and long names can be quoted. For example, SSLClientAuthGroup IBMpeople "Org = IBM".

The user specifies a logic string of specific client certificate attributes and a group name is assigned to these attributes. Multiple subexpressions can be logically ANDed , ORed, or NOTed to configure the desired group of client certificate attributes. Valid equalities include '=' and '!='.

Example One

```
SSLClientAuthGroup IBMpeople Org=IBM
```

Example Two

```
SSLClientAuthGroup MNIBM ST=MN && Org=IMB
```

Note: A group name cannot include spaces.

See also "SSLClientAuthRequire" on page 451

SSLClientAuthRequire

Module: mod_ibm_ssl

Syntax: SSLClientAuthRequire *attribute-expression*

Default: none

Context: directory, .htaccess

Override: AuthConfig

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM
```

Example: SSLClientAuthRequire *group != IBMpeople && ST= MN*

The SSLClientAuthRequire directive is used to provide a specific client certificate attributes, or groups of attributes, that must be validated before the server will allow access to the directory. If the certificate received does not have a particular attribute, then we do not check for an attribute match. Even if the matching value is " ", this may still not be the same as not having the attribute there at all. Any attribute specified on the SSLClientAuthRequire and not available on the certificate causes the request to be rejected.

The following is a list of the attribute values that may be specified on this directive:

Table 35. Attribute values

Long name	**Short name**
IssuerStateOrProvince	IST
IssuerCommonName	ICN
IssuerOrgUnit	IOU
IssuerCountry	IC
IssuerLocality	IL
IssuerOrg	IO
IssuerEmail	IE
IssuerPostalCode	IPC
StateOrProvince	ST
CommonName	CN
OrgUnit	OU

Table 35. Attribute values (continued)

Long name	**Short name**
Country	C
Locality	L
Org	O
PostalCode	PC
SerialNumber	SN
Email	E
IssuerEmail	IE

Either the long name or the short name may be used in this directive.

The user specified a logic string of specific client certificate attributes. Multiple subexpressions can be logically ANDed , ORed, or Noted to configure the desired client certificate attributes. Valid logical symbols include '=' and '!='. The user may also specify a group name, configured on the SSLClientAuthGroup, that allows a group of attributes to be configured.

Multiple SSLClientAuthRequire directives may be specified for each directory, and each attribute specified is used to check the attributes in the client certificate. Multiple directives place a logical AND on the attributes specified with the directives.

Example 1: SSLClientAuthRequire (CommonName="John Doe" || StateOrProvince=MN) && Org !=IBM

Example 2: SSLClientAuthRequire group!=IBMpeople && ST=MN

Note: The short and long names can be quoted. For example, SSLClientAuthRequire group != IBMpeople && "ST= MN"

See also "SSLClientAuthGroup" on page 449.

SSLClientAuthVerify

Module: mod_ibm_ssl

Syntax: SSLClientAuthfVerify statuscode | OFF

Default: SSLClientAuthfVerify 500

Context: directory

Override: None

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM
```

Example: SSLClientAuthVerify OFF

Example: SSLClientAuthVerify 419

The SSLClientAuthVerify directive is used together with "SSLClientAuth Optional Noverify" to provide a user friendly web page, instead of the default browser error message when client certificate fails validation (for example, it is expired or revoked). Use this directive in a context such as <Location> or <Directory> to fail requests that are received on that connection with a specific error code, or handled normally by setting OFF.

Parameter *statuscode*: The specified status code must be a response status that is valid in HTTP and known to IBM HTTP Server. The values are between 100 and 599, and are typically defined in an RFC or standards proposal. If you are unsure, try a status code in a test configuration and use apachectl -t to see if it is valid. Other unused codes that are valid and would be good choices include: 418, 419, 420, and 421.

Parameter OFF: Ignore the client certificate failure and process the request normally.

By providing a custom error document for specific status code, the administrator can control the page that is presented to the user, for example, to tell the user their certificate is invalid and provide further instructions. If the error document is an internal redirect to another URL in the same virtual host, you must ensure that URL has SSLClientAuthVerify OFF in its context so it does not immediately fail.

If the error document is an internal redirect to another URL in the same virtual host, you must ensure that URL has SSLClientAuthVerify OFF in its context so it does not immediately fail, as well. See below as an example.

Example:

```
<VirtualHost *:443>
   SSLClientAuth Optional Noverify
   <Location />
      SSLClientAuthVerify 419
   </Location>
   ErrorDocument 419 /error419.html
    <Location /error419.html>
        SSLClientAuthVerify OFF
    </Location>
</VirtualHost>
```

SSLClientCertDisable

Module: mod_ibm_ssl

Syntax: SSLClientCertDisable

Default: none

Context: directory, .htaccess

Override: AuthConfig

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM`

Example: SSLClientCertDisable

The SSLClientCertDisable directive indicates to the server that a valid certificate is not required in order to access this directory.

This directive may be used in conjunction with the SSLAuthType directive. If specified in addition to the SSLAuthTypeCert directive, the certificate received only needs to be associated with a user ID or an Internet user.

This directive negates the SSLClientCertEnable directive.

SSLClientCertEnable

Module: mod_ibm_ssl

Syntax: SSLClientCertEnable

Default: none

Context: directory, .htaccess

Override: AuthConfig

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM`

Example: SSLClientCert Enable

The SSLClientCertEnable directive indicates to the server that a valid certificate is required in order to access this directory.

This directive may be used in conjunction with the SSLAuthType directive.

If specified in addition to the SSLAuthTypeCert directive, the certificate received needs to be valid, as well as associated with a user ID or an Internet user. This directive is negated by the SSLClientCertDisable directive.

SSLDenySSL

Module: mod_ibm_ssl

Syntax: SSLDenySSL

Default: none

Context: directory, .htaccess

Override: AuthConfig

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM`

Example: SSLDenySSL

The SSLDenySSL directive will deny access to the directory when SSL is used for the request. This directive interacts somewhat with the SSLRequireSSL directive. If a directory has both the SSLRequireSSL and the SSLDenySSL directives specified, then the last directive in the directory scope will take effect. Since this directive is scoped to a directory, a server or a virtual host may also have SSLRequireSSL for some directories, but SSLDenySSL for other directories. Also, more specific directory container directives will override previously specified directives for a less specific directory.

Example:

```
<Directory /ABC>
 SSLRequireSSL
</Directory>
<Directory /ABC/DEF>
 SSLDenySSL
</Directory>
```

This example will require SSL for directory /ABC, but deny SSL for directory /ABC/DEF.

SSLDisable

Module: mod_ibm_ssl

Syntax: SSLDisable

Default: SSLDisable

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM`

Example: SSLDisable

The SSLDisable directive causes SSL to be disabled for the server or virtual host. The effect of this directive will depend on the location of the directive. If the directive is located in the configuration file for the main server, SSL will not be allowed for the server. If the directive is located in a <Virtual Host> container, then SSL will not be allowed for the virtual host. The directive located at the server level can be overridden for a particular virtual host using the SSLEnable directive.

SSLEnable

Module: mod_ibm_ssl

Syntax: SSLEnable

Default: none

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM`

Example: SSLEnable

The SSLEnable directive will cause SSL to be enabled. The effect of this directive will depend on the location of the directive. If the directive is located in the configuration file for the main server, SSL will be required for the server. If the directive is located in a <Virtual Host> container, then SSL will be required for the virtual host. The directive, located at the server level, can be overridden for a particular virtual host using the SSLDisable directive. This directive requires that the directive SSLAppName be set.

Note: Some applications need SetEnv HTTPS_PORT <port> configured when SSLEnable is configured.

SSLEngine

Module: mod_ibm_ssl

Syntax: SLEngine *On | Off | Optional*

Default: SSLEngine Off

Context: server, virtual host

Override: none

Origin: Apache

Usage Considerations: The server must be restarted prior to using the directive. A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM`

Example: SSLEngine On

The SSLEngine directive toggles the usage of SSL processing. If SSLEngine *On* is specified, SSL processing is enabled. If SSLEngine *Off* is specified, SSL processing is disabled. If SSLEngine *Optional* is specified, SSL processing is turned on to handle upgrading a non-SSL connection to an SSL connection. The effect of this directive depends on the location of the directive. If the directive is located in the configuration file for the main server, the type of SSL processing is set for the entire server. If the directive is located in a <VirtualHost> container, then the type of SSL processing is set for only that virtual host. If this directive is set at the server level, it can be overridden for a particular virtual host by specifying the other allowed option. SSLEngine *On* is equivalent to SSLEnable, SSLEngine *Off* is equivalent to SSLDisable, and SSLEngine Optional is equivalent to SSLUpgrade. These directives can be used interchangeably. The SSLEngine directive is being added in order to be compatible with Apache's mod_ssl.

If SSLEngine *On* or SSLEngine *Optional* is configured, the directive SSLAppName must also be configured.

See also SSLEnable, SSLDisable, SSLUpgrade, and SSLAppName.

Parameter: *seconds*

- The *seconds* parameter has a valid value range of 1 to 86400 seconds. If the value specified is greater than 86400, or less than 1, then the default value of 86400 seconds will be used as the timeout value. This value is used for negotiated SSLVersion 3, or TLS Version 1, sessions.

SSLFallbackProtection

Module: mod_ibm_ssl

Syntax: SSLFallbackProtection *On* | *Off*

Default: SSLRenegotiation on

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM`

Example: SSLFallbackProtection off

The SSLFallbackProtection directive enables/disables TLS_FALLBACK_SCSV. It allows the TLS_FALLBACK_SCSV pseudo cipher to be sent by HTTP Server for i. This helps browsers from being fooled into downgrading TLS versions.

ON (default)

```
Enable TLS_FALLBACK_SCSV
```

OFF

```
Disable TLS_FALLBACK_SCSV
```

SSLHandshakeTimeout

Module: mod_ibm_ssl

Syntax: SSLHandshakeTimeout *seconds*

Default: None - (Use the value of TimeOut directive to be compatible with previous releases)

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM`

Example: SSLHandshakeTimeout 60

The SSLHandshakeTimeout directive can be used to reduce the timeout for SSL handshake I/O operations. If set to 0 or not specified, the value of Core Timeout will be used.

```
<VirtualHost *:443>
   SSLEnable
   Timeout 60
   SSLHandshakeTimeout 20
</VirtualHost>
```

SSLProxyAppName

Module: mod_ibm_ssl

Syntax: SSLProxyAppName *server_application_name*

Default: none

Context: server, virtual host

Override: none

Origin: IBM

Usage Considerations: The server must be restarted prior to using the directive.

Example: SSLProxyAppName QIBM_HTTP_CLIENT_APACHE

The SSLProxyAppName directive is used to:

- to uniquely label the proxy server as a client application that intends to use SSL to a remote content server.
- to keep track of the registered name used by the proxy server.
- to identify the server when association of a client certificate with a secure application is done in the Digital Certificate Manager (DCM).
- to identify the server to the SSL API's so that the SSL API's can use the certificate that is associated with the server.

The registration of the secure client application and the creation of the SSLProxyAppName is done automatically when the system administrator enables the SSL Proxy engine for the server using the HTTP Server configuration GUI. The association of a client certificate with the application is accomplished by the system administrator using DCM: after a secure client application is registered, and before attempting to start the server with the SSL proxy engine enabled and SSLProxyAppName configured, the user must use DCM to assign a client certificate to the corresponding secure application. Since this directive is valid at the virtual host level, the server may have more than one certificate assigned, with each virtual host having a different application name. The specified value on this directive is the name of the application that the server or virtual host is known as. If both the SSLProxyAppName directive and the SSLProxyMachineCertificateFile directive are configured for the server, then the SSLProxyAppName directive is used to identify the client certificate and the handshake processing.

Note: Please leave the SSL fields to the default if creating an application ID via DCM for Apache Server as those settings override the same settings used by Apache server directives in the HTTP Server configuration file.

SSLOCSPResponderURL

Module: mod_ibm_ssl

Syntax: SSLOCSPResponderURL *URL*

Default: Disabled

Context: virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM
```

Example: SSLOCSPResponderURL *http://hostname:2560/*

The SSLOCSPResponderURL directive enables checking of client certificates through a statically configured online certificate status protocol (OCSP) responder. IBM HTTP Server uses the supplied URL to check for certificate revocation status when an SSL client certificate is provided.

If both SSLOCSPEnable and SSLOCSPResponderURL are configured, the responder defined by SSLOCSPResponderURL is checked first. If the revocation status is unknown or inconclusive, HTTP Server checks OCSP responders for SSLOCSPEnable. If CRL checking is also configured via DCM, OCSP checking is performed before any CRL checking. CRL checking occurs only if the result of the OCSP checking is unknown or inconclusive.

In some cases HTTP Server might not be able to determine the revocation status of a client certificate, because the backend server, which is the source of the revocation data, is not available. The SSLUnknownRevocationStatus directive is provided for cases in which recoverable errors occur in HTTP Server when it is communicating with the backend server, and the HTTP Server cannot determine the revocation status of a certificate. The default behavior is to continue processing the handshake unless the backend server can successfully indicate that the certificate is revoked.

SSLOCSPEnable

Module: mod_ibm_ssl

Syntax: SSLOCSPEnable

Default: Disabled

Context: virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM
```

The SSLOCSPEnable directive enables checking of client certificates through OCSP responders defined in the Authority Information Access (AIA) extension of their certificate. If SSLOCSPEnable is set, and an SSL client certificate chain contains an AIA extension, HTTP Server contacts the OCSP responder indicated by the AIA extension to check revocation status of the client certificate.

If both SSLOCSPEnable and SSLOCSPResponderURL are configured, the responder defined by SSLOCSPResponderURL is checked first. If the revocation status is unknown or inconclusive, HTTP Server checks OCSP responders for SSLOCSPEnable. If CRL checking is also configured via DCM, OCSP checking is performed before any CRL checking. CRL checking occurs only if the result of the OCSP checking is unknown or inconclusive.

SSLProxyCipherSpec

Module: mod_ibm_ssl

Syntax: SSLProxyCipherSpec *cipher-spec*, SSLProxyCipherSpec *[protocol_name] [+|-]cipher [[+|-]cipher...]*

Default: none

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM

Example:

SSLProxyCipherSpec *"3A"*

SSLProxyCipherSpec *SSL_RSA_WITH_3DES_EDE_CBC_SHA*

SSLProxyCipherSpec *3A*

SSLProxyCipherSpec *"SSL_RSA_WITH_3DES_EDE_CBC_SHA"*

SSLProxyCipherSpec *ALL +SSL_RSA_WITH_3DES_EDE_CBC_SHA*

SSLProxyCipherSpec *ALL -SSL_RSA_WITH_RC4_128_MD5*

The SSLProxyCipherSpec directive allows for specifying a cipher specification to be used for the SSL connection. Each occurrence of this directive will add the associated cipher specification to that context's existing cipher suite list. The cipher specification is used on the SSL handshake, which then uses the cipher suite list to negotiate the cipher used for communications between the proxy server and the content server.

The order of the SSLProxyCipherSpec directives is important. The cipher suite list passed to SSL is created by putting the first cipher listed in the configuration file at the top of the cipher suite list. SSL uses this list as the preferred order of ciphers.

This directive works in conjunction with the SSLProxyVersion directive during the SSL handshake. The values specified for the SSLProxyCipherSpec directive must correspond with the value specified on the SSLProxyVersion directive. If this directive is not used, a default cipher suite list is used.

Parameter: *cipher-spec*

- The *cipher-spec* parameter specifies the cipher specification to be used. Either the short name or the long name in the following table may be specified.

Table 36.

HEX	Short Name	Key Size	Long Name	SSLv3	TLSv10	TLSv11	TLSv12
0x01	31	0	TLS_RSA_WITH_NULL_MD5 (*)	X	X	X	X
0x02	32	0	TLS_RSA_WITH_NULL_SHA (*)	X	X	X	X
0x03	33	40	TLS_RSA_WITH_NULL_SHA (*)	X	X		

Table 36. (continued)

HEX	Short Name	Key Size	Long Name	SSLv3	TLSv10	TLSv11	TLSv12
0x04	34	128	TLS_RSA_WITH_RC4_128_MD5 (*)	X	X	X	X
0x05	35	128	TLS_RSA_WITH_RC4_128_SHA (*)	X	X	X	X
0x06	36	40	TLS_RSA_EXPORT_WITH_RC2_CBC_40_MD5 (*)	X	X		
0x09	39	56	TLS_RSA_WITH_DES_CBC_SHA (*)	X	X	X	X
0x0A	3A	168	TLS_RSA_WITH_3DES_EDE_CBC_SHA (*)		X	X	X
0x2F	X2F	128	TLS_RSA_WITH_AES_128_CBC_SHA		X	X	X
0x35	X35	256	TLS_RSA_WITH_AES_256_CBC_SHA		X	X	X
0x3B	X3B	0	TLS_RSA_WITH_NULL_SHA256				X
0x3C	X3C	128	TLS_RSA_WITH_AES_128_CBC_SHA256				X
0x3D	X3D	256	TLS_RSA_WITH_AES_256_CBC_SHA256				X

Table 36. (continued)

HEX	Short Name	Key Size	Long Name	SSLv3	TLSv10	TLSv11	TLSv12
0x9C	X9C	128	TLS_RSA_WITH_AES_128_GCM_SHA256				X
0x9D	X9D	256	TLS_RSA_WITH_AES_256_GCM_SHA384				X
0xC006	N/A	0	TLS_ECDHE_ECDSA_WITH_NULL_SHA				X
0xC007	N/A	128	TLS_ECDHE_ECDSA_WITH_RC4_128_SHA				X
0xC008	N/A	168	TLS_ECDHE_ECDSA_WITH_3DES_EDE_CBC_SHA				X
0xC010	N/A	0	TLS_ECDHE_RSA_WITH_NULL_SHA				X
0xC011	N/A	128	TLS_ECDHE_RSA_WITH_RC4_128_SHA				X
0xC012	N/A	168	TLS_ECDHE_RSA_WITH_3DES_EDE_CBC_SHA				X
0xC023	N/A	128	TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA256				X

Table 36. (continued)

HEX	Short Name	Key Size	Long Name	SSLv3	TLSv10	TLSv11	TLSv12
0xC024	N/A	256	TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA384				X
0xC027	N/A	128	TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256				X
0xC028	N/A	256	TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384				X
0xC02B	N/A	128	TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256				X
0xC02C	N/A	256	TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384				X
0xC02F	N/A	128	TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256				X
0xC030	N/A	256	TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384				X

Note: (*) indicates the long name can also be named by starting with "SSL_" in order to be compatible with older releases.

Version 3 Ciphers:

Table 37.

Long Name	Short name
SSL_RSA_WITH_3DES_EDE_CBC_SHA / TLS_RSA_WITH_3DES_EDE_CBC_SHA	3A
SSL_RSA_WITH_RC4_128_SHA / TLS_RSA_WITH_RC4_128_SHA	35
SSL_RSA_WITH_RC4_128_MD5 / TLS_RSA_WITH_RC4_128_MD5	34
SSL_RSA_WITH_DES_CBC_SHA / TLS_RSA_WITH_DES_CBC_SHA	39
SSL_RSA_EXPORT_WITH_RC4_40_MD5 / TLS_RSA_EXPORT_WITH_RC4_40_MD5	33
SSL_RSA_EXPORT_WITH_RC2_CBC_40_MD5 / TLS_RSA_EXPORT_WITH_RC2_CBC_40_MD5	36
SSL_RSA_WITH_NULL_SHA / TLS_RSA_WITH_NULL_SHA	32
SSL_RSA_WITH_NULL_MD5 / TLS_RSA_WITH_NULL_MD5	31

Note: SSLV3 is disabled by default on i 7.2

TLS 1.0 Ciphers:

Table 38.

Long Name	Short name
SSL_RSA_WITH_3DES_EDE_CBC_SHA / TLS_RSA_WITH_3DES_EDE_CBC_SHA	3A
SSL_RSA_WITH_RC4_128_SHA / TLS_RSA_WITH_RC4_128_SHA	35
SSL_RSA_WITH_RC4_128_MD5 / TLS_RSA_WITH_RC4_128_MD5	34
SSL_RSA_WITH_DES_CBC_SHA / TLS_RSA_WITH_DES_CBC_SHA	39
SSL_RSA_EXPORT_WITH_RC4_40_MD5 / TLS_RSA_EXPORT_WITH_RC4_40_MD5	33
SSL_RSA_EXPORT_WITH_RC2_CBC_40_MD5 / TLS_RSA_EXPORT_WITH_RC2_CBC_40_MD5	36
SSL_RSA_WITH_NULL_SHA / TLS_RSA_WITH_NULL_SHA	32
SSL_RSA_WITH_NULL_MD5 / TLS_RSA_WITH_NULL_MD5	31
TLS_RSA_WITH_AES_128_CBC_SHA	X2F
TLS_RSA_WITH_AES_256_CBC_SHA	X35

TLS 1.1 Ciphers:

Table 39.

Long Name	Short name
SSL_RSA_WITH_3DES_EDE_CBC_SHA	3A
SSL_RSA_WITH_RC4_128_SHA / TLS_RSA_WITH_RC4_128_SHA	35
SSL_RSA_WITH_RC4_128_MD5 / TLS_RSA_WITH_RC4_128_MD5	34
SSL_RSA_WITH_DES_CBC_SHA / TLS_RSA_WITH_DES_CBC_SHA	39
SSL_RSA_WITH_NULL_SHA / TLS_RSA_WITH_NULL_SHA	32
SSL_RSA_WITH_NULL_MD5 / TLS_RSA_WITH_NULL_MD5	31
TLS_RSA_WITH_AES_128_CBC_SHA	X2F
TLS_RSA_WITH_AES_256_CBC_SHA	X35

TLS 1.2 Ciphers:

Table 40.

Long Name	Short name
SSL_RSA_WITH_3DES_EDE_CBC_SHA	3A
SSL_RSA_WITH_RC4_128_SHA / TLS_RSA_WITH_RC4_128_SHA	35
SSL_RSA_WITH_RC4_128_MD5 / TLS_RSA_WITH_RC4_128_MD5	34
SSL_RSA_WITH_NULL_SHA / TLS_RSA_WITH_NULL_SHA	32
SSL_RSA_WITH_NULL_MD5 / TLS_RSA_WITH_NULL_MD5	31
TLS_RSA_WITH_AES_128_CBC_SHA	X2F
TLS_RSA_WITH_AES_256_CBC_SHA	X35
TLS_RSA_WITH_NULL_SHA256	X3B
TLS_RSA_WITH_AES_128_CBC_SHA256	X3C
TLS_RSA_WITH_AES_256_CBC_SHA256	X3D
TLS_RSA_WITH_AES_128_GCM_SHA256	X9C
TLS_RSA_WITH_AES_256_GCM_SHA384	X9D
TLS_ECDHE_ECDSA_WITH_NULL_SHA	N/A
TLS_ECDHE_ECDSA_WITH_RC4_128_SHA	N/A
TLS_ECDHE_ECDSA_WITH_3DES_EDE_CBC_SHA	N/A

Table 40. (continued)

Long Name	Short name
TLS_ECDHE_RSA_WITH_NULL_SHA	N/A
TLS_ECDHE_RSA_WITH_RC4_128_SHA	N/A
TLS_ECDHE_RSA_WITH_3DES_EDE_CBC_SHA	N/A
TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA256	N/A
TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA384	N/A
TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256	N/A
TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384	N/A
TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256	N/A
TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384	N/A
TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256	N/A
TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384	N/A

SSLProtocolDisable

Module: mod_ibm_ssl

Syntax: SSLProtocolDisable *protocolname [protocolname]...*

Default: Disabled

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM
```

Example: SSLProtocolDisable SSLv2 SSLv3

The SSLProtocolDisable directive specifies one or more SSL protocols which cannot be used by the client for a specific virtual host. The specified protocol is disagreed to negotiate by the server.

The possible value for this directive is as following:

Value	Description
SSLv2	SSL Version 2.0
SSLv3	SSL Version 3.0

TLS	All TLS versions
TLSV1	TLS Version 1.0
TLSV1.1	TLS Version 1.1
TLSV1.2	TLS Version 1.2

Example

```
<VirtualHost *:443>
   SSLEngine On
   SSLProtocolDisable  SSLv2 SSLv3
   (any other directives...)
</VirtualHost>
```

SSLProxyProtocolDisable

Module: mod_ibm_ssl

Syntax: SSLProxyProtocolDisable *protocolname [protocolname]...*

Default: Disabled

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM
```

Example: SSLProxyProtocolDisable SSLv2 SSLv3

The SSLProxyProtocolDisable directive specifies one or more SSL protocols which cannot be used to negotiate between HTTP proxy server and the remote content server during the SSL handshake.

The possible value for this directive is as following:

Value	Description
SSLv2	SSL Version 2.0
SSLv3	SSL Version 3.0
TLS	All TLS versions
TLSV1	TLS Version 1.0
TLSV1.1	TLS Version 1.1
TLSV1.2	TLS Version 1.2

Example

```
<VirtualHost *:443>
   SSLProxyEngine on
   SSLProxyProtocolDisable  SSLv2 SSLv3
   (any other directives...)
</VirtualHost>
```

SSLProxyEngine

Module: mod_ibm_ssl

Syntax: SSLProxyEngine *On | Off*

Default: SSLProxyEngine Off

Context: server, virtual host

Override: none

Origin: Apache

Usage Considerations: The server must be restarted prior to using the directive. This directive requires that either the SSLProxyAppName directive or the SSLProxyMachineCertificateFile be configured. Use of the SSLProxyMachineCertificateFile directive is required if the remote content server does not require a client certificate to be sent by the proxy server during the handshake process. If a certificate will be required by the remote content server, then the SSLProxyAppName should be used to identify the client certificate to use on the handshake.

Example: SSLProxyEngine On

The SSLProxyEngine directive toggles the usage of SSL connections to be used by the proxy to connect to the content server. This is usually used inside a <VirtualHost> section to enable SSL/TLS for proxy usage in a particular virtual host.

SSLProxyVerify

Module: mod_ibm_ssl

Syntax: SSLProxyVerify */ 1 | Optional | 2 | Required*

Default: SSLProxyVerify *Required*

Context: server, virtual host

Override: none

Origin: Apache

Example:

1. SSLProxyVerify *2*
2. SSLProxyVerify *Required*

The SSLProxyVerify directive is used to indicate the type of server-side SSL certificate validation is required by the proxy server. The following values are valid for the SSLProxyVerify directive:

- (1 or Optional) - The content server may present a valid certificate.
- (2 or Required) - The content server must present a valid, trusted certificate.

The default value of this directive is 2 or Required, indicating that the content server certificate must be valid and have a trusted root. If an incorrect value is specified, an error message is issued and the server will not start.

The proxy server requires a certificate to be received from the content server. However, this certificate may be expired, or not be trusted by the server CA, as configured on the SSLProxyAppName directive or the SSLProxyMachineCertificatePath directive. This will result in a handshake failure if 2 or Required is configured.

A value of 1 or Optional, will cause the proxy server to allow for an expired content server certificate, or allow for the consent server certificate to not be trusted by the server application ID configured. This will result in the handshake completing successfully.

SSLProxyVersion

Module: mod_ibm_ssl

Syntax: SSLProxyVersion *SSLV2 | SSLV3 | TLSV1 | TLSV1_SSLV3 | TLSV1.1 | TLSV1.2 | TLSV1.x | ALL*

Default: SSLProxyVersion *TLSV1.x*

Context: server config, virtual host

Override: none

Origin: Modified

Example: SSLVersion TLSV1

The SSLProxyVersion directive specifies the SSL version that is negotiated with the remote content server during the SSL agreement that takes place when connecting the Apache proxy server to the content server via the SSL protocol. The version specified must be negotiated or access to content server is denied.

There are five possible values for this directive:

Table 41. Directive values

Value	Description
SSLV2	SSL Version 2.0 only
SSLV3	SSL Version 3.0 only
TLSV1	TLS Version 1.0 only
TLSV1_SSLV3	TLS Version 1.0 with SSL Version 3.0 compatibility
TLSV1.1	TLS Version 1.1 only
TLSV1.2	TLS Version 1.2 only
TLSV1.x (default)	TLS Version 1.0, TLS Version 1.1 with TLS Version 1.2 compatibility
ALL	TLS Version 1.0, TLS Version 1.1, TLS Version 1.2 with SSLV2.0 & SSL V3.0 compatibility

The server will default to *TLSV1.x* indicating that the server will only accept TLS protocol that is negotiated due to the security vulnerability of SSLv2 and SSLv3.

Note: Besides setting the protocol from HTTP server, user also needs to check the system value of QSSLPCL. Only QSSLPCL enabled protocols can be used with and the others will be silently ignored even though it's specified in HTTP Server configuration file. SSLV3 has been disabled by default since IBM i 7.2.

SSLRequireSSL

Module: mod_ibm_ssl

Syntax: SSLRequireSSL

Default: none (if neither SSLRequireSSL or SSLDenySSL are configured, the client may access the container using a secure or non-secure connection)

Context: directory, .htaccess

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM
```

Example: SSLRequireSSL

The SSLRequireSSL directive will deny access to the directory whenever SSL is not used for the request. This is used to ensure that the client uses the SSL protocol to access a directory, and helps protect the resources in the directory from being accessed, even though there may be errors in the server configuration.

This directive interacts with the SSLDenySSL directive. If a directory has both the SSLRequireSSL and the SSLDenySSL directives specified, the last directive in the directory scope will take effect. Since this directive is scoped to a directory, a server or a virtual host may also have SSLRequireSSL for some directories, but SSLDenySSL for other directories. Also, more specific directory container directives will override previously specified directives for a less specific directory.

Example:

```
<Directory /ABC>
 SSLRequireSSL
</Directory>
<Directory /ABC/DEF>
 SSLDenySSL
</Directory>
```

This example will require SSL for directory /ABC, but deny SSL for directory /ABC/DEF.

SSLRenegotiation

Module: mod_ibm_ssl

Syntax: SSLRenegotiation on|off

Default: SSLRenegotiation on

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM
```

Example: SSLRenegotiation off

The SSLRenegotiation directive controls the types of TLS renegotiation permitted by HTTP Server for i. TLS renegotiation is how clients can initiate a new SSL handshake on an existing secure connection, which is rarely used by normal browser-based clients.

ON (default)

Secure renegotiation, as currently defined by RFC5746, is permitted.

OFF

No renegotiation is permitted.

SSLServerCert

Module: mod_ibm_ssl

Syntax: SSLServerCert *certificate_label*

Default: none

Context: virtual host

Override: none

Origin: IBM

Usage Considerations: The server must be restarted prior to using the directive. A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM
```

Example: SSLServerCert QIBM_HTTP_SERVER_CERT

The SSLServerCert directive sets the server certificate to use for the specific SSL enabled name based virtual host.

Server Name Indication(SNI) support has been added to HTTP Server for i. Specify this directive along with the "ServerName " on page 355 directive to set the server certificate and fully qualified domain name(FQDN) for that specific virtual host if you have multiple SSL enabled name based virtual hosts are configured and want to have the SNI support.

If this directive is not specified, the default virtual host server certificate will be used for all SSL enabled name based virtual hosts.

Example:

```
<VirtualHost 10.1.2.3:443>
    SSLEngine On
    SSLAppName QIBM_HTTP_SERVER_APACHE1
    DocumentRoot /www/example1
    ServerName www.example1.com
    SSLServerCert QIBM_HTTP_SERVER_CERT1
</VirtualHost>
```

```
<VirtualHost 10.1.2.3:443>
    SSLEngine On
    SSLAppName QIBM_HTTP_SERVER_APACHE2
    DocumentRoot /www/example2
    ServerName www.example2.com
    SSLServerCert QIBM_HTTP_SERVER_CERT2
</VirtualHost>
```

Note: Both SSLServerCert and ServerName directives are required to be specified in each SSL enabled name based virtual hosts in order to get SNI work correctly. The SSLServerCert directive only takes effect in SSL enabled name based virtual hosts, it will be ignored in any other types of virtual hosts.

SSLUpgrade

Module: mod_ibm_ssl

Syntax: SSLUpgrad

Default: none

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM
```

Example: SSLUpgrade

The SSLUpgrade directive enables a server to support a client request to upgrade a normal non-SSL connection to a Transport Layer Security (TLS) connection (for a single request). This directive's effectiveness will depend on the directive location. If the directive is located in the main server configuration file, any connection to the server will be eligible for a TLS upgrade. If the directive is located in a <Virtual Host> container, only the connection to that virtual host will be eligible for the upgrade. The directive, located at the server level, can be overridden for a particular virtual host using the SSLDisable or SSLEnable directives. SSLUpgrade requires that the directive SSLAppName is defined.

The SSLVersion directive is affected by SSLUpgrade. If SSLUpgrade is configured, the SSLVersion that is negotiated on the handshake will only be TLS. The SSLVersion specified in the configuration file will be ignored.

The SSLCipherSpec directive is also affected by SSLUpgrade. If SSLUpgrade is configured, only SSLV3/TLS ciphers are allowed. If SSLCipherSpec specifies SSL version 2 ciphers, these ciphers will be ignored, and only configured SSLV3/ TLS ciphers will be allowed. If there are no SSLV3/TLS ciphers configured, the defined default system cipher list will be used.

The SSLRequireSSL directive may be configured for a resource that is accessed through an upgraded connection. If the upgrade is requested as a part of the request through the use of the upgrade header, the SSLRequireSSL directive will be enforced before the connection is upgraded. This will allow the request to be processed, since the connection will be upgraded to SSL before the request has been handled, and the reply has been sent.

The SSLDenySSL directive will be enforced in the same manner as the SSLRequireSSL directive. If the request for the resource is received along with the upgrade header request, the request will be denied with a 403, Forbidden, response returned to the client, since the request will be processed after the connection has been upgraded.

SSLUnknownRevocationStatus

Module: mod_ibm_ssl

Syntax: SSLUnknownRevocationStatus *ignore | log | log_always | deny*

Default: SSLUnknownRevocationStatus ignore

Context: virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM
```

Example:

Example: SSLUnknownRevocationStatus log

Example: SSLUnknownRevocationStatus deny

The SSLUnknownRevocationStatus directive specifies how HTTP Server reacts when HTTP Server cannot readily determine the revocation status, which is coming through CRL or OCSP.

Parameter: *ignore | log | log_always | deny*

- The *ignore* parameter specifies that a debug level message is issued when a handshake completes and the revocation status is not known. This message is not re-issued when the SSL session is resumed.
- The *log* parameter specifies that a notice-level message is issued when a handshake completes and the revocation status is not known. This message is not re-issued when the SSL session is resumed.
- The *log_always* parameter specifies that a notice-level message is issued when a handshake completes and the revocation status is not known. HTTP Server issues the same message for subsequent handshakes.
- The *deny* parameter specifies that a notice-level message is issued when a handshake completes, the revocation status is not known, the session is not resumable, and the HTTPS connection is immediately closed. HTTP Server reports the same message for subsequent handshakes.

Whenever a message is logged for UnknownRevocationStatus, the SSL_UNKNOWNREVOCATION_SUBJECT variable, an internal SSL environment variable, is set. You can log this variable with the following syntax:

%{SSL_UNKNOWNREVOCATION_SUBJECT}e

You could also use the variable in mod_rewrite expressions when the SSLUnknownRevocationStatus directive has any value other than deny. Use the following variable name:

%{ENV:SSL_UNKNOWNREVOCATION_SUBJECT}

SSLVersion

Module: mod_ibm_ssl

Syntax: SSLVersion *SSLV2 | SSLV3 | TLSV1 | TLSV1_SSLV3 | TLSV1.1 | TLSV1.2 | TLSV1.x | ALL*

Default: SSLVersion *TLSV1.x*

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM`

Example: SSLVersion TLSV1

he SSLVersion directive specifies the SSL version that will be negotiated with the client during the SSL handshake. The version specified must be negotiated or access to specified resource will be denied.

There are five possible values for this directive:

Table 42. Directive values

Value	Description
SSLV2	SSL Version 2.0 only
SSLV3	SSL Version 3.0 only
TLSV1	TLS Version 1.0 only
TLSV1_SSLV3	TLS Version 1.0 with SSL Version 3.0 compatibility
TLSV1.1	TLS Version 1.1 only
TLSV1.2	TLS Version 1.2 only
TLSV1.x (default)	TLS Version 1.0, TLS Version 1.1 with TLS Version 1.2 compatibility
ALL	TLS Version 1.0, TLS Version 1.1, TLS Version 1.2 with SSLV2.0 & SSL V3.0 compatibility

The server will default to *TLSV1.x* indicating that the server will only accept TLS protocol that is negotiated due to the security vulnerability of SSLv2 and SSLv3.

Note: Besides setting the protocol from HTTP server, user also needs to check the system value of QSSLPCL. Only QSSLPCL enabled protocols can be used with and the others will be silently ignored even though it's specified in HTTP Server configuration file. SSLV3 has been disabled by default since IBM i 7.2.

SSLV2Timeout

Module: mod_ibm_ssl

Syntax: SSLV2Timeout *seconds*

Default: SSLV2Timeout 100

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM`

Example: SSLV2Timeout 32

The SSLV2Timeout directive specifies the timeout value for the session ID caching done by sockets that will be used on the SSL session. This directive indicates the number of seconds in which the internal SSL session identifier will expire. The session identifier is maintained by sockets. It allows caching of handshake information in order to allow for a shortened handshake to be done if the timeout value has not been reached. Lower values are safer but slower, because the complete handshake will be done after each timeout. If client certificates are being requested by the server, they will also be required to be represented at each timeout.

Parameter: *seconds*

- The *seconds* parameter has a valid value range of 1 to 100 seconds. If the value specified is greater than 100, or less than 1, then the default value of 100 seconds will be used as the timeout value. This value is used for negotiated SSL Version 2 sessions.

SSLV3Timeout

Module: mod_ibm_ssl

Syntax: SSLV3Timeout *seconds*

Default: SSLV3Timeout 86400

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: `LoadModule ibm_ssl_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVSSL.SRVPGM`

Example: SSLV3Timeout 32

The SSLV3Timeout directive specifies the timeout value for the session ID caching done by sockets that will be used on the SSL session. This directive indicates the number of seconds in which the internal SSL session identifier will expire. The session identifier is maintained by sockets, and allows caching of handshake information in order to allow for a shortened handshake to be done if the timeout value has not been reached. Lower values are safer, but also slower, as the complete handshake will be done after each timeout. If client certificates are being requested by the server, they will also be required to be represented at each timeout.

Parameter: *seconds*

- The *seconds* parameter has a valid value range of 1 to 86400 seconds. If the value specified is greater than 86400, or less than 1, then the default value of 86400 seconds will be used as the timeout value. This value is used for negotiated SSLVersion 3, or TLS Version 1, sessions.

Module mod_imagemap

Module mod_imagemap supports directives for the IBM HTTP Server for i Web server.

Summary

The module mod_imagemap provides for .map files, replacing the functionality of the imagemap CGI program. Any directory or document type configured to use the handler imap-file (using either AddHandler or SetHandler) will be processed by this module. This module is in the default HTTP Server distribution. The following directive will activate files ending with Map as imagemap files:

```
AddHandler imap-file map
```

Note: The following is still supported:

```
AddType application/x-httpd-imap map
```

Features

- URL references relative to the Referer: information
- Default <BASE> assignment through a new map directive base
- No need for imagemap.conf file
- Point references
- Configurable generation of imagemap lists

See "Additional information on Imagemap files" on page 476 for more information on Imagemaps.

Directives

- ImapBase
- ImapDefault
- ImapMenu

ImapBase

Module: mod_imagemap

Syntax: ImapBase *map | referer | URL*

Default: ImapBase map

Context: server config, virtual host, directory, .htaccess

Override: Indexes

Origin: Apache

Example: ImapBase map

The ImapBase directive sets the default base used in the imagemap files. Its value is overridden by a base directive within the imagemap file. If not present, the base defaults to http://servername/.

Parameter: *map | referer | URL*

- The *map* parameter is equivalent to the URL of the imagemap file itself. No coordinates are sent with this, so a list will be generated unless ImapMenu is set to none.
- The *referer* parameter is equivalent to the URL of the referring document. Defaults to http://servername/ if no Referer.
- The *URL* parameter can be relative or absolute. Relative URLs can contain '..' syntax and will be resolved relative to the base value . The base value itself will not be resolved according to the current value. The statement base mailto: will work properly, though.

ImapDefault

Module: mod_imagemap

Syntax: ImapDefault *error | nocontent | map | referer | URL*

Default: ImapDefault nocontent

Context: server config, virtual host, directory, .htaccess

Override: Indexes

Origin: Apache

Example: ImapDefault nocontent

The ImapDefault directive sets the default used in the imagemap files. Its value is overridden by a default directive within the imagemap file. If not present, the default action is nocontent, which means that a 204 No Content is sent to the client. In this case, the client should continue to display the original page.

Parameter: *error | nocontent | map | referer | URL*

- The *error* parameter fails with a 500 Server Error. Valid for all but base , but sort of useless for anything but default.
- The *nocontent* parameter sends a status code of 204 No Content, telling the client to keep the same page displayed. Valid for all but base.
- The *map* parameter is equivalent to the URL of the imagemap file itself. No coordinates are sent with this, so a list will be generated unless ImapMenu is set to none.
- The *referer* parameter is equivalent to the URL of the referring document. Defaults to http://servername/ if no Referer.
- The URL parameter can be relative or absolute. Relative URLs can contain '..' syntax and will be resolved relative to the base value . The base value itself will not be resolved according to the current value. However, the statement base mailto: will work properly.

ImapMenu

Module: mod_imagemap

Syntax: ImapMenu *none | formatted | semiformatted | unformatted*

Default: ImapMenu formatted

Context: server config, virtual host, directory, .htaccess

Override: Indexes

Origin: Apache

Example: ImapMenu formatted

The ImapMenu directive determines the action taken if an imagemap file is called without valid coordinates.

Parameter: *none | formatted | semiformatted | unformatted*

- The *none* parameter means no menu is generated and the default action is performed
- The *formatted* parameter formatted menu which is the simplest menu. Comments in the imagemap file are ignored. A level one header is printed, then an hrule, then the links, each on a separate line. The menu has a consistent, plain look close to that of a directory listing.
- The *semiformatted* parameter generates a semiformatted menu, comments are printed where they occur in the imagemap file. Blank lines are turned into HTML breaks. No header or hrule is printed, but otherwise the menu is the same as a formatted menu.

- The *unformatted* parameter generates an unformatted menu, comments are printed, blank lines are ignored. Nothing is printed that does not appear in the imagemap file. All breaks and headers must be included as comments in the imagemap file. This gives you the most flexibility over the appearance of your menu, but requires you to treat your map files as HTML instead of plaintext.

Additional information on Imagemap files

The lines in the imagemap files can have one of several formats:

```
directive value [x,y ...]
directive value "Menu text" [x,y ...]
directive value x,y ... "Menu text"
```

The directive is one of base, default, poly, circle, rect, or point. The value is an absolute or relative URL, or one of the special values listed below. The coordinates are x,y pairs separated by whitespace. The quoted text is used as the text of the link if a imagemap list is generated. Lines beginning with '#' are comments.

Imagemap File Directives

There are six directives allowed in the imagemap file. The directives can come in any order, but are processed in the order they are found in the imagemap file.

- base directive - Has the effect of <BASE HREF="value">. The non-absolute URLs of the map-file are taken relative to this value. The base directive overrides ImapBase as set in a .htaccess file or in the server configuration files. In the absence of an ImapBase configuration directive, base defaults to http://server_name/.
- base_uri - Is synonymous with base. Note that a trailing slash on the URL is significant.
- default directive - The action taken if the coordinates given do not fit any of the poly, circle or rect directives, and there are no point directives. Defaults to nocontent in the absence of an ImapDefault configuration setting, causing a status code of 204 No Content to be returned. The client should keep the same page displayed.
- poly directive - Takes three to one-hundred points, and is obeyed if the user selected coordinates fall within the polygon defined by these points.
- circle directive - Takes the center coordinates of a circle and a point on the circle. Is obeyed if the user selected point is with the circle.
- rect directive - Takes the coordinates of two opposing corners of a rectangle. Obeyed if the point selected is within this rectangle.
- point directive - Takes a single point. The point directive closest to the user selected point is obeyed if no other directives are satisfied. Note that default will not be followed if a point directive is present and valid coordinates are given.

Values

The values for each of the directives can be any of the following:

- URL - The URL can be relative or absolute. Relative URLs can contain '..' syntax and will be resolved relative to the base valu . The base value itself will not be resolved according to the current value. The statement base mailto: will work properly, though.
- Map - Equivalent to the URL of the imagemap file itself. No coordinates are sent with this, so a list will be generated unless ImapMenu is set to none.
- Menu - Synonymous with map.
- Referer - Equivalent to the URL of the referring document. Defaults to http://servername/ if no Referer:
- nocontent - Sends a status code of 204 No Content, telling the client to keep the same page displayed. Valid for all but base.
- Error - Fails with a 500 Server Error. Valid for all but base , but sort of useless for anything but default.

Coordinates

0,0 200,200 - A coordinate consists of an x and a y value separated by a comma. The coordinates are separated from each other by whitespace. To accommodate the way Lynx handles imagemaps, should a user select the coordinate 0,0, it is as if no coordinate had been selected.

Quoted Text

list Text - After the value or after the coordinates, the line optionally may contain text within double quotes. This string is used as the text for the link if a list is generated:

```
<A HREF="http://QIBM.com/">list text</A>
If quoted text is not present, the name of the link will be used as the text:
<A HREF="http://QIBM.com/">http://QIBM.com</A>
```

It is impossible to escape double quotes within this text.

Example Mapfile

```
#Comments are printed in a 'formatted' or 'semiformatted' list.
#And can contain html tags. <hr>
base referer
poly map "Could I have a list, please?" 0,0 0,10 10,10 10,0
rect .. 0,0 77,27 "the directory of the referer"
circle http://www.ibmdc.com/lincoln/feedback/ 195,0 305,27
rect another_file "in same directory as referer" 306,0 419,27
point http://www.ibmda.com/ 100,100
point http://www.ibmdb.com/ 200,200
rect mailto:me@ibm.com 100,150 200,0 "Bugs?"
```

Referencing your mapfile

```
<A HREF="/maps/imagemap1.map">
<IMG ISMAP SRC="/images/imagemap1.gif">
</A>
```

Module mod_include

Module mod_include supports directives for the IBM HTTP Server for i Web server.

Summary

The module mod_include provides for server-parsed html documents.

Note: A configuration change is required in order for mod_include to work correctly. Previously, mod_include was a handler, and the config file had a AddHandler server-parsed .htmls directive in order to define mod_include as a handler for extensions of .htmls. mod_include is now a filter. Thus, the AddHandler directive no longer applies. Directive AddOutputFilter must be used and associated with a file extension, much like directive AddHandler. For example:

```
AddOutputFilter INCLUDES .shtml
```

Enabling Server-Side Includes

Server-Side Includes (SSI) are implemented by the INCLUDES filter. If documents containing SSI directives are given the extension .shtml, the following directives makes the HTTP Server parse and assign the resulting documents as MIME type text/html. For example:

```
AddType text/html .shtml
AddOutputFilter INCLUDE .sthml
```

The following directive must be given for the directories containing the shtml files (typically in a <Directory> section, but this directive is also valid .htaccess files if AllowOverride Options is set). For example:

```
Options +Includes
```

See the "Options" on page 348 directive for more information.

Note: The IBM i system does not support XBitHack to enable server-side includes.

Directives

- "SSIETag" on page 478
- "SSIEndTag" on page 478
- "SSIErrorMsg" on page 479
- "SSILastModified " on page 479
- "SSILegacyExprParser" on page 480
- "SSIStartTag" on page 480
- "SSITimeFormat" on page 480
- "SSIUndefinedEcho" on page 481

SSIETag

Module: mod_include

Syntax: SSIETag *on/off*

Default: SSIETag *off*

Context: directory, .htaccess

Override: none

Origin: Apache

Example: SSIETag *on*

The SSIETag directive controls whether an ETags header are generated by the server.

Under normal circumstances, a file filtered by mod_include may contain elements that are either dynamically generated, or that may have changed independently of the original file. As a result, by default the server is asked not to generate an ETag header for the response by adding no-etag to the request notes.

The SSIETag directive suppresses this behaviour, and allows the server to generate an ETag header. This can be used to enable caching of the output. Note that a backend server or dynamic content generator may generate an ETag of its own, ignoring no-etag, and this ETag will be passed by mod_include regardless of the value of this setting.

Parameter: *on | off*

- The *on* parameter represents the existing ETags will be respected, and ETags generated by the server will be passed on in the response.
- The *off* parameter represents no-etag will be added to the request notes, and the server is asked not to generate an ETag. Where a server ignores the value of no-etag and generates an ETag anyway, the ETag will be respected.

SSIEndTag

Module: mod_include

Syntax: SSIEndTag *string*

Default: SSIEndTag "-->"

Context: server config, virtual host

Override: none

Origin: Apache

Example: SSIEndTag "-->"

The SSIEndTag directive changes the string that mod_include looks for to mark the end of a include command.

Parameter: *string*

- The *string* parameter represents the string that mod_include looks for to mark the end of a include command.

SSIErrorMsg

Module: mod_include

Syntax: SSIErrorMsg *string*

Default: SSIErrorMsg "[an error occurred while processing this directive]"

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Example: SSIErrorMsg "This is the default error message"

This SSIErrorMsg directive defines the default error message that is used when an error is encountered while processing SSI tags in a file. This configuration directive can be used instead of the **config errmsg** SSI tag.

Parameter: *string*

- The string parameter defines the default error message that is used when an error is encountered while processing SSI tags in a file. For example:

  ```
  SSIErrorMsg "This is the default error message"
  ```

SSILastModified

Module: mod_include

Syntax: SSILastModified *on|off*

Default: SSILastModified *off*

Context: directory, .htaccess

Override: none

Origin: Apache

Example: SSILastModified *on*

The SSILastModified directive controls whether Last-Modified headers are generated by the server.

Under normal circumstances, a file filtered by mod_include may contain elements that are either dynamically generated, or that may have changed independently of the original file. As a result, by default the Last-Modified header is stripped from the response.

The SSILastModified directive overrides this behaviour, and allows the Last-Modified header to be respected if already present, or set if the header is not already present. This can be used to enable caching of the output.

Parameter: *on | off*

- The *on* parameter represents the Last-Modified header will be respected if already present in a response, and added to the response if the response is a file and the header is missing.
- The *off* parameter represents the Last-Modified header will be stripped from responses.

SSILegacyExprParser

Module: mod_include

Syntax: SSILegacyExprParser *on|off*

Default: SSILegacyExprParser *off*

Context: directory, .htaccess

Override: none

Origin: Apache

Example: SSILegacyExprParser *on*

mod_include has been switched to the new ap_expr syntax for conditional expressions in #if flow control elements. The SSILegacyExprParser directive allows to switch to the old syntax which is compatible with HTTP server version 2.2.x and earlier.

Parameter: *on | off*

- The *on* parameter represents the old syntax conditional expressions is used.
- The *off* parameter represents the new ap_expr syntax conditional expressions is used (default behavior).

SSIStartTag

Module: mod_include

Syntax: SSIStartTag *string*

Default: SSIStartTab "<!--#"

Context: server config, virtual host

Override: none

Origin: Apache

Example: SSIStartTab "<!--#"

The SSIEndTag directive changes the string that mod_include looks for to mark an include element to process. You may want to use this option if you have 2 servers parsing the output of a file (each processing different commands, possibly at different times).

Parameter: *string*

- The *string* parameter represents the string that mod_include looks for to mark an include element to process.

Example 1

```
SSIStartTag "*!ENTITY!*%"
SSIEndTag "%>"
```

The example above, which specifies a matching SSIEndTag, allows you to use SSI directives as shown in the example below:

Example 2: SSI directives with alternate start and end tags

```
*!ENTITY!*%printenv %>
```

SSITimeFormat

Module: mod_include

Syntax: SSITimeFormat *strftime string*

Default: SSITimeFormat "%A, %d-%b-%Y %H:%M:%S %Z"

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Example: SSITimeFormat "%H:%M:%S %m-%d-%y"

The SSITimeFormat directive defines the default dates/times format that are returned to the browser while processing SSI tags. This configuration directive can be used instead of the config timefmt SSI tag.

Parameter: *strftime string*

- The *strftime string* parameter defines the default dates/times format that are returned to the browser while processing SSI tags. For example,

  ```
  SSITimeFormat "%H:%M:%S %m-%d-%y"
  ```

See "Server-side include commands for HTTP Server" on page 643 for a list of supported server-side include directives.

Note: HTTP Server does not support the %Z (time zone) format.

SSIUndefinedEcho

Module: mod_include

Syntax: SSIUndefinedEcho *string*

Default: SSIUndefinedEcho "(none)"

Context: server config, virtual host

Override: none

Origin: Apache

Example: SSIUndefinedEcho "The value on an SSI Echo request is not defined"

The SSIUndefinedEcho directive is used to define the default message that is used when an "echo" SSI tag is requesting a variable whose value has not been set.

Parameter: *string*

- The *string* parameter defines the default message that is used when an "echo" SSI tag is requesting a variable whose value has not been set.

Module mod_log_config

Module mod_log_config supports directives for the IBM HTTP Server for i Web server.

Summary

The module mod_log_config provides for logging of the requests made to the server, using the Common Log Format or a user-specified format. There are 3 directives that control log file creation in this module. The TransferLog, LogFormat, and CustomLog directives are used for log file creation. The TransferLog directive is used to create a log file. The LogFormat directive is used to set a custom format. The CustomLog directive to define a log file and format in one go. The TransferLog and CustomLog directives can be used multiple times in each server to cause each request to be logged to multiple files. The other directives in this module control log file archiving. See "Log formats for HTTP Server" on page 29 for information on the log file formats supported on HTTP Server.

Use with virtual hosts

If a "<VirtualHost> " on page 363 section does not contain any TransferLog or CustomLog directives, the logs defined for the main server will be used. If it does contain one or more of these directives, requests serviced by this virtual host will only be logged in the log files defined within its definition, not in any of the main server's log files. See the examples below.

Security considerations

See "Security tips for HTTP Server" on page 30 for details on why your security could be compromised if the directory where log files are stored is writable by anyone other than the user that starts the server.

Directives

- "CustomLog" on page 482
- "FRCACustomLog" on page 484
- "GlobalLog" on page 486
- "LogFormat" on page 487
- "TransferLog" on page 488

CustomLog

Module: mod_log_config

Syntax: CustomLog *file-or-pipe format-or-nickname* [*env=*[!]*environment-variable*|*expr=expression*]

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: The directive can be specified multiple times in the same configuration file. This is how one would generate multiple log files for the same server instance. For example, if you want an access log, agent log, and referer log, you could specify this directive three separate times with a different file and format. Log files created with CustomLog will be created with a CCSID of UTF-8 (1208) for Integrated File System.

Example: See below.

The CustomLog directive is used to log requests to the server. A log format is specified, and the logging can optionally be made conditional on request characteristics using environment variables.

Parameter One: *file-or-pipe*

- The *file-or-pipe* value indicates the filename to which log records should be written. This is used exactly like the argument to TransferLog; that is, it is either a full path or relative to the current server root. If a pipe is specified, it would be the name of a program that would receive the log file information on standard in. A pipe is specified by using the pipe character (|) followed by a path to the program name (no space between them). The program name can be either a path to a QSYS program object or an IFS path to a symbolic link. The symbolic link would then link to a QSYS program. Data written to the pipe from the server will be in the FSCCSID that is in use by the server.

Parameter Two: *format-or-nickname*

- If the value is *format*, it specifies a format for each line of the log file. The options available for the format are exactly the same as for the argument of the LogFormat directive. If the format includes any spaces (which it will in almost all cases) they should be enclosed in double quotes. If the argument is nickname, that nickname will tie back to a LogFormat directive with the same specified nickname.

  If the nickname "DDS" is specified, the server will create a DDS log file and each record will contain the format described by file QHTTPSVR/QAZHBLOG. When the second argument is "DDS", a path name to a file in the QSYS.LIB file system must also be specified. When "DDS" is specified, it is not necessary to use the Logformat directive to define the format. The nickname "DDS" is a special nickname that is predefined in HTTP Server.

Parameter Three: ***[env=[!]environment-variable] | expr=expression***

- The optional *env=* clause controls whether a particular request will be logged in the specified file or not. If the specified environment variable is set for the request (or is not set, in the case of a 'env=!name' clause), then the request will be logged. Alternatively, the condition can be expressed as arbitrary boolean expression. If the condition is not satisfied, the request will not be logged. References to HTTP headers in the expression will not cause the header names to be added to the Vary header. Environment variables can be set on a per-request basis using the mod_setenvif and/or mod_rewrite modules.

  There is no way to specify conditional logging for requests handled by Fast Response Cache Accelerator (FRCA). That is, environment variable conditions have no affect on the selection of FRCA requests that are logged. If FRCA is being used and a FRCACustomLog is not configured, all requests handled by FRCA will be logged in the CustomLog. The environment variable conditions continue to apply to requests not served from FRCA.

For example, if you want to record requests for all GIF images on your server in a separate log file, but not your main log, you can use:

```
SetEnvIf Request_URI \.gif$ fig-image
CustomLog gif-requests.log common env-gif-image
CustomLog nongif-requests.log common env=!gif-image
```

Examples of CustomLog:

```
# CustomLog with format nickname
LogFormat "%h %l %u %t \"%r\" %>s %b" common
CustomLog logs/access_log common

# CustomLog in QSYS with format nickname
LogFormat "%h %l %u %t \"%r\" %>s %b" common
CustomLog /QSYS.LIB/MYLIB.LIB/MYLOG.FILE common

# CustomLog with explicit format string
CustomLog logs/access_log "%h %l %u %t \"%r\" %>s %b"

# CustomLog with env specified
SetEnvIf Request_URI \.gif$ gif-image
CustomLog gif-requests.log common env=gif-image
CustomLog nongif-requests.log common env=!gif-image

# CustomLog defining a piped log
LogFormat "%h %l %u %t \"%r\" %>s %b" common
CustomLog |/QSYS.LIB/MYLIB.LIB/CUSTOMPIPE.PGM common
```

For IFS files, the user must create the directories that contain the log file and must grant the QTMHHTTP user write access to the directory. For QSYS.LIB logs, the user must create the library that contains the logs. The server will create the file and members in the specified library.

Note: It is recommended that HTTP Server create the QSYS.LIB log file. If the QSYS.LIB log file is created with a record length that is too small, log information may be truncated and lost. By default the server creates all QSYS.LIB log files with a record size of 512 or greater.

If the filename does not begin with a slash (/) then it is assumed to be relative to the ServerRoot. If "LogCycle" on page 341 is active and if the path ends without a (/) character, then the path is considered to be the complete log file name. In this case, the server will add an extension in the format QCYYMMDDHH, where these variables have the following values:

- **Q** is a default value that indicates to the server that this is a log file.
- **C** is the century indicator (0 for pre-2000, 1 for post-2000).
- **YY** is the year indicator.
- **MM** is the month indicator.
- **DD** is the day indicator.
- **HH** is the hour indicator (00 = 00:00 (midnight), 23=23:00).

  Note: This variable will not be generated for filesystem QDLS

For example, a path of "/logs/errorlog" results in a file such as "/logs/errorlog.Q100030300".

If "LogCycle" on page 341 is active and if the path ends with a (/) character, then the path is considered to be the directory that will contain the log file. In this case, the server will create log files named in the QCYYMMDDHH format. For example, a path of "/logs/errorlog/" results in a file such as "/logs/errorlog/Q100030300". If "LogCycle" on page 341 is active and the logfile is in the QSYS filesystem, the name must end in the file component of the IFS path. Example:

```
# Config file directives
LogCycle Daily
LogFormat "%h %l %u %t \"%r\" %>s %b" common
CustomLog /QSYS.LIB/MYLIB.LIB/MYLOGS.FILE common
```

The resulting daily log rollovers will be of the form /QSYS.LIB/MYLIB.LIB/MYLOGS.FILE/Qcyymmddhh.MBR.

"LogCycle" on page 341 Hourly is not valid if the logfile is in the QDLS filesystem as that filesystem only supports 8 character file names and 3 character extensions. For QDLS, the path given on the CustomLog directive must be a directory. For example

```
CustomLog /QDLS/MYPATH/LOGS/ common
```

If "LogCycle" on page 341 is not active, no special naming is used. The name of the log file given on the CustomLog directive is used as given for the name of the log file. If the name is a directory, a default name of http.log will be concatenated to the directory name to create the log file. For example:

```
# Config file directives
LogCycle Off
LogFormat "%h %l %u %t \"%r\" %>s %b" common
CustomLog /logs/path/ common
```

The resulting log file will be /logs/path/http.log.

Security: See "Security tips for HTTP Server" on page 30 for details on why your security could be compromised if the directory where log files are stored is writable by anyone other than the user that starts the server. If a program is used, then it will be run under the user who started httpd. This will be root if the server was started by root (be sure that the program is secure).

FRCACustomLog

Module: mod_log_config

Syntax: FRCACustomLog *file-or-pipe file format-or-nickname*

Default: none

Context: server config

Override: none

Origin: IBM

Usage Considerations: The directive can be specified multiple times in the same configuration file. This is how one would generate multiple log files for the same server instance. For example, if you want an access log, agent log, and referer log, you could specify this directive three separate times with a different file and format. Log files created with FRCACustomLog will be created with a CCSID of UTF-8 (1208) for Integrated File System.

Example: See below.

The FRCACustomLog directive is used to log FRCA requests to the server.

Parameter One: *file-or-pipe file*

- The *file-or-pipe* file value indicates the filename to which log records should be written. It is either a full path or relative to the current server root. If a pipe is specified, it would be the name of a program that would receive the log file information on standard in. A pipe is specified by using the pipe character "|" followed by a path to the program name (no space between them). The program name can be either a path to a QSYS program object or an IFS path to a symbolic link. The symbolic link would then link to a QSYS program. Note that data written to the pipe from the server will be in the FSCCSID that is in use by the server.

Parameter Two: ***format-or-nickname***

- The format-or-nickname argument specifies a format or nickname for each line of the log file . If it is a format, it specifies a format for each line of the log file. The options available for the format are exactly the same as for the argument of the LogFormat directive. If the format includes any spaces (which it will in almost all cases) they should be enclosed in double quotes. If the argument is a nickname, that nickname will tie back to a LogFormat directive with the same specified nickname.

  If the nickname "DDS" is specified, the server will create a DDS log file and each record will contain the format described by file QHTTPSVR/QAZHBLOG. When the second argument is "DDS" a path name to a file in the QSYS.LIB file system must also be specified. When "DDS" is specified, it is not necessary to use the Logformat directive to define the format. The nickname "DDS" is a special nickname that is pre-defined in the server. See directive Logformat for additional considerations for the DDS nickname.

Examples of FRCACustomLog:

```
# FRCACustomLog with format nickname
LogFormat "%h %l %u %t \"%r\" %>s %b" common
FRCACustomLog logs/FRCAaccess_log common

# FRCACustomLog in QSYS with format nickname
LogFormat "%h %l %u %t \"%r\" %>s %b" common
FRCACustomLog /QSYS.LIB/MYLIB.LIB/MYFRCALOG.FILE common

# CustomLog in QSYS with DDS format
FRCACustomLog /QSYS.LIB/MYLIB.LIB/FRCADDSLOG.FILE DDS

# FRCACustomLog with explicit format string
FRCACustomLog logs/FRCAaccess_log "%h %l %u %t \"%r\" %>s %b"

# FRCACustomLog defining a piped log
LogFormat "%h %l %u %t \"%r\" %>s %b" common
FRCACustomLog |/QSYS.LIB/MYLIB.LIB/PIPELOG.PGM common
```

For IFS log files and QSYS log files, the user must create the directories that contain the log file and must grant the QTMHHTTP user write access to the directory. For QSYS.LIB logs, the user must create the library that contains the logs. The server will create the file and members in the specified library.

Note: It is recommended that HTTP Server create the QSYS.LIB log file. If the QSYS.LIB log file is created with a record length that is too small, log information may be truncated and lost. By default the server creates all QSYS.LIB log files with a record size of 512 or greater.

If the filename does not begin with a slash (/) then it is assumed to be relative to the ServerRoot. If "LogCycle" on page 341 is active and if the path ends without a (/) character, then the path is considered to be the complete log file name. In this case, the server will add an extension in the format QCYYMMDDHH, where these variables have the following values:

- **Q** is a default value that indicates to the server that this is a log file.
- **C** is the century indicator (0 for pre-2000, 1 for post-2000).
- **YY** is the year indicator.
- **MM** is the month indicator.
- **DD** is the day indicator.
- **HH** is the hour indicator (00 = 00:00 (midnight), 23=23:00).

  Note: this variable will not be generated for filesystem QDLS

  For example, a path of "/logs/errorlog" results in a file such as "/logs/errorlog.Q100030300".

If “LogCycle” on page 341 is active and if the path ends with a (/) character, then the path is considered to be the directory that will contain the log file. In this case, the server will create log files named in the QCYYMMDDHH format. For example, a path of "/logs/errorlog/" results in a file such as "/logs/errorlog/Q100030300". If “LogCycle” on page 341 is active and the logfile is in the QSYS filesystem, the name must end in the file component of the IFS path. Example:

```
# Config file directives
LogCycle Daily
LogFormat "%h %l %u %t \"%r\" %>s %b" common
FRCACustomLog /QSYS.LIB/MYLIB.LIB/MYLOGS.FILE common
```

The resulting daily log rollovers will be of the form /QSYS.LIB/MYLIB.LIB/MYLOGS.FILE/Qcyymmddhh.MBR.

“LogCycle” on page 341 Hourly is not valid if the logfile is in the QDLS filesystem as that filesystem only supports 8 character file names and 3 character extensions. Also for QDLS, the path given on the FRCACustomLog directive must be a directory. For example:

```
FRCACustomLog /QDLS/MYPATH/LOGS/ common
```

The resulting log files would be /QDLS/MYPATH/LOGS/Qcyymmdd.

If “LogCycle” on page 341 is not active, no special naming is used. The name of the log file given on the FRCACustomLog directive is used as given for the name of the log file. If the name is a directory, a default name of http.log will be concatenated to the directory name to create the log file. For example:

```
# Config file directives
LogCycle Off
LogFormat "%h %l %u %t \"%r\" %>s %b" common
CustomLog /logs/path/ common
```

The resulting log file will be /logs/path/http.log.

If FRCACustomLog is in the configuration, FRCA requests will be logged to the file specified on the FRCACustomLog directive. All non-FRCA related requests will be logged to any other custom logs configured with the CustomLog directive. Example:

```
LogFormat "%h %l %u %t \"%r\" %>s %b" common
CustomLog logs/access_log common
FRCACustomLog logs/FRCAaccess_log common
```

All FRCA requests will be logged to logs/FRCAaccess_log and all non-FRCA requests will be logged to logs/access_log. If FRCACustomLog is not specified in the configuration of the server instance, ALL requests are logged to any custom logs configured with CustomLog including FRCA requests.

GlobalLog

Module: mod_log_config

Syntax: GlobalLog *file|pipe format|nickname [env=[!]environment-variable| expr=expression]*

Default: none

Context: server config

Override: none

Origin: Apache

Example:

```
# GlobalLog with format nickname
LogFormat "%h %l %u %t \"%r\" %>s %b" common
GlobalLog logs/access_log common
```

```
# GlobalLog in QSYS with format nickname
LogFormat "%h %l %u %t \"%r\" %>s %b" common
GlobalLog /QSYS.LIB/MYLIB.LIB/MYLOG.FILE common
```

```
# GlobalLog in QSYS with DDS format
GlobalLog /QSYS.LIB/MYLIB.LIB/DDSLOG.FILE DDS
```

```
# GlobalLog with explicit format string
GlobalLog logs/access_log "%h %l %u %t \"%r\" %>s %b"
```

```
# GlobalLog with env specified
SetEnvIf Request_URI \.gif$ gif-image
GlobalLog gif-requests.log common env=gif-image
GlobalLog nongif-requests.log common env=!gif-image
```

```
# GlobalLog defining a piped log
LogFormat "%h %l %u %t \"%r\" %>s %b" common
GlobalLog |/QSYS.LIB/MYLIB.LIB/CUSTOMPIPE.PGM common
```

The GlobalLog directive defines a log shared by the main server configuration and all defined virtual hosts.

The GlobalLog directive is identical to the CustomLog directive, apart from the following differences:

- GlobalLog is not valid in virtual host context.
- GlobalLog is used by virtual hosts that define their own CustomLog, unlike a globally specified CustomLog.

LogFormat

Module: mod_log_config

Syntax: LogFormat *format [nickname]*

Default: LogFormat "%h %l %u %t \"%r\" %s %b"

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: The directive can be specified multiple times in the same configuration file. This is how one would generate multiple log file formats. For example, if you want an access log, agent log, and referer log, you could specify this directive three separate times to define the formats of your log files.

Example: LogFormat "%h %l %u %t \"%r\" %s %b \"%{Referer}i\" \"%{User-agent}i\""

The LogFormat directive sets the format of the default log file named by the TransferLog directive. See the section on Custom Log Formats for details on the format arguments. If you include a nickname for the format on the directive line, you can use that nickname in FRCACutomLog and CustomLog directives rather than repeating the entire format string.

Parameter One: *format*

- The *format* parameter sets the format of the default log file named by the TransferLog directive. See the section on Custom Log Formats for details on the format arguments.

Parameter Two: *[nickname]*

- The optional *nickname* parameter allows you to include a nickname for the format on the directive line.

A LogFormat directive that defines a nickname does nothing else. That is, it only defines the nickname, it doesn't actually apply the format and make it the default.

If LogFormat is used without a nickname, then any TransferLog directive that does not specify a format will use the format defined with this directive, if it happened to be the most recent LogFormat directive in the configuration file. If another LogFormat directive (without a nickname) is placed in the configuration file, then that format becomes the new log format to be used on subsequent TransferLog directives.

The nickname "DDS" is a log format reserved for use in configuring data description specification (DDS) log files. The server will automatically recognize this format and create a DDS log file based on QHTTPSVR/QAZHBLOG. The "DDS" nickname should not be used when defining a new LogFormat. A LogFormat directive with a nickname of "DDS" will be ignored by the server. The server will assume a DDS file in QSYS.LIB when the "DDS" nickname appears on the CustomLog or FRCACustomLog directives.

See "Log formats for HTTP Server" on page 29 for information on the log file formats supported on HTTP Server.

TransferLog

Module: mod_log_config

Syntax: TransferLog *file-or-pipe*

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: The directive can be specified multiple times in the same configuration file. This is how one would generate multiple log files for the same server instance. For example, if you want an access log, agent log, and referer log, you could specify this directive three separate times with a different file and most recent LogFormat. Log files created with TransferLog will be created with a CCSID of UTF-8 (1208) for Integrated File System.

Example: TransferLog logs/access_log

The TransferLog directive adds a log file in the format defined by the most recent LogFormat directive, or Common Log Format. This is only if no other default format has been specified.

Parameter: *file-or-pipe*

- The *file-or-pipe* parameter specifies either a filename relative to the ServerRoot or a program to pipe to. Use the pipe symbol (|) followed by a program to receive the log information in its standard input. Data written to the pipe from the server will be in UTF-8 (1208) in use by the server. The new program will not be started for a VirtualHost if it inherits the TransferLog from the main server.

Examples of TransferLog:

```
# IFS example
LogFormat "%h %l %u %t \"%r\" %>s %b \"%{Referer}i\" \"%{User-agent}i\""
TransferLog logs/access_log

# QSYS example
LogFormat "%h %l %u %t \"%r\" %>s %b"
TransferLog /QSYS.LIB/MYLIB.LIB/MYLOGS.FILE

# Piped log example
LogFormat "%h %l %u %t \"%r\" %>s %b \"%{Referer}i\" \"%{User-agent}i\""
TransferLog |/QSYS.LIB/MYLIB.LIB/TRANSPIPE.PGM
```

For IFS files, the user must create the directories that contain the log file and must grant the QTMHHTTP user write access to the directory. For QSYS.LIB logs, the user must create the library that contains the logs. The server will create the file and members in the specified library. If the filename does not begin with a slash (/) then it is assumed to be relative to the ServerRoot. If LogCycle is active and if the path ends without a (/) character, then the path is considered to be the complete log file name. In this case, the server will add an extension in the format QCYYMMDDHH, where these variables have the following values:

- **Q** is a default value that indicates to the server that this is a log file.
- **C** is the century indicator (0 for pre-2000, 1 for post-2000).
- **YY** is the year indicator.
- **MM** is the month indicator.
- **DD** is the day indicator.
- **HH** is the hour indicator (00 = 00:00 (midnight), 23=23:00).

  Note: this variable will not be generated for filesystem QDLS

  For example, a path of "/logs/errorlog" results in a file such as "/logs/errorlog.Q100030300".

If "LogCycle" on page 341 is active and if the path ends with a (/) character, then the path is considered to be the directory that will contain the log file. In this case, the server will create log files named in the QCYYMMDDHH format. For example, a path of "/logs/errorlog/" results in a file such as "/logs/errorlog/Q100030300". If "LogCycle" on page 341 is active and the logfile is in the QSYS filesystem, the name must end in the file component of the IFS path. For example:

```
# Config file directives
LogCycle Daily
LogFormat "%h %l %u %t \"%r\" %>s %b" common
TransferLog /QSYS.LIB/MYLIB.LIB/MYLOGS.FILE
```

The resulting daily log rollovers will be of the form /QSYS.LIB/MYLIB.LIB/MYLOGS.FILE/Qcyymmddhh.MBR.

"LogCycle" on page 341 Hourly is not valid if the logfile is in the QDLS filesystem as that filesystem only supports 8 character file names and 3 character extensions. If "LogCycle" on page 341 is not active, no special naming is used. The name of the log file given on the TransferLog directive is used as given for the name of the log file. If the name is a directory, a default name of http.log will be concatenated to the directory name to create the log file. For example:

```
# Config file directives
LogCycle Off
LogFormat "%h %l %u %t \"%r\" %>s %b" common
CustomLog /logs/path/ common
```

The resulting log file will be /logs/path/http.log.

Note: See "Security tips for HTTP Server" on page 30 for details on why your security could be compromised if the directory where log files are stored is writable by anyone other than the user that starts the server. If a program is used, then it will be run under the user who started httpd. This will be root if the server was started by root (be sure that the program is secure).

Note: When possible, you should use "CustomLog" on page 482 in place of TransferLog.

Module mod_log_io

Module mod_log_io supports logging formats for the IBM HTTP Server for i Web server.

Summary

This module provides the logging of input and output number of bytes received and sent per request. The numbers reflect the actual bytes received on the network, which then takes into account the headers and bodies of requests and responses. The counting is done before SSL/TLS on input and after SSL/TLS on output. The numbers will correctly reflect any changes made by encryption.

This module requires Module mod_log_config, and is loaded by default. No LoadModule statement is required.

This module adds two new logging formats. The characteristics of the request itself are logged by placing "%" directives in the format string, which are replaced in the log file by the values as follows:
`Format String Description %...I`

Bytes received, including request and headers, cannot be zero (%...0). Bytes sent, including headers, cannot be zero.

Format String Description

String	Description
%...I	Bytes received, including request and headers, cannot be zero.
%...O	Bytes sent, including headers, cannot be zero.

Example: Combined I/O log format

```
"%h %l %u %t \"%r\" %>s %b \"%{Referer}i\" \"%{User-agent}i\" %I %O"
```

Module mod_mime

Module mod_mime supports directives for the IBM HTTP Server for i Web server.

Summary

The module mod_mime associates the request filename's extensions (for example, .html) with the file's behavior (handlers and filters) and content (mime-type, language, character set and encoding). This module is used to determine various bits of "meta information" with files by their filename extensions. This information relates to the content of the document to its mime-type, language, character set and encoding. This information is sent to the browser, and participates in content negotiation. The user's preferences are respected when choosing one of several possible files to serve. In addition, a handler can be set for a document that determines how the document will be processed within the server. See mod_negotiation for more information regarding content negotiation.

The directives AddCharset, AddClient, AddEncoding, AddHandler, AddLanguage, and AddType are all used to map file extensions onto the meta-information for that file. Respectively they set the character set, content-encoding, handler, content-language, browser, and MIME-type (content-type) of documents.

In addition, mod_mime may define the document handler that controls which module or script will serve the document. With the introduction of filters, mod_mime can also define the filters that the the content should be processed through (for example, the Includes output filter for server side scripting) and what filters the client request and POST content should be processed through (the input filters).

The directives AddHandler, AddOutputFilter, and AddInputFilter control the modules or scripts that serve the document. The MultiviewsMatch directive allows mod_negotiation to consider these file extensions when testing Multiviews matches.

The directive TypesConfig is used to specify a file that also maps extensions onto MIME types. Most administrators use the provided mime.types file that associates common filename extensions with IANA registered content types.

The core directives ForceType and SetHandler are used to associate all the files in a given container (<location>, <directory>, or <files>) with a particular MIME-type or handler. These settings override any filename extension mappings defined in mod_mime.

Note that changing the type or encoding of a file does not change the value of the Last-Modified header. Therefore, previously cached copies may still be used by a client or proxy, with the previous headers. If you change the meta-information (language, content type, character set or encoding) you may need to update affected files (updating their last modified date) to ensure that all visitors are receiving the corrected content headers.

Files with Multiple Extensions

Files can have more than one extension, and the order of the extensions is normally irrelevant. For example, if the file welcome.html.fr maps onto content type text/html and then language French, the file welcome.fr.html will map onto exactly the same information. The only exception to this is if an extension is given which HTTP Server does not handle. In this case it will forget about any information it obtained from extensions to the left of the unknown extension. For example, if the extensions fr and html are mapped to the appropriate language and type, but extension xxx is not assigned to anything, then the file welcome.fr.xxx.html will be associated with content-type text/html but no language.

If more than one extension is given that maps onto the same type of meta-information, then the one to the right will be used. For example, if ".gif" maps to the MIME-type image/gif and ".html" maps to the MIME-type text/html, then the file welcome.gif.html will be associated with the MIME-type "text/html".

When a file with multiple extensions gets associated with both a MIME-type and a handler be careful. This will usually result in the module associating a request with the handler. For example, if the .imap extension is mapped to the handler "imap-file" (from mod_imap) and the .html extension is mapped to the MIME-type "text/html", then the file world.imap.html will be associated with both the "imap-file" handler and "text/html" MIME-type. When it is processed, the imap-file handler will be used, and it will be treated as a mod_imap imagemap file.

Directives

- "AddCharset" on page 491
- "AddClient" on page 492
- "AddEncoding" on page 492
- "AddHandler" on page 493
- "AddInputFilter" on page 493
- "AddLanguage" on page 494
- "AddOutputFilter" on page 495
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- "DefaultLanguage" on page 496
- "ModMimeUsePathInfo" on page 497
- "MultiviewsMatch" on page 497
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- "RemoveLanguage" on page 500
- "RemoveOutputFilter" on page 501
- "RemoveType" on page 501
- "SuffixCaseSense" on page 502
- "TypesConfig" on page 502

AddCharset

Module: mod_mime

Syntax: AddCharset *charset extension [extension...]*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: AddCharset ISO-2022-JP .jis

The AddCharset directive maps the given filename extensions to the specified content charset. Charset is the MIME charset parameter of filenames containing extension. This mapping is added to any already in force, overriding any mappings that already exist for the same extension.

This directive is useful for informing the client about the character encoding of the document so it can be interpreted and displayed appropriately. It also used for content negotiation. Content Negotiation is where the server returns one from several documents based on the client's charset preference.

Parameter One: *charset*

- The *charset* parameter value is any valid MIME character set.

Parameter Two: *extension*

- The *extension* parameter value is any character string that is a valid file extension.

See "Module mod_negotiation" on page 503 for more information.

AddClient

Module: mod_mime

Syntax: AddClient *user-agent extension*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: IBM

Example: AddClient Mozilla/2.0 .moz

Example: AddClient IBM* .ibm

The AddClient directive binds files with a particular extension to the type and version of the browser (user-agent) that is sending the request. This is often referred to as Automatic Browser Detection. All HTTP requests contain a User-Agent header that identifies the client browser. Based on this User-Agent header, the server can respond with a specific version of the resource (with the extension specified) that is especially appropriate for the client browser.

Parameter One: *user-agent*

- The *user-agent* parameter value matched in the User-Agent header of the incoming request. This is case-sensitive. The asterisk may be used as a wildcard character.

Parameter Two: *extension*

- The *extension* parameter value is the file extension that should be associated with the browser. Wildcards cannot be used.

AddEncoding

Module: mod_mime

Syntax: AddEncoding *MIME-enc extension [extension...]*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: AddEncoding x-gzip gz

The AddEncoding directive maps the given filename extensions to the specified encoding type. MIME-enc is the MIME encoding that is used for documents containing the extension. This mapping is added to any already in force, overriding any mappings that already exist for the same extension.

Old clients expect x-gzip and x-compress, however the standard dictates that they're equivalent to gzip and compress respectively. HTTP Server does content encoding comparisons by ignoring any leading x-. When responding with an encoding the HTTP Server will use whatever form (for example., x-QIBM or QIBM) the client requested. If the client didn't specifically request a particular form, the server will use the form given by the AddEncoding directive. In conclusion you should always use x-gzip and x-compress for these two specific encodings. More recent encodings, such as deflate should be specified without the x-.

Parameter One: *MIME-enc*

- The *MIME-enc* parameter value should be set to a content-encoding supported by HTTP/1.1. Currently, these values are 'gzip', 'compress' and 'deflate'.

Parameter Two: *extension*

- The *extension* parameter value is any string that is a valid file extension.

AddHandler

Module: mod_mime

Syntax: AddHandler *handler-name extension [extension...]*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: AddHandler cgi-script cgi

The AddHandler directive maps the filename extensions to handler handler-name. This mapping is added to any already in force, overriding any mappings that already exist for the same extension. For example, to activate CGI scripts with the file extension ".cgi", you might use:

```
AddHandler cgi-script cgi
```

Once this has been put into your configuration file, any file containing the ".cgi" extension will be treated as a CGI program.

Parameter One: *handler-name*

- The *handler-name* parameter value is the name of the handler (program) that will process the request.

Parameter Two: *extension*

- The *extension* parameter value is any character string that is a valid file extension.

AddHandler can also be used to configure the use of Server Side Includes. This is done with the following directive combination:

```
AddType text/html .shtml
AddHandler server-parsed .shtml
```

See "Handler for HTTP Server" on page 196 for more information.

AddInputFilter

Module: mod_mime

Syntax: AddInputFilter *filter extension [extension ...]*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Example: AddInputFilter gzip .zip

The AddInputFilter directive maps the filename extensions extension to the filters that will process client requests and POST input (when they are received by the server). This is in addition to any filters defined elsewhere, including the SetInputFilter directive. This mapping is merged over any already in force, overriding any mappings that already exist for the same extension.

If SuffixCaseSense is on (default is off), then the extension argument is case-insensitive. The extension can be specified with or without a leading dot.

Parameter One: *filter*

- The *filter* parameter value is the process that is applied to data that is sent or received by the server.

Parameter Two: *extension*

- The *extension* parameter value is any character string that is a valid file extension.

Example

```
<Directory/www/data/>
AddInputFilter gzip Zip
</Directory>
```

See the Apache Software Foundation filter documentation for more information.

AddLanguage

Module: mod_mime

Syntax: AddLanguage *MIME-lang extension [extension...]*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: AddLanguage fr .fr

The AddLanguage directive maps the given filename extensions to the specified content language. MIME-lang is the MIME language of filenames containing extension. This mapping is added to any already in force, overriding any mappings that already exist for the same extension.

Even though the content language is reported to the client, the browser is unlikely to use this information. The AddLanguage directive is more useful for content negotiation, where the server returns one from several documents based on the client's language preference.

If multiple language assignments are made for the same extension, the last one encountered is the one that is used.

Parameter One: *MIME-lang*

- The *MIME-lang* parameter value is any valid MIME-language designation.

Parameter Two: *value*

- The *extension* parameter value is any character string that is a valid file extension.

See "Module mod_negotiation" on page 503 for more information.

AddOutputFilter

Module: mod_mime

Syntax: AddOutputFilter *filter extension [extension ...]*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Example: AddOutputFilter INCLUDES shtml

The AddOutputFilter directive maps the filename extensions extension to the filters that process responses from the server (before they are sent to the client). This is in addition to any filters defined elsewhere, including the SetOutputFilter directive. This mapping is merged over any already in force, overriding any mappings that already exist for the same extension.

For example, the following configuration will process all .shtml files for server-side includes.

```
AddOutputFilter INCLUDES shtml
```

If SuffixCaseSense is on (default is off), then the extension argument is case-insensitive. The extension can be specified with or without a leading dot.

Parameter One: *filter*

- The *filter* parameter value is the process that is applied to data that is sent or received by the server.

Parameter Two: *extension*

- The *extension* parameter value is any character string that is a valid file extension.

See the Apache Software Foundation filter documentation for more information.

AddType

Module: mod_mime

Syntax: AddType *MIME-type extension [extension...]*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: AddType image/gif .gif

Example: AddType image/jpeg jpeg jpg jpe

The AddType directive maps the given filename extensions onto the specified content type. MIME-type is the MIME type to use for filenames containing extension. This mapping is added to any already in force, overriding any mappings that already exist for the same extension. This directive can be used to add mappings not listed in the MIME types file. It is recommended that new MIME types be added using the AddType directive rather than changing the TypesConfig file.

Parameter One: *MIME-type*

- The *MIME-type* parameter value is any valid MIME-type.

Parameter Two: *extension*

- The *extension* parameter value is any character string that is a valid file extension. The extension parameter is case-insensitive and can be specified with or without a leading dot. File names may have multiple extensions and the extension argument will be compared against each of them.

A similar effect to mod_negotiation's LanguagePriority can be achieved by qualifying a *media-type* with qs:

Example

AddType application/rss+xml;qs=0.8 .xml

This is useful in situations, *e.g.* when a client requesting Accept: */* can not actually processes the content returned by the server.

This directive primarily configures the content types generated for static files served out of the file system. For resources other than static files, where the generator of the response typically specifies a Content-Type, this directive has no effect.

Notes:

If no handler is explicitly set for a request, the specified content type will also be used as the handler name.

When explicit directives such as "SetHandler" on page 359 or "AddHandler" on page 493 do not apply to the current request, the internal handler name normally set by those directives is instead set to the content type specified by this directive.

This is a historical behavior that may be used by some third-party modules (such as mod_php) for taking responsibility for the matching request.

Configurations that rely on such "synthetic" types should be avoided. Additionally, configurations that restrict access to "SetHandler" on page 359 or "AddHandler" on page 493 should restrict access to this directive as well.

DefaultLanguage

Module: mod_mime

Syntax: DefaultLanguage *MIME-lang*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: DefaultLanguage en-US

The DefaultLanguage directive tells HTTP Server that all files in the directive's scope (for example, all files covered by the current <Directory> container) that don't have an explicit language extension configured by AddLanguage should be considered to be in the specified MIME-lang language. This allows entire directories to be marked as containing Dutch content, for instance, without having to rename each file. Note that unlike using extensions to specify languages, DefaultLanguage can only specify a single language.

If no DefaultLanguage directive is in force, and a file does not have any language extensions configured by AddLanguage, then that file will be considered to have no language attribute.

Parameter: *MIME-lang*

- The *MIME-lang*parameter value is any valid MIME-language designation.

See “Module mod_negotiation” on page 503 for more information.

ModMimeUsePathInfo

Module: mod_mime

Syntax: ModMimeUsePathInfo *on | off*

Default: ModMimeUsePathInfo off

Context: directory

Override: none

Origin: Apache

Example: ModMimeUsePathInfo on

The ModMimeUsePathInfo directive is used to combine the filename with the path_info URL component to apply mod_mime's directives to the request. The default value is off, meaning the path_info component is ignored. This directive is recommended when you have a virtual filesystem.

For example, if ModMimeUsePathInfo is set to on, then a request for /bar/file.shtml where /bar is a Location, mod_mime will treat the incoming request as /bar/file.shtml and directives like AddOutputFilter INCLUDES .shtml will add the INCLUDES filter to the request. If ModMimeUsePathInfo is not set, the INCLUDES filter will not be added.

Parameter: *on | off*

- The *on* parameter value specifies that filenames will be combines with path_info URL components.
- The *off* parameter value specifies that the path_info component is ignored.

Example

```
ModMimeUsePathInfo on
```

If you have a request for /myfile/more.shtml where myfile is an existing file containing SSI, and AcceptPathInfo is set on in order to accept the actual file "myfile" as the requested file, and ModMimeUsePathInfo is on, mod_mime will treat the incoming request as SSI and directives like AddOutputFilter INCLUDES .shtml will add the INCLUDES filter to the request. If ModMimeUsePathInfo is not set, the INCLUDES filter will not be added. When ModMimeUsePathInfo is set, the trailing path name can be used to determine the content type of the existing file.

MultiviewsMatch

Module: mod_mime

Syntax: MultiviewsMatch *NegotiatedOnly | Handlers | Filters | Any*

Default: MultiviewsMatch NegotiatedOnly

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: MultiviewsMatch Handlers

Example: MultiviewsMatch Handlers Filters

The MultiviewsMatch directive permits three different behaviors for mod_negotiation's Multiviews feature. Multiviews allows a request for a file (index.html for example) to match any negotiated extensions following the base request (for example, index.html.en, index.html.fr, or index.html.gz).

Parameter: *NegotiatedOnly | Handlers | Filters | Any*

- The *NegotiatedOnly* parameter value specifies that every extension following the base name must correlate to a recognized mod_mime extension for content negotiation (for example, Charset, Content-Type, Language, or Encoding). This is the strictest implementation with the fewest unexpected side effects, and is the default behavior.
- The *Handlers* and *Filters* parameter value set the MultiviewsMatch directive to either Handlers, Filters, or both option keywords. If all other factors are equal, the smallest file will be served (for example, in deciding between index.html.cgi of 500 characters and index.html.pl of 1000 bytes, the .cgi file would be served). Users of .asis files might prefer to use the Handler option, if .asis files are associated with the asis-handler.
- The *Any* parameter value specifies that any extensions to match, even if mod_mime doesn't recognize the extension. This was the behavior in Apache 1.3, and can cause unpredictable results, such as serving .old or .bak files the webmaster never expected to be served.

RemoveCharset

Module: mod_mime

Syntax: RemoveCharset *extension [extension...]*

Default: none

Context: virtual host, directory, .htaccess

Override: none

Origin: Apache

Example: RemoveCharset .ext

The RemoveCharset directive removes any character set associations for files with the given extensions. This allows .htaccess files in subdirectories to undo any associations inherited from parent directories or the server configuration files.

Parameter: *extension*

- The *extension* parameter value is any character string that is a valid file extension.

Note: If SuffixCaseSense is on (default is off), then the extension argument is case-insensitive. The extension can be specified with or without a leading dot.

RemoveClient

Module: mod_mime

Syntax: RemoveClient *extension [extension...]*

Default: none

Context: virtual host, directory, .htaccess

Override: none

Origin: IBM

Example: RemoveClient .moz

The RemoveClient directive removes any client (browser) associations for files with the given extensions. This allows .htaccess files in subdirectories to undo any associations inherited from parent directories or the server config files.

Parameter: *extension*

- The *extension* parameter value is any character string that is a valid file extension.

Example

```
/work/.htaccess:
RemoveClient .moz
```

If SuffixCaseSense is on (default is off), then the extension argument is case-insensitive. The extension can be specified with or without a leading dot. This removes any special handling of .moz files in the / work/ directory (and any subdirectories), thereby disabling automatic browser detection for files in this directory. The extension argument is case-insensitive, and can be specified with or without a leading dot.

Note: RemoveClient directives are processed after any "AddClient" on page 492 directives, so it is possible they may undo the effects of the latter if both occur within the same directory configuration.

RemoveEncoding

Module: mod_mime

Syntax: RemoveEncoding *extension [extension...]*

Default: none

Context: virtual host, directory, .htaccess

Override: none

Origin: Apache

Example: RemoveEncoding .gz

The RemoveEncoding directive removes any encoding associations for files with the given extensions. This allows .htaccess files in subdirectories to undo any associations inherited from parent directories or the server config files.

Parameter: *extension*

- The *extension* parameter value is any character string that is a valid file extension.

Example

```
/work/.htaccess:
AddEncoding x-gzip .gz
AddType text/plain .asc
<Files *.gz.asc>
     RemoveEncoding .gz
</Files>
```

The example will cause work.gz to be marked as encoded with the gzip method, but cause work.gz.asc to be marked as an unencoded plaintext file.

Note: RemoveEncoding directives are processed after any AddEncoding directives, so it is possible they may undo the effects of the latter if both occur within the same directory configuration. If SuffixCaseSense is on (default is off), then the extension argument is case-insensitive. The extension can be specified with or without a leading dot.

RemoveHandler

Module: mod_mime

Syntax: RemoveHandler *extension [extension...]*

Default: none

Context: virtual host, directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: RemoveHandler .html

Example: example

The RemoveHandler directive removes any handler associations for files with the given extensions. This allows .htaccess files in subdirectories to undo any associations inherited from parent directories or the server config files.

Parameter: *extension*

- The *extension* parameter value is any character string that is a valid file extension.

Example

```
/QIBM/.htaccess: AddHandler server-parsed .html
/QIBM/bar/.htaccess: RemoveHandler .html
```

The example has the effect of returning .html files in the /QIBM/bar directory to being treated as normal files, rather than as candidates for parsing.

RemoveInputFilter

Module: mod_mime

Syntax: RemoveInputFilter *extension [extension ...]*

Default: none

Context: virtual host, directory, .htaccess

Override: none

Origin: Apache

Example: RemoveInputFilter .ext

The RemoveInputFilter directive removes any input filter associations for files with the given extensions. This allows .htaccess files in subdirectories to undo any associations inherited from parent directories or the server configuration files.

Parameter: *extension*

- The *extension* parameter value is any character string that is a valid file extension.

Note: If SuffixCaseSense is on (default is off), then the extension argument is case-insensitive. The extension can be specified with or without a leading dot.

RemoveLanguage

Module: mod_mime

Syntax: RemoveLanguage *extension [extension ...]*

Default: none

Context: virtual host, directory, .htaccess

Override: none

Origin: Apache

Example: RemoveLanguage Fr

The RemoveLanguage directive removes any language associations for files with the given extensions. This allows .htaccess files in subdirectories to undo any associations inherited from parent directories or the server configuration files.

Parameter: *extension*

- The *extension* parameter value is any character string that is a valid file extension.

Note: If SuffixCaseSense is on (default is off), then the extension argument is case-insensitive. The extension can be specified with or without a leading dot.

RemoveOutputFilter

Module: mod_mime

Syntax: RemoveOutputFilter *extension [extension ...]*

Default: none

Context: virtual host, directory, .htaccess

Override: none

Origin: Apache

Example: RemoveOutputFilter .ext

The RemoveOutputFilter directive removes any output filter associations for files with the given extensions. This allows .htaccess files in subdirectories to undo any associations inherited from parent directories or the server configuration files.

Parameter: *extension*

- The *extension* parameter value is any character string that is a valid file extension.

Note: If SuffixCaseSense is on (default is off), then the extension argument is case-insensitive. The extension can be specified with or without a leading dot.

RemoveType

Module: mod_mime

Syntax: RemoveType *extension [extension...]*

Default: none

Context: virtual host, directory, .htaccess

Override: none

Origin: Apache

Example: RemoveType .cgi

The RemoveType directive removes any MIME type associations for files with the given extensions. This allows .htaccess files in subdirectories to undo any associations inherited from parent directories or the server config files.

Parameter: *extension*

- The *extension* parameter value is any character string that is a valid file extension.

Example

```
/work/.htaccess:
RemoveType .cgi
```

The example removes any special handling of .cgi files in the /work/ directory (and any beneath it), causing the files to be treated as the default type.

Note: RemoveType directives are processed after any AddType directives, so it is possible they may undo the effects of the latter if both occur within the same directory configuration. If SuffixCaseSense is on (default is off), then the extension argument is case-insensitive. The extension can be specified with or without a leading dot.

SuffixCaseSense

Module: mod_mime

Syntax: SuffixCaseSense *on | off*

Default: SuffixCaseSense off

Context: server config

Override: none

Origin: IBM

Example: SuffixCaseSense on

The SuffixCaseSense directive is used to specify whether the server should distinguish between uppercase and lowercase characters when it has to compare file extensions to the extension patterns on the following directives:

- AddType
- AddClient
- AddEncoding
- AddLanguage
- AddCharset
- AddHandler
- AddInputFilter
- AddOutputFilter
- RemoveType
- RemoveClient
- RemoveEncoding
- RemoveLanguage
- RemoveCharset
- RemoveHandler
- RemoveInputFilter
- RemoveOutputFilter

By default, the HTTP Server will not be sensitive to the case of the extensions.

Parameter: *on | off*

- The *on* parameter value specifies the server will be sensitive to the case of file extensions.
- The *off* parameter value specifies the server will not be sensitive to the case of file extensions.

TypesConfig

Module: mod_mime

Syntax: TypesConfig *filename*

Default: TypesConfig /QIBM/UserData/HTTPA/conf/mime.types

Context: server config

Override: none

Origin: Apache

Example: TypesConfig /conf/mime2.types

The TypesConfig directive sets the location of the MIME types configuration file. Filename is relative to the ServerRoot. This file sets the default list of mappings from filename extensions to content types; changing this file is not recommended. Use the AddType directive instead. The file contains lines in the format of the arguments to an AddType command:

```
MIME-type extension [extension ...]
```

Blank lines, and lines beginning with a hash character (#) are ignored.

Parameter: *filename*

- The *filename* parameter value is a filename where the MIME-type file can be located. This filename must be relative to the "ServerRoot " on page 356. This restricts the file to the IFS file system.

Module mod_negotiation

Module mod_negotiation supports directives for the IBM HTTP Server for i Web server.

Summary

Content negotiation is the selection of the document that best matches the clients capabilities from one of several available documents. There are two implementations of content negotiation:

- A type-map (a file with the handler type-map) which explicitly lists the files containing the variants.
- A MultiViews search (enabled by the MultiViews "Options" on page 348) where the server does an implicit filename pattern match and makes a choice from the results.

See "Content negotiation for HTTP Server" on page 17 for more information.

Type maps

A type map has the same format as RFC822 mail headers. It contains document descriptions separated by blank lines, with lines beginning with a pound sign ('#') are treated as comments. A document description consists of several header records. Records may be continued on multiple lines if the continuation lines start with spaces. The leading space will be deleted and the lines concatenated. A header record consists of a keyword name, which always ends in a colon, followed by a value. Whitespace is allowed between the header name and value, and between the tokens of value. The headers allowed are:

Header	Description
Content-Encoding	The encoding of the file. The server only recognizes encoding that is defined by an AddEncoding directive. This normally includes the encoding x-compress for compress'ed files, and x-gzip for gzip'ed files. The x- prefix is ignored for encoding comparisons.
Content-Language	The language of the variant, as an Internet standard language tag (RFC 1766). An example is en, meaning English.
Content-Length	The length of the file, in bytes. If this header is not present, then the actual length of the file is used.

Header	Description
Content-Type	The MIME media type of the document, with optional parameters. Parameters are separated from the media type and from one another by a semicolon, with a syntax of name=value. Common parameters include: **Parameter One: *level*** • The *level* parameter is an integer specifying the version of the media type. For text/html, this defaults to '2', otherwise '0'. **Parameter Two: *qs*** • The *qs* parameter is a floating-point number with a value in the range of '0.0' to '1.0', indicating the relative quality of this variant compared to the other available variants, independent of the client's capabilities. For example, a '.jpeg' file is usually of higher source quality than an '.ascii' file it is attempting to represent a photograph. However, if the resource being represents is ASCII art, then an ASCII file would have a higher source quality than a '.jpeg' file. All Qs values therefore specific to a given source. For example: `Content-Type: image/jpeg; Qs=0.8`
URL	The path to the file containing this variant, relative to the map file.

MultiViews

A MultiViews search is enabled by the MultiViews Option. If the server receives a request for /some/dir/QIBM and /some/dir/QIBM does not exist, then the server reads the directory looking for all files named QIBM.* , and effectively makes up a type map which names all those files, assigning them the same media types and content-encodings it would have if the client had asked for one of them by name. It then chooses the best match to the client's requirements, and returns that document.

Directives

- “CacheNegotiatedDocs” on page 504
- “ForceLanguagePriority” on page 505
- “LanguagePriority” on page 505

CacheNegotiatedDocs

Module: mod_negotiation

Syntax: CacheNegotiatedDocs *on | off*

Default: CacheNegotiatedDocs off

Context: server config, virtual host

Override: none

Origin: Apache

Example: CacheNegotiatedDocs on

The CacheNegotiatedDocs directive allows content-negotiated documents requested using HTTP/1.0 to be cached by proxy servers.

Parameter: *on | off*

- Setting this directive to *on* could mean that clients behind proxies may retrieve versions of the documents that are not the best match for their abilities. The purpose of this directive is to make cache more efficient. This directive only applies to requests which come from HTTP/1.0 browsers. HTTP/1.1 provides much better control over the caching of negotiated documents, and this directive has no effect in responses to HTTP/1.1 requests.

ForceLanguagePriority

Module: mod_negotiation

Syntax: ForceLanguagePriority *None | Prefer | Fallback [Prefer | Fallback]*

Default: ForceLanguagePriority None

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: See below.

The ForceLanguagePriority directive uses the given LanguagePriority to satisfy negotiation where the server could otherwise not return a single matching document.

Parameter: *None | Prefer | Fallback*

- The *Prefer* parameter uses LanguagePriority to serve one valid result, rather than returning an HTTP result 300 (MULTIPLE CHOICES) when there are several equally valid choices. If the directives below were given, and the user's Accept-Language header assigned *en* and *de* each as quality .500 (equally acceptable) then the first matching variant (*en*) will be served.

```
LanguagePriority en Fr de
ForceLanguagePriority Prefer
```

- The *Fallback* parameter uses LanguagePriority to serve a valid result, rather than returning an HTTP result 406 (NOT ACCEPTABLE). If the directives below were given, and the user's Accept-Language only permitted an *en* language response, but such a variant isn't found, then the first variant from the LanguagePriority list is served.

```
LanguagePriority en Fr de
ForceLanguagePriority Fallback
```

Both options, *Prefer* and *Fallback*, may be specified, so either the first matching variant from LanguagePriority will be served if more that one variant is acceptable, or the first available document will be served if none of the variants match the client's acceptable list of languages.

Note: When specifying both *Prefer* and *Fallback* options, the behavior is the same regardless of the order in which they are specified.

See DefaultLanguage, AddLanguage and "LanguagePriority" on page 505 for more information.

LanguagePriority

Module: mod_negotiation

Syntax: LanguagePriority *MIME-lang [MIME-lang...]*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: LanguagePriority en Fr de

The LanguagePriority directive sets the precedence of language variants for the case where the client does not express a preference when handling a MultiViews request. The list of MIME-lang are in order of decreasing preference.

Parameter: *MIME-lang*

- The *MIME-lang* parameter is any Internet standard language tag or MIME language designation.

This directive may be configured multiple times in a container. The directives are processed from the first to the last occurrence.

Note: This directive only has an effect if a best language cannot be determined by any other means. If the client expresses a language preference, this directive has no effect on the file selected during content negotiation.

Module mod_proxy

Module mod_proxy supports directives for the IBM HTTP Server for i Web server.

Summary

Directives for forward proxy function are as follows:

Required: ProxyRequests
Optional: AllowCONNECT, ProxyBlock, ProxyDomain, ProxyReceiveBufferSize, ProxyVia

Directives for reverse proxy function are as follows:

Required: ProxyPass
Optional: ProxyBlock, ProxyPassReverse, ProxyReceiveBufferSize, ProxyVia

Directives for proxy chaining function are as follows:

Required: ProxyRemote
Optional: NoProxy, (see forward or reverse proxy, above, for additional directives).

For a detailed description of these proxy functions and how they may be used, see "Proxy server types and uses for HTTP Server" on page 24.

Note: The mod_proxy directives require the following LoadModules in HTTP Server configuration file:

```
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Directives

- "BalancerInherit" on page 507
- "BalancerMember" on page 508
- "NoProxy" on page 508
- "<Proxy>" on page 510
- "ProxyAddHeaders" on page 511
- "ProxyBadHeader" on page 512
- "ProxyBlock" on page 512
- "ProxyCacheOnly" on page 513
- "ProxyDomain" on page 514

- “ProxyErrorOverride” on page 515
- “ProxyForceCacheCompletion” on page 516
- “ProxyIOBufferSize” on page 517
- “<ProxyMatch>” on page 517
- “ProxyMaxForwards” on page 519
- “ProxyNoCache” on page 520
- “ProxyNoConnect” on page 521
- “ProxyPass” on page 522
- “ProxyPassInherit” on page 533
- “ProxyPassInterpolateEnv” on page 533
- “ProxyPassMatch” on page 534
- “ProxyPassReverse” on page 534
- “ProxyPassReverseCookieDomain” on page 536
- “ProxyPassReverseCookiePath” on page 537
- “ProxyPreserveHost” on page 537
- “ProxyReceiveBufferSize” on page 538
- “ProxyRemote” on page 539
- “ProxyRemoteMatch” on page 540
- “ProxyRequests” on page 540
- “ProxyReverse” on page 541
- “Proxyset” on page 542
- “ProxySourceAddress” on page 545
- “ProxyTimeout” on page 545
- “ProxyVia” on page 546

BalancerInherit

Module: mod_proxy

Syntax: BalancerInherit *on* | *off*

Default: BalancerInherit On

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: BalancerInherit off

The BalancerInherit directive will cause the current server/virtual host to "inherit" ProxyPass Balancers and Workers defined in the main server.

Note: This can cause issues and inconsistent behavior if using the Balancer Manager and so should be disabled if using that feature.

The setting in the global server defines the default for all virtual hosts

BalancerMember

Module: mod_proxy

Syntax: BalancerMember *[balancerurl] url [key=value [key=value ...]]*

Default: none

Context: directory.

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example 1

```
ProxyPass /special-area http://special.example.com/ smax=5 max=10
ProxyPass / balancer://mycluster stickysession=jsessionid nofailover
<Proxy balancer://mycluster>
BalancerMember http://1.2.3.4:8009
BalancerMember http://1.2.3.5:8009 smax=10
# Less powerful server, don't send as many requests there
BalancerMember http://1.2.3.6:8009 smax=1 loadfactor=20
</Proxy>
```

Example 2

```
<Proxy balancer://mycluster2>
BalancerMember http://196.128.0.1:4000
BalancerMember http://196.128.0.1:4001
</Proxy>
```

Then you proxy the location or virtual host to the cluster:

```
<VirtualHost *:80>
ProxyPass / balancer://mycluster2/
ProxyPassReverse / balancer://mycluster2/
</VirtualHost>
```

Note: The slash much occur after the ProxyPass directive.

The BalancerMember directive adds a member to a load balancing group. It can be used within a <Proxy *balancer://...*> container directive and can take any of the key value pair parameters available to "ProxyPass" on page 522 directives.

One additional parameter is available only to "BalancerMember" on page 508 directives: *loadfactor*. This is the member load factor - a number between 1 (default) and 100, which defines the weighted load to be applied to the member in question.

The *balancerurl* is only needed when not within a <Proxy *balancer://...*> container directive. It corresponds to the url of a balancer defined in "ProxyPass" on page 522 directive.

The path component of the balancer URL in any <Proxy *balancer://...*> container directive is ignored.

Trailing slashes should typically be removed from the URL of a BalancerMember.

NoProxy

Module: mod_proxy

Syntax: NoProxy *domain | subnet | ipaddr | hostname [domain | subnet | ipaddr | hostname ...]*

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: NoProxy .mycompany.com 192.168.112.0/21

The NoProxy directive specifies a list of domains, subnets, IP addresses, and/or hosts (in any combination) separated by spaces. Multiple NoProxy directives are allowed. Items in each list are used to match requests for which the server should attempt to handle directly rather than going through a remote proxy server (specified using the ProxyRemote directive). When a client sends a request that matches one or more listed items, the server attempts to connect directly to the server specified in the URL rather than to a remote proxy (specified by ProxyRemote) to chain the request.

Parameter: *domain | subnet | ipaddr | hostname*

- A *domain* is a partially qualified DNS domain name, preceded by a period. It represents a group of hosts that logically belong to the same DNS domain or zone (that is, the suffixes of the hostnames are all ending in Domain).
- A *subnet* is a partially qualified Internet address in a numeric (dotted quad) form, optionally followed by a slash (/) and the netmask, specified as the number of significant bits in the subnet. It is used to represent a subnet of hosts that can be reached over a common network interface. In the absence of the explicit netmask it is assumed that omitted (or zero valued) trailing digits specify the mask. In this case, the netmask can only be multiples of '8 bits' wide. For example, the subnet '192.168.0.0' with an implied netmask of '16' valid bits (sometimes used in the netmask form 255.255.0.0.).
- An *ipaddr* represents a fully qualified Internet address in numeric (dotted quad) form. Usually this address represents a host, but there need not necessarily be a DNS domain name connected with the address. For example: 192.168.123.7
- A *hostname* is a fully qualified DNS domain name that can be resolved to one or more IP addresses via the DNS domain name service. It represents a logical host (in contrast to domain, see above) and must be resolvable to at least one ipaddr (or often to a list of hosts with different IP addresses).

Example

```
ProxyRemote * http://firewall.mycompany.com:81
NoProxy .mycompany.com 192.168.112.0/21
```

- ProxyBlock may be used to block incoming requests prior to consideration for this directive.
- This directive is commonly used in conjunction with the ProxyRemote and ProxyDomain directives for directing proxy requests within intranets.
- Setting ProxyNoConnect to on negates this directive.

This directive may be configured multiple times in a container. The directives are processed from the first to the last occurrence.

Note: Hostname and domain name comparisons are done without regard to the case, and are always assumed to be anchored in the root of the DNS tree.

<Proxy>

Module: mod_proxy

Syntax: <Proxy *criteria*> ... </Proxy>

Default: none

Context: server config, virtual host, Not in Limit

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: Forward proxy

```
<Proxy http://www.ibm.com/>
  Require all granted
</Proxy>
```

Example: Reverse proxy

```
<Proxy /docs/>
  Require all granted
</Proxy>
```

The <Proxy> and </Proxy> directives are used to enclose (or contain) a group of directives that apply only to proxy requests that match the specified criteria. Multiple proxy containers are allowed, however they may not be nested. Requests that do not match container criteria are outside the context of the enclosed directives. Any directive allowed within a directory context is also allowed within a proxy context (see <Directory> for details on directory containers).

Parameter: *criteria*

- The *criteria* parameter accepts a partial URL or virtual directory path used to identify requests to which the enclosed directives apply. Partial URLs are used to identify both forward and reverse proxy requests. A match is considered by comparing request URL strings to the specified criteria string, starting with the first character. A match is made if the two strings are identical, up to the length of the criteria string.

  Refer to <ProxyMatch> for details regarding the use of regular expression criteria for proxy containers.

  Directives within proxy containers apply only to matched requests handled by the proxy function (including both forward and reverse proxy). Requests not handled by the proxy function are not affected by directives within proxy containers.

Example One

```
<Proxy /user/local/httpd/htdocs>
 Require all granted
</Proxy>
```

Note: Previously, directory containers were used to enclose groups of directives that applied to proxy requests by appending the prefix "proxy:" to the beginning of the directory name criteria specified for <Directory> or <DirectoryMatch> directives. This is no longer supported. The proxy function now ignores directives enclosed in <Directory> (or <File>) containers.

Directives within <Location> containers (if matched) take precedence over directives within <Proxy> containers. See <Location> or <LocationMatch> for more information on <Location> containers.

When request URLs match criteria strings of multiple proxy containers, directives within all matched containers are combined and applied. <Proxy> sections are processed in the order they appear in the configuration file. The following is an example of how directives are combined and applied according to order.

Example Two: Forward Proxy

```
ProxyRequest on
<Proxy http://>
 Require all denied
 ServerSignature on
</Proxy>
<Proxy http://www.ibm.com/>
 Require all granted
</Proxy>
```

For this example, a request for http://www.ibm.com/docs/whitepaper.pdf matches criteria specified for both proxy containers, therefore the server applies the directives within both containers. Since the criteria specified for the second container (<Proxy http://www.ibm.com/>) is more specific (a better match) than the criteria specified for the first container (<Proxy http://>) directives enclosed within the second container take precedence. The request is therefore allowed since the second container has an "Require all granted" directive. The ServerSignature directive would be applied to this request as well (if needed). A request for http://web.samples.org/welcome.htm, however, only matches the criteria for the first container, and is therefore denied since this container has a "Require all denied" directive.

If request URLs match criteria strings for one or more <Proxy> directives as well as regular expression criteria for one or more <ProxyMatch> directives, the server applies matched <Proxy> and <ProxyMatch> container directives in the order they appear in the configuration file.

Example:

```
ProxyRequest on
<Proxy http://www.ibm.com/>
  Require all granted
</Proxy>
<ProxyMatch ^(.*)>
  Require all denied
</ProxyMatch>
```

A request for http://www.ibm.com/welcome.html matches criteria specified for both proxy containers, therefore the server applies the directives within both containers. Directives for the <Proxy> container are applied first, then directives for the <ProxyMatch> container. Due to the order that directives are applied, the request is denied since the "Require all denied" directive (from the <ProxyMatch> container) is applied last, eveh though the <Proxy> container is a more exact match.

Note: Setting ProxyRequests to *off* does not negate this directive. It is available regardless of the forward proxy state.

ProxyAddHeaders

Module: mod_proxy

Syntax: ProxyAddHeaders *Off|On*

Default: ProxyAddHeaders *On*

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyAddHeaders *Off*

The ProxyAddHeaders directive determines whether or not proxy related information should be passed to the backend server through X-Forwarded-For, X-Forwarded-Hostand X-Forwarded-Server HTTP headers.

Note: It only takes effect in HTTP proxying handled by mod_proxy_http.

ProxyBadHeader

Module: mod_proxy

Syntax: ProxyBadHeader *IsError | Ignore | StartBody*

Default: ProxyBadHeader IsError

Context: server, virtual host

Override: none

Origin: Apache

Example: ProxyBadHeader Ignore

This directive tells the server how to handle a bad header line in a response. The value *ignore* means the proxy ignores the bad header and continues. The value *IsError* means that the proxy fails out on the request. The value *StartBody* means that proxy (if it has seen other headers before this bad one) starts sending the rest of the headers as body and hopes that the server can handle it.

ProxyBlock

Module: mod_proxy

Syntax: ProxyBlock *word | host | domain [word | host | domain ...]*

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyBlock somecompany.com www-1.ibm.com www-2.ibm.com

The ProxyBlock directive specifies a list of words, hosts, and/or domains (in any combination), separated by spaces. Multiple ProxyBlock directives are allowed. Requests to sites whose URLs contain matched words, hosts, or domains are blocked by the server. At startup the server attempts to determine list item IP addresses, that may be host names, and records them for a match test.

Parameter: ***word | host | domain***

- A *word* can be any keyword (for example, `ProxyBlock hello server good-bye`).
- A *host* is a fully qualified DNS domain name that can be resolved to one or more IP addresses via the DNS domain name service. It represents a logical host (in contrast to domain, see below) and must be resolvable to at least one IP address (or often to a list of hosts with different IP addresses), otherwise it is simply treated as a word (see above).
- A *domain* is a partially qualified DNS domain name, preceded by a period. It represents a group of hosts that logically belong to the same DNS domain or zone (that is, the suffixes of the hostnames are all ending in Domain).

Example

```
ProxyBlock ibm.com www-1.ibm.com www-2.ibm.com server hello
```

The 'www-2.ibm.com' would also be matched if referenced by IP address since the server records addresses at startup for a match test. Note that either 'ibm.com' or 'ibm' is sufficient to match both 'www-1.ibm.com' and 'www-2.ibm.com' by word. However, their corresponding IP addresses would not be blocked since the server could not determine their addresses without having their hostnames specifically listed.

Note: " `ProxyBlock *`" effectively blocks requests to all sites and therefore should be avoided.

ProxyCacheOnly

Module: mod_proxy

Syntax: ProxyCacheOnly *word | host | domain [word | host | domain ...]*

Default: none (meaning cache all documents satisfying other caching directives)

Context: server config, virtual host

Override: none (meaning cache all documents satisfying other caching directives)

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyCacheOnly ibm.com www-1.ibm.com www-2.ibm.com

The ProxyCacheOnly directive specifies a list of words, hosts, and domains (in any combination), separated by spaces. Multiple ProxyCacheOnly directives are allowed. Listed items are used to match requests for which the server should cache documents if caching is enabled. The server may then serve cached documents for subsequent requests. The server will also attempt to determine list item IP addresses and records them for a match test.

If this directive is absent, all documents satisfying all other caching directives (for example, ProxyNoCache, CacheMaxFileSize, CacheMinFileSize, etc.) are cached. If this directive is present, only documents from matched words, hosts, or domains are cached (as long as they also satisfy all other caching directives).

Parameter: ***word | host | domain***

- A *word* can be any keyword (for example, `ProxyCacheOnly hello server good-bye`).
- A *host* is a fully qualified DNS domain name that can be resolved to one or more IP addresses via the DNS domain name service. It represents a logical host (in contrast to

domain, see below) and must be resolvable to at least one IP address (or often to a list of hosts with different IP addresses), otherwise it is simply treated as a word (see above).

- A *domain* is a partially qualified DNS domain name, preceded by a period. It represents a group of hosts that logically belong to the same DNS domain or zone (that is, the suffixes of the hostnames are all ending in Domain).

Example

```
ProxyCacheOnly ibm.com www-1.ibm.com sample.server.edu
```

For this example, 'sample.server.edu' would also be matched if referenced by IP address since the server records addresses at startup for a match test. Note that 'sample', 'server', 'edu', 'sample.server', or 'server.edu' is sufficient to match 'sample.server.edu' by word, however documents for requests using IP addresses corresponding to 'sample.server.edu' would not be cached since the server could not determine the addresses unless the hostname is specifically listed.

- CacheMinFileSize, CacheMaxFileSize, and CacheTimeMargin may make documents ineligible for cache prior to consideration for this directive.
- ProxyNoCache provides counter function. Documents matching a previous ProxyNoCache template in the configuration will not be cached, regardless of whether they match a subsequent ProxyCacheOnly template. In other words, a ProxyNoCache directive may override a ProxyCacheOnly directive if configured prior to the ProxyCacheOnly directive.
- This directive is used only if CacheRoot is set.
- Setting ProxyNoConnect to off negates this directive.

Note: "`ProxyCacheOnly *`" enables caching for all documents if not preceded and matched by a ProxyNoCache directive.

ProxyDomain

Module: mod_proxy

Syntax: ProxyDomain *domain*

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyDomain .mycompany.com

The ProxyDomain directive specifies the default domain to which the server belongs when acting as a forward proxy server. If a request specifies a host without a domain name, the server sends a response that redirects the client to the host with the configured domain appended. Possible values include all domain names starting with a dot (or period) and consisting only of the characters AZ, AZ, '.' (dot), '-' (dash), and 0-9.

Parameter: *domain*

- The *domain* is a partially qualified DNS domain name, preceded by a period. It represents a group of hosts that logically belong to the same DNS domain or zone (that is, the suffixes of the hostnames are all ending in Domain).

Example

```
ProxyRemote * http://firewall.mycompany.com:81
NoProxy .mycompany.com 192.168.112.0/21
ProxyDomain .mycompany.com
```

For this example, if an unqualified request for http://myserver/ comes in, the server will redirect the client to a fully qualified host name using the default domain. That is, the client will be redirected to http://myserver.mycompany.com/.

- ProxyBlock may be used to block incoming requests prior to consideration for this directive.
- This directive is commonly used in conjunction with the NoProxy and ProxyRemote directives for directing proxy requests within intranets.
- Setting ProxyRequests to off negates this directive

ProxyErrorOverride

Module: mod_proxy

Syntax: ProxyErrorOverride *on | off*

Default: ProxyErrorOverride off

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyErrorOverride on

The ProxyErrorOverride directive specifies if the server is to override error response codes and message text sent by remote servers to enable local error messaging for remote server problems. If disabled (the default), all responses sent by remote servers (including errors) are relayed to clients (local error messaging is not used). If enabled, server related error codes and messages sent by remote servers (codes greater than or equal to 400®) are overridden and local error messaging is used to send responses that pertain to the local server, rather than the remote server. Non-server related error codes (codes less than 400) are not affected by this directive and are always relayed to clients.

Parameter: *on | off*

- If *off*, is specified (the default), all response codes and messages sent by remote servers are relayed to clients (unaltered).
- If *on* is specified, error response codes and messages sent by remote servers relating to server problems are overridden and local error messaging is used to send responses to clients.

By default, local error messaging will send hardcoded messages to clients. However, it may be configured to send custom web pages as well, or to redirect certain errors to local CGI programs (or servlets) or remote servers to handle. When ProxyErrorOverride is used in conjunction with ErrorDocument support, custom responses may be sent to clients when proxy requests fail due to remote server problems. This is useful for reverse proxy setups where remote server problems need to be concealed from clients or when web sites must have a common error reporting appearance. It may be used, however, for any proxy setup where remote server errors need to be handled in a certain (customized) manner.

For example, suppose the local server has address http://www.ibm.com/ and the following directives are setup for reverse proxy:

```
ProxyPass /docs/ http://pubserver.ibm.com/public/documentation/
ProxyErrorOverride on
ErrorDocument proxyrmterror /cgi-bin/proxyerr.pgm
```

Now further suppose the local server was sent the request http://www.ibm.com/docs/whitepaper.html. The ProxyPass directive will cause the request to be internally converted into a request for http://pubserver.ibm.com/public/documentation/whitepaper.html. The proxy function will then be invoked to retrieve /public/documentation/whitepaper.html from pubserver.ibm.com. The remote server (pubserver.ibm.com) then has an error that causes it to return response code 500 (internal error) to the local server (www.ibm.com). Since ProxyErrorOverride is enabled, the local server overrides the response code (along with any message text) and enables local error messaging to handle the response. Furthermore, since ErrorDocument is setup for such a response (proxyrmterror), the error is passed to the cgi program /cgi-bin/proxyerr.pgm which handles the problem by sending a customized error page to the client.

In this example of a reverse proxy request process, internal server errors from a remote server (pubserver.ibm.com) are concealed from the client since local error messaging is enabled for proxy requests on www.ibm.com. Similar handling may be setup for forward proxy scenarios as well.

- If custom error messages are not defined (not enabled via ErrorDocument), local error messaging may still be used to send hardcoded messages pertaining to the local server.
- Setting ProxyRequests to off does not negate this directive. It is available regardless of the forward proxy state.

ProxyForceCacheCompletion

Module: mod_proxy

Syntax: ProxyForceCacheCompletion *percentage*

Default: ProxyForceCacheCompletion 90

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: Multiple LoadModule directives are required in the configuration file prior to using the directive. The statements should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyForceCacheCompletion 60

The ProxyForceCacheCompletion directive specifies a download percentage used to determine whether the server should continue to cache documents after a client cancels a request. If a request for a document is canceled, the server will complete the cache transfer over the connection with the content server if more than the percentage specified has already been received. If the server has received less than the percentage specified, or if the proxy caching function is not enabled (see CacheRoot for details), all data is discarded and the server drops the connection with the content server.

Note: This directive is used only if CacheRoot is set. In addition, if the ProxyNoConnect directive is set to on, it negates the ProxyForceCacheCompletion setting.

Parameter: ***percentage***

The *percentage* parameter accepts an integer value between 0 and 100 to specify the minimum amount of data the server is to receive (specified as a percentage of the whole document) to continue caching a document, regardless of whether the client's request is canceled.

ProxyIOBufferSize

Module: mod_proxy

Syntax: ProxyIOBufferSize bytes

Default: ProxyIOBufferSize 8192

Context: server, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: CacheTimeMargin 300

The ProxyIOBufferSize directive adjusts the size of the internal buffer, which is used as a scratchpad for the data between input and output. The size must be less or equal 8192, and it is recommended that you do not change the size.

<ProxyMatch>

Module: mod_proxy

Syntax: <ProxyMatch *criteria*> ... </ProxyMatch>

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: Reverse proxy

```
ProxyReverse on
ProxyPass /docs/v4r4m0/ http://pubserver.ibm.com/public/v4r4m0/
<ProxyMatch "^http://pubserver.ibm.com/public/v[0-9]r[0-9]m[0-9]/(.*)">
  Require all granted
</ProxyMatch>
```

Example: Forward proxy

```
<ProxyMatch "^http://server[0-9]r[0-9]m[0-9]/docs/*">
  Require all granted
</ProxyMatch>
```

The <ProxyMatch> directive is used to enclose a group of directives that apply only to proxy requests that match the specified criteria. Multiple proxy containers are allowed, however they may not be nested. Requests that do not match container criteria are outside the context of the enclosed directives. Any directive allowed within a directory context is also allowed within a proxy context.

Parameter: *criteria*

- The *criteria* parameter accepts a UNIX-style extended regular expression used to identify requests to which the enclosed directives apply. Expressions are used to identify both forward and reverse proxy requests. A match is considered by comparing request URL strings to the specified expression. Subexpressions are grouped within parentheses. Then, parenthetically enclosed regular expressions are substituted in a subsequent $n statement. A match is made if the URL string matches the expression using regular expression logic. For reverse proxy, the specified expression must match the new outgoing URL.

Proxy containers defined by <ProxyMatch> directives (including the directives enclosed by them) are handled in the same way as those defined by <Proxy> directives. The only difference is in how the criteria is specified and handled using regular expressions (for <ProxyMatch>) rather than string literals (for <Proxy>). Refer to <Proxy> for further details regarding proxy containers.

For example, suppose the local server has address http://as400.ibm.com/ and the following directives are setup for reverse proxy:

Example

```
ProxyPass /v4r3m0/docs/ http://pubserver.ibm.com/public/vrm430/
ProxyPass /v4r4m0/docs/ http://pubserver.ibm.com/public/vrm440/
ProxyPass /v4r5m0/docs/ http://pubserver.ibm.com/public/vrm450/
ProxyPass /v5r1m0/docs/ http://pubserver.ibm.com/public/vrm510/
<ProxyMatch "^http://pubserver.ibm.com/public/v[0-9]r[0-9]m[0-9]/(.*)">
 AuthName "i Document Server"
 AuthType Basic
 Require group admin
 PasswdFile QUSRSYS/DOC_USERS
 GroupFile /groups/doc_readers
</ProxyMatch>
```

For this example, a request for /v4r5m0/docs/manual.html is identified as a proxy request since it matches the third ProxyPass statement (ProxyPass /v4r5m0/docs/ http://pubserver.ibm.com/public/vrm450/). Once identified as a proxy request, it is compared against criteria specified for the proxy container (ProxyMatch "^http://pubserver.ibm.com/public/v[0-9]r[0-9]m[0-9]/(.*)") using regular expression logic. A match is made and the server applies the directives within the container that requires the client to provide basic authentication credentials (AuthType Basic). If the client is authenticated (PasswdFile QUSRSYS/DOC_USERS) and authorized (GroupFile /groups/doc_readers, or Require group admin) the request will be internally converted into a request for http://publicserver.ibm.com/public/vrm450/manual.html and further handled by the proxy function (see "ProxyPass" on page 522 for more information on reverse proxy). If the client is not authenticated or authorized, the request fails.

- The client is authenticated if a valid userid and password is provided, according to the PasswdFile directive.
- The client is authorized if the userid (or group) is allowed access, according to the GroupFile or Require directives.

Notice that in the above example the directives enclosed in the proxy container will apply to requests matching any of the ProxyPass directives since the regular expression criteria (specified for <ProxyMatch>) matches all four virtual directory path names specified for ProxyPass.

- Setting ProxyRequests to off does not negate this directive. It is available regardless of the forward proxy state.

Named groups and backreferences are captured and written to the environment with the corresponding name prefixed with "MATCH_" and in upper case. This allows elements of URLs to be referenced from within expressions and modules like mod_rewrite . In order to prevent confusion, numbered (unnamed) backreferences are ignored. Use named groups instead.

For example:

```
<ProxyMatch "^http://pubserver.ibm.com/public/(?<groupnum>group\d)/(.*)">
    AuthName "i Document Server"
    AuthType Basic
    Require group %{env:MATCH_GROUPNUM}
    PasswdFile QUSRSYS/DOC_USERS
    GroupFile /groups/doc_readers
</ProxyMatch>
```

ProxyMaxForwards

Module: mod_proxy

Syntax: ProxyMaxForwards *maximum*

Default: ProxyMaxForwards -1

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyMaxForwards 8

The maximum parameter accepts an integer value no greater than 2,147,483,648 to specify the value the server is to use when it adds Max-Forwards request headers to proxy requests. When the server receives requests that do not contain a Max-Forwards header, it automatically adds one using the specified value. This setting is not used for requests that already contain a Max-Forwards header.

Parameter: *maximum*

- The *maximum* parameter accepts an integer value between 1 and 2,147,483,648 to specify the value the server is to use when it adds Max-Forwards request headers to proxy requests.

The server uses Max-Forwards headers to prevent infinite proxy loops, and possibly certain types of denial of service attacks. This is accomplished by ensuring that a Max-Forwards header is set for all requests to control the maximum number of times it can be forwarded (or passed to subsequent servers).

When the server receives requests containing a Max-Forwards header, it will continue to process the requests only if the value for the header is greater than 0 (zero). If the value is greater than zero, the server decrements it and continues to process the request. If the request subsequently needs to be forwarded to another server, the Max-Forwards header is sent with the decremented value. This process is repeated until the request is fulfilled (or rejected) by a server, or until the value for the Max-Forwards header reaches zero. Once the value reaches zero (or less), the server will not forward the request and will respond immediately (see example, request 3) with the following response codes:

- If TRACE method is used, 200 (OK) is returned as well as any trace data.
- If OPTIONS method is used, 200 (OK) is returned as well as any options data.
- If any other method is used, 502 (BAD_GATEWAY) is returned as well as the server's customized error page for "proxyfail" (if enabled, see "ErrorDocument " on page 315).

This setting is used for both forward and reverse proxy requests.

Example: Forward Proxy

```
ProxyRequests on
ProxyMaxForwards 8
```

For this example, consider the following three requests:

Request 1

```
GET http://docserver.ibm.com/manual.pdf HTTP/1.0
```

For this request, the server will use the value specified for ProxyMaxForwards (8) to add the new header "Max-Forwards : 8" to the request (since it is not already present), and then forward it to docserver.ibm.com as:

```
GET /manual.pdf HTTP/1.0
Max-Forwards : 8
```

Request 2

```
GET http://docserver.ibm.com/manual.pdf HTTP/1.0
Max-Forwards : 3
```

For this request, the server will decrement the value for the Max-Forwards header to 2, and then forward the request to docserver.ibm.com as:

```
GET /manual.pdf HTTP/1.0
Max-Forwards : 2
```

In this case, the value specified for ProxyMaxForwards is not used since the request already contained a Max-Forwards header.

Request 3

```
GET http://docserver.ibm.com/manual.pdf HTTP/1.0
Max-Forwards : 0
```

For this request, the server will immediately return response code 502 (BAD_GATEWAY) since the request cannot be forwarded any further due to the Max-Forwards header value. In this case, docserver.ibm.com is never contacted.

- Setting ProxyRequests to *off* does not negate this directive. It is available regardless of the forward proxy state.

Note: Setting ProxyMaxForwards is a violation of the HTTP/1.1 protocol (RFC2616), which forbids a Proxy setting Max-Forwards if the Client didn't set it. A negative ProxyMaxForwards value, including the default -1, gives you protocol-compliant behaviour, but may leave you open to loops.

ProxyNoCache

Module: mod_proxy

Syntax: ProxyNoCache *word* / *host* / *domain*

Default: absent [meaning cache all files satisfying other caching directives]

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyNoCache ibm.com www-1.ibm.com sample.example.edu

The ProxyNoCache directive specifies a list of words, hosts, and domains (in any combination), separated by spaces. HTTP and non-passworded FTP documents from matched words, hosts or domains are not cached by the proxy server. The proxy module will also attempt to determine IP addresses of list items, that may be hostnames during startup, and cache them for a match test. If this directive is absent, all documents satisfying all other caching directives (for example: ProxyCacheOnly, CacheMaxFileSize, CacheMinFileSize, etc.) are cached. If this directive is present, documents from matched words, hosts or domains are not cached.

Parameter: *word | host | domain*

- A *word* can consist of any combination of keywords (for example, ProxyNoCache hello server good-bye).
- The *host* is a fully qualified DNS domain name that can be resolved to one or more IP address via the DNS domain name service. It represents a logical host (in contrast to domain, see above) and must be resolvable to at least one IP address (or often to a list of hosts with different IP addresses).
- The *domain* is a partially qualified DNS domain name, preceded by a period. It represents a list of hosts that logically belong to the same DNS domain or zone (that is, the suffixes of the hostnames are all ending in Domain).

Example

```
ProxyNoCache ibm.com www-1.ibm.com sample.example.edu
```

The 'sample.example.edu' would also be matched if referenced by IP address. Note that 'example ' is sufficient to match 'example.edu'.

- ProxyCacheOnly provides counter function. Documents matching a previous ProxyCacheOnly template in the configuration will be cached, regardless of whether they match a subsequent ProxyNoCache template. In other words, a ProxyCacheOnly directive may override a ProxyNoCache directive if configured prior to the ProxyNoCache directive.
- This directive is used only if CacheRoot is set.
- Setting ProxyRequests to *off* negates this directive.

Note: "`ProxyNoCache *`" disables caching for all documents if not preceded by the ProxyCacheOnly directive, however garbage collection is not affected.

ProxyNoConnect

Module: mod_proxy

Syntax: ProxyNoConnect *on* | *off*

Default: ProxyNoConnect off

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyNoConnect off

The ProxyNoConnect directive specifies if the proxy is to connect to remote content servers to retrieve documents. If the server is not allowed to connect to remote content servers, it can only serve documents from cache.

Parameter: *on | off*

- If *off* is specified, the server may serve documents from cache (if enabled) as well as issue outgoing requests to remote servers to retrieve servable documents (see Example 1, below).
- If set to *on* is specified, the proxy may only serve documents from cache (if enabled). It will not establish outgoing connections with remote servers. CacheRoot is required if on is specified (see Example 2, below).

Example 1

```
ProxyRequests on
ProxyNoConnect off
CacheRoot /QIBM/UserData/HTTPA/CacheRoot/myproxy
```

In this example, the proxy may serve documents from cache as well as issue outgoing requests to remote servers.

Example 2

```
ProxyRequests on
ProxyNoConnect on
CacheRoot /QIBM/UserData/HTTPA/CacheRoot
```

In this example, the proxy may only serve documents from cache. Documents will not be retrieved from remote servers since outgoing connections are not permitted. Since the server is not permitted to retrieve documents, items in cache must be managed by another application or process other than the server itself.

- CacheRoot is required if this directive is set to *on*.
- The ProxyNoConnect directive causes the AllowCONNECT directive to be ineffective. If ProxyNoConnect is present, and AllowCONNECT is also specified, then even if the AllowCONNECT allows a SSL connection to be made on a specific port, the ProxyNoConnect directive dictates that no connections are allowed.

ProxyPass

Module: mod_proxy

Syntax: *ProxyPass [path] !|url [key=value [key=value ...]] [nocanon] [interpolate] [noquery]*

Default: none

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example:

```
ProxyPass /docs/confidential/ !
ProxyPass /docs/ http://pubserver.ibm.com/public/documentation/
```

This directive allows remote servers to be mapped into the space of the local server; the local server does not act as a proxy in the conventional sense, but appears to be a mirror of the remote server. path is the name of a local virtual path; url is a partial URL for the remote server and cannot include a query string.

The ProxyPass directive specifies information used either to identify and map requests into the space of remote servers, or to prevent requests from being mapped into the space of remote servers, when the reverse proxy function is enabled. Multiple ProxyPass directives are allowed. When enabled, the server does not act as a proxy in the conventional sense, but appears to be a mirror of remote servers by transforming requests that match specified (virtual) directory paths into proxy requests using a corresponding partial URL. If the reverse proxy function is not enabled, this directive has no affect (see "ProxyReverse" on page 541).

Parameter One: *path | url*

- The *path* parameter is the name of a local virtual path. When the directive is placed outside a location container, the first parameter accepts a directory name used to identify requests to be handled by the proxy function. The directory name does not need to specify an existing directory, it may be a name used only as a virtual directory for the server.
- The *url* parameter is a partial URL for the remote server. When the directive is placed inside a location container, the first parameter accepts a partial URL used to transform matched requests (for the location container) into proxy requests. When matched, the portion of the original request URL that matches the location container criteria is replaced with the specified partial URL. Mapped requests are then handled by the proxy function (see example two).

Parameter Two: *!|url [key=value [key=value ...]] [nocanon] [interpolate] [noquery]*

- The *!|url [key=value [key=value ...]] [nocanon] [interpolate] [noquery]* parameter is used when the directive is placed outside a location container, the second parameter accepts a partial URL or the negation operator (!). Partial URLs are used to transform matched requests into proxy requests by replacing the portion of the original request URL that matches the path parameter (parameter one) with the specified partial URL (parameter two). Mapped requests are then handled by the proxy function. The negation operator is used to prevent requests that match the path parameter (parameter one) from being mapped and handled by the proxy function, even though they may match a succeeding ProxyPass directive. Example one, below, shows both partial URLs and the negation operator being used for multiple ProxyPass directives.
- mod_proxy supports pooled connections to a backend server. . Using the key=value parameters to tune this connection pooling. .
- Normally, mod_proxy will canonicalise ProxyPassed URLs. But this may be incompatible with some backends, particularly those that make use of PATH_INFO. The optional nocanon keyword suppresses this, and passes the URL path "raw" to the backend. Note that may affect the security of your backend, as it removes the normal limited protection against URL-based attacks provided by the proxy.

- The optional interpolate keyword, in combination with ProxyPassInterpolateEnv causes the ProxyPass to interpolate environment variables, using the syntax ${VARNAME}. Note that many of the standard CGI-derived environment variables will not exist when this interpolation happens, so you may still have to resort to mod_rewrite for complex rules. Also note that interpolation is not supported within the scheme portion of a URL. Dynamic determination of the scheme can be accomplished with mod_rewrite as in the following example.

```
        RewriteEngine On
```

```
        RewriteCond %{HTTPS} =off
        RewriteRule . - [E=protocol:http]
        RewriteCond %{HTTPS} =on
        RewriteRule . - [E=protocol:https]
```

```
        RewriteRule ^/mirror/foo/(.*) %{ENV:protocol}://backend.example.com/$1 [P]
        ProxyPassReverse  /mirror/foo/ http://backend.example.com/
        ProxyPassReverse  /mirror/foo/ https://backend.example.com/
```

- Normally, mod_proxy will include the query string when generating the SCRIPT_FILENAME environment variable. The optional noquery keyword prevents this.

The server functions as a reverse proxy by mapping requests for documents inside virtual directories (specified by the path parameter or location container criteria) into the space of remote servers (specified by the url parameter). It then retrieves the documents (via proxy), and serves them while making it appear to the client as if they originated from the local server.

The negation operator (!) is used to prevent specific virtual subdirectories to be mapped into the space of remote servers, while allowing higher level (parent) directories to be mapped. Order is important in these situations. ProxyPass directives using the negation operator to prevent specific virtual subdirectories from being mapped must be placed before those mapping higher level (parent) directories (see example one).

Suppose the local server has address http://iseries.ibm.com/:

Example 1

```
ProxyReverse on
ProxyPass /docs/v4r5m0/ http://pubserver.ibm.com/public/v4r5m0/
ProxyPass /docs/archives/confidential/ !
ProxyPass /docs/archives/private/ !
ProxyPass /docs/archives/ http://pubserver.ibm.com/archives/documents/example
```

For this example, since the reverse proxy function is enabled (ProxyReverse on), the first ProxyPass directive will cause a local request for /docs/v4r5m0/manual.html to be internally transformed into a request for http://pubserver.ibm.com/public/v4r5m0/manual.html. The proxy function will then be used to retrieve /public/v4r5m0/manual.html from pubserver.ibm.com and return the document to the requesting client. In this way, a virtual /docs/v4r5m0/ directory on the local server (as400.ibm.com) appears as a mirror of the /public/v4r5m0/ directory of the remote server (pubserver.ibm.com). A request for /docs/archives/20020101.log will be handled in a similar way, using the last ProxyPass directive (ProxyPass /docs/archives/ http://pubserver.ibm.com/archives/documents/). However, a request for /docs/archives/confidential/secrets.txt will not be handled by the proxy function since the second ProxyPass directive prohibits any request for documents within the /docs/archives/confidential/ virtual subdirectory. Likewise, the third ProxyPass directive prohibits any request for documents within the /docs/archives/private/ virtual subdirectory.

The following example shows the ProxyPass directive being used within a location container to obtain results similar to example 1.

Example Two

```
ProxyReverse on
<Location /docs/v4r5m0/>
```

```
 ProxyPass http://pubserver.ibm.com/public/v4r5m0/
</Location>
ProxyPass /docs/archives/confidential/ !
ProxyPass /docs/archives/private/ !
ProxyPass /docs/archives/ http://pubserver.ibm.com/archives/documents/
```

Notice the first ProxyPass directive is placed within a location container and specifies only one parameter. A local request for /docs/v4r5m0/manual.html is identified by matching the location container criteria (/docs/v4r5m0/), transformed into a request for http://pubserver.ibm.com/public/v4r5m0/manual.html by replacing the matched portion with the ProxyPass parameter, and handled by the proxy function in the same way described for example one.

- "ProxyPassReverse" on page 534 may be used to handle HTTP redirect responses from remote servers.
- Setting "ProxyReverse" on page 541 to *off* negates this directive.
- Setting "ProxyRequests" on page 540 to *off* does not negate this directive. It is available regardless of the forward proxy state. The "ProxyRequests" on page 540 directive should usually be set off when using ProxyPass.

Ordering ProxyPass Directives

The configured "ProxyPass" on page 522 and "<ProxyMatch>" on page 517 rules are checked in the order of configuration. The first rule that matches wins. So usually you should sort conflicting "ProxyPass" on page 522 rules starting with the longest URLs first. Otherwise later rules for longer URLS will be hidden by any earlier rule which uses a leading substring of the URL. Note that there is some relation with worker sharing. In contrast, only one "ProxyPass" on page 522 directive can be placed in a Location block, and the most specific location will take precedence. For the same reasons exclusions must come before the general "ProxyPass" on page 522 directives.

ProxyPass key=value Parameters

mod_proxy supports pooled connections to a backend server. Connections created on demand can be retained in a pool for future use. Limits on the pool size and other settings can be coded on the ProxyPass directive using key=value parameters, described in the table below.

By default, mod_proxy will allow and retain the maximum number of connections that could be used simultaneously by that web server child process. Use the max parameter to reduce the number from the default. Use the ttl parameter to set an optional time to live; connections which have been unused for at least ttl seconds will be closed. ttl can be used to avoid using a connection which is subject to closing because of the backend server's keep-alive timeout.

Example

```
ProxyPass /example http://backend.example.com max=20 ttl=120 retry=300
```

Table 43. BalancerMember parameters

Parameter	Default	Description
min	0	Minumum number of connections that will always be open to the backend server.

Table 43. BalancerMember parameters (continued)

Parameter	Default	Description
max	1...n	Maximum number of connections that will be allowed to the backend server. The default for a Maximum for the number of connections is the number of threads per process in the active MPM. With the Worker MPM it is controlled by the ThreadsPerChild. HTTP server will never create more than the Hard Maximum connections to the backend server. If max is is set to 0 not specified, it will be set to ThreadsPerChild.
smax	max	Retained connection pool entries above this limit are freed during certain operations if they have been unused for longer than the time to live, controlled by the ttl parameter. If the connection pool entry has an associated connection, it will be closed. This only needs to be modified from the default for special circumstances where connection pool entries and any associated connections which have exceeded the time to live need to be freed or closed more aggressively.
acquire	-	If set this will be the maximum time to wait for a free connection in the connection pool, in milliseconds. If there are no free connections in the pool the HTTP server will return SERVER_BUSY status to the client.
connectiontimeout	Timeout	Connect timeout in seconds. The number of seconds HTTP server waits for the creation of a connection to the backend to complete. By adding a postfix of ms the timeout can be also set in milliseconds.

Table 43. BalancerMember parameters (continued)

Parameter	Default	Description
disablereuse	Off	This parameter should be used when you want to force mod_proxy to immediately close a connection to the backend after being used, and thus, disable its persistent connection and pool for that backend. This helps in various situations where a firewall between HTTP server and the backend server (regardless of protocol) tends to silently drop connections or when backends themselves may be under round- robin DNS. To disable connection pooling reuse, set this property value to On.
enablereuse	On	This is the inverse of 'disablereuse' above, provided as a convenience for scheme handlers that require opt-in for connection reuse.
flushwait	10	The time to wait for additional input, in milliseconds, before flushing the output brigade if 'flushpackets' is 'auto'.
iobuffersize	8192	Adjusts the size of the internal scratchpad IO buffer. This allows you to override the ProxyIOBufferSize for a specific worker. This must be at least 512 or set to 0 for the system default of 8192.

Table 43. BalancerMember parameters (continued)

Parameter	**Default**	**Description**
keepalive	Off	This parameter should be used when you have a firewall between your HTTP server and the backend server, which tends to drop inactive connections. This flag will tell the Operating System to send KEEP_ALIVE messages on inactive connections and thus prevent the firewall from dropping the connection. To enable keepalive set this property value to *On*. The frequency of initial and subsequent TCP keepalive probes depends on global OS settings, and may be as high as 2 hours. To be useful, the frequency configured in the OS must be smaller than the threshold used by the firewall.
lbset	0	Sets the load balancer cluster set that the worker is a member of. The load balancer will try all members of a lower numbered lbset before trying higher numbered ones.
ping	0	Ping property tells the webserver to "test" the connection to the backend before forwarding the request. For HTTP, it causes mod_proxy_http to send a 100-Continue to the backend (only valid for HTTP/1.1 - for non HTTP/1.1 backends, this property has no effect). The parameter is the delay in seconds to wait for the reply. This feature has been added to avoid problems with hung and busy backends. This will increase the network traffic during the normal operation which could be an issue, but it will lower the traffic in case some of the cluster nodes are down or busy. By adding a postfix of ms the delay can be also set in milliseconds.

Table 43. BalancerMember parameters (continued)

Parameter	Default	Description
loadfactor	1	Worker load factor. Used with BalancerMember. It is a number between 1 and 100 and defines the normalized weighted load applied to the worker.
receivebuffersize	0	Adjusts the size of the explicit (TCP/IP) network buffer size for proxied connections. This allows you to override the ProxyReceiveBufferSize for a specific worker. This must be at least 512 or set to 0 for the system default.
redirect	-	Redirection Route of the worker. This value is usually set dynamically to enable safe removal of the node from the cluster. If set, all requests without a session id will be redirected to the BalancerMember that has route parameters equal to this value.
retry	60	Connection pool worker retry timeout in seconds. If the connection pool worker to the backend server is in the error state, HTTP server will not forward any requests to that server until the timeout expires. This enables to shut down the backend server for maintenance, and bring it back online later.
route	-	Route of the worker when used inside load balancer. The route is a value appended to session id.

Table 43. BalancerMember parameters (continued)

Parameter	Default	Description
status	-	Single letter value defining the initial status of this worker: D: Worker is disabled and will not accept any requests. S: Worker is administratively stopped. I: Worker is in ignore-errors mode, and will always be considered available. H: Worker is in hot-standby mode and will only be used if no other viable workers are available. E: Worker is in an error state. N: Worker is in drain mode, and will only accept existing sticky sessions destined for itself and ignore all other requests. Status can be set (which is the default) by prepending with '+' or cleared by prepending with '-'. Thus, a setting of 'S-E' sets this worker to Stopped and clears the in-error flag.
timeout	ProxyTimeout	Connection timeout in seconds. The number of seconds HTTP server waits for data sent by / to the backend.
ttl	-	Time to live for inactive connections and associated connection pool entries, in seconds. Once reaching this limit, a connection will not be used again; it will be closed at some later time.

If the Proxy directive scheme starts with the balancer:// (eg: balancer://cluster, any path information is ignored) then a virtual worker that does not really communicate with the backend server will be created. Instead it is responsible for the management of several "real" workers. In that case the special set of parameters can be add to this virtual worker. See mod_proxy_balancer for more information about how the balancer works.

Table 44. Balancer parameters

Parameter	Default	Description
lbmethod	byrequests	Balancer load-balance method. Select the load-balancing scheduler method to use. Either byrequests, to perform weighted request counting or bytraffic, to perform weighted traffic byte count balancing, or bybusyness, to perform pending request balancing. The default is byrequests.
maxattempts	One less than the number of workers, or 1 with a single worker.	Maximum number of failover attempts before giving up.
nofailover	Off	If set to On the session will break if the worker is in error state or disabled. Set this value to On if backend servers do not support session replication.
stickysession	-	Balancer sticky session name. The value is usually set to something like JSESSIONID or PHPSESSIONID, and it depends on the backend application server that support sessions. If the backend application server uses different name for cookies and url encoded id (like servlet containers) use | to separate them. The first part is for the cookie the second for the path.
scolonpathdelim	Off	If set to On the semi-colon character ';' will be used as an additional sticky session path delimiter/separator. This is mainly used to emulate mod_jk's behavior when dealing with paths such as JSESSIONID=6736bcf34;foo=aabfa
timeout	0	Balancer timeout in seconds. If set this will be the maximum time to wait for a free worker. The default is not to wait.
failonstatus	-	A single or comma-separated list of HTTP status codes. If set this will force the worker into error state when the backend returns any status code in the list. Worker recovery behaves the same as other worker errors.

Table 44. Balancer parameters (continued)

Parameter	Default	Description
nonce	<auto>	The protective nonce used in the balancer-manager application page. The default is to use an automatically determined UUID-based nonce, to provide for further protection for the page. If set, then the nonce is set to that value. A setting of None disables all nonce checking. **Note:** In addition to the nonce, the balancer-manager page should be protected via an ACL.
growth	0	Number of additional BalancerMembers to allow to be added to this balancer in addition to those defined at configuration.
forcerecovery	On	Force the immediate recovery of all workers without considering the retry parameter of the workers if all workers of a balancer are in error state. There might be cases where an already overloaded backend can get into deeper trouble if the recovery of all workers is enforced without considering the retry parameter of each worker. In this case set to Off.

Example 1： A sample balancer setup

ProxyPass /special-area http://special.example.com smax=5 max=10

ProxyPass / balancer://mycluster/ stickysession=JSESSIONID|jsessionid nofailover=On

```
<Proxy balancer://mycluster>
    BalancerMember http://1.2.3.4:8009
    BalancerMember http://1.2.3.5:8009 loadfactor=20
    # Less powerful server, don't send as many requests there,
    BalancerMember http://1.2.3.6:8009 loadfactor=5
</Proxy>
```

Example 2：Setting up a hot-standby, that will only be used if no other members are available

ProxyPass / balancer://hotcluster/

```
<Proxy balancer://hotcluster>
    BalancerMember http://1.2.3.4:8009 loadfactor=1
    BalancerMember http://1.2.3.5:8009 loadfactor=2
    # The server below is on hot standby
    BalancerMember http://1.2.3.6:8009 status=+H
    ProxySet lbmethod=bytraffic
</Proxy>
```

Note: The ProxyPass directive is not supported in <Directory> or <Files> sections.

When used inside a <Location> section, the first argument is omitted and the local directory is obtained from the <Location>. The same will occur inside a "<LocationMatch>" on page 340 section, however

ProxyPass does not interpret the regular expression as such, so it is necessary to use ProxyPassMatch in this situation instead.

If you require a more flexible reverse-proxy configuration, see the "RewriteRule" on page 576 directive with the [P] flag.

ProxyPassInherit

Module: mod_proxy

Syntax: ProxyPassInherit *on | off*

Default: ProxyPassInherit On

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyPassInherit off

The ProxyPassInherit directive will cause the current server/virtual host to "inherit" "ProxyPass" on page 522 directives defined in the main server.

Note: This can cause issues and inconsistent behavior if using the Balancer Manager for dynamic changes and so should be disabled if using that feature

The setting in the global server defines the default for all vhosts.

Disabling ProxyPassInherit also disables "BalancerInherit" on page 507.

ProxyPassInterpolateEnv

Module: mod_proxy

Syntax: ProxyPassInterpolateEnv *on | off*

Default: ProxyPassInterpolateEnv Off

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyPassInterpolateEnv On

The ProxyPassInterpolateEnv directive, together with the interpolate argument to ProxyPass, ProxyPassReverse, ProxyPassReverseCookieDomain and ProxyPassReverseCookiePath enables reverse proxies to be dynamically configured using environment variables, which may be set by another module such as mod_rewrite . It affects the ProxyPass, ProxyPassReverse, ProxyPassReverseCookieDomain, and

ProxyPassReverseCookiePath directives, and causes them to substitute the value of an environment variable varname for the string ${varname} in configuration directives (if the interpolate option is set).

Note: Keep this turned off (for server performance) unless you need it!

ProxyPassMatch

Module: mod_proxy

Syntax: ProxyPassMatch *[regex] !|url [key=value [key=value ...]]*

Default: none

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyPassMatch ^/(.*\.gif)$ http://backend.example.com/$1

The ProxyPassMatch directive is equivalent to "ProxyPass" on page 522 , but makes use of regular expressions, instead of simple prefix matching. The supplied regular expression is matched against the url, and if it matches, the server will substitute any parenthesized matches into the given string and use it as a new url.

Example

Suppose the local server has address http://example.com/; then ProxyPassMatch "^/(.*\.gif)$" "http://backend.example.com/$1" will cause a local request for http://example.com/foo/bar.gif to be internally converted into a proxy request to http://backend.example.com/foo/bar.gif.

The ! directive is useful in situations where you don't want to reverse-proxy a subdirectory. When used inside a <LocationMatch> section, the first argument is omitted and the regular expression is obtained from the <LocationMatch>. If you require a more flexible reverse-proxy configuration, see the RewriteRule directive with the [P] flag.

Note: The ProxyPassMatch directive is not supported in <Directory> or <Files> sections.

ProxyPassReverse

Module: mod_proxy

Syntax: ProxyPassReverse *[path] url [interpolate]*

Default: none

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyPassReverse /docs/ http://pubserver.ibm.com/public/documentation/

The ProxyPassReverse directive lets Apache adjust the URL in the Location, Content-Location and URI headers on HTTP redirect responses. This is essential when Apache is used as a reverse proxy to avoid by-passing the reverse proxy because of HTTP redirects on the backend servers which stay behind the reverse proxy.

The ProxyPassReverse directive may specify a directory path and a partial URL used to identify and adjust URLs in response headers returned to the client (via proxy). Multiple ProxyPassReverse directives are allowed.

Only the HTTP response headers specifically mentioned above will be rewritten. Apache will not rewrite other response headers, nor will it by default rewrite URL references inside HTML pages. This means that if the proxied content contains absolute URL references, they will by-pass the proxy. To rewrite HTML content to match the proxy, you must load and enable mod_proxy_html .

Parameter One: *path | url*

- The *path* parameter is the name of a local virtual path. When the directive is placed outside a location container, the first parameter accepts a directory name used to adjust response header values. If URLs specified in response headers match the url parameter (parameter two), the portion that matches is replaced with the specified directory name. Adjusted headers are then returned to the client. The directory name does not need to specify an existing directory, it may be a name used only as a virtual directory for the server.
- The *url* parameter is a partial URL for the remote server. When the directive is placed inside a location container, the first parameter accepts a partial URL used to identify URLs in URI, Location, and Content-Location response headers returned to the server as requested by the proxy function. If any of these request headers match the specified partial URL, the portion that matches is replaced with the directory name specified for the location container. Adjust headers are then returned to the client.

Parameter Two: *url*

- The *url* parameter is a partial URL for the remote server. When the directive is placed outside a location container, the second parameter accepts a partial URL used to identify URLs in URI, Location, and Content-Location response headers returned to the server as requested by the proxy function.
- When the directive is placed inside a location container a second parameter cannot be specified.

This directive provides support to be used in applications when it is essential that clients are not directed to use URLs that bypass the proxy function. It is mainly intended to provide additional function for reverse proxy, however it may also be applied to forward proxy requests handled by the server.

Suppose the local server has address http://iseries.ibm.com:

Example

```
ProxyReverse on
ProxyPass /docs/v4r4m0/ http://pubserver.ibm.com/public/v4r4m0/
ProxyPass /docs/v4r5m0/ http://pubserver.ibm.com/public/v4r5m0/
ProxyPass /docs/v5r1m0/ http://pubserver.ibm.com/public/v5r1m0/
ProxyPassReverse /docs/ http://pubserver.ibm.com/public/
ProxyPass /docs/archives/ http://pubserver.ibm.com/archives/
```

For this example, since the reverse proxy function is enabled (ProxyReverse on), a request for /docs/v4r4m0/api_reference.htm will be internally transformed into a proxy request for http://pubserver.ibm.com/public/v4r4m0/API_reference.htm (the functionality the first ProxyPass directive provides here). The use of ProxyPassReverse adjusts URLs in URI, Location, and Content-Location response headers from pubserver.ibm.com. Therefore, when the server's request is subsequently redirected by pubserver.ibm.com with the following response:

```
301 "Permanently Moved"
Location: http://pubserver.ibm.com/public/archives/440/API_reference.htm
{other response headers}

{optional body text}
```

The server changes the matching portion of the URL in the Location header (http://pubserver.ibm.com/public/) to the virtual server path (/docs/) before sending the following (adjusted) response to the client:

```
301 "Permanently Moved"
Location: http://as400.ibm.com/docs/archives/440/API_reference.htm
{other response headers}

{optional body text}
```

In this way, any new request the client sends due to the redirect response (301 "Permanently Moved") is directed back to the proxy since the Location header is adjusted. The back end server and path name (http://pubserver.ibm.com/public/) remain hidden from the client.

- This directive is only useful when used in conjunction with the "ProxyPass" on page 522 directive.
- Setting "ProxyReverse" on page 541 to *off* negates this directive.
- Setting "ProxyRequests" on page 540 to *off* does not negate this directive. It is available regardless of the proxy state.
- Note that this ProxyPassReverse directive can also be used in conjunction with the proxy feature (RewriteRule ... [P]) from mod_rewrite because it doesn't depend on a corresponding "ProxyPass" on page 522 directive.
- The optional interpolate keyword, used together with ProxyPassInterpolateEnv, enables interpolation of environment variables specified using the format *${VARNAME}*. Note that interpolation is not supported within the scheme portion of a URL.
- When used inside a "<Location> " on page 339 section, the first argument is omitted and the local directory is obtained from the "<Location> " on page 339. The same occurs inside a "<LocationMatch>" on page 340 section, but will probably not work as intended, as ProxyPassReverse will interpret the regexp literally as a path; if needed in this situation, specify the ProxyPassReverse outside the section, or in a separate "<Location> " on page 339 section.
- This directive is not supported in "<Directory> " on page 311 or "<Files>" on page 323 sections.

ProxyPassReverseCookieDomain

Module: mod_proxy

Syntax: ProxyPassReverseCookieDomain *internal-domain public-domain*

Default: none

Context: Server, Virtual Host, Directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyPassReverseCookieDomain internal.domain.com www.company.com

The ProxyPassReverseCookieDomain directive adjusts the Domain string in Set-Cookie headers from a reverse- proxied server. The usage of the ProxyPassReverseCookieDomain directive is similar to ProxyPassReverse, but instead of rewriting headers that are a URL it rewrites the domain string in Set-Cookie headers.

ProxyPassReverseCookiePath

Module: mod_proxy

Syntax: ProxyPassReverseCookiePath *internal-path public-path*

Default: none

Context: Server, Virtual Host, Directory

Override: none

Origin: Apache

UsageConsiderations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

The ProxyPassReverseCookiePath directive adjusts the Path string in Set-Cookie headers from a reverse-proxied serve. The usage of the ProxyPassReverseCookiePath directive is similar to ProxyPassReverse, but instead of rewriting headers that are a URL, this rewrites the path string in Set-Cookie headers.

ProxyPreserveHost

Module: mod_proxy

Syntax: ProxyPreserveHost on | off

Default: ProxyPreserveHost off

Context: server config, virtual host, Directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyPreserveHost on

The ProxyPreserveHost directive specifies whether the server is to preserve Host: headers when handling requests using the reverse proxy function.

Parameter: *on | off*

- If *off* is specified (the default), the server generates Host: headers for requests handled by the reverse proxy function, using the hostname (and optionally a port number) specified for the ProxyPass or RewriteRule directives.
- If *on* is specified, the server uses Host: headers sent with requests, rather than generating Host: headers, and uses the hostname (and optional port) specified for the ProxyPass or RewriteRule directives only to route the request.

Suppose, for example, the local server has the address http://as400.ibm.com/ with the following directive set up for reverse proxy:

Example

```
ProxyPass /docs/ http://pubserver.ibm.com:8080/public/documentation/
ProxyPreserveHost on
```

The server in this example is sent the following request:

```
GET /docs/manual.html HTTP/1.0
Host: virtual-host.ibm.com
{other request headers}

{optional body text}
```

The ProxyPass directive will cause the request to be internally transformed into a request for http://pubserver.ibm.com:8080/public/documentation/manual.html, and the ProxyPreserveHost directive will cause the Host: header to be preserved and passed by the proxy function, resulting in the following request sent to pubserver.ibm.com:

```
GET /public/documentation/manual.html HTTP/1.0
Host: virtual-host.ibm.com
{other request headers}

{optional body text}
```

If off were specified for ProxyPreserveHost, the Host: header would not be preserved. The server, in this case, would generate a Host: header, resulting in the following request:

```
GET /public/documentation/manual.html HTTP/1.0
Host: pubserver.ibm.com:8080
{other request headers}

{optional body text}
```

- "ProxyPassReverse" on page 534 may be used to handle HTTP redirect responses from remote servers.
- Setting "ProxyReverse" on page 541 to *off* negates this directive.
- Setting "ProxyRequests" on page 540 to *off* does not negate this directive. It is available regardless of the forward proxy state.

Note: This option should normally be turned Off. It is mostly useful in special configurations like proxied mass name-based virtual hosting, where the original Host header needs to be evaluated by the backend server.

ProxyReceiveBufferSize

Module: mod_proxy

Syntax: ProxyReceiveBufferSize *bytes*

Default: ProxyReceiveBufferSize 0

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyReceiveBufferSize 2048 The ProxyReceiveBufferSize directive specifies an explicit network buffer size for outgoing HTTP and FTP connections (for increased throughput). This directive effectively overrides the server's default TCP/IP buffer size. Possible values include 0 (zero) and all positive integers greater than or equal to 512 (the maximum value is 2,147,483,647 bytes). The value 0 (zero) indicates the system's default buffer size should be used.

Parameter: *bytes*

- The *bytes* parameter has to be greater than '512' or set to '0' to indicate that the system's default buffer size should be used.

ProxyRemote

Module: mod_proxy

Syntax: ProxyRemote *match remote-server*

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyRemote ftp http://ftpproxy.mydomain.com:8080

The ProxyRemote directive defines remote proxies for the local server. Multiple ProxyRemote directives are allowed. When a client sends a request that matches a ProxyRemote directive, the local server connects to the remote proxy server specified in the directive, rather than to the server specified in the URL. The remote proxy server retrieves the requested document and returns it to the local server, who in turn returns it to the client. This is referred to as a "proxy chain" since more than one proxy is used.

Proxy chains are useful in cases where multiple caches are used, or when the local server doesn't support the protocol (or schema) specified in the URL and must chain the request to a proxy that does support the protocol. Proxy chains may also be useful in cases where certain requests must be chained to another proxy server in order to get through a firewall or route across a virtual private network.

Parameter One: *match*

- The *match* parameter is either the name of a URL scheme that the remote proxy server supports, a partial URL that can be used to distinguish requests that should be chained from requests that need not be chained, or '*' to indicate the remote proxy server should be contacted (or chained) for all requests.

Parameter Two: *remote-server*

- The *remote-server* parameter is a partial URL for the remote server.

  Syntax: *<remote-server>=<protocol>://<hostname>[:port]*

  Where *<protocol>* is the protocol that should be used to communicate with the remote server. Only HTTP is supported by this module.

Example 1

```
ProxyRemote ftp http://ftpproxy.server.com:8080
```

Example 2

```
ProxyRemote http://server.com/ http://mirrorserver.com:8000
```

Example 3

```
ProxyRemote * http://server.com
```

In example 1, the server will forward (or chain) all FTP requests, encapsulated as yet another HTTP proxy request, to the server named ftpproxy.server.com (port 8080), which then handles the request and returns the document to the local server.

In example 2, the server will forward all requests that match the partial URL http://server.com/ to the server named mirrorserver.com (port 8000).

In example 3, all requests will be forwarded to the server named server.com.

- "ProxyBlock" on page 512 may be used to block incoming requests prior to consideration for this directive.
- Requests matching a "NoProxy" on page 508 directive are not chained.
- This directive is commonly used in conjunction with "NoProxy" on page 508 and "ProxyDomain" on page 514 for directing proxy requests within intranets.
- Setting ProxyNoConnect to on negates this directive.

ProxyRemoteMatch

Module: mod_proxy

Syntax: ProxyRemoteMatch *regex remote-server*

Default: none

Context: server, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyRemote ftp http://ftpproxy.mydomain.com:8080

The ProxyRemoteMatch is identical to the ProxyRemote directive, except the first argument is a regular expression match against the requested URL.

ProxyRequests

Module: mod_proxy

Syntax: ProxyRequests *on | off*

Default: ProxyRequests off

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyRequests on

The ProxyRequest directive allows or prevents the server from functioning as a forward proxy.

Parameter: *on | off*

- If set to *off* , the server does not function as a forward proxy (see Example 1, below).
- If set to *on*, the server functions as a forward proxy and accepts proxy requests. All other directives for the mod_proxy module are in effect.

Example 1

```
ProxyRequests off
```

Example 2

```
    ProxyRequests on
    CacheRoot /QIBM/UserData/HTTPA/CacheRoot
```

Example 3

```
    ProxyRequests on
    ProxyNoConnect on
    CacheRoot /QIBM/UserData/HTTPA/CacheRoot
```

Example 4

```
    ProxyRequests on
    CacheExpiryCheck off
    CacheRoot /QIBM/UserData/HTTPA/CacheRoot
```

- If CacheRoot is set, the proxy also activates its caching function and may serve documents from cache (by default) as well as issue direct outgoing requests (by default) (see Example 2, above). Expiry checking for cached documents is performed (by default).
- If CacheRoot is set and "ProxyNoConnect" on page 521 is set to *on*, the proxy activates its caching function but will only serve documents from cache. It will not issue outgoing requests (see Example 3, above). Expiry checking for cached documents is performed.
- If CacheRoot is set and "CacheExpiryCheck" on page 270 is set to *off*, the proxy activates its caching function but will not check expiry times for cached documents. Expired documents may be served from cache (see Example 4, above).
- Setting "ProxyRequests" on page 540 to *off* negates all directives for the mod_proxy module, except for the "ProxyPass" on page 522 and "ProxyPassReverse" on page 534 directives.

ProxyReverse

Module: mod_proxy

Syntax: ProxyReverse *on | off*

Default: ProxyReverse on

Context: server config, virtual host

Override: none

Origin: IBM

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyReverse off

The ProxyReverse directive specifies whether the server may function as a reverse proxy to handle requests. The reverse proxy function is enabled by default, however other directives must specify how the server identifies and maps requests for reverse proxy. If off is specified, the reverse proxy function is disabled, and directives that apply the function (ProxyPass and RewriteRule directives using the 'proxy' flag) are ineffective. See "ProxyPass" on page 522 and "RewriteRule" on page 576 for more details on reverse proxy.

Parameter: *on | off*

- If set to *off* , the server does not function as a reverse proxy (see Example 1).
- If set to *on*, the server functions as a reverse proxy to handle requests identified and mapped for reverse proxy

Example 1

```
ProxyReverse off
ProxyPass /docs/ http://pubserver.ibm.com/public/documentation/
```

For example one, the reverse proxy function is disabled. The ProxyPass directive is ineffective.

In the following example, the reverse proxy function is enabled. The server functions as a reverse proxy to handle requests that match the path specified for the ProxyPass directive.

Example 2

```
ProxyReverse on
ProxyPass /docs/ http://pubserver.ibm.com/public/documentation/
```

See "ProxyPass" on page 522 for more details.

Proxyset

Module: mod_proxy

Syntax: ProxySet *[path] [key=value key=value ...]]*

Default: none

Context: server config, Virtual Host, Directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule balancer_proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example:

```
RewriteRule ^/mbp/(.*) balancer://ourcluster/$1 [P]
<Proxy balancer://myCluster>
.....
ProxySet stickysession=OUR_COOKIE timeout=20 nofailover=On
</Proxy>
```

```
<Proxy "balancer://hotcluster">
    BalancerMember "http://www2.example.com:8080" loadfactor=1
    BalancerMember "http://www3.example.com:8080" loadfactor=2
    ProxySet lbmethod=bytraffic
 </Proxy>
ProxySet "balancer://foo" lbmethod=bytraffic timeout=15
```

The ProxySet is similar to the ProxyPass directive. If the ProxySet directive scheme starts with the balancer:// then a virtual worker that does not really communicate with the backend server will be created. Instead it is responsible for the management of several "real" workers. In that case the special set of parameters can be added to this virtual worker. These same parameters can also be added to the ProxySet directive when balancer:// is specified. The following table displays the parameters for all proxy workers in a group or cluster.

Table 45. ProxySet parameters

Header	**Default**	**Description**
lbmethod	byrequests	Balancer load-balance method. Select the load-balancing scheduler method to use. Either byrequests, to perform weighted request counting or bytraffic, to perform weighted traffic byte count balancing, or bybusyness, to perform pending request balancing. Default is byrequests.
maxattempts	One less than the number of workers, or 1 with a single worker.	Maximum number of failover attempts before giving up.
nofailover	Off	If set to On the session will break if the worker is in error state or disabled. Set this value to On if backend servers do not support session replication.
stickysession	-	Balancer sticky session name. The value is usually set to something like JSESSIONID or PHPSESSIONID, and it depends on the backend application server that support sessions. If the backend application server uses different name for cookies and url encoded id (like servlet containers) use | to separate them. The first part is for the cookie the second for the path.

Table 45. ProxySet parameters (continued)

Header	Default	Description
stickysessionsep	"."	Sets the separation symbol in the session cookie. Some backend application servers do not use the '.' as the symbol. For example the Oracle Weblogic server uses '!'. The correct symbol can be set using this option. The setting of 'Off' signifies that no symbol is used.
scolonpathdelim	Off	If set to On the semi-colon character ';' will be used as an additional sticky session path delimiter/separator. This is mainly used to emulate mod_jk's behavior when dealing with paths such as JSESSIONID=6736bcf34;foo=aabfa
timeout	0	Balancer timeout in seconds. If set this will be the maximum time to wait for a free worker. Default is not to wait.
failonstatus	-	A single or comma-separated list of HTTP status codes. If set this will force the worker into error state when the backend returns any status code in the list. Worker recovery behaves the same as other worker errors.
failontimeout	Off	If set, an IO read timeout after a request is sent to the backend will force the worker into error state. Worker recovery behaves the same as other worker errors.
nonce	<auto>	The protective nonce used in the balancer-manager application page. The default is to use an automatically determined UUID-based nonce, to provide for further protection for the page. If set, then the nonce is set to that value. A setting of None disables all nonce checking. **Note:** In addition to the nonce, the balancer-manager page should be protected via an ACL.
growth	0	Number of additional BalancerMembers to allow to be added to this balancer in addition to those defined at configuration.

Table 45. ProxySet parameters (continued)

Header	Default	Description
forcerecovery	On	Force the immediate recovery of all workers without considering the retry parameter of the workers if all workers of a balancer are in error state. There might be cases where an already overloaded backend can get into deeper trouble if the recovery of all workers is enforced without considering the retry parameter of each worker. In this case set to Off.

You MUST specify the ProxySet directive AFTER the BalancerMember directives.

ProxySourceAddress

Module: mod_proxy

Syntax: ProxySourceAddress address

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxySourceAddress 192.168.0.100

The ProxySourceAddress directive allows to set a specific local address to bind to when connecting to a backend server.

ProxyTimeout

Module: mod_proxy

Syntax: ProxyTimeout *period*

Default: none (the general server timeout value is used)

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyTimeout 300

The ProxyTimeout directive specifies the maximum number of minutes the server will wait for responses from remote servers when handling proxy requests. If not specified, the general server timeout value is used (see the "TimeOut" on page 361 directive).

Parameter: *period*

- The *period* parameter accepts an integer value between 1 and 2,147,483,648 to specify the maximum period of time the server should wait for responses from remote servers (in seconds).

If a response is not received in the specified number of seconds, the server will cancel the request and return response code 504 (Gateway timeout).

Example

```
ProxyTimeout 120
```

For this example, the server will wait up to 120 seconds (or 2 minute) for responses from remote servers.

- "ProxyPassReverse" on page 534 may be used to handle HTTP redirect responses from remote servers.
- Setting "ProxyReverse" on page 541 to *off* negates this directive.
- Setting "ProxyRequests" on page 540 to *off* does not negate this directive. It is available regardless of the forward proxy state.

ProxyVia

Module: mod_proxy

Syntax: ProxyVia *off | on | full | block*

Default: ProxyVia off

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyVia on

The ProxyVia directive controls the server's use of the Via: HTTP header. Its intended use is to control the flow of proxy requests along a chain of servers. See RFC2068 (HTTP/1.1) for an explanation of Via: header lines.

Parameter: ***off | on | full | block***

- If set to *off* (the default value), no special processing is performed. The proxy does not include a Via: header line, however any existing Via: headers from other proxy servers are kept intact.
- If set to *on* , each request and reply will get a Via: header line added for the current host. The proxy includes its own, abbreviated Via: header line. Any additional Via: header lines from other proxy servers are kept intact.
- If set to *full*, each generated Via: header line will additionally have HTTP Server version shown on the Via: comment field. The proxy includes its own, full Via: header (containing the proxy's version description). Any additional Via: header lines from other proxy servers are kept intact.
- If set to *block*, every proxy request will have all its Via: header lines removed. No new Via: header will be generated. The proxy does not include a Via: header and removes all existing Via headers from other proxy servers.

A server may be a participant in a proxy chain even though it is not specifically configured to chain its own requests. For this reason, it may be necessary to control the server's use of the Via: HTTP header even though it is not specifically configured for proxy chaining (see "ProxyRemote" on page 539 for more details about proxy chains).

Module mod_proxy_connect

Module mod_proxy_connect supports directives for the IBM HTTP Server for i Web server.

Summary

This module provides support for the CONNECT HTTP method. This method is mainly used to tunnel SSL requests through proxy servers. CONNECT is also used when the server needs to send an HTTPS request through a forward proxy. In this case the server acts as a CONNECT client.

Note: The modules require the following LoadModules in HTTP Server configuration file:

- LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Directives

- "AllowCONNECT" on page 547

AllowCONNECT

Module: mod_proxy_connect

Syntax: AllowCONNECT *port[-port] [port[-port]] ...*

Default: AllowCONNECT 443 563

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: AllowCONNECT 1070-1078 8080-8088

The AllowCONNECT directive specifies a list of port numbers or ranges the server allows clients to specify when using the proxy CONNECT method. Clients use the CONNECT method when HTTPS connections are requested and proxy tunneling over HTTP is in effect. By default, only the default HTTPS port (443) and the default SNEWS port (563) are enabled. Use this directive to override the default and only allow connections that use one of the listed ports.

Parameter: *port[-port] [port[-port]] ...*

- The *port[-port] [port[-port]]* .. parameter can consist of a string of port numbers or ranges separated by spaces (see examples below).

  ```
  AllowCONNECT 443 563 1070 8088
  AllowCONNECT 1070-1078 8080-808
  ```

- ProxyBlock may be used to block incoming requests prior to this directive's consideration.
- Setting ProxyRequests to off negates this directive.

This directive may be configured multiple times in a container. The directives are processed from the first to the last occurrence.

Module mod_proxy_ftp

Directives

- “ProxyFtpEscapeWildcards” on page 548
- “ProxyFtpListOnWildcard” on page 548

ProxyFtpEscapeWildcards

Module: mod_proxy_ftp

Syntax: ProxyFtpEscapeWildcards *on|off*

Default: on

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyFtpEscapeWildcards off

The ProxyFtpEscapeWildcards directive controls whether wildcard characters ("*?[{~") in requested filenames are escaped with backslash before sending them to the FTP server. That is the default behavior, but many FTP servers don't know about the escaping and try to serve the literal filenames they were sent, including the backslashes in the names.

Set to "off" to allow downloading files with wildcards in their names from FTP servers that don't understand wildcard escaping.

ProxyFtpListOnWildcard

Module: mod_proxy_ftp

Syntax: ProxyFtpEscapeWildcards *on|off*

Default: on

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyFtpEscapeWildcards off

The ProxyFtpListOnWildcard directive controls whether wildcard characters ("*?[{~") in requested filenames cause mod_proxy_ftp to return a listing of files instead of downloading a file. By default (value on), they do. Set to "off" to allow downloading files even if they have wildcard characters in their names.

Module mod_proxy_html

Module mod_proxy_html supports directives for the IBM HTTP Server for i Web server.

Summary

The mod_proxy_html module provides an output filter to rewrite HTML links in a proxy situation, to ensure that links work for users outside the proxy. It serves the same purpose as HTTP Server's ProxyPassReverse directive does for HTTP headers, and is an essential component of a reverse proxy.

For example, if a company has an application server at appserver.example.com that is only visible from within the company's internal network, and a public webserver www.example.com, they may wish to provide a gateway to the application server at http://www.example.com/appserver/. When the application server links to itself, those links need to be rewritten to work through the gateway. mod_proxy_html serves to rewrite <a href="http://appserver.example.com/foo/bar.html">foobar</a> to <a href="http://www.example.com/appserver/foo/bar.html"> foobar</a> making it accessible from outside.

Note: The mod_proxy_html directives require the following LoadModules in HTTP Server configuration file:

- LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_html_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Directives

- “ProxyHTMLMeta” on page 555
- “ProxyHTMLStripComments” on page 556
- “ProxyHTMLURLMap” on page 557

ProxyHTMLBufSize

Module: mod_proxy_html

Syntax: ProxyHTMLBufSize *bytes*

Default: ProxyHTMLBufSize *8192*

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_html_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyHTMLBufSize 10240

The ProxyHTMLBufSize directive sets the buffer size increment for buffering inline scripts and stylesheets. In order to parse non-HTML content (stylesheets and scripts) embedded in HTML documents, mod_proxy_html has to read the entire script or stylesheet into a buffer. This buffer will be expanded as necessary to hold the largest script or stylesheet in a page, in increments of bytes as set by this directive.

The default is 8192, and will work well for almost all pages. However, if you know you're proxying pages containing stylesheets and/or scripts bigger than 8K (that is, for a single script or stylesheet, NOT in total), it will be more efficient to set a larger buffer size and avoid the need to resize the buffer dynamically during a request.

ProxyHTMLCharsetOut

Module: mod_proxy_html

Syntax: ProxyHTMLCharsetOut Charset | *

Default: ProxyHTMLCharsetOut UTF-8

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_html_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule xml2enc_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example:

ProxyHTMLCharsetOut *

ProxyHTMLCharsetOut ISO-8859-1

The ProxyHTMLCharsetOut directive specifies a charset for mod_proxy_html output. This selects an encoding for mod_proxy_html output. It should not normally be used, as any change from the default UTF-8 (Unicode) will impose an additional processing overhead. The special token ProxyHTMLCharsetOut * will generate output using the same encoding as the input.

Note: This directive requires mod_xml2enc to be loaded.

ProxyHTMLDocType

Module: mod_proxy_html

Syntax: ProxyHTMLDocType *HTML|XHTML [Legacy]* OR *ProxyHTMLDocType fpi [SGML|XML]*

Default: none

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_html_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyHTMLDocType XHTML

The ProxyHTMLDocType directive sets an HTML or XHTML document type declaration. In the first form, documents will be declared as HTML 4.01 or XHTML 1.0 according to the option selected. This option also determines whether HTML or XHTML syntax is used for output. Note that the format of the documents coming from the backend server is immaterial: the parser will deal with it automatically. If the optional second argument is set to "Legacy", documents will be declared "Transitional", an option that may be necessary if you are proxying pre-1998 content or working with defective authoring/publishing tools.

In the second form, it will insert your own FPI. The optional second argument determines whether SGML/HTML or XML/XHTML syntax will be used.

The default is changed to omitting any FPI, on the grounds that no FPI is better than a bogus one. If your backend generates decent HTML or XHTML, set it accordingly.

If the first form is used, mod_proxy_html will also clean up the HTML to the specified standard. It cannot fix every error, but it will strip out bogus elements and attributes. It will also optionally log other errors at LogLevel Debug.

ProxyHTMLEnable

Module: mod_proxy_html

Syntax: ProxyHTMLEnable *on|off*

Default: ProxyHTMLEnable *off*

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_html_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyHTMLEnable On

The ProxyHTMLEnable directive turns the proxy_html filter on or off. It's a simple switch to enable or disable the proxy_html filter. If mod_xml2enc is loaded it will also automatically set up internationalization support.

Note: The proxy_html filter will only act on HTML data (Content-Type text/html or application/xhtml+xml) when the data are proxied.

ProxyHTMLEvents

Module: mod_proxy_html

Syntax: ProxyHTMLEvents *attribute [attribute ...]*

Default: None

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_html_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyHTMLEvents onclick ondblclick onmousedown onmouseup

The ProxyHTMLEvents directive specifies one or more attributes to treat as scripting events and apply ProxyHTMLURLMaps to where enabled. You can specify any number of attributes in one or more ProxyHTMLEvents directives.

Normally you'll set this globally. If you set ProxyHTMLEvents in more than one scope so that one overrides the other, you'll need to specify a complete set in each of those scopes.

Below is a default configuration which defines the events in standard HTML 4 and XHTML 1. You can directly add the needed ones to your HTTP server configuration file or simply create a proxy-html.conf file with all the following configurations and have the file included to your HTTP server configuration file(i.e. Include conf/proxy_html.conf).

# To support scripting events (with ProxyHTMLExtended On),

# you'll need to declare them too.

```
ProxyHTMLEvents    onclick ondblclick onmousedown onmouseup \
        onmouseover onmousemove onmouseout onkeypress \
        onkeydown onkeyup onfocus onblur onload \
        onunload onsubmit onreset onselect onchange
```

ProxyHTMLExtended

Module: mod_proxy_html

Syntax: ProxyHTMLExtended *on|off*

Default: ProxyHTMLExtended *off*

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_html_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyHTMLExtended On

The ProxyHTMLExtended directive determines whether to fix links in inline scripts, stylesheets, and scripting events.

Parameter: *On | Off*

- If *off* is specified (the default), HTML links are rewritten according to the ProxyHTMLURLMap directives, but links appearing in Javascript and CSS are ignored.
- If *on* is specified, all scripting events (as determined by ProxyHTMLEvents) and embedded scripts or stylesheets are also processed by the ProxyHTMLURLMap rules, according to the flags set for each rule. Since this requires more parsing, performance will be best if you only enable it when strictly necessary.

Note: You'll also need to take care over patterns matched, since the parser has no knowledge of what is a URL within an embedded script or stylesheet. In particular, extended matching of / is likely to lead to false matches.

ProxyHTMLFixups

Module: mod_proxy_html

Syntax: ProxyHTMLFixups *[lowercase] [dospath] [reset]*

Default: None

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_html_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyHTMLFixups lowercase

The ProxyHTMLFixups directive fixes for simple HTML errors. This directive takes one to three parameters as follows:

Parameter: ***[lowercase] [dospath] [reset]***

- **lowercase** Urls are rewritten to lowercase
- **dospath** Backslashes in URLs are rewritten to forward slashes.
- **reset** Unset any options set at a higher level in the configuratio

Note: Take care when using these. The fixes will correct certain authoring mistakes, but risk also erroneously fixing links that were correct to start with. Only use them if you know you have a broken backend server.

ProxyHTMLInterp

Module: mod_proxy_html

Syntax: ProxyHTMLInterp *on|off*

Default: ProxyHTMLInterp Off

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_html_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyHTMLInterp On

The ProxyHTMLInterp directive per-request interpolation in ProxyHTMLURLMap to- and from- patterns.

Parameter: ***on | off***

- If *off* is specified (the default), all rules are pre-compiled at startup.
- If *on* is specified, all rules are re-compiled for every request, which implies an extra processing overhead. It should therefore be enabled only when necessary.

ProxyHTMLLinks

Module: mod_proxy_html

Syntax: ProxyHTMLLinks *element attribute [attribute2 ...]*

Default: None

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_html_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyHTMLLinks a href

The ProxyHTMLLinks directive specifies HTML elements that have URL attributes that should be rewritten using standard ProxyHTMLURLMaps. You will need one ProxyHTMLLinks directive per element, but it can have any number of attributes.

Normally you'll set this globally. If you set ProxyHTMLLinks in more than one scope so that one overrides the other, you'll need to specify a complete set in each of those scopes.

Below is a default configuration which defines the HTML links for standard HTML 4 and XHTML 1. You can directly add the needed ones to your HTTP server configuration file or simply create a proxy-html.conf file with all the following configurations and have the file included to your HTTP server configuration file(i.e. Include conf/proxy_html.conf).

```
# Here's the declaration for W3C HTML 4.01 and XHTML 1.0

 ProxyHTMLLinks a                      href
 ProxyHTMLLinks area                   href
 ProxyHTMLLinks link                   href
 ProxyHTMLLinks img                    src longdesc usemap
 ProxyHTMLLinks object                 classid codebase data usemap
 ProxyHTMLLinks q                      cite
 ProxyHTMLLinks blockquote             cite
 ProxyHTMLLinks ins                    cite
 ProxyHTMLLinks del                    cite
 ProxyHTMLLinks form                   action
 ProxyHTMLLinks input                  src usemap
 ProxyHTMLLinks head                   profile
 ProxyHTMLLinks base                   href
 ProxyHTMLLinks script                 src for

# If you need to support legacy (pre-1998, aka "transitional") HTML or XHTML,
# you'll need to uncomment the following deprecated link attributes.
#
 # ProxyHTMLLinks              frame          src longdesc
 # ProxyHTMLLinks              iframe         src longdesc
 # ProxyHTMLLinks              body           background
 # ProxyHTMLLinks              applet         codebase

#
# If you're dealing with proprietary HTML variants,
# declare your own URL attributes here as required.
#
 # ProxyHTMLLinks            myelement          myattr otherattr
```

ProxyHTMLMeta

Module: mod_proxy_html

Syntax: ProxyHTMLMeta *On|Off*

Default: ProxyHTMLMeta *Off*

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_html_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyHTMLMeta On

The ProxyHTMLMeta directive turns on or off pre-parsing of metadata in HTML <head> sections.

ProxyHTMLMeta has two effects. Firstly and most importantly it enables detection of character encodings declared in the form <meta http-equiv="Content-Type" content="text/html;charset=foo"> or, in the case of an XHTML document, an XML declaration. It is NOT required if the charset is declared in a real HTTP header (which is always preferable) from the backend server, nor if the document is utf-8 (unicode) or a subset such as ASCII.

The other effect of enabling ProxyHTMLMeta is to parse all <meta http-equiv=...> declarations and convert them to real HTTP headers, in keeping with the original purpose of this form of the HTML <meta> element.

If not required, turning ProxyHTMLMeta Off will give a small performance boost by skipping this parse step. However, it is sometimes necessary for internationalization to work correctly.

ProxyHTMLStripComments

Module: mod_proxy_html

Syntax: ProxyHTMLStripComments *On|Off*

Default: ProxyHTMLStripComments *Off*

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_html_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyHTMLStripComments On

The ProxyHTMLStripComments directive determines whether to strip HTML comments.

Note: This will also kill off any scripts or styles embedded in comments. It may also interfere with comment-based processors such as SSI: be sure to run any of those before mod_proxy_html in the filter chain if stripping comments.

ProxyHTMLURLMap

Module: mod_proxy_html

Syntax: ProxyHTMLURLMap *from-pattern to-pattern [flags] [cond]*

Default: None

Context: server config, virtual host, directory

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_html_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: ProxyHTMLURLMap http://www.internal.com/ /reverseProxy/

The ProxyHTMLURLMap directive defines a rule to rewrite HTML links. This is the key directive for rewriting HTML links. When parsing a document, whenever a link target matches *from-pattern*, the matching portion will be rewritten to *to-pattern*, as modified by any flags supplied and by the ProxyHTMLExtended directive.

The optional third argument may define any of the following **Flags**. Flags are case-sensitive.

flag	**description**
h	Ignore HTML links (pass through unchanged)
e	Ignore scripting events (pass through unchanged)
c	Pass embedded script and style sections through untouched.
L	Last-match. If this rule matches, no more rules are applied (note that this happens automatically for HTML links).
l	Opposite to L. Overrides the one-change-only default behavior with HTML links.
R	Use Regular Expression matching-and-replace. from-pattern is a regexp, and to-pattern is a replacement string that may be based on the regexp. Regexp memory is supported: you can use brackets () in the from-pattern and retrieve the matches with $1 to $9 in the to-pattern. If R is not set, it will use string-literal search-and-replace. The logic is *starts-with* in HTML links, but *contains* in scripting events and embedded script and style sections.
x	Use POSIX extended Regular Expressions. Only applicable with R.
i	Case-insensitive matching. Only applicable with R.

flag	description
n	Disable regexp memory (for speed). Only applicable with R.
s	Line-based regexp matching. Only applicable with R. **Note:** The newline character is 0x0A(LF)
^	Match at start only. This applies only to string matching (not regexps) and is irrelevant to HTML links.
$	Match at end only. This applies only to string matching (not regexps) and is irrelevant to HTML links.
V	Interpolate environment variables in to-pattern. A string of the form ${varname|default} will be replaced by the value of environment variable varname. If that is unset, it is replaced by default. The |default is optional. **Note:** interpolation will only be enabled if ProxyHTMLInterp is *On*.
v	Interpolate environment variables in from-pattern. Patterns supported are as above. **Note:** interpolation will only be enabled if ProxyHTMLInterp is *On*

The optional fourth cond argument defines a condition that will be evaluated per Request, provided ProxyHTMLInterp is On. If the condition evaluates FALSE the map will not be applied in this request. If TRUE, or if no condition is defined, the map is applied.

Module mod_proxy_scgi

Directives

- "ProxySCGIInternalRedirect" on page 558
- "ProxySCGISendfile" on page 559

ProxySCGIInternalRedirect

Module: mod_proxy_scgi

Load_Module:

```
proxy_scgi_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Syntax: ProxySCGIInternalRedirect *on|off*

Default: on

Context: server config, virtual host, directory

Override: none

Origin: Apache

Current® GUI Location: None

Example: ProxySCGIInternalRedirect off

The ProxySCGIInternalRedirect enables the backend to internally redirect the gateway to a different URL. This feature origins in mod_cgi, which internally redirects the response, if the response status is OK (200) and the response contains a Location header and its value starts with a slash (/). This value is interpreted as a new local URL the apache internally redirects to.

mod_proxy_scgi does the same as mod_cgi in this regard, except that you can turn off the feature.

ProxySCGISendfile

Module: mod_proxy_scgi

Load_Module:

```
proxy_scgi_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Syntax: ProxySCGISendfile *On|Off|Headername*

Default: ProxySCGISendfile Off

Context: server config, virtual host, directory

Override: none

Origin: Apache

Current GUI Location: None

Example: ProxySCGISendfile On

The ProxySCGISendfile directive enables the SCGI backend to let files serve directly by the gateway. This is useful performance purposes -- the httpd can use sendfile or other optimizations, which are not possible if the file comes over the backend socket.

The ProxySCGISendfile argument determines the gateway behaviour:

off No special handling takes place.

On The gateway looks for a backend response header called X-Sendfile and interprets the value as filename to serve. The header is removed from the final response headers. This is equivalent to ProxySCGISendfile X-Sendfile.

anything else Similar to On, but instead of the hardcoded header name the argument is applied as header name.

Module mod_remoteip

Module mod_remoteip supports directives for the IBM HTTP Server for i Web server.

Summary

The module mod_remoteip is used to treat the useragent which initiated the request as the originating useragent as identified by HTTP server for the purposes of authorization and logging, even where that useragent is behind a load balancer, front end server, or proxy server.

The module mod_remoteip overrides the client IP address for the connection with the useragent IP address reported in the request header configured with the RemoteIPHeader directive. Once replaced as instructed, this overridden useragent IP address is then used for the mod_authz_host <Require ip> feature, and is recorded by mod_log_config %a and core %a format strings. The underlying client IP of the connection is available in the %{c}a format string.

Remote IP Processing

HTTP server by default identifies the useragent with the connection's client_ip value, and the connection remote_host and remote_logname are derived from this value. These fields play a role in authentication, authorization and logging and other purposes by other loadable modules.

mod_remoteip overrides the client IP of the connection with the advertised useragent IP as provided by a proxy or load balancer, for the duration of the request. A load balancer might establish a long lived keepalive connection with the server, and each request will have the correct useragent IP, even though the underlying client IP address of the load balancer remains unchanged.

When multiple, comma delimited useragent IP addresses are listed in the header value, they are processed in Right-to-Left order. Processing halts when a given useragent IP address is not trusted to present the preceding IP address. The header field is updated to this remaining list of unconfirmed IP addresses, or if all IP addresses were trusted, this header is removed from the request altogether.

In overriding the client IP, the module stores the list of intermediate hosts in a remoteip-proxy-ip-list note, which mod_log_config can record using the %{remoteip-proxy-ip-list}n format token. If the administrator needs to store this as an additional header, this same value can also be recording as a header using the directive RemoteIPProxiesHeader.

Directives

- “RemoteIPHeader” on page 560
- “RemoteIPInternalProxy” on page 561
- “RemoteIPInternalProxyList” on page 561
- “RemoteIPProxiesHeader” on page 561
- “RemoteIPTrustedProxy” on page 562
- “RemoteIPTrustedProxyList” on page 562

RemoteIPHeader

Module: mod_remoteip

Syntax: RemoteIPHeader *header-field*

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Examples: RemoteIPHeader X-Client-IP

Examples: RemoteIPHeader X-Forwarded-For

The RemoteIPHeader directive triggers mod_remoteip to treat the value of the specified header-field header as the useragent IP address, or list of intermediate useragent IP addresses, subject to further configuration of the “RemoteIPInternalProxy” on page 561 and “RemoteIPTrustedProxy” on page 562 directives. Unless these other directives are used, mod_remoteip will trust all hosts presenting a RemoteIPHeader IP value.

Example 1

```
#Internal (Load Balancer)
RemoteIPHeader X-Client-IP
```

Example 2

```
#Proxy
RemoteIPHeader X-Forwarded-For
```

RemoteIPInternalProxy

Module: mod_remoteip

Syntax: RemoteIPInternalProxy *proxy-ip|proxy-ip/subnet|hostname ...*

Default: none

Context: Server config, virtual host

Override: none

Origin: Apache

Examples: RemoteIPInternalProxy 10.0.2.0/24

The RemoteIPInternalProxy directive adds one or more addresses (or address blocks) to trust as presenting a valid "RemoteIPHeader" on page 560 value of the useragent IP. Unlike the "RemoteIPTrustedProxy" on page 562 directive, any IP address presented in this header, including private intranet addresses, are trusted when passed from these proxies.

Example:

```
#Internal (Load Balancer)
RemoteIPHeader X-Client-IP
RemoteIPInternalProxy 10.0.2.0/24
RemoteIPInternalProxy gateway.localdomain
```

RemoteIPInternalProxyList

Module: mod_remoteip

Syntax: RemoteIPInternalProxyList *filename*

Default: none

Context: Server config, virtual host

Override: none

Origin: Apache

Examples: RemoteIPInternalProxyList conf/trusted-proxies.lst

The RemoteIPInternalProxyList directive specifies a file parsed at startup, and builds a list of addresses (or address blocks) to trust as presenting a valid RemoteIPHeader value of the useragent IP.

The '#' hash character designates a comment line, otherwise each whitespace or newline separated entry is processed identically to the RemoteIPInternalProxy directive.

Example:

```
#Internal (Load Balancer)
RemoteIPHeader X-Client-IP
RemoteIPInternalProxyList conf/trusted-proxies.lst
```

Example of conf/trusted-proxies.lst contents

```
# Our internally trusted proxies;
10.0.2.0/24         #Everyone in the testing group
gateway.localdomain #The front end balancer
```

RemoteIPProxiesHeader

Module: mod_remoteip

Syntax: RemoteIPProxiesHeader *HeaderFiledName*

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Examples:

```
RemoteIPHeader X-Forwarded-For
RemoteIPProxiesHeader X-Forwarded-By
```

The RemoteIPProxiesHeader directive specifies a header into which mod_remoteip will collect a list of all of the intermediate client IP addresses trusted to resolve the useragent IP of the request. Note that intermediate RemoteIPTrustedProxy addresses are recorded in this header, while any intermediate RemoteIPInternalProxy addresses are discarded.

RemoteIPTrustedProxy

Module: mod_remoteip

Syntax: RemoteIPProxiesHeader *HeaderFiledName*

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Examples: RemoteIPTrustedProxy 10.0.2.16/28

Examples: RemoteIPTrustedProxy proxy.example.com

The RemoteIPTrustedProxy directive adds one or more addresses (or address blocks) to trust as presenting a valid RemoteIPHeader value of the useragent IP. Unlike the RemoteIPInternalProxy directive, any intranet or private IP address reported by such proxies, including the 10/8, 172.16/12, 192.168/16, 169.254/16 and 127/8 blocks (or outside of the IPv6 public 2000::/3 block) are not trusted as the useragent IP, and are left in the RemoteIPHeader header's value.

Example:

```
#Trusted (Load Balancer)
RemoteIPHeader X-Forwarded-For
RemoteIPTrustedProxy 10.0.2.16/28
RemoteIPTrustedProxy proxy.example.com
```

RemoteIPTrustedProxyList

Module: mod_remoteip

Syntax: RemoteIPTrustedProxyList *filename*

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Examples: RemoteIPTrustedProxyList conf/trusted-proxies.lst

The RemoteIPTrustedProxyList directive specifies a file parsed at startup, and builds a list of addresses (or address blocks) to trust as presenting a valid "RemoteIPHeader" on page 560 value of the useragent IP.

The '#' hash character designates a comment line, otherwise each whitespace or newline separated entry is processed identically to the RemoteIPTrustedProxy directive.

Example:

```
#Trusted(Load Balancer)
RemoteIPHeader X-Forwarded-For
RemoteIPTrustedProxyList conf/trusted-proxies.lst
```

Example of conf/trusted-proxies.lst contents

```
# Identified external proxies;
192.0.2.16/28 #wap phone group of proxies
proxy.isp.example.com #some well known ISP
```

Module mod_reflector

Module mod_reflector supports directives for the IBM HTTP Server for i Web server.

Summary

The module mod_reflector allows request bodies to be reflected back to the client, in the process passing the request through the output filter stack. A suitably configured chain of filters can be used to transform the request into a response. This module can be used to turn an output filter into an HTTP service.

Directives

- "ReflectorHeader" on page 563

ReflectorHeader

Module: mod_reflector

Syntax: ReflectorHeader *inputheader [outputheader]*

Default: None

Context: server config, virtual host, directory, .htaccess

Override: Options

Origin: Apache

Example: ReflectorHeader My-header My-response-header

The ReflectorHeader directive controls the reflection of request headers to the response. The first argument is the name of the request header to copy. If the optional second argument is specified, it will be used as the name of the response header, otherwise the original request header name will be used.

Example 1: Compression service

Pass the request body through the DEFLATE filter to compress the body. This request requires a Content-Encoding request header containing "gzip" for the filter to return compressed data.

```
<Location /compress>
   SetHandler reflector
   SetOutputFilter DEFLATE
</Location>
```

Example 2：Image downsampling service

Pass the request body through an image downsampling filter, and reflect the results to the caller.

```
<Location /downsample>
   SetHandler reflector
   SetOutputFilter DOWNSAMPLE
</Location>
```

Example 3：

The value of request header "My-header" will be passed to repsonse header "My-response-header"

```
<Location /compress>
   SetHandler reflector
   ReflectorHeader My-header My-response-header
</Location>
```

Module mod_reqtimeout

Module mod_reqtimeout supports directives for the IBM HTTP Server for i Web server.

Summary

The module mod_reflector sets timeout and minimum data rate for receiving requests.

Directives

- "RequestReadTimeout" on page 564

RequestReadTimeout

Module: mod_reqtimeout

Syntax: RequestReadTimeout *[header=timeout[-maxtimeout][,MinRate=rate] [body=timeout[-maxtimeout][,MinRate=rate]*

Default: header=20-40,MinRate=500 body=20,MinRate=500

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows:

```
LoadModule reqtimeout_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

Example: RequestReadTimeout header=10 body=30

Example: RequestReadTimeout header=10-30,MinRate=500

The RequestReadTimeout directive can set various timeouts for receiving the request headers and the request body from the client. If the client fails to send headers or body within the configured time, a 408 REQUEST TIME OUT error is sent.

For SSL virtual hosts, the header timeout values also include the time needed to do the initial SSL handshake. Therefore the header timeout values should not be set to very low values for SSL virtual hosts. The body timeout values include the time needed for SSL renegotiation (if necessary).

For each of the two timeout types (header or body), there are three ways to specify the timeout:

- **Fixed timeout value:**

```
      type=timeout
```

The time in seconds allowed for reading all of the request headers or body, respectively. A value of 0 means no limit.

- **Disable module for a vhost:**

  ```
        header=0 body=0
  ```

  This disables mod_reqtimeout completely.
- **Timeout value that is increased when data is received:**

  ```
        type=timeout,MinRate=data_rate
  ```

  Same as above, but whenever data is received, the timeout value is increased according to the specified minimum data rate (in bytes per second).
- **Timeout value that is increased when data is received, with an upper bound:**

  ```
        type=timeout-maxtimeout,MinRate=data_rate
  ```

  Same as above, but the timeout will not be increased above the second value of the specified timeout range.

Example 1:

Allow 10 seconds to receive the request including the headers and 30 seconds for receiving the request body:

```
RequestReadTimeout header=10 body=30
```

Example 2:

Allow at least 10 seconds to receive the request body. If the client sends data, increase the timeout by 1 second for every 1000 bytes received, with no upper limit for the timeout (except for the limit given indirectly by "LimitRequestBody" on page 334):

```
RequestReadTimeout body=10,MinRate=1000
```

Example 3

Allow at least 10 seconds to receive the request including the headers. If the client sends data, increase the timeout by 1 #second for every 500 bytes received. But do not allow more than 30 seconds for the request including the headers:

```
RequestReadTimeout header=10-30,MinRate=500
```

Example 4

Usually, a server should have both header and body timeouts configured. If a common configuration is used for http and #https virtual hosts, the timeouts should not be set too low:

```
RequestReadTimeout header=20-40,MinRate=500 body=20,MinRate=500
```

Module mod_request

Module mod_request supports directives for the IBM HTTP Server for i Web server.

Summary

The module mod_request provides filters to handle and make available HTTP request bodies.

Directives

- "KeptBodySize" on page 566

KeptBodySize

Module: mod_request

Syntax: KeptBodySize *size*

Default: KeptBodySize 0

Context: directory

Override: none

Origin: Apache

Under normal circumstances, request handlers such as the default handler for static files will discard the request body when it is not needed by the request handler. As a result, filters such as mod_include are limited to making GET requests only when including other URLs as subrequests, even if the original request was a POST request, as the discarded request body is no longer available once filter processing is taking place.

When this directive has a value greater than zero, request handlers that would otherwise discard request bodies will instead set the request body aside for use by filters up to the maximum size specified. In the case of the mod_include filter, an attempt to POST a request to the static shtml file will cause any subrequests to be POST requests, instead of GET requests as before.

This feature makes it possible to break up complex web pages and web applications into small individual components, and combine the components and the surrounding web page structure together using mod_include. The components can take the form of CGI programs, scripted languages, or URLs reverse proxied into the URL space from another server using mod_proxy.

Note: Each request set aside has to be set aside in temporary RAM until the request is complete. As a result, care should be taken to ensure sufficient RAM is available on the server to support the intended load. Use of this directive should be limited to where needed on targeted parts of your URL space, and with the lowest possible value that is still big enough to hold a request body.

If the request size sent by the client exceeds the maximum size allocated by this directive, the server will return *413 Request Entity* Too Large.

Module mod_rewrite

Module mod_rewrite supports directives for the IBM HTTP Server for i Web server.

Summary

This module allows you to control URL access to your HTTP Server.

For example, to prevent a particular user agent called Web crawler from accessing any pages on the server. To do this, include the following directives in your configuration:

```
RewriteEngine on
RewriteCond %{HTTP_USER_AGENT} ^Webcrawler
RewriteRule ^.*$ - [F,L]
```

The first line enables the rewrite engine. The second line provides a test that returns true if the HTTP_USER_AGENT string starts with the letters Web crawler. If the second line is true, then the third line takes any URL string and returns a forbidden message to the client.

Note: RewriteLog and RewriteLogLevel directives have been removed, this functionality has been completely replaced by the new per-module logging configuration.

For example:

LogLevel warn rewrite:info

Search text '[rewrite: ' in the error log to get the mod_rewrite specific log messages.

Directives

RewriteBase

Module: mod_rewrite

Syntax: RewriteBase *Base_URL*

Default: RewriteBase physical directory path

Context: Directory, but not Location, .htaccess

Override: FileInfo

Origin: Apache

Example: RewriteBase /xyz

The RewriteBase directive explicitly sets the base URL for per-directory rewrites. As you will see below, RewriteRule can be used in per-directory config files (.htaccess). There it will act locally (for example, the local directory prefix is stripped at this stage of processing and your rewriting rules act only on the remainder). At the end it is automatically added back to the path.

When a substitution occurs for a new URL, this module has to re-inject the URL into the processing server. To be able to do this it needs to know what the corresponding URL-prefix or URL-base is. By default this prefix is the corresponding filepath itself. At most, Web sites URLs are not directly related to physical filename paths, so this assumption is usually incorrect. In this case, you have to use the RewriteBase directive to specify the correct URL-prefix.

Assume the following per-directory configuration file (/abc/def is the physical path of /xyz, and the server has the 'Alias /xyz /ABC/def' established).

```
RewriteEngine On
RewriteBase /xyz
RewriteRule ^old\.html$ new.html
```

In the above example, a request to /xyz/old.html is correctly rewritten to the physical file /ABC/def/new.html.

In the example below, RewriteBase is necessary to avoid rewriting to http://example.com/opt/myapp-1.2.3/welcome.html since the resource was not relative to the document root. This misconfiguration would normally cause the server to look for an "opt" directory under the document root.

```
DocumentRoot /var/www/example.com
AliasMatch /myapp /opt/myapp-1.2.3
<Directory /opt/myapp-1.2.3>
    RewriteEngine On
    RewriteBase /myapp/
    RewriteRule ^index\.html$  welcome.html
</Directory>
```

Note: If your webserver's URLs are not directly related to physical file paths, you have to use RewriteBase in every .htaccess file where you want to use RewriteRule directives.

This directive is required when you use a relative path in a substitution in per-directory (htaccess) context unless either of the following conditions are true:

- The original request, and the substitution, are underneath the DocumentRoot (as opposed to reachable by other means, such as Alias).
- The *filesystem* path to the directory containing the RewriteRule, suffixed by the relative substitution is also valid as a URL path on the server (this is rare).
- This directive may be omitted when the request is mapped via Alias or mod_userdir.

RewriteCond

Module: mod_rewrite

Syntax: RewriteCond *TestString CondPattern [flags]*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: RewriteCond %{HTTP_USER_AGENT} ^Mozilla.*

The RewriteCond directive defines a rule condition. Precede a RewriteRule directive with one or more RewriteCond directives. The following rewriting rule is only used if its pattern matches the current state of the URI and if these additional conditions apply.

Parameter One: *TestString*

- The *TestString* parameter can contain the following expanded constructs in addition to plain text:
  - **RewriteRule backreferences**: These are backreferences of the form.

    $N
    (0 <= N <= 9) that provide access to the grouped sections (those in parenthesis) of the pattern from the corresponding RewriteRule directive (the one following the current RewriteCond directives).
  - **RewriteCond backreferences**: These are backreferences of the form.

    %N
    (0 <= N <= 9) that provide access to the grouped sections (those in parenthesis) of the pattern from the last matched RewriteCond directive in the current conditions
  - **RewriteMap expansions**: These are expansions of the form.

    ${mapname:key|default}
    See "RewriteMap" on page 573 for more details.
  - **Server-Variables**: These are variables of the form

    %{ NAME_OF_VARIABLE }
    Where NAME_OF_VARIABLE can be a string taken from the following list:

    HTTP headers

    - HTTP_USER_AGENT
    - HTTP_REFERRER
    - HTTP_COOKIE
    - HTTP_FORWARDED
    - HTTP_HOST
    - HTTP_PROXY_CONNECTION
    - HTTP_ACCEPT

    Connection and Request

    - AUTH_TYPE

- CONN_REMOTE_ADDR
- CONTEXT_PREFIX
- CONTEXT_DOCUMENT_ROOT
- IPV6
- PATH_INFO
- QUERY_STRING
- REMOTE_ADDR
- REMOTE_HOST
- REMOTE_USER
- REMOTE_IDENT
- REQUEST_METHOD
- SCRIPT_FILENAME

Server Internals

- DOCUMENT_ROOT
- SERVER_ADMIN
- SERVER_NAME
- SERVER_ADDR
- SERVER_PORT
- SERVER_PROTOCOL
- SERVER_SOFTWARE

System

- TIME_YEAR
- TIME_MON
- TIME_DAY
- TIME_HOUR
- TIME_MIN
- TIME_SEC
- TIME_WDAY
- TIME

Special

- API_VERSION
- CONN_REMOTE_ADDR
- HTTPS
- IS_SUBREQ
- REMOTE_ADDR
- REQUEST_URI
- REQUEST_FILENAME
- REQUEST_SCHEME
- THE_REQUEST

Tip:

1. The variables SCRIPT_FILENAME and REQUEST_FILENAME contain the same value (the value of the filename field of the internal request_rec structure of the server). The first

name is just the commonly known CGI variable name while the second is the consistent counterpart to REQUEST_URI (which contains the value of the URI field of request_rec).

2. There is the special format: %{ENV:variable} where variable can be any environment variable. This is looked-up via internal structures and (if not found there) via getenv() from the server process.
3. There is the special format: %{SSL:variable}, where variable is the name of an SSL environment variable, can be used whether or not mod_ibm_ssl is loaded, but will always expand to the empty string if it is not.
4. There is the special format: %{HTTP: header} where header can be any HTTP MIME-header name. This is looked-up from the HTTP request. Example: %{HTTP:Proxy-Connection} is the value of the HTTP header ` ` Proxy-Connection:''.
5. There is the special format %{LA-U:variable} for look-aheads that perform an internal (URL-based) sub-request to determine the final value of variable. Use this when you want to use a variable for rewriting (which is actually set later in an API phase and thus is not available at the current stage). For instance when you want to rewrite according to the REMOTE_USER variable from within the per-server context (httpd.conf file) you have to use %{LA-U:REMOTE_USER} because this variable is set by the authorization phases that come after the URL translation phase where mod_rewrite operates. On the other hand, because mod_rewrite implements its per-directory context (.htaccess file) via the Fixup phase of the API and because the authorization phases come before this phase, you just can use %{REMOTE_USER} there.
6. There is the special format: %{LA-F:variable} that performs an internal (filename-based) sub-request to determine the final value of variable. Most of the time this is the same as LA-U above.

Parameter Two: *CondPattern*

- The *CondPattern* parameter is the condition pattern (a regular expression) that is applied to the current instance of the TestString. TestString is evaluated and then matched against CondPattern.

  CondPattern is a standard Extended Regular Expression with some additions:

  1. You can prefix the pattern string with a '!' character (exclamation mark) to negate the result of the condition, no matter what kind of *CondPattern* is used.
  2. You can perform lexicographical string comparisons:

     <CondPattern
     Treats the CondPattern as a plain string and compares it lexically to TestString. True if TestString is lexically lower than CondPattern.

     >CondPattern
     Treats the CondPattern as a plain string and compares it lexically to TestString. True if TestString is lexically greater than CondPattern.

     =CondPattern
     Treats the CondPattern as a plain string and compares it lexically to TestString. True if TestString is lexically equal to CondPattern (the two strings are exactly equal, character by character). If CondPattern is just "" (two quotation marks) this compares TestString to the empty string.

     <=CondPattern
     Treats the CondPattern as a plain string and compares it lexicographically to TestString. True if TestString lexicographically precedes CondPattern, or is equal to CondPattern (the two strings are equal, character for character).

     >=CondPattern
     Treats the CondPattern as a plain string and compares it lexicographically to TestString. True if TestString lexicographically follows CondPattern, or is equal to CondPattern (the two strings are equal, character for character).
  3. You can perform integer comparisons:

-eq (is numerically equal to)
The *TestString* is treated as an integer, and is numerically compared to the *CondPattern*. True if the two are numerically equal.

-ge (is numerically greater than or equal to)
The *TestString* is treated as an integer, and is numerically compared to the *CondPattern*. True if the *TestString* is numerically greater than or equal to the *CondPattern*.

-gt (is numerically greater than)
The *TestString* is treated as an integer, and is numerically compared to the *CondPattern*. True if the *TestString* is numerically greater than the *CondPattern*.

-le (is numerically less than or equal to)
The *TestString* is treated as an integer, and is numerically compared to the *CondPattern*. True if the *TestString* is numerically less than or equal to the *CondPattern*. Avoid confusion with the -l by using the -L or -h variant.

-lt (is numerically less than)
The *TestString* is treated as an integer, and is numerically compared to the *CondPattern*. True if the *TestString* is numerically less than the *CondPattern*. Avoid confusion with the -l by using the -L or -h variant.

4. You can perform various file attribute tests:

-d
Treats the TestString as a pathname and tests if it exists and is a directory.

-f
Treats the TestString as a pathname and tests if it exists and is a regular file.

-F
Checks whether or not TestString is a valid file, accessible via all the server's currently-configured access controls for that path. This uses an internal subrequest to do the check, so use it with care - it can impact your server's performance!

-H(is symbolic link, bash convention)
See -l.

-l
Treats the TestString as a pathname and tests if it exists and is a symbolic link.

-L(is symbolic link, bash convention)
See -l.

-s
Treats the TestString as a pathname and tests if it exists and is a regular file with size greater than zero.

-U
Checks if TestString is a valid URL and accessible via all the server's currently-configured access controls for that path. This uses an internal subrequest to do the check, so use it with care - it can impact your server's performance!

This flag only returns information about things like access control, authentication, and authorization. This flag does not return information about the status code the configured handler (static file, CGI, proxy, etc.) would have returned.

-x
Treats the TestString as a pathname and tests whether or not it exists, and has executable permissions. These permissions are determined according to the underlying OS.

For example:

```
RewriteCond /var/www/%{REQUEST_URI} !-f
RewriteRule ^(.+) /other/archive/$1 [R]
```

5. If the *TestString* has the special value expr, the *CondPattern* will be treated as an ap_expr.

In the below example, -strmatch is used to compare the REFERER against the site hostname, to block unwanted hotlinking.

RewriteCond expr "! %{HTTP_REFERER} -strmatch '*://%{HTTP_HOST}/*'"

RewriteRule ^/images - [F]

Parameter Three: *flags*

- The *flags* parameter is appended to the CondPattern parameter. The *flags* parameter is a comma -serapertaed list of the following flags:

  nocase|NC
  This makes the test case-insensitive (there is no difference between 'A-Z' and AZ both in the expanded TestString and the CondPattern). This flag is effective only for comparisons between TestString and CondPattern. It has no effect on filesystem and subrequest checks.

  ornext|OR
  Use this to combine rule conditions with a local OR instead of the implicit AND. Typical example:

  ```
  RewriteCond %{REMOTE_HOST}  ^host1.*  [OR]
  RewriteCond %{REMOTE_HOST}  ^host2.*  [OR]
  RewriteCond %{REMOTE_HOST}  ^host3.*
  RewriteRule ...some special stuff for any of these hosts...
  ```

  Without this flag you would have to write the cond/rule three times.

  novary|NV
  If a HTTP header is used in the condition, this flag prevents this header from being added to the Vary header of the response. Using this flag might break proper caching of the response if the representation of this response varies on the value of this header. So this flag should be only used if the meaning of the Vary header is well understood.

Note: If the *TestString* has the special value *expr*, the *CondPattern* will be treated as an ap_expr. HTTP headers referenced in the expression will be added to the Vary header if the novary flag is not given.

Example:

To rewrite the Homepage of a site according to the "User-Agent:" header of the request, you can use the following:

```
RewriteCond  %{HTTP_USER_AGENT}  (iPhone|Blackberry|Android)
RewriteRule  ^/$                 /homepage.mobile.html  [L]

RewriteRule  ^/$                 /homepage.std.html  [L]
```

Explanation: If you use a browser which identifies itself as a mobile browser (note that the example is incomplete, as there are many other mobile platforms), the mobile version of the homepage is served. Otherwise, the standard page is served.

RewriteEngine

Module: mod_rewrite

Syntax: RewriteEngine *on | off*

Default: RewriteEngine off

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: RewriteEngine on

The RewriteEngine directive enables or disables the runtime rewriting engine. You can use this directive to disable rules in a particular context, rather than commenting out all the RewriteRule directives.

Parameter: ***on | off***

- If set to *on* runtime processing is enabled. If it is set to *off* runtime processing is disabled and this module does not runtime processing at all.
- If it is set to *off* runtime processing is disabled and this module does no runtime processing at all. It does not even update the SCRIPT_URx environment variables.

Note: By default, rewrite configurations are not inherited by virtual hosts. This means that you need to have the RewriteEngine on for each virtual host in which you want to use rewrite rules.

RewriteMap

Module: mod_rewrite

Syntax: RewriteMap *MapName MapType:MapSource*

Default: none

Context: server config, virtual host

Override: none

Origin: Apache

Example: RewriteMap servers rnd:/path/to/file/map.txt

The RewriteMap directive defines a Rewriting Map that can be used inside rule substitution strings by the mapping-functions to insert or substitute fields through a key lookup. The source of this lookup can be of various types.

Parameter: ***MapName***

- The *MapName* parameter is the name of the map and is used to specify a mapping-function for the substitution strings of a rewriting rule via one of the following constructs:

  ```
  ${ MapName : LookupKey }
  ${ MapName : LookupKey | DefaultValue }
  ```

  When such a construct occurs the map MapName is consulted and the key LookupKey is looked-up. If the key is found, the map-function construct is substituted by SubstValue. If the key is not found then it is substituted by DefaultValue or by the empty string if no DefaultValue was specified. The following combinations for MapType and MapSource can be used:

  Standard Plain Text
  MapType: txt, MapSource: Path to a file

  This is the standard rewriting map feature where the MapSource is a plain text file containing either blank lines, comment lines (starting with a '#' character) or pairs like the following (one per line): MatchingKey SubstituionValue.

  File example:

  ```
  ##
  ##  map.txt -- rewriting map
  ##
  Ralf.B.Jones          rbj   # Operator
  Mr.Joe.Average    joe   # Mr. Average
  ```

  Directive example:

  ```
  RewriteMap real-to-user txt:/path/to/file/map.txt
  ```

  Randomized Plain Text
  MapType: rnd, MapSource: Path to a file

  This is identical to the Standard Plain Text variant above but with a special post-processing feature. After looking up a value it is parsed according to the contained horizontal bar (|)

characters which mean "or". In other words, the horizontal bars indicate a set of alternatives from which the actual returned value is randomly chosen. This feature was designed for load balancing in a reverse proxy situation where the looked up values are server names.

File example:

```
##
##  map.txt -- rewriting map
##
static   www1|www2|www3|www4
dynamic  www5|www6
```

Directive example:

```
RewriteMap servers rnd:/path/to/file/map.txt
```

Internal Function

MapType: int, MapSource: Internal Apache function

The following internal functions are valid:

toupper
Converts the looked up key to all upper case.

tolower
Converts the looked up key to all lower case.

escape
Translates special characters in the looked up key to hex-encodings.

unescape
Translates hex-encodings in the looked up key back to special characters.

The RewriteMap directive can occur more than once. For each mapping function use one RewriteMap directive to declare its rewriting mapfile. While you cannot declare a map in a per-directory context, it is possible to use this map in a per-directory context.

Note: The prg, dbm and dbd or fastdbd MapTypes are not supported

RewriteOptions

Module: mod_rewrite

Syntax: RewriteOptions *Option*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: RewriteOptions inherit

The RewriteOptions directive sets some special options for the current per-server or per-directory configuration.

Parameter: *Option*

- The *Option* parameter strings can be one of the following:

  inherit
  This forces the current configuration to inherit the configuration of the parent. In per-virtual-server context this means that the maps, conditions and rules of the main server are inherited. In per-directory context this means that conditions and rules of the parent directory's .htaccess configuration or"<Directory> " on page 311 are inherited. The inherited rules are virtually copied to the section where this directive

is being used. If used in combination with local rules, the inherited rules are copied behind the local rules. The position of this directive - below or above of local rules - has no influence on this behavior. If local rules forced the rewriting to stop, the inherited rules won't be processed.

Note: Rules inherited from the parent scope are applied after rules specified in the child scope.

InheritBefore
Like **Inherit** above, but the rules from the parent scope are applied before rules specified in the child scope.

InheritDown
If this option is enabled, all child configurations will inherit the configuration of the current configuration. It is equivalent to specifying RewriteOptions Inherit in all child configurations. See the Inherit option for more details on how the parent-child relationships are handled.

InheritDownBefore
Like InheritDown above, but the rules from the current scope are applied **before** rules specified in any child's scope.

IgnoreInherit
This option forces the current and child configurations to ignore all rules that would be inherited from a parent specifying InheritDown or InheritDownBefore.

AllowNoSlash

By default, mod_rewrite will ignore URLs that map to a directory on disk but lack a trailing slash, in the expectation that the mod_dir will issue the client with a redirect to the canonical URL with a trailing slash.

When the "DirectorySlash" on page 377 directive is set to off, the AllowNoSlash option can be enabled to ensure that rewrite rules are no longer ignored. This option makes it possible to apply rewrite rules within .htaccess files that match the directory without a trailing slash, if so desired. Available in Apache HTTP Server 2.4.0 and later.

AllowAnyURI

When "RewriteRule" on page 576 is used in VirtualHost or server context, mod_rewrite will only process the rewrite rules if the request URI is a URL-path. This avoids some security issues where particular rules could allow "surprising" pattern expansions (see CVE-2011-3368 and CVE-2011-4317). To lift the restriction on matching a URL-path, the AllowAnyURI option can be enabled, and mod_rewrite will apply the rule set to any request URI string, regardless of whether that string matches the URL-path grammar required by the HTTP specification.

Note: Enabling this option will make the server vulnerable to security issues if used with rewrite rules which are not carefully authored. It is **strongly recommended** that this option is not used. In particular, beware of input strings containing the '@' character which could change the interpretation of the transformed URI, as per the above CVE names.

MergeBase

With this option, the value of "RewriteBase" on page 567 is copied from where it's explicitly defined into any sub-directory or sub-location that doesn't define its own "RewriteBase" on page 567.

IgnoreContextInfo
When a relative substitution is made in directory (htaccess) context and RewriteBase has not been set, this module uses some extended URL and filesystem context information to change the relative substitution back into a URL. Modules such as mod_userdir and mod_alias supply this extended context info.

RewriteRule

Module: mod_rewrite

Syntax: RewriteRule *pattern substitution [flags]*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: RewriteRule ^/ABC(.*) /def$1 [PT]

The RewriteRule directive is the real rewriting workhorse. The directive can occur more than once. Each directive then defines one single rewriting rule. The definition order of these rules is important, because this order is used when applying the rules at run-time.

Parameter One: *pattern*

- The *pattern* parameter can be a perl compatible regular expression. On the first RewriteRule, it is matched against the (%-decoded) URL-path (or file-path, depending on the context) of the request. Subsequent patterns are matched against the output of the last matching RewriteRule.
- In VirtualHost context, The *Pattern* will initially be matched against the part of the URL after the hostname and port, and before the query string (e.g. "/app1/index.html").
- In Directory and .htaccess context, the *Pattern* will initially be matched against the *filesystem* path, after removing the prefix that led the server to the current RewriteRule (e.g. "app1/index.html" or "index.html" depending on where the directives are defined).
- If you want to match against the hostname, port, or query string, use a RewriteCond with the %{HTTP_HOST}, %{SERVER_PORT}, or %{QUERY_STRING} variables respectively.
- **Per-directory Rewrites**
  - The rewrite engine may be used in .htaccess files and in "<Directory> " on page 311 sections, with some additional complexity.
  - To enable the rewrite engine in this context, you need to set "RewriteEngine On" and "Options FollowSymLinks" must be enabled. If your administrator has disabled override of FollowSymLinks for a user's directory, then you cannot use the rewrite engine. This restriction is required for security reasons.
  - When using the rewrite engine in .htaccess files the per-directory prefix (which always is the same for a specific directory) is automatically removed for the RewriteRule pattern matching and automatically added after any relative (not starting with a slash or protocol name) substitution encounters the end of a rule set. See the "RewriteBase" on page 567 directive for more information regarding what prefix will be added back to relative substitutions.
  - If you want to match against the full URL-path in a per-directory (htaccess) RewriteRule, use the %{REQUEST_URI} variable in a RewriteCond.
  - The removed prefix always ends with a slash, meaning the matching occurs against a string which never has a leading slash. Therefore, a Pattern with ^/ never matches in per-directory context.
  - Although rewrite rules are syntactically permitted in "<Location> " on page 339 and "<Files>" on page 323 sections (including their regular expression counterparts), this should never be necessary and is unsupported. A likely feature to break in these contexts is relative substitutions.
- Additionally in mod_rewrite the NOT character ('!') is a possible pattern prefix. This gives you the ability to negate a pattern; to say, for instance: ` `if the current URL does not match this pattern''. This can be used for exceptional cases, where it is easier to match the negative pattern, or as a last default rule.

Note: When using the not character to negate a pattern you cannot have grouped wild card parts in the pattern. This is impossible because when the pattern does not match, there are no contents for the groups, and you cannot use $N in the substitution string.

Parameter Two: *substitution*

- The substitution parameter is the string which is substituted for (or replaces) the original URL-path for which Pattern matched. The Substitution may be a:
  - file-system path

    Designates the location on the file-system of the resource to be delivered to the client. Substitutions are only treated as a file-system path when the rule is configured in server (virtualhost) context and the first component of the path in the substitution exists in the file-system
  - URL-path

    A "DocumentRoot " on page 313-relative path to the resource to be served. Note that mod_rewrite tries to guess whether you have specified a file-system path or a URL-path by checking to see if the first segment of the path exists at the root of the file-system. For example, if you specify a Substitution string of /www/file.html, then this will be treated as a URL-path unless a directory named www exists at the root or your file-system (or, in the case of using rewrites in a .htaccess file, relative to your document root), in which case it will be treated as a file-system path. If you want other URL-mapping directives (such as Alias) to be applied to the resulting URL-path, use the [PT] flag as described below.
  - Absolute URL

    If an absolute URL is specified, mod_rewrite checks to see whether the hostname matches the current host. If it does, the scheme and hostname are stripped out and the resulting path is treated as a URL-path. Otherwise, an external redirect is performed for the given URL. To force an external redirect back to the current host, see the [R] flag below.
  - - (dash)

    A dash indicates that no substitution should be performed (the existing path is passed through untouched). This is used when a flag needs to be applied without changing the path, for example, in conjunction with the C (chain) flag to be able to have more than one pattern to be applied before a substitution occurs.
- Beside plain text you can use back-references $N to the RewriteRule pattern, back-references %N to the last matched RewriteCond pattern, server-variables as in rule condition test-strings (%{VARNAME}) and mapping-function calls (${mapname:key|default}).
- Back-references are $N (N=0..9) identifiers which will be replaced by the contents of the Nth group of the matched Pattern. The server-variables are the same as for the TestString of a RewriteCond directive. The mapping-functions come from the RewriteMap directive and are explained there. These three types of variables are expanded in the order of the above list.
- All the rewriting rules are applied to the results of previous rewrite rules, in the order of definition in the config file). The URL-path or file-system path is completely replaced by the Substitution and the rewriting process goes on until all rules have been applied, or it is explicitly terminated by an L flag, or other flag which implies immediate termination, such as END or F.

Note: By default, the query string is passed through unchanged. You can even create URLs in the substitution string containing a query string part. Just use a question mark inside the substitution string to indicate that the following stuff should be re-injected into the QUERY_STRING. When you want to erase an existing query string, end the substitution string with just the question mark. To combine new and old query strings, use the [QSA] flag.

Parameter Three: *flags*

- The flags parameter can additionally be set to special [flags] for Substitution by appending [flags] as the third argument to the RewriteRule directive. Flags is a comma separated list, surround by square brackets, of the following flags:

redirect|R [=code]

Prefix Substitution with http://thishost[:thisport]/ (which makes the new URL a URI) to force a external redirection. If no code is given an HTTP response of 302 (MOVED TEMPORARILY) is used. If you want to use other response codes in the range 300-400 just specify them as a number or use one of the following symbolic names: temp (default), permanent, seeother. Use it for rules which should canonicalize the URL and give it back to the client, for example, translate ``/~'' into ``/u/'' or always append a slash to /u/user, etc.

Note: When you use this flag, make sure that the substitution field is a valid URL. If not, you are redirecting to an invalid location! And remember that this flag itself only prefixes the URL with http://thishost[:thisport]/, rewriting continues. Usually you also want to stop and do the redirection immediately. To stop the rewriting you also have to provide the 'L' flag.

forbidden|F

This forces the current URL to be forbidden, for example, it immediately sends back an HTTP response of 403 (FORBIDDEN). Use this flag in conjunction with appropriate RewriteConds to conditionally block some URLs.

gone|G

This forces the current URL to be gone, for example, it immediately sends back an HTTP response of 410 (GONE). Use this flag to mark pages which no longer exist as gone.

proxy|P

This flag forces the substitution part to be internally forced as a proxy request and immediately (for example, rewriting rule processing stops here) put through the proxy module. You have to make sure that the substitution string is a valid URI (for example, typically starting with http://hostname) which can be handled by HTTP Server proxy module. If not you get an error from the proxy module. Use this flag to achieve a more powerful implementation of the ProxyPass directive, to map some remote stuff into the name space of the local server.

Note: To use this functionality make sure you have the proxy module loaded into your HTTP Server configuration (for example, via LoadModule directive).

last|L

Stop the rewriting process here and don't apply any more rewriting rules. (This corresponds to the Perl last command or the break command from the C language.) Use this flag to prevent the currently rewritten URL from being rewritten further by following rules. For example, use it to rewrite the rootpath URL ('/') to a real one, for example, '/e/www/'.

An alternative flag, [END], can be used to terminate not only the current round of rewrite processing but prevent any subsequent rewrite processing from occurring in per-directory (htaccess) context. This does not apply to new requests resulting from external redirects.

next|N

Re-run the rewriting process (starting again with the first rewriting rule). Here the URL to match is again not the original URL but the URL from the last rewriting rule. (This corresponds to the Perl next command or the continue command from the C language.) Use this flag to restart the rewriting process, for example, to immediately go to the top of the loop. But be careful not to create an infinite loop.

chain|C

This flag chains the current rule with the next rule (which itself can be chained with the following rule, etc.). This has the following effect: if a rule matches, then processing continues as usual, for example, the flag has no effect. If the rule does not match, then all following chained rules are skipped. For instance, use it to remove the ``.www'' part inside a per-directory rule set when you let an external redirect happen (where the ``.www '' part should not occur).

type|T=MIME-type

Force the MIME-type of the target file to be MIME-type. For instance, this can be used to simulate the mod_alias directive ScriptAlias which internally forces all files inside the mapped directory to have a MIME type of ``application/x-httpd-cgi''.

nosubreq|NS

This flag forces the rewriting engine to skip a rewriting rule if the current request is an internal sub-request. For instance, sub-requests occur internally in HTTP Server when mod_include tries to find out information about possible directory default files (index.xxx). On sub-requests it is not always useful and even sometimes causes a failure if the complete set of rules are applied. Use this flag to exclude some rules. Whenever you prefix some URLs with CGI-scripts to force them to be processed by the CGI-script, the chance is high that you will run into problems (or even overhead) on sub-requests. In these cases, use this flag.

nocase|NC

This makes the Pattern case insensitive, for example, there is no difference between AZ and AZ when Pattern is matched against the current URL.

noescape|NE

This flag prevents mod_rewrite from applying the usual URI escaping rules to the result of a rewrite. Ordinarily, special characters (%', '$', ';',) will be escaped into their hexcode equivalents ('%25', '%24', and '%3B', respectively); this flag prevents this from happening. This flag allows percent symbols to appear in the output, as in RewriteRule /foo/(.*) /bar?arg=P1\%3d$1 [R,NE] which would turn '/foo/zed' into a safe request for '/bar?arg=P1=zed'.

qsappend|QSA

This flag forces the rewriting engine to append a query string part in the substitution string to the existing one instead of replacing it. Use this when you want to add more data to the query string via a rewrite rule.

qsdiscard|QSD

When the requested URI contains a query string, and the target URI does not, the default behavior of RewriteRule is to copy that query string to the target URI. Using the [QSD] flag causes the query string to be discarded. Using [QSD] and [QSA] together will result in [QSD] taking precedence. If the target URI has a query string, the default behavior will be observed - that is, the original query string will be discarded and replaced with the query string in the RewriteRule target URI.

passthrough|PT

This flag forces the rewriting engine to set the URI field of the internal request_rec structure to the value of the filename field. This flag is used to be able to post-process the output of RewriteRule directives by Alias, ScriptAlias, Redirect, etc. - directives from other URI-to-filename translators. A trivial example to show the semantics: If you want to rewrite /ABC to /def via the rewriting engine of mod_rewrite and then /def to /ghi with mod_alias:

```
RewriteRule ^/ABC(.*)  /def$1 [PT]
Alias       /def       /ghi
```

If you omit the PT flag then mod_rewrite will do its job fine, for example, it rewrites uri=/ABC/... to filename=/def/... as a full API-compliant URI-to-filename translator should do. Then mod_alias comes and tries to do a URI-to-filename transition which will not work.

Note: You have to use this flag if you want to intermix directives of different modules which contain URL-to-filename translators. The typical example is the use of mod_alias and mod_rewrite.

skip|S=num

This flag forces the rewriting engine to skip the next num rules in sequence when the current rule matches. Use this to make pseudo if-then-else constructs: The last rule of the then-clause becomes skip=N where N is the number of rules in the else-clause. (This is not the same as the 'chain|C' flag.)

env|E=[!]VAR[:VAL]

This forces an environment variable named VAR to be set to the value VAL, where VAL can contain regexp backreferences $N and %N which will be expanded. You can use this flag more than once to set more than one variable. The variables can be later dereferenced in many situations, but usually from within SSI (via <!--#echo var="VAR"-->) or CGI (for example

$ENV{'VAR'}). Additionally you can dereference it in a following RewriteCond pattern via %{ENV:VAR}. Use this to strip but remember information from URLs.

qslast|QSL
Interpret the last (right-most) question mark as the query string delimeter, instead of the first (left-most) as normally used.

END
Stop the rewriting process immediately and don't apply any more rules. Also prevents further execution of rewrite rules in per-directory and .htaccess context.

Using the [END] flag terminates not only the current round of rewrite processing (like [L]) but also prevents any subsequent rewrite processing from occurring in per-directory (htaccess) context.

This does not apply to new requests resulting from external redirects.

B
Escape non-alphanumeric characters in backreferences before applying the transformation. The [B] flag instructs "RewriteRule" on page 576 to escape non-alphanumeric characters before applying the transformation. mod_rewrite has to unescape URLs before mapping them, so backreferences are unescaped at the time they are applied. Using the B flag, non-alphanumeric characters in backreferences will be escaped.

backrefnoplus|BNP
If backreferences are being escaped, spaces should be escaped to %20 instead of +. Useful when the backreference will be used in the path component rather than the query string.

cookie|CO=*NAME:VAL*

This flag allows you to set a cookie in the client browser when a particular RewriteRule matches. The argument consists of three required fields and four optional fields. The full syntax for the flag, including all attributes, is: [CO=NAME:VALUE:DOMAIN:lifetime:path:secure:httponly]

If a literal ':' character is needed in any of the cookie fields, an alternate syntax is available. To opt-in to the alternate syntax, the cookie "Name" should be preceded with a ';' character, and field separators should be specified as ';'.

```
[CO=;NAME;VALUE:MOREVALUE;DOMAIN;lifetime;path;secure;httponly]
```

You must declare a name, a value, and a domain for the cookie to be set.

discardpath|DPI
This flag causes the PATH_INFO portion of the rewritten URI to be discarded. Use this flag on any substitution where the PATH_INFO that resulted from the previous mapping of this request to the filesystem is not of interest. This flag permanently forgets the PATH_INFO established before this round of mod_rewrite processing began. PATH_INFO will not be recalculated until the current round of mod_rewrite processing completes. Subsequent rules during this round of processing will see only the direct result of substitutions, without any PATH_INFO appended.

Handler|H=*Content-handler*
This flag forces the resulting URI to be sent to the specified Content-handler for processing. For example, one might use this to force all files without a file extension to be parsed by the php handler: RewriteRule !\. - [H=application/x-httpd-php] The regular expression above - !\. - will match any request that does not contain the literal . character.

Note: Never forget that Pattern is applied to a complete URL in per-server configuration files. But in per-directory configuration files, the per-directory prefix (which always is the same for a specific directory!) is automatically removed for the pattern matching and automatically added after the substitution has been done. This feature is essential for many sorts of rewriting, because without this prefix stripping you have to match the parent directory which is not always possible. There is one exception: If a substitution string starts with ` `http://'' then the directory prefix will not be added and an external redirect or proxy throughput (if flag P is used) is forced. To enable the rewriting engine for per-directory configuration files you need to set RewriteEngine On in these files and Option FollowSymLinks must be enabled. If the override of FollowSymLinks is disabled for a user's directory, then you cannot use the rewriting engine. This restriction is needed for security reasons.

Possible substitution combinations and meanings:

1. Inside per-server configuration (httpd.conf) for request "GET /somepath/pathinfo":

Given rule	Resulting substitution
^/somepath(.*) otherpath$1	not supported
^/somepath(.*) otherpath$1 [R]	not supported
^/somepath(.*) otherpath$1 [P]	not supported
^/somepath(.*) /otherpath$1	/otherpath/pathinfo
^/somepath(.*) /otherpath$1 [R]	http://thishost/otherpath/pathinfo via external redirection
^/somepath(.*) /otherpath$1 [P]	not supported
^/somepath(.*) http://thishost/ otherpath$1	/otherpath/pathinfo
^/somepath(.*) http://thishost/ otherpath$1 [R]	http://thishost/otherpath/pathinfo via external redirection
^/somepath(.*) http://thishost/ otherpath$1 [P]	not supported
^/somepath(.*) http://otherhost/ otherpath$1	http://otherhost/otherpath/pathinfo via external redirection
^/somepath(.*) http://otherhost/ otherpath$1 [R]	http://otherhost/otherpath/pathinfo via external redirection (the [R] flag is redundant)
^/somepath(.*) http://otherhost/ otherpath$1 [P]	http://otherhost/otherpath/pathinfo via internal proxy

2. Inside per-directory configuration for /somepath(/physical/path/to/somepath/.htaccess, with RewriteBase /somepath) for request "GET /somepath/localpath/pathinfo":

Given rule	Resulting substitution
^localpath(.*) otherpath$1	/somepath/otherpath/pathinfo
^localpath(.*) otherpath$1 [R]	http://thishost/somepath/otherpath/pathinfo via external redirection
^localpath(.*) otherpath$1 [P]	not supported
^localpath(.*) /otherpath$1	/otherpath/pathinfo
^localpath(.*) /otherpath$1 [R]	http://thishost/otherpath/pathinfo via external redirection
^localpath(.*) /otherpath$1 [P]	not supported
^localpath(.*) http://thishost/otherpath$1	/otherpath/pathinfo
^localpath(.*) http://thishost/otherpath$1 [R]	http://thishost/otherpath/pathinfo via external redirection
^localpath(.*) http://thishost/otherpath$1 [P]	not supported

Given rule	Resulting substitution
^localpath(.*) http://otherhost/otherpath$1	http://otherhost/otherpath/pathinfo via external redirection
^localpath(.*) http://otherhost/otherpath$1 [R]	http://otherhost/otherpath/pathinfo via external redirection (the [R] flag is redundant)
^localpath(.*) http://otherhost/otherpath$1 [P]	http://otherhost/otherpath/pathinfo via internal proxy

If you wanted to rewrite URLs of the form `/ Language /~ Realname /.../ File into /u/ Username /.../ File` . Language, you would take the rewrite mapfile from above and save it under `/path/to/file/map.txt`. Then we only have to add the following lines to HTTP Server configuration file:

```
RewriteLog /path/to/file/rewrite.log
RewriteMap real-to-user txt:/path/to/file/map.txt
RewriteRule ^/([^/]+)/~([^/]+)/(.*)$ /u/${real-to-user:$2|nobody}/$3.$1
```

Module mod_setenvif

Module mod_setenvif supports directives for the IBM HTTP Server for i Web server.

Summary

The mod_setenvif module allows you to set environment variables if different aspects of the request match regular expressions that you specify. These variables can be used by other parts of the server to make decisions about actions to be taken, as well as becoming available to CGI scripts and SSI pages.

The directives are considered in the order they appear in the configuration. So more complex sequences can be used, such as this example, which sets Netscape if the browser is Mozilla but not MSIE.

```
BrowserMatch ^Mozilla netscape
BrowserMatch MSIE !netscape
```

When the server looks up a path via an internal subrequest such as looking for a "DirectoryIndex" on page 375 or generating a directory listing with mod_auto_index, per-request environment variables are not inherited in the subrequest. Additionally, "SetEnvIf" on page 584 directives are not separately evaluated in the subrequest due to the API phases mod_setenvif takes action in.

Directives

- "BrowserMatch" on page 582
- "BrowserMatchNoCase" on page 583
- "SetEnvIf" on page 584
- "SetEnvIfExpr" on page 586
- "SetEnvIfNoCase" on page 586

BrowserMatch

Module: mod_setenvif

Syntax: BrowserMatch *regex [!]env-variable[=value] [[!]env-variable[=value]]...*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: BrowserMatch ^Mozilla forms jpeg=yes browser=netscape

BrowserMatch defines environment variables based on the User-Agent HTTP request header field. The first argument should be a perl compatible regular expression . The rest of the arguments give the names of variables to set, and optional values to which they should be set. These take the form of the following:

- varname
- !varname
- varname=value

See "Environment variables set by HTTP Server" on page 634 for more information.

In the first form, the value will be set to "1". The second will remove the given variable if already defined, and the third will set the variable to the value given by value. If a User-Agent string matches more than one entry, they will be merged. Entries are processed in the order in which they appear, and later entries can override earlier ones. For example:

```
BrowserMatch ^Mozilla forms jpeg=yes browser=netscape
BrowserMatch ^Mozilla/[2-3]" tables agif frames javascript
BrowserMatch MSIE !javascript
```

In the above example, if the User-Agent field is Mozilla, the environment variables forms, jpeg=yes and browser=netscape will be set. If the request is Mozilla/2 or Mozilla/3, then in addition to the environment variables on the first BrowserMatch directive, the variables tables, agif, frames and javascript will be set.

Note: The regular expression string is case-sensitive. For case-insensitive matching, see "BrowserMatchNoCase" on page 583. BrowserMatch and "BrowserMatchNoCase" on page 583 are special cases of "SetEnvIf" on page 584 and "SetEnvIfNoCase" on page 586. The following two lines have the same effect:

```
BrowserMatch Robot is_a_robot
SetEnvIf User-Agent Robot is_a_robot
```

Parameter One: ***regex***

- The *regex* parameter is a case-sensitive perl compatible regular expression. This gives the user the ability to select variants on the User-Agent field, such as using some wildcarding to group versions of a client browser. See "Environment variables set by HTTP Server" on page 634 for more information.

Parameter Two: ***[!]env-variable[=value] [[!]env-variable[=value]] ...***

- The *[!]env-variable[=value] [[!]env-variable[=value]] ...* parameter gives the names of the variables to set and, optional, values to which they should be set. The case is preserved when lowercase characters are specified. Valid values include all EBCDIC characters. The value must be enclosed in quotation marks if it contains any non-alphanumeric character or blanks.

BrowserMatchNoCase

Module: mod_setenvif

Syntax: BrowserMatchNoCase *regex [!]env-variable[=value] [[!]env-variable[=value]] ...*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: BrowserMatchNoCase ibm platform=ibm

BrowserMatchNoCase is semantically identical to “BrowserMatch” on page 582. However, it provides for case-insensitive matching. For example:

```
BrowserMatchNoCase mac platform=ibm
BrowserMatchNoCase win platform=windows
```

“BrowserMatch” on page 582 and BrowserMatchNoCase are special cases of “SetEnvIf” on page 584 and “SetEnvIfNoCase” on page 586. The following two lines have the same effect:

```
BrowserMatchNoCase Robot is_a_robot
SetEnvIfNoCase User-Agent Robot is_a_robot
```

Parameter One: *regex*

- The *regex* parameter is a case-insensitive perl compatible regular expression. This gives the user the ability to select variants on the User-Agent field, such as using some wildcarding to group version of a client browser. See “Environment variables set by HTTP Server” on page 634 for more information.

Parameter Two: *[!]env-variable[=value] [[!]env-variable[=value]] ...*

- The *[!]env-variable[=value] [[!]env-variable[=value]] ...* parameter gives the names of variables to set and, optionally, values to which they should be set. They can take the form of 'varname', '!varname' or 'varname=value'. The case is preserved when lowercase characters are specified. Valid values include all EBCDIC characters. The value must be enclosed in quotation marks if it contains any non-alphanumeric character or blanks.

SetEnvIf

Module: mod_setenvif

Syntax: SetEnvIf *attribute regex [!]env-variable[=value] [[!]env-variable[=value]] ...*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: SetEnvIf Request_URI "\.gif$" object_is_image=gif

Example: SetEnvIf Requet_Method "GET" QIBM_CGI_LIBRARY_LIST="MIME;CGIURL;CGILIBL"

SetEnvIf defines environment variables based on attributes of the request. These attributes can be the values of various HTTP request header fields or of other aspects of the request. See RFC2068 for more information.

Note: To view the RFC listed above, visit the RFC index search engine located on the RFC editor web site. Search for the RFC number you want to view. The search engine results display the corresponding RFC title, author, date, and status.

Attribute	**Description**
Remote_Host	The hostname (if available) of the client making the request.
Remote_Addr	The IP address of the client making the request.
Server_Addr	The IP address of the server on which the request was received.
Remote_User	The authenticated username (if available).
Request_Method	The name of the method being used (GET, POST, etc).

Attribute	Description
Request_Protocol	The name and version of the protocol with which the request was made (e.g., "HTTP/0.9", "HTTP/1.1", etc.)
Request_URI	The resource requested on the HTTP request line -- generally the portion of the URL following the scheme and host portion without the query string. See the RewriteCond directive of mod_rewrite for extra information on how to match your query string.

Some of the more commonly used request header field names include Host, User-Agent, and Referrer.

If the attribute name does not match any of the special keywords, or any of the request's header field names, it is tested as the name of an environment variable in the list of those associated with the request. This allows SetEnvIf directives to test against the result of prior matches.

Only those environment variables defined by earlier SetEnvIf[NoCase] directives are available for testing in this manner. Earlier means that they were defined in a broader context (such as server-wide) or previously in the current directive's context. Environment variables will be considered only if there was no match among request characteristics and a regular expression was not used for the *attribute*.

For example:

```
SetEnvIf Request_URI "\.gif$" object_is_image=gif
SetEnvIf Request_URI "\.jpg$" object_is_image=jpg
SetEnvIf Request_URI "\.xbm$" object_is_image=xbm

SetEnvIf Referrer www\.mydomain\.com intra_site_referral

SetEnvIf Request_URI "\.(.*)$" EXTENSION=$1

SetEnvIf ^TS  ^[a-z]  HAVE_TS

SetEnvIf  Requet_Method   "GET"   QIBM_CGI_LIBRARY_LIST="MIME;CGIURL;CGILIBL"
```

The first three will set the environment variable object_is_image if the request was for an image file, and the fourth sets intra_site_referral if the referring page was somewhere on the www.mydomain.com Web site. The 5th statement of the example will set environment variable HAVE_TS if the request contains any headers that begin with "TS" whose values begins with any character in the set [a-z]. The sixth statement sets the library list.

Parameter One: *attribute*

- The *attribute* parameter is the attribute of the request, such as an HTTP header value. The attribute can also be an environment variable that was set by an earlier SETENVIF directive.

Parameter Two: *regex*

- The *regex* parameter is a case-sensitive perl compatible regular expression. This gives the user the ability to select variants on the Attribute field, such as using some wildcarding to group related values, and use those to set the environment variables. See "Environment variables set by HTTP Server" on page 634 for more information.

Parameter Three: *[!]env-variable[=value] [[!]env-variable[=value]] ...*

- The *[!]env-variable[=value] [[!]env-variable[=value]] ...* parameter gives the names of variables to set and, optionally, values to which they should be set. They take the form of 'varname', '!varname' or 'varname=value'. In the first form, the value will be set to "1". The second will remove the given variable if already defined, and the third will set the variable to the literal value given by value. HTTP Server will recognize occurrences of $1..$9 within value and replace them by parenthesized subexpressions of *regex*. $0 provides access to the whole string matched by that pattern.
- The case is preserved when lowercase characters are specified. Valid values include all EBCDIC characters. The value must be enclosed in quotation marks if it contains any non-alphanumeric character or blanks. Lowercase characters for the library names will not work if this directive is used

to change the library list. When changing the library list values, the libraries need to be separated by a semicolon.

SetEnvIfExpr

Module: mod_setenvif

Syntax: SetEnvIfExpr *expr [!]env-variable[=value] [[!]env-variable[=value]] ...*

Default: none

Context: server config, virtual host, directory .htaccess

Override: FileInfo

Origin: Apache

Example: SetEnvIfExpr "tolower(req('X-Sendfile')) == '/home/images/very_big.iso')" iso_delivered

The SetEnvIfExpr directive defines environment variables based on an "<If>" on page 329 ap_expr . These expressions will be evaluated at runtime, and applied *env-variable* in the same fashion as "SetEnvIf" on page 584.

Example:

#Set the variable rfc1918 if the remote IP address is a private address according to RFC 1918

SetEnvIfExpr "-R '10.0.0.0/8' || -R '172.16.0.0/12' || -R '192.168.0.0/16'" rfc1918

Parameter One: *expr*

- The *expr* is an ap_expr expression to be evaluated at runtime. The environment variables is defined if and only if expression evaluates to true.

Parameter Two: *[!]env-variable[=value] [[!]env-variable[=value]] ...*

- The *[!]env-variable[=value] [[!]env-variable[=value]] ...* parameter gives the names of variables to set and, optionally, values to which they should be set. They take the form of 'varname', '!varname' or 'varname=value'. In the first form, the value will be set to "1". The second will remove the given variable if already defined, and the third will set the variable to the literal value given by value. HTTP Server will recognize occurrences of $1..$9 within value and replace them by parenthesized subexpressions of regex.
- The case is preserved when lowercase characters are specified. Valid values include all EBCDIC characters. The value must be enclosed in quotation marks if it contains any non-alphanumeric character or blanks. Lowercase characters for the library names will not work if this directive is used to change the library list. When changing the library list values, the libraries need to be separated by a semicolon.

SetEnvIfNoCase

Module: mod_setenvif

Syntax: SetEnvIfNoCase *attribute regex [!]env-variable[=value] [[!]env-variable[=value]] ...*

Default: none

Context: server config, virtual host, directory .htaccess

Override: FileInfo

Origin: Apache

Example: SetEnvIfNoCase *Host IBM\.Org site=ibm*

Example: SetEnvIfNoCase *Request_Method "get" QIBM_CGI_LIBRARY_LIST="mime;cgiurl;cgilibl"*

The SetEnvIfNoCase directive is semantically identical to SetEnvIf, and differs only in that the regular expression matching is performed in a case-insensitive manner. For example: SetEnvIfNoCase Host QIBM\.Org site=ibm

This will cause the site variable to be set to 'ibm' if the HTTP request header field Host: was included and contained QIBM.Org, qibm.org, or any other combination.

Parameter One: *attribute*

- The *attribute* parameter is the attribute of the request, such as an HTTP Header value. The attribute can also be an environment variable that was set by an earlier setenvif directive.

Parameter Two: *regex*

- The *regex* parameter is a case-sensitive perl compatible regular expression. This gives the user the ability to select variants on the Attribute field, such as using some wildcarding to group related values, and use those to set the environment variables. See "Environment variables set by HTTP Server" on page 634 for more information.

Parameter Three: *[!]env-variable[=value] [[!]env-variable[=value]] ...*

- The *[!]env-variable[=value] [[!]env-variable[=value]] ...* parameter gives the names of variables to set and, optionally, values to which they should be set. They take the form of 'varname', '!varname' or 'varname=value'. In the first form, the value will be set to "1". The second will remove the given variable if already defined, and the third will set the variable to the literal value given by value. HTTP Server will recognize occurrences of $1..$9 within value and replace them by parenthesized subexpressions of regex.
- The case is preserved when lowercase characters are specified. Valid values include all EBCDIC characters. The value must be enclosed in quotation marks if it contains any non-alphanumeric character or blanks. Lowercase characters for the library names will not work if this directive is used to change the library list. When changing the library list values, the libraries need to be separated by a semicolon.

Module mod_so

Module mod_so supports directives for the IBM HTTP Server for i Web server.

Summary

The module mod_so provides for loading of executable code and modules into the HTTP Server at startup or restart time. On the IBM i server, the loaded code comes from a service program object with a .SRVPGM extension.

Directive

- "LoadModule " on page 587

LoadModule

Module: mod_so

Syntax: LoadModule *module filename*

Default: none

Context: server config

Override: none

Origin: Apache

Example: LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM

The LoadModule directive links in the object file filename and adds the module structure named module to the list of active modules.

Parameter One: *module*

- The *module* parameter is the name of the external variable of type module is the IBM i file.

Parameter Two: *filename*

- The *filename* parameter must be an IBM i service program.

The following example loads ibm_ldap in QZSRVLDAP service program into the current HTTP Server:

```
LoadModule ibm_ldap_module /QSYS.LIB/QHTTPSVR.LIB/QZSRVLDAP.SRVPGM
```

Module mod_userdir

Module mod_userdir supports directives for the IBM HTTP Server for i Web server.

Summary

The module mod_userdir allows user-specific directories to be accessed using the http://www.QIBM.com/~user/ syntax.

Directive

- "UserDir " on page 588

UserDir

Module: mod_userdir

Syntax: UserDir *directory [directory ...] | enabled username [username ...] | disabled [username...]*

Context: server config, virtual host

Override: none

Origin: Apache

Example: UserDir WWW

Example: UserDir enable lewis thomas

Example: UserDir disable sherman fazio

Example: UserDir disable

The UserDir directive sets the real directory in a user's home directory to use when a request for a document for a user is received. The user's home directory is based on the HOMEDIR setting of the user's IBM i user profile. Directory is one of the following:

Parameter: *directory*

- The name of a directory or a pattern such as those shown below.
- The keyword *disabled*. This turns off all username-to-directory translations except those explicitly named with the enabled keyword (see below).
- The keyword *disabled* followed by a space-delimited list of usernames. Usernames that appear in such a list will never have directory translation performed, even if they appear in an enabled clause.
- The keyword *enabled* followed by a space-delimited list of usernames. These usernames will have directory translation performed even if a global disable is in effect, but not if they also appear in a disabled clause. Note: the keyword enabled without a list of usernames is not valid.

Note: The UserDir directive is not inherited by virtual hosts when it is set in the global server configuration.

If neither the enabled nor the disabled keywords appear in the UserDir directive, the argument is treated as a filename pattern (or list of filename patterns), and is used to turn the name into a directory specification. For example, assume that the HOMEDIR parameter of the IBM i user profile "bob" is set to /home/bob. A request for `http://www.QIBM.com/~bob/one/two.html` will be translated to:

```
UserDir public_html -> /home/bob/public_html/one/two.html
UserDir /usr/web -> /usr/web/bob/one/two.html
UserDir /home/*/www -> /home/bob/www/one/two.html
```

The following directives will send redirects to the client:

```
UserDir http://www.QIBM.com/users -> http://www.QIBM.com/users/home/bob/one/two.html
UserDir http://www.QIBM.com/*/usr -> http://www.QIBM.com/home/bob/usr/one/two.html
UserDir http://www.QIBM.com/~*/ -> http://www.QIBM.com/home/bob/one/two.html
```

Note: Use caution when using this directive; for instance, "`UserDir ./`" would map "`/~root" to "/`" - which is most likely undesirable. It is strongly recommended that your configuration include a "`UserDir disabled root`" declaration. If multiple UserDir directives without disable or enable keywords occur in a configuration, the last one is used.

Note: User directory substitution is not active by default.

See <Directory> and "Security tips for HTTP Server" on page 30 for more information.

Example 1:

#Allow a few users to have UserDir directories, but not anyone else, use the following:

UserDir disabled

UserDir enabled user1 user2 user3

Example 2:

#Allow most users to have UserDir directories, but deny this to a few (UserDir disabled user4 user5 user6)

UserDir disabled user4 user5 user6

Example 3:

#Specify alternative user directories

UserDir public_html /usr/web http://www.QIBM.com/

With a request for http://www.QIBM.com/~bob/one/two.html, will try to find the page at ~bob/public_html/one/two.html first, then /usr/web/bob/one/two.html, and finally it will send a redirect to http://www.QIBM.com/bob/one/two.html.

If you add a redirect, it must be the last alternative in the list. HTTP server cannot determine if the redirect succeeded or not, so if you have the redirect earlier in the list, that will always be the alternative that is used.

Module mod_usertrack

Module mod_usertrack supports directives for the IBM HTTP Server for i Web server.

Summary

This module provides support for tracking users through the use of cookies.

Note: Netscape 4.x (Communicator) and above can use two or four digit dates. Netscape 3.x and below will only accept two digit dates. To ensure the expiration date is legible to the client's browser use two digit dates.

Directives

- "CookieDomain" on page 590
- "CookieExpires" on page 590
- "CookieName" on page 590

- “CookieStyle” on page 591
- “CookieTracking” on page 591

CookieDomain

Module: mod_usertrack

Syntax: CookieDomain *domain*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Example: CookieDomain .mydomain.com

The CookieDomain directive controls the setting of the domain to which the tracking cookie applies. If not present, no domain is included in the cookie header field. The domain string must begin with a dot, and must include at least one embedded dot. That is, .ibm.com is legal, but ibm.com and .com are not.

Parameter: *domain*

- A *domain* is a partially qualified DNS domain name, preceded by a period. It represents a group of hosts that logically belong to the same DNS domain or zone (that is, the suffixes of the hostnames are all ending in Domain).

CookieExpires

Module: mod_usertrack

Syntax: CookieExpires *expiry-period*

Default: none

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Example: CookieExpires 120

The CookieExpires directive sets an expiry time on the cookie generated by the usertrack module. If this directive is not used, cookies last only for the current browser session.

Parameter: *expiry-period*

- The *expiry-period* specifies the time, in seconds, the cookie should remain.

CookieName

Module: mod_usertrack

Syntax: CookieName *token*

Default: CookieName Apache

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: CookieName ABCDE19

The CookieName directive allows you to change the name of the cookie. The cookie name is used for tracking purposes. You must specify a valid cookie name; results are unpredictable if you use a name containing unusual characters. Valid characters include A-Z, a-z, 0-9, '_' and '-'.

Parameter: *token*

- The *token* parameter allows you to change the name of the cookie.

CookieStyle

Module: mod_usertrack

Syntax: CookieStyle *Netscape* | *Cookie* | *Cookie2* | *RFC2109* | *RFC2965*

Default: CookieStyle Netscape

Context: server config, virtual host, directory, .htaccess

Override: none

Origin: Apache

Example: CookieStyle Cookie

This CookieStyle directive controls the format of the cookie header field.

Parameter: *Netscape | Cookie | Cookie2 | RFC2109 | RFC2965*

- *Netscape* is the original, but now deprecated, syntax. This is the default, and the syntax HTTP Server has historically used.
- *Cookie* or *RFC2109* is the syntax that superseded the *Netscape* syntax.
- *Cookie2* or *RFC2965* is the most current cookie syntax.

Note: Not all clients can understand all of these formats. You should use the most current one that is generally acceptable to your users' browsers.

CookieTracking

Module: mod_usertrack

Syntax: CookieTracking *on | off*

Default: Compiling mod_usertrack will not activate cookies by default.

Context: server config, virtual host, directory, .htaccess

Override: FileInfo

Origin: Apache

Example: CookieTracking on

The CookieTracking directive allows you to send a user-tracking cookie for all new requests. This directive can be used to turn this behavior on or off on a per-server or per-directory basis.

Parameter: *on | off*

- With CookieTracking *on*, the server starts sending a user-tracking cookie for all new requests.
- With CookieTracking *off*, the server does not send a user-tracking cookie for all new requests.

Module mod_vhost_alias

Module mod_vhost_alias supports directives for the IBM HTTP Server for i Web server.

Summary

The module mod_vhost_alias provides support for dynamically configured mass virtual hosting.

Virtual hosting

The term Virtual Host refers to the practice of maintaining more than one server on one machine or server instance, as differentiated by their apparent hostname (or server instance name). For example, it is often desirable for companies sharing a web server to have their own domains, with web servers accessible as www.company1.com and www.company2.com, without requiring the user to know extra path information.

HTTP Server supports two types of virtual hosting, they are IP-based Virtual Host and Name-based Virtual Host. As the term IP-based indicates, the server must have a different IP address for each IP-based virtual host. This can be achieved by the machine having several physical network connections, or by use of virtual interfaces that are supported by most modern operating systems.

While the approach with IP-based Virtual Hosts works well, it is not the most elegant solution, because a dedicated IP address is needed for every virtual host and is hard to implement on some machines. The HTTP/1.1 protocol contains a method for the server to identify what name it is being addressed as.

The benefits of using the name-based virtual host support is a practically unlimited number of servers, ease of configuration and use, and no additional hardware or software requirements. The main disadvantage is that the client must support this part of the protocol. The latest versions of most browsers (e.g. HTTP 1.1) do, but there are still old browsers (e.g. HTTP 1.0) in use that do not. This can cause problems, although a possible solution is addressed below.

Using non-IP virtual hosts

The notable difference between IP-based and name-based virtual host configuration is the NameVirtualHost directive that specifies an IP address that should be used as a target for name-based virtual hosts. For example, suppose that both www.domain.tld and www.otherdomain.tld point at the IP address 111.22.33.44. Simply add to one of the configuration files (most likely httpd.conf or srm.conf) code similar to the following:

```
NameVirtualHost 111.22.33.44

<VirtualHost 111.22.33.44>
ServerName www.domain.tld
DocumentRoot /www/domain
</VirtualHost>

<VirtualHost 111.22.33.44>
ServerName www.otherdomain.tld
DocumentRoot /www/otherdomain
</VirtualHost>
```

Of course, any additional directives can (and should) be placed into the <VirtualHost> section. To make this work, make sure that the names www.domain.tld and www.otherdomain.tld are pointing to the IP address 111.22.33.44

Note: When you specify an IP address in a NameVirtualHost directive, requests to that IP address are only served by matching <VirtualHost>s. The main server is never served from the specified IP address. If you start to use virtual hosts you should stop using the main server as an independent server and use it as a place for configuration directives that are common for all your virtual hosts. In other words, you should add a <VirtualHost> section for every server (hostname) you want to maintain on your server.

Additionally, many servers may want to be accessible by more than one name. For example, the example server might want to be accessible as domain.tld, or www2.domain.tld, assuming the IP addresses pointed to the same server. In fact, one might want it so that all addresses at domain.tld were picked up by the server. This is possible with the ServerAlias directive, placed inside the <VirtualHost> section. For example:

```
ServerAlias domain.tld *.domain.tld
```

Note: You can use * and ? as wild-card characters.

You might also need ServerAlias if you are serving local users who do not always include the domain name. For example, if local users are familiar with typing "www" or "www.example" then you will need to add ServerAlias www www.example. It isn't possible for the server to know what domain the client uses for their name resolution because the client doesn't provide that information in the request. The ServerAlias directive provides a means for different hostnames to point to the same virtual host.

Dynamic virtual hosting

A virtual host is defined by two pieces of information: its IP address, and the contents of the Host: header in the HTTP request. The dynamic mass virtual hosting technique is based on automatically inserting this information into the pathname of the file that is used to satisfy the request. This is done most easily using mod_vhost_alias.

A couple of things need to be `faked', that being specific parameters with incorrect parameter values, to make the dynamic virtual host look like a normal one. The most important is the server name which is used by HTTP Server to generate a self referencing URLs. It is configured with the ServerName directive, and it is available to CGIs via the SERVER_NAME environment variable. The actual value used at run time is controlled by the UseCanonicalName setting. With UseCanonicalName off the server name comes from the contents of the Host: header in the request. With UseCanonicalName DNS it comes from a reverse DNS lookup of the virtual host's IP address. The former setting is used for name-based dynamic virtual hosting, and the latter is used for IP-based hosting. If HTTP Server cannot work out the server name because there is no Host: header or the DNS lookup fails then the value configured with ServerName is used instead.

The other thing to `fake' is the document root (configured with DocumentRoot and available to CGIs via the DOCUMENT_ROOT environment variable). This setting is used by the core module when mapping URIs to filenames, but when the server is configured to do dynamic virtual hosting that job is taken over by the mod_vhost_alias module. If any CGIs or SSI documents make use of the DOCUMENT_ROOT environment variable they will therefore get a misleading value; there is not any way to change DOCUMENT_ROOT dynamically.

Motivation for dynamic virtual hosting

The techniques described here are of interest if your httpd.conf contains many <VirtualHost> sections that are substantially the same. For example:

```
NameVirtualHost 10.22.33.44
<VirtualHost 10.22.33.44>
ServerName www.customer-1.com
DocumentRoot /www/hosts/www.customer-1.com/docs
ScriptAlias /cgi-bin/ /www/hosts/www.customer-1.com/cgi-bin
</VirtualHost>
<VirtualHost 10.22.33.44>
ServerName www.customer-2.com
DocumentRoot /www/hosts/www.customer-2.com/docs
ScriptAlias /cgi-bin/ /www/hosts/www.customer-2.com/cgi-bin
</VirtualHost>
# comment line
<VirtualHost 10.22.33.44>
ServerName www.customer-N.com
DocumentRoot /www/hosts/www.customer-N.com/docs
ScriptAlias /cgi-bin/ /www/hosts/www.customer-N.com/cgi-bin
</VirtualHost>
```

The basic idea is to replace all of the static <VirtualHost> configuration with a mechanism that works it out dynamically. This has a number of advantages:

1. Your configuration file is smaller so HTTP Server starts faster and uses less memory.
2. Adding virtual hosts is simply a matter of creating the appropriate directories in the filesystem and entries in the DNS - you do not need to configure or restart HTTP Server.

The main disadvantage is that you cannot have a different log file for each virtual host; however if you have very many virtual hosts then doing this is dubious anyway because it eats file descriptors. It is better to log to a pipe or a fifo and arrange for the process at the other end to distribute the logs to the customers (it can also accumulate statistics).

A request for http://www.example.isp.com/directory/file.html will be satisfied by the file:

```
/usr/local/apache/vhosts/isp.com/e/x/a/example/directory/file.html.
```

A more even spread of files can be achieved by hashing from the end of the name, for example:

```
VirtualDocumentRoot /usr/local/apache/vhosts/%3+/%2.-1/%2.-2/%2.-3/%2
```

The example request would come from /usr/local/apache/vhosts/isp.com/e/l/p/example/directory/file.html. Alternatively you might use:

```
VirtualDocumentRoot /usr/local/apache/vhosts/%3+/%2.1/%2.2/%2.3/%2.4+
```

The example request would come from /usr/local/apache/vhosts/isp.com/e/x/a/mple/directory/file.html.

Simple dynamic virtual hosts

This extract from httpd.conf implements the virtual host arrangement outlined in the Motivation section above, but in a generic fashion using mod_vhost_alias.

```
# get the server name from the Host: header
UseCanonicalName off
# this log format can be split per-virtual-host based on the first field
LogFormat "%V %h %l %u %t \"%r\" %s %b" vcommon
CustomLog logs/access_log vcommon
# include the server name in the filenames used to satisfy requests
VirtualDocumentRoot /www/hosts/%0/docs
VirtualScriptAlias /www/hosts/%0/cgi-bin
```

This configuration can be changed into an IP-based virtual hosting solution by just turning UseCanonicalName off into UseCanonicalName DNS. The server name that is inserted into the filename is then derived from the IP address of the virtual host.

A virtually hosted homepages system

This is an adjustment of the above system tailored for an ISP's homepages server. Using a slightly more complicated configuration we can select substrings of the server name to use in the filename so that e.g. the documents for www.user.isp.com are found in /home/user/. It uses a single cgi-bin directory instead of one per virtual host.

```
# all the preliminary stuff is the same as above, then
# include part of the server name in the filenames
VirtualDocumentRoot /www/hosts/%2/docs
# single cgi-bin directory
ScriptAlias /cgi-bin/ /www/std-cgi/
```

Use more than one virtual hosting system on the same server

With more complicated setups you can use HTTP Server's normal <VirtualHost> directives to control the scope of the various virtual hosting configurations. For example, you could have one IP address for homepages customers and another for commercial customers with the following setup. This can of course be combined with conventional <VirtualHost> configuration sections.

```
UseCanonicalName off

LogFormat "%V %h %l %u %t \"%r\" %s %b" vcommon

<Directory /www/commercial>
Options FollowSymLinks
AllowOverride All
</Directory>
<Directory /www/homepages>
Options FollowSymLinks
AllowOverride None
</Directory>
<VirtualHost 10.22.33.44>
ServerName www.commercial.isp.com
CustomLog logs/access_log.commercial vcommon
VirtualDocumentRoot /www/commercial/%0/docs
VirtualScriptAlias /www/commercial/%0/cgi-bin
</VirtualHost>
<VirtualHost 10.22.33.45>
ServerName www.homepages.isp.com
CustomLog logs/access_log.homepages vcommon
VirtualDocumentRoot /www/homepages/%0/docs
```

```
ScriptAlias /cgi-bin/ /www/std-cgi/
</VirtualHost>
```

Directory name interpolation

All the directives in this module interpolate (insert) a string into a pathname. The interpolated string may either be the server name (see "UseCanonicalName" on page 362 for more information) or the IP address of the virtual host on the server in dotted-quad format. The interpolation is controlled by specifiers inspired by UNIX printf which have a number of formats:

Specifier	Description
%%	Insert a % sign
%p	Insert the port number of the virtual host
%N.M	Insert (part of) the interpolated string

N and **M** are used to specify substrings of the interpolated string. **N** selects from the period separated components of the interpolated string, and **M** selects characters within whatever **N** has selected. **M** is optional and defaults to zero if it is not present. The period (.) must be present if and only if **M** is present. The interpretation is as follows:

N.M interpretation	Description
0	The whole name.
1	The first part.
2	The second part.
-1	The last part.
-2	The next to last part.
2+	The second and all subsequent parts.
-2+	The next to last part and all preceding parts.
1+ and -1+	The same as 0 (zero).

If **N** or **M** is greater than the number of parts available a single underscore is interpolated.

Examples:

For a simple name-based virtual hosts you might use the following directives in your server configuration file:

```
     UseCanonicalName off
     VirtualDocumentRoot /www/webserver/vhosts/%0
```

A request for http://www.qibm.com/directory/file.html will be satisfied by the file /www/webserver/vhosts/www.qibm.com/directory/file.html.

For a very large number of virtual hosts it is a good idea to arrange the files to reduce the size of the vhosts directory. To do this you might use the following in your configuration file:

```
     UseCanonicalName off
     VirtualDocumentRoot /www/webserver/vhosts/%3+/%2.1/%2.2/%2.3/%2
```

A request for http://www.domain.qibm.com/directory/file.html will be satisfied by the file /www/webserver/vhosts/qibm.com/d/o/m/domain/directory/file.html.

A more even spread of files can be achieved by hashing from the end of the name, for example:

```
     VirtualDocumentRoot /www/webserver/vhosts/%3+/%2.-1/%2.-2/%2.-3/%2
```

The example request would come from /www/webserver/vhosts/qibm.com/n/i/a/domain/directory/file.html. Alternatively you might use:

```
     VirtualDocumentRoot  /www/webserver/vhosts/%3+/%2.1/%2.2/%2.3/%2.4+
```

The example request would come from /www/webserver/vhosts/qibm.com/d/o/m/ain/directory/file.html.

A very common request by users is the ability to point multiple domains to multiple document roots without having to worry about the length or number of parts of the hostname being requested. If the requested hostname is sub.www.domain.qibm.com instead of simply www.domain.qibm.com, then using %3+ will result in the document root being /www/webserver/vhosts/domain.qibm.com/... instead of the intended qibm.com directory. In such cases, it can be beneficial to use the combination %-2.0.%-1.0, which will always yield the domain name and the tld, for example qibm.com regardless of the number of subdomains appended to the hostname. As such, one can make a configuration that will direct all first, second or third level subdomains to the same directory:

```
     VirtualDocumentRoot /www/webserver/vhosts/%-2.0.%-1.0
```

In the example above, both www.qibm.com as well as www.sub.qibm.com or qibm.com will all point to /www/webserver/vhosts/qibm.com.

For IP-based virtual hosting you might use the following in your configuration file:

```
    UseCanonicalName DNS
    VirtualDocumentRootIP /www/webserver/vhosts/%1/%2/%3/%4/docs
    VirtualScriptAliasIP  /www/webserver/vhosts/%1/%2/%3/%4/cgi-bin
```

A request for http://www.domain.qibm.com/directory/file.html would be satisfied by the file /www/webserver/vhosts/10/20/30/40/docs/directory/file.html if the IP address of www.domain.qibm.com were 10.20.30.40. A request for http://www.domain.qibm.com/cgi-bin/script.pl would be satisfied by executing the program /www/webserver/vhosts/10/20/30/40/cgi-bin/script.pl.

If you want to include the . character in a VirtualDocumentRoot directive, but it clashes with a % directive, you can work around the problem in the following way:

```
    VirtualDocumentRoot /www/webserver/vhosts/%2.0.%3.0
```

A request for http://www.domain.qibm.com/directory/file.html will be satisfied by the file /www/webserver/vhosts/domain.qibm/directory/file.html.

The LogFormat directives %V and %A are useful in conjunction with this module. See "LogFormat" on page 487 for more information.

Directives

- "VirtualDocumentRoot" on page 596
- "VirtualDocumentRootIP" on page 597
- "VirtualScriptAlias" on page 599
- "VirtualScriptAliasIP" on page 600

VirtualDocumentRoot

Module: mod_vhost_alias

Syntax: VirtualDocumentRoot *interpolated-directory | none*

Default: VirtualDocumentRoot none

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the config file prior to using the directive. The statement should be as follows: LoadModule vhost_alias_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Example: See below.

The VirtualDocumentRoot directive allows you to determine where the server will finds your documents based on the value of the server name. The result of expanding interpolated-directory is used as the root of the document tree in a similar manner to the DocumentRoot directive's parameter. See "DocumentRoot " on page 313 for more information.

If interpolated-directory is *none* then VirtualDocumentRoot is disabled. This directive cannot be used in the same context as VirtualDocumentRootIP. See "VirtualDocumentRootIP" on page 597 for more information.

Parameter: *interpolated-directory | none*

- The *interpolated-directory* parameter the full path to a directory.
- Specify none to disable VirtualDocumentRoot

For example, a simple dynamic virtual host:

```
# LocalModule directive required
LoadModule vhost_alias_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
# get the server name from the Host: header
UseCanonicalName off
# this log format can be split per-virtual-host based on the first field
LogFormat "%V %h %l %u %t \"%r\" %s %b" vcommon
CustomLog logs/access_log vcommon
# include the server name in the filenames used to satisfy requests
VirtualDocumentRoot /www/web/%0/docs
```

The next example is an adjustment of the above, system tailored for an ISP's homepage server. Using a slightly more complicated configuration we can select substrings of the server name to use in the filename so that e.g. the documents for www.user.isp.com are found in /home/user/. It uses a single cgi-bin directory instead of one per virtual host:

```
# LocalModule directive required
LoadModule vhost_alias_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
# get the server name from the Host: header
UseCanonicalName off
# include part of the server name in the filenames
VirtualDocumentRoot /usr/web/hosts/%2/docs
# single cgi-bin directory
ScriptAlias /cgi-bin/ /usr/web/std-cgi/
```

Note: This configuration can be changed into an IP-based virtual hosting solution by just turning UseCanonicalName off into UseCanonicalName DNS. The server name that is inserted into the filename is then derived from the IP address of the virtual host. See "UseCanonicalName" on page 362 for more information.

Note: VirtualDocumentRoot will override any "DocumentRoot " on page 313 directives you may have put in the same context or child contexts. Putting a VirtualDocumentRoot in the server config will effectively override "DocumentRoot " on page 313 directives in any virtual hosts defined later on, unless you set VirtualDocumentRoot to None in each virtual host.

VirtualDocumentRootIP

Module: mod_vhost_alias

Syntax: VirtualDocumentRootIP *interpolated-directory | none*

Default: VirtualDocumentRootIP none

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the config file prior to using the directive. The statement should be as follows: LoadModule vhost_alias_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Example: See VirtualDocumentRoot.

The VirtualDocumentRootIP directive is like the "VirtualDocumentRoot" on page 596 directive, except that it uses the IP address of the server end of the connection for directory interpolation instead of the server name. See "VirtualDocumentRoot" on page 596 for more information.

Parameter: *interpolated-directory*

- The *interpolated-directory* parameter the full path to a directory.
- Specify none to disable VirtualDocumentRootIP

More complicated setups can use the server's normal <VirtualHost> directives to control the scope of the various virtual hosting configurations. For example, you could have one IP address for home page customers and another for commercial customers with the following directives. This can of course be combined with conventional <VirtualHost> configuration sections.

```
UseCanonicalName off

LogFormat "%V %h %l %u %t \"%r\" %s %b" vcommon

<Directory /usr/web/commercial>
Options FollowSymLinks
AllowOverride All
</Directory>

<Directory /usr/web/homepages>
Options FollowSymLinks
AllowOverride None
</Directory>
# LocalModule directive required
LoadModule vhost_alias_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM


<VirtualHost 10.22.33.44>
ServerName www.commercial.isp.com
CustomLog logs/access_log.commercial vcommon
VirtualDocumentRoot /usr/web/commercial/%0/docs
VirtualScriptAlias /usr/web/commercial/%0/cgi-bin
</VirtualHost>
<VirtualHost 10.22.33.45>
ServerName www.homepages.isp.com
CustomLog logs/access_log.homepages vcommon
VirtualDocumentRoot /usr/web/homepages/%0/docs
ScriptAlias /cgi-bin/ /usr/web/std-cgi/
</VirtualHost>
```

More efficient IP-based virtual hosting:

In the first example note that it is easy to turn it into an IP-based virtual hosting setup. Unfortunately that configuration is not very efficient because it requires a DNS lookup for every request. This can be avoided by laying out the filesystem according to the IP addresses themselves rather than the corresponding names and changing the logging similarly. HTTP Server will not usually need to work out the server name and a DNS lookup. For example:

```
# Get the server name from the reverse DNS of the IP address
UseCanonicalName DNS
# LocalModule directive required
LoadModule vhost_alias_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

# include the IP address in the logs so they may be split
LogFormat "%A %h %l %u %t \"%r\" %s %b" vcommon
CustomLog logs/access_log vcommon
# include the IP address in the filenames
VirtualDocumentRootIP /usr/web/hosts/%0/docs
VirtualScriptAliasIP /usr/web/hosts/%0/cgi-bin
```

VirtualScriptAlias

Module: mod_vhost_alias

Syntax: VirtualScriptAlias *interpolated-directory* | *none*

Default: VirtualScriptAlias none

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the config file prior to using the directive. The statement should be as follows: LoadModule vhost_alias_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Example: See below.

The VirtualScriptAlias directive allows you to specify the directory path where the server will find CGI scripts in a similar manner to "VirtualDocumentRoot" on page 596 does for other documents. In this case the target directory of the CGI scripts must be named "cgi-bin". For example:

```
VirtualScriptAlias /user/web/commercial/%0/cgi-bin
```

Parameter: *interpolated-directory*

- The *interpolated-directory* parameter the full path to a directory.
- Specify none to disable VirtualScriptAlias

Using more than one virtual hosting system on the same server instance:

More complicated setups use the server's normal <VirtualHost> directives to control the scope of the various virtual hosting configurations. For example, you could have one IP address for homepages customers and another for commercial customers with the following directives. This can of course be combined with conventional <VirtualHost> configuration sections.

```
UseCanonicalName off

LogFormat "%V %h %l %u %t \"%r\" %s %b" vcommon

<Directory/usr/web/commercial>
Options FollowSymLinks
AllowOverride All


</Directory>
<Directory /usr/web/homepages>
Options FollowSymLinks
AllowOverride None
</Directory>


# LocalModule directive required
LoadModule vhost_alias_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
<VirtualHost 10.22.33.44>
ServerName www.commercial.isp.com
CustomLog logs/access_log.commercial vcommon
VirtualDocumentRoot /usr/web/commercial/%0/docs
VirtualScriptAlias /usr/web/commercial/%0/cgi-bin
</VirtualHost>


<VirtualHost 10.22.33.45>
ServerName www.homepages.isp.com
CustomLog logs/access_log.homepages vcommon
VirtualDocumentRoot /usr/web/homepages/%0/docs
ScriptAlias /cgi-bin/ /usr/web/std-cgi/
</VirtualHost>
```

VirtualScriptAliasIP

Module: mod_vhost_alias

Syntax: VirtualScriptAliasIP *interpolated-directory | none*

Default: VirtualScriptAliasIP none

Context: server config, virtual host

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the config file prior to using the directive. The statement should be as follows: LoadModule vhost_alias_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Example: See "VirtualScriptAlias" on page 599.

The VirtualScriptAliasIP directive is like the "VirtualScriptAlias" on page 599 directive, except that it uses the IP address of the server end of the connection for directory interpolation instead of the server name. See "VirtualScriptAlias" on page 599 for more information.

Parameter: *interpolated-directory*

- The *interpolated-directory* parameter the full path to a directory.
- Specify none to disable VirtualScriptAliasIP

Module mod_version

Module mod_version supports directives for the IBM HTTP Server for i Web server.

Summary

The module mod_version is designed for use in test suites and large networks which have to deal with different HTTP Server versions and different configurations. It provides a new container that enables flexible version checking, including numeric comparisons and regular expressions. This module is helpful when using the same configuration across different apache versions and IBM i releases.

Directive

- "<IfVersion>" on page 600

<IfVersion>

Module: mod_version

Syntax: <IfVersion> [[!]operator] version> ... </IfVersion>

Default: none

Context: server, virtual host, directory, .htaccess

Override: All

Origin: Apache

The <IfVersion> section encloses configuration directives which are executed only if the Apache HTTP version matches the desired criteria. For normal (numeric) comparisons the version argument has the format major[.minor[.patch]], e.g. 2.2.11 or 2.4. minor and patch are optional. If these numbers are omitted, they are assumed to be zero.

The following numerical operators are possible:

Table 46. Mod_version operators

Operator	Description
= or ==	Apache HTTP version is equal
>	Apache HTTP version is greater than
>=	Apache HTTP version is greater or equal
<	Apache HTTP version is less than
<=	Apache HTTP version is less or equal

Example

```
<IfVersion >= 2.2>
# this happens only in versions greater or equal 2.2.0
</IfVersion>
```

```
<IfVersion = 2.4>
# this happens only in version 2.4.0 but not in version 2.4.2, etc.
</IfVersion>
```

Besides the numerical comparison it is possible to match a regular expression against the Apache HTTP version. There are two ways to write it:

Operator	Description
= or ==	version has the form /regex/
~	version has the form regex

Example

```
<IfVersion = /^2.4.[01234]$/>
   # e.g. workaround for buggy versions
</IfVersion>
```

In order to reverse the meaning, all operators can be preceded by an exclamation mark (!):

```
<IfVersion !~ ^2.4.[01234]$>
   # not for those versions
</IfVersion>
```

Note: If the operator is omitted, it is assumed to be =.

Module mod_watchdog

Module mod_watchdog supports directives for the IBM HTTP Server for i Web server.

Summary

The module mod_watchdog defines programmatic hooks for other modules to periodically run tasks. These modules can register handlers for mod_watchdog hooks.

Directives

- "WatchdogInterval" on page 601

WatchdogInterval

Module: mod_watchdog

Syntax: WatchdogInterval *number-of-seconds*

Default: WatchdogInterval *1*

Context: server config

Override: none

Origin: Apache

Example: WatchdogInterval 10

Sets the interval at which the watchdog_step hook runs. Default is to run every second.

Module mod_proxy_balancer

Module mod_proxy_balancer does not provide directives for the IBM HTTP Server for i Web server.

Summary

The Proxy balancer module requires the service of mod_proxy and it provides load balancing support for HTTP, FTP and WebSocket protocols.

The load balancer enables requests to be shared among workers via three methods, Request Counting, Weighted Traffic Counting and Pending Request Counting. The default Request counting just counts the number of requests and distributes requests across workers until they have each served an equal number of requests. These methods are controlled via the lbmethod value of the Balancer definition. See the ProxyPass directive for more information, especially regarding how to configure the Balancer and BalancerMembers.

Load balancing scheduler algorithm is now provided by modules: mod_lbmethod_byrequests, mod_lbmethod_bytraffic and mod_lbmethod_bybusyness. In order to get the ability of load balancing, mod_proxy, mod_proxy_balancer, and at least one of load balancing scheduler algorithm modules have to be loaded. For example：

```
LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule proxy_balancer_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
LoadModule lbmethod_byrequests_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
```

If you are using proxy load balancing with a Proxy directive scheme that starts with balancer://, you will need to specify the working members of the cluster. The balancer://xxx specification refers to a virtual worker that gets created. It does not really communicate with the backend server but is responsible for the management of several "real" workers. A special set of parameters can be added to this virtual worker. The "real" worker is a member of the load balancer, usually a remote host serving one of the supported protocols. Review ProxyPass directive for all of the allowed parameters.

The Proxy balancer module supports two ways of implementing stickyness: cookie based and URL encoding based. For example:

```
ProxyPass "/test" "balancer://mycluster" stickysession=JSESSIONID|jsessionid scolonpathdelim=On
<Proxy "balancer://mycluster">
    BalancerMember "http://192.168.1.50:80" route=node1
    BalancerMember "http://192.168.1.51:80" route=node2
</Proxy>
```

Module zend_enabler

Module zend_enabler supports directives for the IBM HTTP Server for i Web server.

Summary

The module zend_enabler enables HTTP server to run AIX programs that implement the FastCGI protocol.

FastCGI is an interface between Web servers and applications which combines some of the performance characteristics of native Web server modules with the Web server independence of the CGI programming interface. AIX FastCGI applications are run in the PASE for i environment.

Directives

- "FastCGIServerID" on page 603

FastCGIServerID

Module: zend_enabler

Syntax: FastCGIServerID *user_profile*

Default: FastCGIServerID *QTMHHTTP*

Context: server config, virtual host

Override: AuthConfig

Origin: IBM

Example: FastCGIServerID webmaster

The FastCGIServerID directive specifies the user profile that the fast CGI server will run under(default is QTMHHTTP). This directive tells what user profile to use when starting the worker threads under the child process.

Parameter One: *user_profile*

- *user_profile* must be a valid user profile. This profile must be authorized to all the directories, files, and other server resources accessed by the fast CGI server unless the server is configured to swap to another profile for specific requests or directories. You must have authority to the specified profile.

Note: The following steps must be done first before using the FastCGIServerID directive

1. Empty IFS temporary directory /tmp
2. Change the authority of IFS directory /usr/local/zendsvr to *PUBLIC *RX (a few *RWX)
3. Ensure the authority of library ZENDSVR is *PUBLIC *RX or *RWX (r-x or rwx)
4. Change the authority of your HTTP server directory(i.e. /www/zendsvr) to *PUBLIC *RX
5. Add the directive to HTTP server configuration file(httpd.conf) and restart HTTP server

   Example：

   FastCGIServerID TESTUSR

   Use WRKACTJOB command to see the user profile that fast CGI server runs under is changed from default QTMHHTTP to TESTUSR

```
ZENDSVR     QTMHHTTP    BCH      .0  PGM-QZHBMAIN     SIGW
ZENDSVR     QTMHHTTP    BCI      .0  PGM-QZSRLOG      SIGW
ZENDSVR     QTMHHTTP    BCI      .0  PGM-QZSRLOG      SIGW
ZENDSVR     QTMHHTTP    BCI      .0  PGM-QZSRHTTP     SIGW
ZENDSVR     QTMHHTTP    BCI      .0  PGM-zfcgi        SELW
ZENDSVR     TESTUSR     BCI      .0  PGM-php-cgi      THDW
ZENDSVR     TESTUSR     BCI      .0  PGM-php-cgi      TIMW
ZENDSVR     TESTUSR     BCI      .0  PGM-php-cgi      TIMW
ZENDSVR     TESTUSR     BCI      .0  PGM-php-cgi      TIMW
ZENDSVR     TESTUSR     BCI      .0  PGM-php-cgi      TIMW
ZENDSVR     TESTUSR     BCI      .0  PGM-php-cgi      TIMW
```

Module mod_filter

Module mod_filters supports directives for the IBM HTTP Server for i Web server.

Summary

The filter module provides context-sensitive configuration of output content filters. This module by gives server administrators a great deal of flexibility in configuring the filter chain. In fact, filters can be inserted based on any Request Header, Response Header or Environment Variable. The filter module has been extended to allow filters to be executed based on conditional criteria. This changes the old model under which documents were merely filtered unconditionally according to the configuration of the *AddOutputFilter* directive or the minor flexibility offered by *AddOutputFilterByType*. Instead of adding specific filters to specific file types you can create a proper filter chain output is processed by each filter in the chain. This requires a declaration of the available filter types, and if necessary, the source requirements (file type) and the filters to apply.

The filter module works by introducing indirection into the filter chain. Instead of inserting filters in the chain, we insert a filter harness which in turn dispatches conditionally to a filter provider. Any content filter may be used as a provider to mod_filter; no change to existing filter modules is required (although it may be possible to simplify them). There can be multiple providers for one filter, but no more than one provider will run for any single request.

A filter chain comprises any number of instances of the filter harness, each of which may have any number of providers. A special case is that of a single provider with unconditional dispatch, which is equivalent to inserting the provider filter directly into the chain.

Directives

- "FilterChain" on page 605
- "AddOutputFilterByType" on page 604
- "FilterDeclare" on page 606
- "FilterProvider" on page 606

AddOutputFilterByType

Module: mod_filter

Syntax: AddOutputFilterByType filter *filtername[;filtername...] media-type [media-type] ...*

Default: none

Context: Server config, Virtual Host, Directory, .htaccess

Override: FileInfo

Origin: Apache

Examples:

AddOutputFilterByType INCLUDES text/html

AddOutputFilterByType INCLUDES;DEFLATE text/html

GUI Design Information: Form --> Compression... Tab --> Output Filters

The AddOutputFilterByType directive matches the MIME *media-type* of files to a filter which will process responses from the server before they are sent to the client. All files of the given *media-type* will be processed through the filter filtername. This is in addition to all defined filters, including those defined in the SetOutputFilter"SetOutputFilter" on page 360 directive.

Parameter One: *filtername*

- The name of a filter which will process responses from the server before they are sent to the client.

Parameter Two: *media-type*

- Any valid media-type

The following example uses the DEFLATE filter, which is provided by mod_deflate. It will compress all output (either static or dynamic) which is labeled as text/html or text/plain before it is sent to the client.

AddOutputFilterByType DEFLATE text/html text/plain

If you want the content to be processed by more than one filter, their names have to be separated by semicolons. It's also possible to use one AddOutputFilterByType directive for each of these filters.

The configuration below causes all script output labeled as text/html to be processed at first by the INCLUDES filter and then by the DEFLATE filter.

```
<Location /cgi-bin/>
    Options Includes
    AddOutputFilterByType INCLUDES;DEFLATE text/html
</Location>
```

See also

- AddOutputFilter
- SetOutputFilter
- filters

FilterChain

Module: mod_filter

Syntax: FilterChain *[+=-@!] filter-name ...*

Default: none

Context: server config, Virtual Host, Directory, .htaccess

Override: Options

Origin: Apache

Examples

Server side Includes (SSI)

A simple case of using FilterProvider in place of "AddOutputFilterByType" on page 604.

```
FilterDeclare SSI
FilterProvider SSI INCLUDES "resp('Content-Type') == 'text/html'"
FilterChain SSI
```

Emulating mod_gzip with mod_deflate

Insert INFLATE filter only if "gzip" is NOT in the Accept-Encoding header. This filter runs with ftype CONTENT_SET.

```
FilterDeclare gzip CONTENT_SET
FilterProvider gzip inflate "req('Accept-Encoding') != 'gzip'"
FilterChain gzip
```

The following are the three stages used to configuring a filter chain with mod_filter.

Declare Filters
The FilterDeclare directive declares a filter, assigning it a name and filter type. Required only if the filter is not the default type AP_FTYPE_RESOURCE.

Register Providers
The FilterProvider directive registers a provider with a filter. The filter may have been declared with FilterDeclare; if not, FilterProvider will implicitly declare it with the default type AP_FTYPE_RESOURCE. The provider must have been registered with ap_register_output_filter by some module. The remaining arguments to FilterProvider are a dispatch criterion and a match string. The former may be an HTTP request or response header, an environment variable, or the Handler used by this request. The latter is matched to it for each request, to determine whether this provider will be used to implement the filter for this request.

Configure the Chain

The above directives build components of a smart filter chain, but do not configure it to run. The FilterChain directive builds a filter chain from smart filters declared, offering the flexibility to insert filters at the beginning or end of the chain, remove a filter, or clear the chain.

FilterChain takes any number of arguments, each optionally preceded with a single-character control that determines what to do. The following information configures an actual filter chain from declared filters.

+filter-name
Adds filter-name to the end of the filter chain.

@filter-name
Inserts filter-name at the start of the filter chain

-filter-name
Removes filter-name from the filter chain

=filter-name
Empty the filter chain and insert filter-name

!

Empty the filter chain

filter-name
Equivalent to +filter-name

FilterDeclare

Module: mod_filter

Syntax: FilterDeclare *filter-name [type]*

Default: none

Context: server config, Virtual Host, Directory, .htaccess

Override: Options

Origin: Apache

This directive declares an output filter together with a header or environment variable that will determine runtime configuration. The first argument is a filter-name for use in FilterProvider and FilterChain directives. The final (optional) argument is the type of filter, and takes values of ap_filter_type - namely RESOURCE (the default), CONTENT_SET, TRANSCODE, PROTOCOL, CONNECTION, or NETWORK.

FilterProvider

Module: mod_filter

Syntax: FilterProvider *FilterProvider filter-name provider-name expression*

Default: none

Context: server config, Virtual Host, Directory, .htaccess

Override: Options

Origin: Apache

Example:

These are examples for using Smart Filtering.

Server side Includes (SSI)

A simple case of using FilterProvider in place of "AddOutputFilterByType" on page 604

FilterDeclare SSI

FilterProvider SSI INCLUDES "resp('Content-Type') == 'text/html'"

FilterChain SSI

Emulating mod_gzip with mod_deflate

Insert INFLATE filter only if "gzip" is NOT in the Accept-Encoding header. This filter runs with ftype CONTENT_SET.

FilterDeclare gzip CONTENT_SET

FilterProvider gzip inflate "req('Accept-Encoding') != 'gzip'"

FilterChain gzip

The FilterProvider directive registers a provider for the Smart Filter. The provider will be called if and only if the *expression* declared evaluates to true when the harness is first called.

The *provider-name* is registered by loading a module that registers the name with ap_register_output_filter.

expression is an ap_expr.

Note: The FilterProvider directive has changed from Apache 2.2: the match and dispatch arguments are replaced with a single but more versatile expression. In general, you can convert a match/dispatch pair to the two sides of an expression, using something like:

```
     "dispatch = 'match'"
```

The Request headers, Response headers and Environment variables are now interpreted from syntax %{req:foo}, %{resp:foo} and %{env:foo} respectively. The variables %{HANDLER} and %{CONTENT_TYPE} are also supported.

Note that the match no longer support substring matches. They can be replaced by regular expression matches.

Module mod_ident

Module mod_ident supports directives for the IBM HTTP Server for i Web server.

Directives

- "IdentityCheck" on page 607
- "IdentityCheckTimeout" on page 608

IdentityCheck

Module: core

Syntax: IdentityCheck *on | off*

Default: IdentityCheck off

Context: server config, virtual host, directory, Not in Limit

Override: none

Origin: Apache

Example: IdentityCheck on

The IdentityCheck directive enables compliant logging of the remote user name for each connection, where the client machine runs `identd` or something similar. This information is logged in the access log.

Parameter: *on | off*

- When set to *on*, the server will attempt to identify the client's user by querying the identd daemon of the client host. Identd will, when given a socket number, reveal which user created that socket. That is, the username of the client on his home machine. Since the information provided is entirely under the control of the client's machine, this information should not be trusted in any way except for rudimentary usage tracking.
- When set to *off*, the server does not attempt to identify the client's user.

Note: This can cause serious latency problems accessing your server since every request requires one of these lookups to be performed. When firewalls are involved each lookup might possibly fail and add 30 seconds of latency to each hit. So in general this is not very useful on public servers accessible from the Internet. This directive controls the identd field of the W3C common or extended log format.

A CustomLog, TransferLog or FRCACustomLog must be configured before this directive will take affect. If IdentityCheck is configured in a directory or location container, the CustomLog, TransferLog or FRCACustomLog must be configured in the server context where the directory or location container resides for it to take affect. Also for this directive to be used in the CustomLog, TransferLog, or FRCACustomLog, the LogFormat for these has to specify "%l" (lower case L) in the format.

See mod_log_config for information on log formats.

IdentityCheckTimeout

Module: mod_ident

Syntax: IdentityCheckTimeout *seconds*

Default: IdentityCheckTimeout 30

Context: Server, Virtual Host, Directory

Override: none

Origin: Apache

The IdentityCheckTimeout directive determines the timeout duration for ident requests. The default value of 30 seconds is recommended by RFC 1413, mainly because of possible network latency. However, you may want to adjust the timeout value according to your local network speed.

Module zhbstartup

Directives

- "Subsystem" on page 608
- "SubsystemPool" on page 609
- "RoutingData" on page 609

Subsystem

Module: zhbstartup

Load_Module: None

Syntax: Subsystem *name*

Default: Subsystem *QHTTPSVR*

Context: server

Override: none

Origin: IBM i

Requirement for Directive to Take Effect: Restart

Current GUI Location: None

Example: Subsystem ZENDSVR

Specify this directive to assign the subsystem that a specific HTTP server runs in. By default all HTTP servers run under QHTTPSVR subsystem. User can use this directive combined with SubsystemPool and RoutingData directives to make HTTP Server to use own customized subsystem, memory pool and routing data so each HTTP server can be set to run in the optimal memory.

SubsystemPool

Module: zhbstartup

Load_Module: None

Syntax: SubsystemPool *number*

Default: SubsystemPool *2*

Context: server

Override: none

Origin: IBM i

Requirement for Directive to Take Effect: Restart

Current GUI Location: None

Range of Numeric Values: [1 ...10]

Example: SubsystemPool 5

Specify this directive to assign the subsystem memory pool that a specific HTTP server runs in. By default all HTTP servers run in *BASE. User can use this directive combined with Subsystem and RoutingData directives to make HTTP Server to use own customized subsystem, memory pool and routing data so each HTTP server can be set to run in the optimal memory.

RoutingData

Module: zhbstartup

Load_Module: None

Syntax: RoutingData *name*

Default: RoutingData *HTTPWWW*

Context: server

Override: none

Origin: IBM i

Requirement for Directive to Take Effect: Restart

Current GUI Location: None

Valid Characters: A maximum of 80 characters can be specified

Example: RoutingData HTTPSVR

Specify this directive to set the routing data when starting HTTP server. The default value is HTTPWWW. User can use this directive combined with Subsystem and SubsystemPool directives to make HTTP Server to use own customized subsystem, memory pool and routing data so each HTTP server can be set to run in the optimal memory.

Module mod_authn_core

Module mod_authn_core supports directives for the IBM HTTP Server for i Web server.

Summary

The mod_authn_core module provides core authentication capabilities to allow or deny access to portions of the web site. mod_authn_core provides directives that are common to all authentication providers.

- "AuthName" on page 610
- "AuthType" on page 610

AuthName

Module: mod_authn_core

Syntax: AuthName *auth-domain*

Default: none

Context: directory, .htaccess

Override: AuthConfig

Origin: Modified

Example: AuthName "IBM Server"

The AuthName directive sets the name of the authorization realm for a directory. This realm is given to the client during basic authentication to inform the user about which username and password to send. To work properly this directive must be accompanied by "AuthType" on page 610 *Basic*, and directives such as "PasswdFile" on page 233.

Parameter: *auth-domain*
Auth-domain takes a single argument; If the realm name contains spaces, it must be enclosed in double quotation marks.

AuthType

Module: mod_authn_core

Syntax: AuthType *type*

Default: none

Context: directory, .htaccess

Override: AuthConfig

Origin: Modified

Example: AuthType None

Example: AuthType Basic

Example: AuthType SSL

Example: AuthType Kerberos

Example: AuthType KerberosOrBasic

The AuthType directive selects the type of user authentication for a directory. For *Basic* authentication to work properly this directive must be accompanied by "AuthName" on page 610. If *Kerberos* is specified, the Require directive must be specified and the PasswdFile directive should be included and set to

%%KERBEROS%%. The AuthName, LDAPConfigFile, and LDAPRequire directives may be configured in the same container, but will be ignored.

Parameter: *type*

- The *type* parameter value specifies the type of user authentication for a directory. Valid values include:

  None

  Configuring "AuthType None" disables authentication. When authentication is enabled, it is normally inherited by each subsequent configuration section, unless a different authentication type is specified. If no authentication is desired for a subsection of an authenticated section, the authentication type None may be used; in the following example, clients may access the /www/webserver/htdocs/public directory without authenticating:

```
<Directory /www/webserver/htdocs>
    AuthType Basic
    AuthName Documents
    PasswdFile %%SYSTEM%%
    Require valid-user
</Directory>
```

```
<Directory /www/webserver/htdocs/public>
    AuthType None
    Require all granted
</Directory>
```

  Basic

  Configuring "AuthType *Basic*" specifies that the server protects resources based on a user ID and password. The user will be prompted for a user ID and password the first time a request is made for a resource protected by this directive. This directive may be used on either a secure or a non-secure HTTP session. On a non-secure HTTP session, the user ID and password are encoded, but not encrypted.

  Note: Note: In order to use the directive "SSLAuthType CertOrBasic", the AuthType directive must be specified with a value of type *Basic*.

  SSL

  Configuring "AuthType *SSL*" specifies that the server will protect resources based on a SSL client certificate that is associated with a user ID. See the SSLAuthType directive for more information.

  Note: In order to use the directive "SSLAuthType Cert", the AuthType directive must be specified with a value of type *SSL*.

  Kerberos

  Configuring "AuthType *Kerberos*" specifies that the server will accept a server ticket from a Kerberos-enabled client to authenticate a user.

  KerberosOrBasic

  Configuring "AuthType *KerberosOrBasic*" specifies that the server will give a basic authentication prompt to those browsers who are either not in a kerberos enabled domain, not using Microsoft Internet Explorer, or if kerberos authentication fails for a Microsoft Internet Explorer browser in a kerberos realm. If the browser is Microsoft Internet Explorer configured for kerberos, and in a kerberos domain with the correct kerberos principal and keytab entries, there will be no prompt (uses kerberos HTTP negotiation). To work correctly the intersection of directives for "Kerberos" and "Basic" authority must be used. Kerberos specific directives will not work, because basic authentication can not use kerberos validation. These directives are required when using KerberosOrBasic:

  – "AuthName" on page 610

  – PasswdFile *%%SYSTEM%%*

  – Require: The parameter *valid-user*, *user* or *group* may be specified. For example: `Require user` *`kerbuser@DOMAIN.COM as400userid`*

  Notes:

- The group file must include both the kerberos principal and the as400userid. For example `Groupfile: productionusers: johndoe@WIN2003.DOMAIN.COM, jdoe`
- If you do not use the *valid-user* you must include both the kerberos client principal and the as400 userid to which it maps.

If you want to have SSL certificate checking, it is recommended that AuthType be set to type *SSL*.

Module mod_access_compat

Module mod_access_compat supports directives for the IBM HTTP Server for i Web server.

Summary

The module mod_access_compat provides access control based on a client's hostname or IP address.

Note: It's a compatibility module with previous version of HTTP Server. The directives provided by this module have been deprecated by mod_authz_host. Mixing old directives like "Order" on page 614, "Allow" on page 612 or "Deny" on page 613 with new ones like "Require" on page 226 is technically possible but discouraged. This module was created to support configurations containing only old directives to facilitate the 2.4 upgrade. Please check the upgrading guide for more information.

Directives

- "Allow" on page 612
- "Deny" on page 613
- "Order" on page 614
- "Satisfy" on page 614

Allow

Module: mod_access_compat

Syntax: allow from *all | env=[!]envvar | host [host ...]*

Default: none

Context: directory, .htaccess

Override: Limit

Origin: Apache

Example: allow from all

Example: allow from env=go_away

Example: allow from 10.10.10.10 .ibm.com

Example: allow from 2001:db8::a00:20ff:fea7:ccea

Example: allow from 2001:db8::a00:20ff:fea7:ccea/10

The Allow directive affects which hosts can access a given directory.

Parameter: *host*

- If *all*, all hosts are allowed access.
- If *full* or *partial domain-name*, hosts whose names match or end in this string are allowed access.
- If *full IP address*, only IP address of a host are allowed access.
- If *partial IP address*, only the first 1 to 3 bytes of an IP address, for subnet restriction.
- If *network/netmask*, a network a.b.c.d. And a netmask w.x.y.z. Can be used for fine-grained subnet restriction (for example, 10.2.0.0/255.255.0.0).
- If *network/nnn CIDR specification*, it is similar to the previous case, except the netmask consists of nnn higher-order 1 bits (for example, 10.1.0.0/16 is the same as 10.1.0.0/255.255.0.0).

Note: This compares whole components, ibm.com would not match *QIBMibm.com*.

The allow from env option controls access to a directory by the existence (or nonexistence) of an environment variable. For example:

```
BrowserMatch ^KnockKnock/2.0 let_me_in
<Directory /docroot>
   order deny,allow
   deny from all
   allow from env=let_me_in
</Directory>
```

In this case browsers with the user-agent string KnockKnock/2.0 will be allowed access, and all others will be denied.

See also "Deny" on page 613, "Order" on page 614, and BrowserMatch.

Deny

Module: mod_access_compat

Syntax: deny from *all | env=[!]envvar | host [host ...]*

Default: none

Context: directory, .htaccess

Override: Limit

Origin: Apache

Example: deny from env=go_away

Example: deny from 10.10.10.10 .ibm.com

The deny directive affects which hosts can access a given directory.

Parameter: *host*

- If *all*, all hosts are denied access.
- If *full* or *partial domain-name*, hosts whose names match or end in this string are denied access.
- If *full IP address*, only IP address of a host are denied access.
- If *partial IP address*, only the first 1 to 3 bytes of an IP address, for subnet restriction.
- If *network/netmask*, a network a.b.c.d. And a net mask w.x.y.z. Can be used for fine-grained subnet restriction (for example, 10.2.0.0/255.255.0.0).
- If *network/nnn CIDR specification*, it is similar to the previous case, except the netmask consists of nnn higher-order 1 bits (for example, 10.1.0.0/16 is the same as 10.1.0.0/255.255.0.0).

Note: This compares whole components (ibm.com would not match *QIBMibm.com*).

The deny from env option controls access to a directory by the existence (or nonexistence) of an environment variable. For example:

```
BrowserMatch ^BadRobot/0.9 go_away
<Directory /docroot>
   order allow,deny
   allow from all
   deny from env=go_away
</Directory>
```

In this case browsers with the user-agent string BadRobot/0.9 will be denied access, and all others will be allowed.

See also "Allow" on page 612 and "Order" on page 614.

Order

Module: mod_access_compat

Syntax: order *ordering*

Default: order deny,allow

Context: directory, .htaccess

Override: Limit

Origin: Modified

Example: order deny,allow

The order directive controls the order in which Allow and Deny directives are evaluated. .

Parameter: *ordering*

- If *deny,allow*, the deny directives are evaluated before the allow directives (the initial state is OK).
- If *allow,deny*, the allow directives are evaluated before the deny directives (the initial state is FORBIDDEN).
- If *mutual-failure*, only those hosts which appear on the allow list and do not appear on the deny list are granted access (the initial state is irrelevant).

Keywords may only be separated by a comma; no whitespace is allowed between them. Note: that in all cases every allow and deny statement is evaluated, there is no "short-circuiting". For Example:

```
order deny,allow
deny from all
allow from .ibm.com
```

In this example, the first container's intent is to keep everyone out. The next container overrides for the appropriate subdirectory.

```
<Directory/>
   Order deny,allow
   deny from all
   allow from none
</Directory>

Alias /root /bobtest/xyz/html
<Directory /bobtest/xyz/html/>
   Order allow,deny
   allow from all
   Authtype Basic
   AuthName "root and %%SYSTEM%%"
   PasswdFile %%SYSTEM%%
   Require valid-user
   UserID %%SYSTEM%%
</Directory>
```

Hosts in the ibm.com domain are allowed access; all other hosts are denied access.

Satisfy

Module: mod_access_compat

Syntax: Satisfy *any | all*

Default: Satisfy all

Context: directory, .htaccess

Override: AuthConfig

Origin: Modified

Example: Satisfy any

The Satisfy directive establishes access policy if both allow and require are used. The parameter can be either 'all' or 'any'. This directive is only useful if access to a particular area is being restricted by both username/password and client host address.

Parameter: *any | all*

- In this case, the default behavior *all* requires that the client passes the address access restriction and enters a valid username and password.
- With the *any* option, the client will be granted access if they either pass the host restriction or enter a valid username and password. This can be used to password restrict an area, but to let clients from particular addresses in without prompting for a password.

The Require directive has to indicate Satisfy is not required every time AuthType is used, but if "Satisfy Any" is used, then you must also use Allow, Require, AuthType AuthName and PasswdFile in order for the Satisfy to work correctly. For example:

```
Order allow,deny
Allow from All
Satisfy Any
AuthType Basic
AuthName "Realm can go here"
PasswdFile %%SYSTEM%%
Require valid-user
```

Note: If you are using SSL Authentication the satisfy directive should be set to any. The all option allows for SSL Authentication, and also authentication with userid and passwords. You do not want to use the Require directive if SSLClientAuth equals zero (0). In this case, the Satisfy directive should not be used with "Allow from All" and "SSLClientAuth 0".

Module mod_authz_host

Module mod_authz_host does not provide directives for the IBM HTTP Server for i Web server.

Summary

The module mod_authz_host provides group authorizations based on host (name or IP address). The authorization providers implemented by mod_authz_host are registered using the "Require" on page 351 directive. The directive can be referenced within a "<Directory> " on page 311, "<Files>" on page 323, or "<Location> " on page 339 section as well as .htaccess files to control access to particular parts of the server. Access can be controlled based on the client hostname or IP address.

In general, access restriction directives apply to all access methods (GET, PUT, POST, etc). This is the desired behavior in most cases. However, it is possible to restrict some methods, while leaving other methods unrestricted, by enclosing the directives in a "<Limit>" on page 333 section

The "Require" on page 351 directive is used during the authorization phase to ensure that a user is allowed or denied access to a resource. mod_authz_host extends the authorization types with ip, host and local. Other authorization types may also be used but may require that additional authorization modules be loaded.

These authorization providers affect which hosts can access an area of the server. Access can be controlled by hostname, IP Address, or IP Address range. See below examples for detail information:

Require ip

The ip provider allows access to the server to be controlled based on the IP address of the remote client. When Require ip *ip-address* is specified, then the request is allowed access if the IP address matches.

A full IP address:

```
  Require ip 10.1.2.3
  Require ip 192.168.1.104 192.168.1.205
```

An IP address of a host allowed access

A partial IP address:

```
Require ip 10.1
Require ip 10 172.20 192.168.2
```

The first 1 to 3 bytes of an IP address, for subnet restriction.

A network/netmask pair:

```
Require ip 10.1.0.0/255.255.0.0
```

A network a.b.c.d, and a netmask w.x.y.z. For more fine-grained subnet restriction.

A network/nnn CIDR specification:

```
Require ip 10.1.0.0/255.255.0.0
```

A network a.b.c.d, and a netmask w.x.y.z. For more fine-grained subnet restriction.

A network/nnn CIDR specification:

```
Require ip 10.1.0.0/16
```

Similar to the previous case, except the netmask consists of nnn high-order 1 bits.

Note that the last three examples above match exactly the same set of hosts.

IPv6 addresses and IPv6 subnets can be specified as shown below:

```
Require ip 2001:db8::a00:20ff:fea7:ccea
Require ip 2001:db8::a00:20ff:fea7:ccea/10
```

Note: As the IP addresses are parsed on startup, expressions are not evaluated at request time.

Require host

The host provider allows access to the server to be controlled based on the host name of the remote client. When Require host host-name is specified, then the request is allowed access if the host name matches.

A (partial) domain-name

```
Require host example.org
Require host .net example.edu
```

Hosts whose names match, or end in, this string are allowed access. Only complete components are matched, so the above example will match foo.example.org but it will not match fooexample.org. This configuration will cause Apache to perform a double reverse DNS lookup on the client IP address, regardless of the setting of the "HostNameLookups " on page 325 directive. It will do a reverse DNS lookup on the IP address to find the associated hostname, and then do a forward lookup on the hostname to assure that it matches the original IP address. Only if the forward and reverse DNS are consistent and the hostname matches will access be allowed.

Require forward-dns

The forward-dns provider allows access to the server to be controlled based on simple host names. When Require forward-dns host-name is specified, all IP addresses corresponding to host-name are allowed access.

In contrast to the host provider, this provider does not rely on reverse DNS lookups: it simply queries the DNS for the host name and allows a client if its IP matches. As a consequence, it will only work with host names, not domain names. However, as the reverse DNS is not used, it will work with clients which use a dynamic DNS service.

Require forward-dns bla.example.org

A client the IP of which is resolved from the name bla.example.org will be granted access.

Require local

The local provider allows access to the server if any of the following conditions is true:

- the client address matches 127.0.0.0/8
- the client address is ::1
- both the client and the server address of the connection are the same

This allows a convenient way to match connections that originate from the local host:

```
    Require local
```

Note: If you are proxying content to your server, you need to be aware that the client address will be the address of your proxy server, not the address of the client, and so using the Require directive in this context may not do what you mean. See mod_remoteip for possible solutions to this problem.

Module mod_asis

Module mod_asis does not provide directives for the IBM HTTP Server for i Web server.

Summary

The module mod_asis provides the handler send-as-is which causes Apache HTTP Server to send the document without adding most of the usual HTTP headers.

This can be used to send any kind of data from the server, including redirects and other special HTTP responses, without requiring a cgi-script or an nph script.

This module will also process any file with the mime type httpd/send-as-is.

Usage

In the server configuration file, associate files with the send-as-is handler, for example:

```
AddType httpd/send-as-is asis
```

The contents of any file with a .asis extension will then be sent by Apache HTTP Server to the client with almost no changes. In particular, HTTP headers are derived from the file itself according to mod_cgi rules, so an asis file must include valid headers, and may also use the CGI Status: header to determine the HTTP response code. The Content-Length: header will automatically be inserted or, if included, corrected by HTTP Server.

Here is an example of a file whose contents are sent asis, telling the client that a file has redirected.

```
Status: 301 Now where did I leave that URL
Location: http://xyz.example.com/foo/bar.html
Content-type: text/html

<HTML>
<HEAD>
<TITLE>Lame excuses'R'us</TITLE>
</HEAD>
<BODY>
<H1>Fred's exceptionally wonderful page has moved to
<A HREF="http://xyz.example.com/foo/bar.html">Joe's</A> site.
</H1>
</BODY>
</HTML>
```

Note: The server always adds a Date: and Server: header to the data returned to the client, so these should not be included in the file. The server does not add a Last-Modified header.

Module mod_data

Module mod_data does not supports directives for the IBM HTTP Server for i Web server.

Summary

The module mod_data provides the ability to convert a response into an RFC2397 data URL.

Data URLs can be embedded inline within web pages using something like the mod_include module, to remove the need for clients to make separate connections to fetch what may potentially be many small images. Data URLs may also be included into pages generated by scripting languages such as PHP.

An example of a data URL：

```
data:image/gif;base64,R0lGODdhMAAwAPAAAAAAAP///ywAAAAAMAAw
AAAC8IyPqcvt3wCcDkiLc7C0qwyGHhSWpjQu5yqmCYsapyuvUUlvONmOZtfzgFz
ByTB10QgxOR0TqBQejhRNzOfkVJ+5YiUqrXF5Y5lKh/DeuNcP5yLWGsEbtLiOSp
a/TPg7JpJHxyendzWTBfX0cxOnKPjgBzi4diinWGdkF8kjdfnycQZXZeYGejmJl
ZeGl9i2icVqaNVailT6F5iJ90m6mvuTS4OK05M0vDk0Q4XUtwvKOzrcd3iq9uis
F81M1OIcR7lEewwcLp7tuNNkM3uNna3F2JQFo97Vriy/Xl4/f1cf5VWzXyym7PH
hhx4dbgYKAAA7
```

The filter takes no parameters, and can be added to the filter stack using the "SetOutputFilter" on page 360 directive, or any of the directives supported by the mod_filter module.

Example of Configuring the filter:

```
<Location "/data/images">
   SetOutputFilter DATA
</Location>
```

Module mod_logio

Module mod_logio does not provide directives for the IBM HTTP Server for i Web server.

Summary

The module mod_logio data provides the logging of input and output number of bytes received/sent per request. The numbers reflect the actual bytes as received on the network, which then takes into account the headers and bodies of requests and responses. The counting is done before SSL/TLS on input and after SSL/TLS on output, so the numbers will correctly reflect any changes made by encryption.

When KeepAlive connections are used with SSL, the overhead of the SSL handshake is reflected in the byte count of the first request on the connection.

Custom Log Formats

This module adds three new logging format strings. The characteristics of the request itself are logged by placing "%" in the format string, which are replaced in the log file by the values as follows:

Table 47.

Format String	Description
%I	Bytes received, including request and headers. Cannot be zero.
%O	Bytes sent, including headers. May be zero in rare cases such as when a request is aborted before a response is sent.
%S	Bytes transferred (received and sent), including request and headers, cannot be zero. This is the combination of %I and %O.
%^FB	Delay in microseconds between when the request arrived and the first byte of the response headers are written. Only available if LogIOTrackTTFB is set to ON.

For example:

Combined I/O log format:

```
    "%h %l %u %t \"%r\" %>s %b \"%{Referer}i\" \"%{User-agent}i\" %I %O"
```

Directives

- "LogIOTrackTTFB " on page 619

LogIOTrackTTFB

Module: mod_logio

Syntax: LogIOTrackTTFB ON | OFF

Default: LogIOTrackTTFB OFF

Context: server config, virtual host, directory, .htaccess

Override: None

Origin: Apache

Example: LogIOTrackTTFB ON

This directive configures whether this module tracks the delay between the request being read and the first byte of the response headers being written. The resulting value may be logged with the %^FB format.

Module mod_proxy_http

Module mod_proxy_http does not provide directives for the IBM HTTP Server for i Web server.

Summary

The mod_proxy_http module provides the features used for proxying HTTP and HTTPS requests. mod_proxy_http supports HTTP/0.9, HTTP/1.0 and HTTP/1.1. It does not provide any caching abilities. If you want to set up a caching proxy, you might want to use the additional service of the mod_cache module.

Environment Variables

In addition to the configuration directives that control the behavior of mod_proxy, there are a number of **environment variables** that control the HTTP protocol provider. Environment variables below that don't specify specific values are enabled when set to any value.

proxy-sendextracrlf

Causes proxy to send an extra CR-LF newline on the end of a request. This is a workaround for a bug in some browsers.

force-proxy-request-1.0

Forces the proxy to send requests to the backend as HTTP/1.0 and disables HTTP/1.1 features.

proxy-nokeepalive

Forces the proxy to close the backend connection after each request.

proxy-chain-auth

If the proxy requires authentication, it will read and consume the proxy authentication credentials sent by the client. With proxy-chain-auth it will also forward the credentials to the next proxy in the chain. This may be necessary if you have a chain of proxies that share authentication information.

Note: Do not set this unless you know you need it, as it forwards sensitive information.

proxy-sendcl

HTTP/1.0 required all HTTP requests that include a body (e.g. POST requests) to include a Content-Length header. This environment variable forces the Apache proxy to send this header to the backend server, regardless of what the Client sent to the proxy. It ensures compatibility when proxying for an HTTP/1.0 or unknown backend. However, it may require the entire request to be buffered by the proxy, so it becomes very inefficient for large requests.

proxy-sendchunks or **proxy-sendchunked**

This is the opposite of *proxy-sendcl*. It allows request bodies to be sent to the backend using chunked transfer encoding. This allows the request to be efficiently streamed, but requires that the backend server supports HTTP/1.1.

proxy-interim-response

This variable takes values RFC (the default) or Suppress. Earlier HTTP Server versions would suppress HTTP interim (1xx) responses sent from the backend. This is technically a violation of the HTTP protocol. In practice, if a backend sends an interim response, it may itself be extending the protocol in a manner we know nothing about, or just broken. So this is now configurable: set proxy-interim-response RFC to be fully protocol compliant, or proxy-interim-response Suppress to suppress interim responses.

proxy-initial-not-pooled

If this variable is set, no pooled connection will be reused if the client request is the initial request on the frontend connection. This avoids the "proxy: error reading status line from remote server" error message caused by the race condition that the backend server closed the pooled connection after the connection check by the proxy and before data sent by the proxy reached the backend. It has to be kept in mind that setting this variable downgrades performance, especially with HTTP/1.0 clients.

Request notes

mod_proxy_http creates the following request notes for logging using the %{VARNAME}n format in "LogFormat" on page 487 or "ErrorLogFormat" on page 320:

proxy-source-port

The local port used for the connection to the backend server.

proxy-status

The HTTP status received from the backend server.

Note: The mod_proxy_http module requires the following LoadModules in HTTP Server configuration file:

- LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Module mod_proxy_wstunnel

Module mod_proxy_wstunnel does not provide directives for the IBM HTTP Server for i Web server.

Summary

The mod_proxy_wstunnel module provides support for the tunnelling of web socket connections to a backend websockets server. The connection is automagically upgraded to a websocket connection:

Upgrade: WebSocket

Connection: Upgrade

Example:

Proxying requests to websockets server

ProxyPass "/ws2/" "ws://echo.websocket.org/".

ProxyPass "/wss2/" "wss://echo.websocket.org/"

Note: The mod_proxy_wstunnel module requires the following LoadModules in HTTP Server configuration file:

- LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_wstunnel_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Module mod_lbmethod_byrequestsl

Module mod_lbmethod_byrequests does not provide directives for the IBM HTTP Server for i Web server.

Summary

The mod_lbmethod_byrequests module provides Request Counting load balancer scheduler algorithm(byrequests method) for mod_proxy_balancer

Example:

```
<Proxy balancer://mycluster>
  BalancerMember http://www.example1.com:8080 loadfactor=1
  BalancerMember http://www.example2.com:8080 loadfactor=2
  ProxySet lbmethod=byrequests
</Proxy>
```

Note: The mod_lbmethod_byrequests module requires the following LoadModules in HTTP Server configuration file:

- LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_balancer_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule lbmethod_byrequests_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Module mod_lbmethod_bybusyness

Module mod_lbmethod_bybusyness does not provide directives for the IBM HTTP Server for i Web server.

Summary

The mod_lbmethod_bybusyness module provides Pending Request Counting load balancer scheduler algorithm(bybusyness method) for mod_proxy_balancer

Example:

```
<Proxy balancer://mycluster>
  BalancerMember http://www.example1.com:8080 loadfactor=1
  BalancerMember http://www.example2.com:8080 loadfactor=2
  ProxySet lbmethod=bybusyness
</Proxy>
```

Note: The mod_lbmethod_byrequests module requires the following LoadModules in HTTP Server configuration file:

- LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_balancer_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule lbmethod_bybusyness_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Module mod_lbmethod_bytraffic

Module mod_lbmethod_bytraffic does not provide directives for the IBM HTTP Server for i Web server.

Summary

The mod_lbmethod_bytraffic module provides Weighted Traffic Counting load balancer scheduler algorithm(bytraffic method) for mod_proxy_balancer

Example:

```
<Proxy balancer://mycluster>
  BalancerMember http://www.example1.com:8080 loadfactor=1
  BalancerMember http://www.example2.com:8080 loadfactor=2
  ProxySet lbmethod=bytraffic
</Proxy>
```

Note: The mod_lbmethod_bytraffic module requires the following LoadModules in HTTP Server configuration file:

- LoadModule proxy_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_ftp_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_http_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_connect_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule proxy_balancer_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM
- LoadModule lbmethod_bytraffic_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Module mod_ratelimit

Module mod_ratelimit does not provide directives for the IBM HTTP Server for i Web server.

Summary

The module mod_ratelimit provides a filter named RATE_LIMIT to limit client bandwidth. The connection speed to be simulated is specified, in KiB/s, using the environment variable rate-limit.

Example Configuration:

```
<Location "/downloads">
    SetOutputFilter RATE_LIMIT
    SetEnv rate-limit 400
</Location>
```

Module mod_unique_id

Module mod_unique_id does not provide directives for the IBM HTTP Server for i Web server.

Summary

The module mod_unique_id provides a magic token for each request which is guaranteed to be unique across "all" requests under very specific conditions. The unique identifier is even unique across multiple machines in a properly configured cluster of machines. The environment variable UNIQUE_ID is set to the identifier for each request.

Module mod_xml2enc

Module mod_xml2enc supports directives for the IBM HTTP Server for i Web server.

Summary

The mod_xml2enc module provides enhanced internationalization support for markup-aware filter modules such as mod_proxy_html. It can automatically detect the encoding of input data and ensure they are correctly processed by the libxml2 parser, including converting to Unicode (UTF-8) where necessary. It can also convert data to an encoding of choice after markup processing, and will ensure the correct charset value is set in the HTTP *Content-Type* header.

Filter modules enabled for mod_xml2enc such as mod_proxy_html use the xml2enc_charset optional function to retrieve the charset argument to pass to the libxml2 parser, and may use the xml2enc_filter optional function to post-process to another encoding. Using mod_xml2enc with an enabled module mod_proxy_html, no configuration is necessary: the mod_proxy_html module will configure mod_xml2enc for you (though you may still want to customize it using the configuration directives below).

mod_xml2enc is designed to work with data whose encoding cannot be known in advance and thus configured. It therefore uses 'sniffing' techniques to detect the encoding of HTTP data as follows:

1. If the HTTP *Content-Type* header includes a charset parameter, that is used.
2. If the data start with an XML Byte Order Mark (BOM) or an XML encoding declaration, that is used.
3. If an encoding is declared in an HTML <META> element, that is used.
4. If none of the above match, the default value set by xml2EncDefault is used.

The rules are applied in order. As soon as a match is found, it is used and detection is stopped.

libxml2 always uses UTF-8 (Unicode) internally, and libxml2-based filter modules mod_proxy_html will output that by default. If you are working with encoding that are not supported by any of the conversion methods available on IBM i, you can still alias them to a supported encoding using xml2EncAlias.

Directive

- "xml2EncAlias" on page 623
- "xml2EncDefault" on page 623
- "xml2StartParse" on page 624

xml2EncAlias

Module: mod_xml2enc

Syntax: xml2EncAlias charset alias [alias ...]

Default: none

Context: server config

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule xml2enc_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Example: xml2EncAlias ISO-8859-1 Windows-1252

The server-wide xml2EncAlias directive aliases one or more encoding to another encoding. This enables encodings not recognized by libxml2 to be handled internally by libxml2's encoding support using the translation table for a recognized encoding. This serves two purposes: to support character sets (or names) not recognized either by libxml2 or iconv, and to skip conversion for an encoding where it is known to be unnecessary.

xml2EncDefault

Module: mod_xml2enc

Syntax: xml2EncDefault name

Default: none

Context: server config, Virtual Host, Directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule xml2enc_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Example: xml2EncDefault iso-8859-1

The xml2EncDefault directive sets a default encoding to assume when absolutely no information can be automatically detected. If you are processing data with known encoding but no encoding information, you can set this default to help mod_xml2enc process the data correctly. For example, to work with the default value of Latin1 (iso-8859-1 specified in HTTP/1.0, use xml2EncDefault iso-8859-1

xml2StartParse

Module: mod_xml2enc

Syntax: xml2StartParse element [element ...]

Default: none

Context: server config, Virtual Host, Directory, .htaccess

Override: none

Origin: Apache

Usage Considerations: A LoadModule is required in the configuration file prior to using the directive. The statement should be as follows: LoadModule xml2enc_module /QSYS.LIB/QHTTPSVR.LIB/QZSRCORE.SRVPGM

Example: xml2StartParse HTML

The xml2StartParse directive advises the parser to skip leading junk and start the parser at the first legitimate element. It specifies that the markup parser should start at the first instance of any of the elements specified. This can be used as a workaround where a broken backend inserts leading junk that messes up the parser.

Note: It should never be used for XML, nor well-formed HTML.

Module mod_macro

Module mod_macro supports directives for the IBM HTTP Server for i Web server.

Summary

The mod_macro module provides macros within Apache HTTP Server runtime configuration files, to ease the process of creating numerous similar configuration blocks. When the server starts up, the macros are expanded using the provided parameters, and the result is processed as along with the rest of the configuration file. Macros are defined using <Macro> blocks, which contain the portion of your configuration that needs to be repeated, complete with variables for those parts that will need to be substituted. For example, you might use a macro to define a <VirtualHost> block, in order to define multiple similar virtual hosts:

```
<Macro VHost $name $domain>
<VirtualHost *:80>
    ServerName $domain
    ServerAlias www.$domain

    DocumentRoot /www/webserver/vhosts/$name
    ErrorLog /www/webserver/logs/$name.error_log
    CustomLog /www/webserver/logs/$name.access_log combined
</VirtualHost>
</Macro>
```

Macro names are case-insensitive, like HTTP Server configuration directives. However, variable names are case sensitive. You would then invoke this macro several times to create virtual hosts:

```
Use VHost example example.com
Use VHost myhost hostname.org
Use VHost apache apache.org
```

UndefMacro VHost

At server startup time, each of these Use invocations would be expanded into a full virtualhost, as described by the Macro definition.

The UndefMacro directive is used so that later macros using the same variable names don't result in conflicting definitions.

Parameter names should begin with a sign such as $, %, or @, so that they are clearly identifiable, and also in order to help deal with interactions with other directives, such as the core Define directive. Failure to do so will result in a warning. Nevertheless, you are encouraged to have a good knowledge of your entire server configuration in order to avoid reusing the same variables in different scopes, which can cause confusion.

Parameters prefixed with either $ or % are not escaped. Parameters prefixes with @ are escaped in quotes.

Avoid using a parameter which contains another parameter as a prefix, (For example, $win and $winter) as this may cause confusion at expression evaluation time. In the event of such confusion, the longest possible parameter name is used.

If you want to use a value within another string, it is useful to surround the parameter in braces, to avoid confusion:

```
<Macro DocRoot ${docroot}>
    DocumentRoot /www/${docroot}/htdocs
</Macro>
```

Examples:

Virtual Host Definition

A common usage of mod_macro is for the creation of dynamically-generated virtual hosts.

## Define a VHost Macro for repetitive configurations

```
<Macro VHost $host $port $dir>
  Listen $port
 <VirtualHost *:$port>
    ServerName $host
    DocumentRoot "$dir"

    # Public document root
    <Directory "$dir">
    Require all granted
    </Directory>
    # limit access to intranet subdir.
    <Directory "$dir/intranet">
      Require ip 10.0.0.0/8
    </Directory>
 </VirtualHost>
</Macro>
```

## Use of VHost with different arguments.

Use VHost www.apache.org 80 /www/webserver/vhosts/apache/htdocs

Use VHost example.org 8080 /www/webserver/vhosts/example/htdocs

Use VHost www.example.fr 1234 /www/webserver/vhosts/example.fr/htdocs

Removal of a macro definition

It's recommended that you undefine a macro once you've used it. This avoids confusion in a complex configuration file where there may be conflicts in variable names.

```
<Macro DirGroup $dir $group>
  <Directory "$dir">
    Require group $group
  </Directory>
</Macro>
```

Use DirGroup /www/webserver/private private

Use DirGroup /www/webserver/server admin

UndefMacro DirGroup

Directives

- "<Macro>" on page 626
- "UndefMacro" on page 626
- "Use" on page 627

<Macro>

Module: mod_macro

Syntax: <Macro name [par1 .. parN]> ... </Macro>

Default: none

Context: server config, virtual host, directory

Override: none

Origin: Apache

Examples: See below

The Macro directive controls the definition of a macro within the server runtime configuration files. The first argument is the name of the macro. Other arguments are parameters to the macro. It is good practice to prefix parameter names with any of '$%@', and not macro names with such characters.

For examples：

```
<Macro LocalAccessPolicy>
    Require ip 10.2.16.0/24
</Macro>

<Macro RestrictedAccessPolicy $ipnumbers>
    Require ip $ipnumbers
</Macro>
```

UndefMacro

Module: mod_macro

Syntax: UndefMacro name

Default: none

Context: server config, virtual host, directory

Override: none

Origin: Apache

Examples: See below

The UndefMacro directive undefines a macro which has been defined before hand.

For examples：

```
<Macro LocalAccessPolicy>
    Require ip 10.2.16.0/24
</Macro>

<Macro RestrictedAccessPolicy $ipnumbers>
    Require ip $ipnumbers
</Macro>

UndefMacro LocalAccessPolicy
UndefMacro RestrictedAccessPolicy
```

Use

Module: mod_macro

Syntax: Use name [value1 ... valueN]

Default: none

Context: server config, virtual host, directory

Override: none

Origin: Apache

Examples: See below

The Use directive controls the use of a macro. The specified macro is expanded. It must be given the same number of arguments as in the macro definition. The provided values are associated to their corresponding initial parameters and are substituted before processing.

For examples：

```
<Macro LocalAccessPolicy>
    Require ip 10.2.16.0/24
</Macro>

<Macro RestrictedAccessPolicy $ipnumbers>
    Require ip $ipnumbers
</Macro>

Use LocalAccessPolicy
...
Use RestrictedAccessPolicy "192.54.172.0/24 192.54.148.0/24"
is equivalent, with the macros defined above, to:
Require ip 10.2.16.0/24
...
Require ip 192.54.172.0/24 192.54.148.0/24
```

Log file format tokens

This topic provides information about tokens used to define log file formats.

Table 48. Tokens that define log file formats

Token	Description
%%	The percent sign.
%a	The remote client IP address. Example: `192.168.1.3`
%{c}a	Underlying peer IP address of the connection (see the mod_remoteip module).
%A	The local client IP address. Example: `192.168.1.3`
%B	Size of response in bytes, excluding HTTP headers.
%b	Size of response in bytes, excluding HTTP headers. In CLF format, i.e. a '-' rather than a 0 when no bytes are sent.

Table 48. Tokens that define log file formats (continued)

Token	Description
%{VARNAME}C	The contents of cookie VARNAME in the request sent to the server. Only version 0 cookies are fully supported.
%D	The time taken to serve the request, in microseconds.
%{VARNAME}e	The contents of the environment variable named VARNAME.
%f	The requested file name. Example: `/www/index.htm`
%h	The remote host name or IP address if HostnameLookups is set to Off. Example: `hal.ibm.com or 192.168.1.3`
%H	The requested protocol.
%{VARNAME}i	The contents of the HTTP header line named VARNAME. Example: `%{User-agent}i = Mozilla/4.5 [en] (WinNT; U)`
%k	Number of keepalive requests handled on this connection. Interesting if KeepAlive is being used, so that, for example, a '1' means the first keepalive request after the initial one, '2' the second, etc...; otherwise this is always 0 (indicating the initial request).
%l	The remote logname.
%L	The request log ID from the error log (or '-' if nothing has been logged to the error log for this request). Look for the matching error log line to see what request caused what error.
%m	The request method.
%{VARNAME}n	The contents of the note named VARNAME from another module.
%{VARNAME}o	The contents of the header lines named VARNAME in the reply.
%p	The canonical Port of the server serving the request. Example: `80`
%{format}p	The canonical port of the server serving the request, or the server's actual port, or the client's actual port. Valid formats are canonical, local, or remote.
%P	The process ID that serviced the request. Example: 837
%{format}P	The process ID or thread ID of the child that serviced the request. Valid formats are pid, tid, and hextid.
%q	The query string (or search argument) prepended with a "?". Example: `?name=hal`
%r	The first line of the request. Example: `GET / HTTP/1.0`
%R	The handler generating the response (if any).
%s	The server response status. For requests that have been internally redirected, this is the status of the original request. Use %>s for the final status. Example: `200`
%t	The time the request was received in common log format. Example: `[21/Mar/2000:14:08:03 -0600]` . The last number indicates the timezone offset from GMT

Table 48. Tokens that define log file formats (continued)

Token	Description
%{format}t	The time, in the form given by format, which should be in an extended strftime(3) format (potentially localized). If the format starts with begin: (default) the time is taken at the beginning of the request processing. If it starts with end: it is the time when the log entry gets written, close to the end of the request processing. In addition to the formats supported by strftime(3), the following format tokens are supported: • sec............number of seconds since the Epoch • msec...........number of milliseconds since the Epoch • usec...........number of microseconds since the Epoch • msec_frac...millisecond fraction • usec_frac....microsecond fraction These tokens can not be combined with each other or strftime(3) formatting in the same format string. You can use multiple %{format}t tokens instead.
%T	The time (in seconds) taken to serve the request. Example: `1`
%{UNIT}T	The time taken to serve the request, in a time unit given by UNIT. Valid units are ms for milliseconds, us for microseconds, and s for seconds. Using s gives the same result as %T without any format; using us gives the same result as %D.
%u	The name of the authenticated remote user. Example: `hal`
%U	The requested URL path. Example: /
%v	The canonical server name of the server serving the request.
%V	The server name according to the UseCanonicalName setting.
%X	Connection status when response is completed: X= Connection aborted before the response completed. += Connection may be kept alive after the response is sent. -= Connection will be closed after the response is sent.
%I	Bytes received, including request and headers. Cannot be zero. You need to enable mod_logio to use this.
%O	Bytes sent, including headers. May be zero in rare cases such as when a request is aborted before a response is sent. You need to enable mod_logio to use this.
%S	Bytes transferred (received and sent), including request and headers, cannot be zero. This is the combination of %I and %O. You need to enable mod_logio to use this.
%{VARNAME}^ti	The contents of VARNAME: trailer line(s) in the request sent to the server.
%{VARNAME}^to	The contents of VARNAME: trailer line(s) in the response sent from the server.

Note:

- The "..." can be replaced with a condition for inclusion or it can be omitted. The character < determines if the original value is logged. The greater than character (>) determines if the redirected value is logged. The condition may be preceded by a ! to reverse the condition. For example:

Condition	Description
%>s	Logs the returned status.
%{User-agent}i	Logs User-agent on all requests.
%400,501{User-agent}i	Logs User-agent only when a 400 error (Bad Request) or a 501 error (Not Implemented) is encountered.
%!200,304,302{Referer}i	Logs Referer on all requests which did not return some sort of normal status.

Log file format tokens for"ErrorLogFormat" on page 320.

Table 49. Format strings that define error log file format.

Token	Description
%%	The percent sign.
%a	Client IP address and port of the request.
%{c}a	Underlying peer IP address and port of the connection (see the mod_remoteip module).
%A	Local IP-address and port.
%{name}e	Request environment variable *name*.
%E	APR/OS error status code and string.
%F	Source file name and line number of the log call.
%{name}i	Request header *name*
%k	Number of keep-alive requests on this connection.
%l	Loglevel of the message.
%L	Log ID of the request.
%{c}L	Log ID of the connection.
%{C}L	Log ID of the connection if used in connection scope, empty otherwise.
%m	Name of the module logging the message.
%M	The actual log message.
%{name}n	Request note *name*
%P	Process ID of current process.
%T	Thread ID of current thread.
%{g}T	System unique thread ID of current thread (the same ID as displayed by e.g. top; currently Linux® only).
%t	The current time.
%{u}t	The current time including micro-seconds.
%{cu}t	The current time in compact ISO 8601 format, including micro-seconds.
%v	The canonical "ServerName " on page 355 of the current server.

Table 49. Format strings that define error log file format. (continued)

Token	**Description**
%V	The server name of the server serving the request according to the "UseCanonicalName" on page 362 setting.
\ (backslash space)	Non-field delimiting space.
% (percent space)	Field delimiter (no output).
Modifiers	
Modified Token	**Meaning**
%-{Referer}i	Logs a - if Referer is not set.
%+{Referer}i	Omits the entire line if Referer is not set.
%4{Referer}i	Logs the Referer only if the log message severity is higher than 4.

Related information

"Log formats for HTTP Server" on page 29
This topic provides information about log formats and log files.

"Setting up logs on HTTP Server" on page 110
Set up logs to record events and other information for your IBM HTTP Server for i instance using the IBM Web Administration for i interface.

Regular expression notation for HTTP Server

This topic provides a general overview of regular expression notation for the IBM HTTP Server for i Web server.

A regular expression notation specifies a pattern of character strings. One or more regular expressions can be used to create a matching pattern. Certain characters (sometimes called wildcards) have special meanings. The following table describes the commonly used pattern matching scheme.

Regular expression pattern matching

Pattern	**Description**
`string`	string with no special characters matches the values that contain the string.
`[set]`	Match a single character specified by the set of single characters within the square brackets.
`[a-z]`	Match a character in the range specified within the square brackets.
`[^abc]`	Match any single character not specified in the set of single characters within the square brackets.
`{n}`	Match exactly n times.
`{n,}`	Match at least n times.
`{n,m}`	Match at least n times, but no more than m times.
`^`	Match the start of the string.
`$`	Match the end of the string.
`.`	Match any character (except Newline).
`*`	Match zero or more of preceding character.
`+`	Match one or more of preceding character.

Pattern	Description
?	Match one or zero of preceding character.
string1|string2	Match string1 or string2.
\	Signifies an escape character. When preceding any of the characters that have special meaning, the escape character removes any special meaning from the character. For example, the backslash is useful to remove special meaning from a period in an IP address.
(group)	Group a character in a regular expression. If a match is found the first group can be accessed using $1. The second group can be accessed using $2 and so on.
(?<name>regex)	Named capturing group. Captures the text matched by "regex" into the group "name". The name can contain letters and numbers but must start with a letter.
\1 through \9	Backreference. Substituted with the text matched between the 1st through 9th numbered capturing group.
\10 through \99	Backreference. Substituted with the text matched between the 10th through 99th numbered capturing group.
\w	Match an alphanumeric character.
\W	Match a character that is not an alphanumeric character.
\s	Match a white-space character.
\S	Match a character that is not a white space character
\t	Tab character.
\n	Newline character.
\r	Return character.
\f	Form feed character.
\v	Vertical tab character.
\a	Bell character.
\b	word boundary
\B	not a word boundary
\0dd	Octal character, for example \076 matches character ">". **Note:** d must between 0 and 7
\ddd	Octal character, for example \101 matches character "A". **Note:** d must between 0 and 7
\o{ddd..}	Octal character, for example \o{123} matches character "S" **Note:** d must between 0 and 7
\xnn	Hex character, for example \x41 matches character "A".
\cx	Control character, for example \cJ matches newline character "\n". **Note:** x is any ASCII printing character
\d	Match a decimal digit
\D	Match a character that is not a decimal digit

Pattern	Description
`\Q...\E`	Escape sequence. Characters between \Q and \E are treated as literals

Examples of regular expression pattern matching

Pattern	Examples of strings that match
`ibm`	`ibm01, myibm, aibmbc`
`^ibm$`	`ibm`
`^ibm0[0-4][0-9]$`	`ibm000 through ibm049`
`ibm[3-8]`	`ibm3, myibm4, aibm5b`
`^ibm`	`ibm01, ibm`
`ibm$`	`myibm, ibm, 3ibm`
`ibm...`	`ibm123, myibmabc, aibm09bcd`
`ibm*1`	`ibm1, myibm1, aibm1abc, ibmkkkkk12`
`^ibm0..`	`ibm001, ibm099, ibm0abcd`
`^ibm0..$`	`ibm001, ibm099`
`10.2.1.9`	`10.2.1.9, 10.2.139.6, 10.231.98.6`
`^10\.2\.1\.9$`	`10.2.1.9`
`^10\.2\.1\.1[0-5]$`	`10.2.1.10, 10.2.1.11, 10.2.1.12, 10.2.1.13, 10.2.1.14, 10.2.1.15`
`^192.\.168\..*\..*$`	(All addresses on class B subnet 192.168.0.0)
`^192.\.168\.10\..*$`	(All addresses on class C subnet 192.168.10.0)

CL commands for HTTP Server

Manage an IBM HTTP Server for i instance using command line (CL) commands for a 5250 session.

The following table summarizes the CL commands associated with the HTTP Server.

Command	Description
CFGTCPHTTP	Configure TCP/IP HTTP - display a list of HTTP Server related commands.
ENDCHTSVR	End Clustered Hash Table Server - end a clustered hash table (CHT) server job on one or more nodes of a cluster.
ENDTCP	End TCP/IP - stop TCP/IP.
ENDTCPSVR	End TCP/IP Server - stop an HTTP Server.
STRCHTSVR	Start Clustered Hash Table Server - start a job for a clustered hash table (CHT) server instance on each of the specified node systems.
STRTCP	Start TCP/IP - autostart an HTTP Server.
STRTCPSVR	Start TCP/IP Server - start an HTTP server.
TRCTCPAPP	Trace TCP/IP Application - capture trace information for the HTTP Server.

The following table summarizes the CL commands associated with the highly available Web server cluster function. See "Highly available HTTP Server" on page 43 for more information.

Command	Description
ADDCLUNODE	Add Cluster Node Entry - add a node to the membership list of an existing cluster.
CHGCLUNODE	Change Cluster Node Entry - change cluster membership information for a cluster node entry.
CHGCRGPRI	Change Cluster Resource Group Primary - performs an administrative switchover of the cluster resource group by changing the current roles of nodes in the recovery domain.
CRTCLU	Create Cluster - create a new cluster of one or more nodes.
DSPCLUINF	Display Cluster Information - display or print information about a cluster.
ENDCLUNOD	End Cluster Node - end Cluster Resource Services on one or all the nodes in the membership list of an existing cluster.
RMVCLUNODE	Remove Cluster Node Entry - remove a node from a cluster.
STRCLUNOD	Start Cluster Node - start Cluster Resource Services on a node in the cluster.

Environment variables set by HTTP Server

The IBM HTTP Server for i supports the standard environment variables in addition to environment variables that are unique to the IBM i server.

When using application programming interfaces to retrieve the value of an environment variable, you need to handle the case in which there is no value for the environment variable. For example, when a CGI program is trying to do a `getenv("CONTENT_LENGTH")` and the request method is `GET`, the value returned is `NULL`. The reason `NULL` is returned for the value is because `CONTENT_LENGTH` is only defined for `POST` request methods (to describe the length of standard input).

The following table lists the environment variables supported by HTTP Server. The environment variables have been divided into two groups: Non-SSL and SSL.

Notes:

1. All headers sent by a client (such as Set-Cookie) are prefixed by "`HTTP_`". To access the value of a header, prefix the header name with "`HTTP_`".
2. In the following table, long variable names are shortened by the insertion of a blank character within the name. This is done for display purposes only.

Table 50. Environment variables that may be set by the HTTP Server

Variable Name	Type	Description
AUTH_TYPE	Non-SSL	If the server supports client authentication and the script is a protected script, this environment variable contains the method that is used to authenticate the client. Example: Cert_Or_Basic
CGI_ASCII_CCSID	Non-SSL	Contains the ASCII CCSID the server used when converting CGI input data. If the server did not perform any conversion, (for Example, in %%BINARY%% mode), the server sets this value to the DefaultNetCCSID configuration directive value. Example: 819
CGI_EBCDIC_CCSID	Non-SSL	Contains the EBCDIC CCSID under which the current CGI job is running (DefaultFsCCSID or CGIJobCCSID configuration directive). It also represents the job CCSID that is used during server conversion (if any) of CGI input data. Example: 37

Table 50. Environment variables that may be set by the HTTP Server (continued)

Variable Name	**Type**	**Description**
CGI_JOB_LOCALE	Non-SSL	Allows a locale to be set globally or for a specific CGI job. After the locale is set, region specific information such as date or time format can be accessed. Some ILE C/C++ run-time functions such as ctime() and localtime() are locale sensitive. Example: CGIJobLocale /QSYS.LIB/LOCALELIB.LIB/EN_US.LOCALE
CGI_MODE	Non-SSL	Contains the CGI conversion mode the server is using for this request. The program can use this information to determine what conversion, if any, was performed by the server on CGI input data and what format that data is currently in. Example: EBCDIC
CGI_OUTPUT_MODE	Non-SSL	Determines which output conversion mode the server is using. Example: EBCDIC
CONTENT_LENGTH	Non-SSL	When the method of POST is used to send information, this variable contains the number of characters. Servers typically do not send an end-of-file flag when they forward the information by using stdin. If needed, you can use the CONTENT_LENGTH value to determine the end of the input string. Example: 7034
CONTENT_TYPE	Non-SSL	When information is sent with the method of POST, this variable contains the type of data included. You can create your own content type in the server configuration file and map it to a viewer. Example: Application/x-www-form-urlencoded
DATE_GMT	Non-SSL	The current date and time in Greenwich Mean Time. Example: 2000/12/31:03:15:20
DATE_LOCAL	Non-SSL	The current date and time in the local time zone. Example: 2000/08/14:15:40:10
DOCUMENT_NAME	Non-SSL	The file name of the document requested by the user. Example: /www/myserver/htdocs/html/hello.html
DOCUMENT_PATH_INFO	Non-SSL	Contains the additional path information as sent by the Web browser for SSI. Example: /wizard
DOCUMENT_ROOT	Non-SSL	Sets the directory from which the HTTP Server will serve files. The server appends the path from the requested URL to the document root and makes the path to the document. Example: /www/myserver/htdocs
DOCUMENT_URI	Non-SSL	The URI of the document requested by the user. Example: /html/hello.html **Note:** The DOCUMENT_URI and DOCUMENT_URL environment variables are identical
DOCUMENT_URL	Non-SSL	The URL of the document requested by the user. Example: /html/hello.html **Note:** The DOCUMENT_URI and DOCUMENT_URL environment variables are identical.
FSCP	Non-SSL	The EBCDIC CCSID used to translate the data. Example: 37
GATEWAY_INTERFACE	Non-SSL	Contains the version of CGI that the server is using. Example: CGI/1.1

Table 50. Environment variables that may be set by the HTTP Server (continued)

Variable Name	**Type**	**Description**
HTTP_ACCEPT	Non-SSL	Contains the list of MIME types the browser accepts. Example: image/gif,image/x-xbitmap,image/jpeg,image/pjeg,image/pgn,*/* **Note:** The header lines received from the client, if any, are placed into the environment variable with the prefix HTTP_* followed by the header name. The header returns the environment variable.
HTTP_ACCEPT_CHARSET	Non-SSL	Contains the list of character sets the browser accepts. Example: iso-8859-1,*,utf-8 **Note:** The header lines received from the client, if any, are placed into the environment variable with the prefix HTTP_* followed by the header name. The header returns the environment variable.
HTTP_ACCEPT_ENCODING	Non-SSL	Contains the list of encoding protocols the browser accepts. Example: gzip **Note:** The header lines received from the client, if any, are placed into the environment variable with the prefix HTTP_* followed by the header name. The header returns the environment variable.
HTTP_ACCEPT_ LANGUAGE	Non-SSL	Contains the list of languages the browser accepts. Example: de,fr,en **Note:** The header lines received from the client, if any, are placed into the environment variable with the prefix HTTP_* followed by the header name. The header will return the environment variable.
HTTP_CONNECTION	Non-SSL	The header lines received from the client, if any, are placed into the environment variable with the prefix HTTP_* followed by the header name. The header returns to the environment variable. Example: Keep-Alive
HTTP_COOKIE	Non-SSL	User-defined cookie for the response. Example: w3ibmTest=true
HTTP_HOST	Non-SSL	Contains the HTTP host URL. Example: IBM.COM **Note:** The header lines received from the client, if any, are placed into the environment variable with the prefix HTTP_* followed by the header name. The header returns the environment variable.
HTTP_USER_AGENT	Non-SSL	Contains the name of your browser (web client). It includes the name and version of the browser, requests that are made through a proxy, and other information. Example: Mozilla/4.72 [en](WinNT;U) **Note:** The header lines received from the client, if any, are placed into the environment variable with the prefix HTTP_* followed by the header name. The header returns the environment variable.
IBM_CCSID_VALUE	Non-SSL	The CCSID under which the current server job is running. Example: 37
NETCP	Non-SSL	The default ASCII CCSID used to translate the data. Example: 819
PATH_INFO	Non-SSL	Contains the additional path information as sent by the web browser. Example: /wizard
PATH_TRANSLATED	Non-SSL	Contains the decoded or translated version of the path information that is contained in PATH_INFO, which takes the path and does any virtual-to-physical mapping to it. Example: /wwwhome/wizard

Table 50. Environment variables that may be set by the HTTP Server (continued)

Variable Name	Type	Description
QIBM_CGI_LIBRARY_LIST	Non-SSL	This variable is used to set the CGI jobs' library list. The variable can be set using the SetEnv directive. See the SetEnv directive for more information.
QUERY_STRING	Non-SSL	When information is sent using a method of GET, this variable contains the information in a query that follows the "?". The string is coded in the standard URL format of changing spaces to "+" and encoding special characters with "%xx" hexadecimal encoding. The CGI program must decode this information. Example: NAME=Eugene+T%2E+Fox=etfox%7Cibm.net=xyz **Note:** The supported maximum size of QUERY_STRING is 8K for HTTP Server.
QZHBHA_MODEL	Non-SSL	Model of the highly available Web server. Example: PRIMARYBACKUP
QZHBIS_FIRST_REQUEST	Non-SSL	This environment variable indicates to a CGI program if this is a subsequent request of some session. The Web server sets this variable to 1 if this is not a subsequent request of any session (this is potentially the first request of a new session). The Web server sets this variable to 0 if this is a subsequent request of some session. Example: 0
QZHBIS_CLUSTER_ENABLED	Non-SSL	This environment variable indicates to the CGI program that the CGI program is allowed to be cluster-enabled if the request does not belong to any existing session (QZHBIS_FIRST_REQUEST is set to 1). This environment variable indicates to the CGI program that the CGI program is cluster-enabled (QZHBIS_FIRST_REQUEST set to "0"). When the Web server receives a first request to a CGI, it decides if the CGI program is allowed to be cluster-enabled. If the CGI program is allowed to be cluster-enabled, the Web server sets the QZHBIS_CLUSTER_ENABLED environment variable to 1; otherwise the Web server does not define the QZHBIS_CLUSTER_ENABLED environment variable. When the Web server receives a subsequent request to a CGI, it looks to see if the session is cluster-enabled. If the session is cluster-enabled, the Web server sets the QZHBIS_CLUSTER_ENABLED environment variable to 1; otherwise the Web server does not define the QZHBIS_CLUSTER_ENABLED environment variable. Example: 1
QZHBNEXT_SESSION_HANDLE	Non-SSL	This environment variable contains a new session handle for a CGI program to use. If the CGI program is cluster-disabled, it may ignore this session handle. The Web server generates a session handle and sets the QZHBNEXT_SESSION_HANDLE environment variable to this value. If the CGI program decides to be cluster-enabled, it must use the passed session handle in the URLs of subsequent requests; otherwise, the Web server will not associate subsequent requests with this session. Example: 8B739003AB741824899F0004AC009021
QZHBRECOVERY	Non-SSL	Contains whether the highly available Web server has gone through a recovery (primary to backup or backup to primary). If this environment variable is present, recovery has occurred. If it is not present, then recovery has not occurred
REDIRECT_QUERY_STRING	Non-SSL	Contains QUERY_STRING from a re-directed request. Example: NAME=Eugene+T%2E+Fox=etfox%7Cibm.net=xyz
REDIRECT_QUERY_URL	Non-SSL	This environment variable is used in the primary/backup models only. This environment variable is used to indicate to a cluster-enabled CGI program that it should perform a recovery operation (for example, restore its state). The Web server passes a session handle to the CGI program through the QZHBRECOVERY environment variable. The Web server passes the CGI's state to the CGI program. If there is no recovery, this environment variable is undefined. In the primary/backup model, the high availability CGI is also treated as a persistent CGI. The high availability CGI state information can also be retained in the CGI job. The next request for the next step in the CGI is automatically run in the same job. Therefore, the CGI program can skip reading its state unless this environment variable is defined. Example: 4D868803AB731824899F0004AC009021

Table 50. Environment variables that may be set by the HTTP Server (continued)

Variable Name	Type	Description
REFERER	Non-SSL	Contains the referrer. Example: http://www.myserver.com/cgi-bin/
HTTP_REFERER	Non-SSL	Contains the referrer. Example: http://www.myserver.com/cgi-bin/
REFERER_URL	Non-SSL	Contains the referrer URL. Example: http://WWW.MYSERVER.COM:8080/perlSetEnv/
REMOTE_ADDR	Non-SSL	Contains the IP address of the remote host (web browser) that is making the request, if available. Example: 10.10.2.3
REMOTE_PORT	Non-SSL	Contains the remote user port number. Example: 3630
REMOTE_IDENT	Non-SSL	Contains the user ID of the remote user. Example: MyIdentityx
REMOTE_USER	Non-SSL	If you have a protected script and the server supports client authentication, this environment variable contains the user name that is passed for authentication. Example: SMITH
REQUEST_METHOD	Non-SSL	Contains the method (as specified with the METHOD attribute in an HTML form) that is used to send the request. Example: GET
REQUEST_URI	Non-SSL	Specifies URI to be requested. Example: /cgi-bin/hello.pgm
RULE_FILE	Non-SSL	Specifies rule file to be used. Example: /www/myserver/conf/httpd.conf
SCRIPT_FILENAME	Non-SSL	The file name of the document requested by the user. Example: /QSYS.LIB/CGI.LIB/HELLO.PGM
SCRIPT_NAME	Non-SSL	A virtual path to the program being run. Use this for self-referring URLs. Example: /cgi-bin/hello.pgm
SERVER_ADDR	Non-SSL	Contains the address of the server. Example: 10.10.2.3
SERVER_ADMIN	Non-SSL	Contains information about the server administrator. Example: [no address given]
SERVER_NAME	Non-SSL	Contains the server host name or IP address of the server. Example: 10.9.8.7
SERVER_PORT	Non-SSL	Contains the port number to which the client request was sent. Example: 2001
SERVER_PROTOCOL	Non-SSL	Contains the name and version of the information protocol that is used to make the request. Example: HTTP/1.0
SERVER_SIGNATURE	Non-SSL	Allows configuration of a trailing footer line under server generated documents like error messages, mod_proxy ftp directory listings, and mod_info output. Enabling the footer line allows the user to tell which chained servers in a proxy chain produced a returned error message. Example: On

Table 50. Environment variables that may be set by the HTTP Server (continued)

Variable Name	**Type**	**Description**
SERVER_SOFTWARE	Non-SSL	Contains the name and version of the information server software that is answering the request. Example: IBM-HTTP-SERVER/1.0
SSI_DIR	Non-SSL	The path of the current file relative to SSI_ROOT. If the current file is in SSI_ROOT, this value is "/". Example: ssi_child_dir/
SSI_FILE	Non-SSL	The file name of the current file. Example: ssi_parent.shtml
SSI_INCLUDE	Non-SSL	The value that is used in the include command that retrieved this file. This is not defined for the topmost file. Example: ssi_child_dir/ssi_child.shtml
SSI_PARENT	Non-SSL	The path and file name of the include, relative to SSI_ROOT. Example: ssi_parent.shtml
SSI_ROOT	Non-SSL	The path of the topmost file. All include requests must be in this directory or a child of this directory. Example: #echo var=SSI_DIR -> **Note:** You can use echo to display a value set by the set or global directives.
UNIQUE_ID	Non-SSL	Provides a unique magic token and acts as the identifier across all requests under very specific conditions. Example: aK8YOAkFBZkAABsuEC4AAACB
HTTPS	SSL	Returns **ON** if the system has completed an SSL handshake. It returns **OFF** if the exchange of signals to set up communications between two modems has failed. Example: OFF
HTTPS_CIPHER	SSL	This is the cipher that is used to negotiate with the client on the SSL handshake. Example: SSL_RSA_WITH_RC4_128_MD5
HTTPS_CLIENT_CERT	SSL	The entire certificate passed to the server from the client browser when SSL client authentication is enabled. The format of the certificate is a BASE64 encoded string that represents the DER format of the X.509 certificate. As an environment variable the BASE64 encoded string has been converted to EBCDIC and must be converted back to ASCII before it can be used for typical digital certificate API's. Example: MIIC0DCCAbigAwIBAgIHOL2Yx...
HTTPS_CLIENT_ CERT_COMMON_NAME	SSL	The common name from the client certificate's distinguished name. Example: SMITH
HTTPS_CLIENT_CERT_COUNTRY	SSL	The region code from the client certificate's distinguished name. Example: US
HTTPS_CLIENT_CERT_DN	SSL	The client certificate's distinguished name. Example: :cn=CAPTAIN,ou=downtown,o=fire fighters,l=Minot,st=North Dakota,c=US
HTTPS_CLIENT_CERT_EMAIL	SSL	The email of the client owning the certificate. Example: me@mycompany.com
HTTPS_CLIENT_CERT_ISSUER_ COMMON_NAME	SSL	The common came of the certificate authority that issued the client's certificate. Example: SMITH
HTTPS_CLIENT_CERT_ISSUER_ COUNTRY	SSL	The region code of the certificate authority that issued the client's certificate. Example: US

Table 50. Environment variables that may be set by the HTTP Server (continued)

Variable Name	**Type**	**Description**
HTTPS_CLIENT_CERT_ISSUER_DN	SSL	The distinguished name of the certificate authority that issued the client's certificate. Example: :cn=testsystem.ibm.com CA,ou=Test Organization Unit,o=System test, l=Rochester,st=Minnesota,c=US
HTTPS_CLIENT_CERT_ISSUER_ EMAIL	SSL	The e-mail address of the certificate authority that issued the client's certificate. Example: me@mydomain.net
HTTPS_CLIENT_CERT_ISSUER_ LOCALITY	SSL	The locality or city of the certificate authority that issued the client's certificate. Example: New York
HTTPS_CLIENT_CERT_ISSUER_ ORG_UNIT	SSL	The organizational unit of the certificate authority that issued the client's certificate. Example: bird watchers
HTTPS_CLIENT_CERT_ISSUER_ ORGANIZATION	SSL	The organization name of the certificate authority that issued the client's certificate. Example: dove
HTTPS_CLIENT_CERT_ISSUER_ POSTAL_CODE	SSL	The postal code of the certificate authority that issued the client's certificate. Example: 12344-6789
HTTPS_CLIENT_CERT_ISSUER_ STATE_OR_PROVINCE	SSL	The state or province of the certificate authority that issued the client's certificate. Example: North Dakota
HTTPS_CLIENT_CERT_LEN	SSL	The length of the certificate passed in HTTPS_CLIENT_CERT. Example: 968
HTTPS_CLIENT_CERT_LOCALITY	SSL	The locality or city of the client certificate's distinguished name. Example: New York
HTTPS_CLIENT_CERT_ORG_UNIT	SSL	The organization unit name from the client certificate's distinguished name. Example: Pack234
HTTPS_CLIENT_CERT_ ORGANIZATION	SSL	The organization name from the client certificate's distinguished name. Example: Scouts
HTTPS_CLIENT_CERT_ POSTAL_CODE	SSL	The postal code assigned by the issueing certificate authority. Example: 80525
HTTPS_CLIENT_CERT_ SERIAL_NUM	SSL	The serial number assigned by the issuing certificate authority. Example: 3F:E4:83:81:02:D5:58
HTTPS_CLIENT_CERT_ STATE_OR_PROVINCE	SSL	The state or province from the client certificate's distinguished name. Example: Alberta
HTTPS_CLIENT_ISSUER_EMAIL	SSL	Contains the email address of the Certificate Authority that issued the certificate. Example: jones@mydomain.net
HTTPS_KEYSIZE	SSL	If a valid security product is installed and the SSLMode directive is SSLMode=ON, this will be set to the size of the bulk encryption key used in the SSL session. Example: [128]
HTTPS_SESSION_ID	SSL	Set to NULL by default when used with HTTP Server.
HTTPS_SESSION_ID_NEW	SSL	If the value is **TRUE**, it indicates that a full handshake was performed for this SSL session. If the value is **FALSE**, it indicates that an abbreviated handshake was performed for this SSL session. Example: True

Table 50. Environment variables that may be set by the HTTP Server (continued)

Variable Name	Type	Description
SSL_CIPHER	SSL	This is the cipher that is used to negotiate with the client on the SSL handshake. Example: SSL_RSA_WITH_RC4_128_MD5
SSL_CLIENT_C	SSL	The region code from the client certificate's distinguished name. Example: USA
SSL_CLIENT_CERTBODY	SSL	The entire certificate passed to the server from the client browser when SSL Client authentication is enabled. The format of the certificate is a BASE64 encoded string that represents the DER format of the X.509 certificate. As an environment variable the BASE64 encoded string has been converted to EBCDIC and must be converted back to ASCII before it can be used for typical digital certificate API's. Example: MIIC0DCC big IB gIHOL2Yx...
SSL_CLIENT_CERTBODYLEN	SSL	The length of the certificate passed in SSL_CLIENT_CERT. Example: 828
SSL_CLIENT_CERT_EMAIL	SSL	The email of the client owning the certificate. Example: me@mycompany.com
SSL_CLIENT_CN	SSL	The common name from the client certificate's distinguished name. Example: SMITH
SSL_CLIENT_DN	SSL	The client's distinguished name. Example: :cn=CAPTAIN,ou=downtown,o=fire fighters,l=Minot,st=North Dakota,c=US HTTPS_CLIENT_CERT_DN :cn=CAPTAIN,ou=downtown,o=fire fighters,l=Minot,st=North Dakota,c=US
SSL_CLIENT_ICN	SSL	The common name of the certificate authority that issued the client's certificate. Example: SMITH
SSL_CLIENT_IC	SSL	The region code of the certificate authority that issued the client's certificate. Example: CA
SSL_CLIENT_IDN	SSL	The distinguished name of the certificate authority that issued the client's certificate. Example: :cn=testsystem.ibm.com CA,ou=Test Organization Unit,o=System test, l=Rochester,st=Minnesota,c=US
SSL_CLIENT_EMAIL	SSL	The e-mail of the certificate authority that issued the client's certificate. Example: me@mycompany.com
SSL_CLIENT_IL	SSL	The locality of the certificate authority that issued the client's certificate. Example: New York
SSL_CLIENT_IO	SSL	The organization name of the certificate authority that issued the client's certificate. Example: bird watchers
SSL_CLIENT_IOU	SSL	The organizational unit of the certificate authority that issued the client's certificate. Example: bird watchers
SSL_CLIENT_IPC	SSL	The postal code of the certificate authority that issued the client's certificate. Example: 55901
SSL_CLIENT_IST	SSL	The state or province of the certificate authority that issued the client's certificate. Example: MNA

Table 50. Environment variables that may be set by the HTTP Server (continued)

Variable Name	Type	Description
SSL_CLIENT_L	SSL	The locality or city of the client certificate's distinguished name. Example: New York
SSL_CLIENT_NEWSESSIONID	SSL	If the value is **TRUE**, it indicates that a full handshake was performed for this SSL session. If the value is **FALSE**, it indicates that an abbreviated handshake was performed for this SSL session. Example: True
SSL_CLIENT_O	SSL	The organization name from the client certificate's distinguished name. Example: bird watchers
SSL_CLIENT_OU	SSL	The organizational unit name from the client certificate's distinguished name. Example: bird watchers
SSL_CLIENT_PC	SSL	The postal code from the client certificate's distinguished name. Example: 58401
SSL_CLIENT_SERIALNUM	SSL	The serial number assigned by the issuing certificate authority. Example: 3F:E4:83:81:02:D5:58
SSL_CLIENT_SESSIONID	SSL	If the value is **TRUE**, it indicates that a full handshake was performed for this SSL session. If the value is **FALSE**, it indicates that an abbreviated handshake was performed for this SSL session. Example: True
SSL_CLIENT_ST	SSL	The state or province from the client certificate's distinguished name. Example: North Dakota
SSL_PROTOCOL_VERSION	SSL	The SSL protocol version negotiated on the SSL handshake with the client. Example: SSLV3
SSL_SERVER_C	SSL	The region where the server is located in. Example: Denmark
SSL_SERVER_CN	SSL	The common name from the server certificate's distinguished name. Example: WWW.MYDOMAIN.COM
SSL_SERVER_DN	SSL	The server's distinguished name. Example: :cn=TESTSYSTEM.IBM.COM,ou=MyTestOrganizationUnit, o=Software test, l=Rochester,st=Minnesota,c=US
SSL_SERVER_EMAIL	SSL	The e-mail address of the server certificate. Example: me@mydomain.net
SSL_SERVER_L	SSL	The locality of the server certificate's distinguished name. Example: New York
SSL_SERVER_OU	SSL	The organization unit name from the server certificate's distinguished name. Example: bird watchers
SSL_SERVER_O	SSL	The organization name from the server certificate's distinguished name. Example: bird watchers
SSL_SERVER_ST	SSL	The state or province from the server certificate's distinguished name. Example: North Dakota
SSL_UNKNOWNREVOCATION_SUBJECT	SSL	The SSL_UNKNOWNREVOCATION_SUBJECT variable is set whenever a message is logged for SSLUnknownRevocationStatus directive.

Table 50. Environment variables that may be set by the HTTP Server (continued)

Variable Name	Type	Description
HTTP_AS_AUTH_PROFILETKN	SSL, Non-SSL	A 32-bit value used to identify or authenticate the user. See the ProfileToken directive for more information.

Related information

“The CGI Process” on page 179
The basic principle of Common Gateway Interface (CGI) is that a Web server passes client request information to CGI programs in system environment variables (and in some cases through standard input or command line arguments) and all standard output of CGI programs is returned to Web clients.

“CGI APIs” on page 133
This topic provides information about IBM HTTP Server for i APIs for CGI applications.

Server-side include commands for HTTP Server

This topic provides information about server-side include (SSI) commands for the IBM HTTP Server for i Web server.

HTTP Server SSI commands have the following format:

```
<--#command parameter="value" -->
```

Note: The value should be enclosed in double quotes and there is a whitespace before the comment terminator (-->). The leading <!--# is one token and should not contain any whitespaces.

The following describes the SSI commands for HTTP Server.

config

This command configures output formats and controls various aspects of the parsing. The valid attributes are:

echomsg
The value is a message that is sent back to the client if the echo element attempts to echo an undefined variable. This overrides any “SSIUndefinedEcho” on page 481 directives.

For example:

```
<!--#config echomsg="[Value Undefined]" -->
```

errmsg
The value is a message that is sent back to the client if an error occurs while parsing the document. This overrides any “SSIErrorMsg” on page 479 directives.

For example:

```
<!--#config errmsg="[Oops, something broke.]" -->
```

sizefmt
The value sets the format to be used when displaying the size of a file. Valid values are bytes for a count in bytes, or abbrev for a count in Kb or Mb as appropriate, for example a size of 1024 bytes will be printed as "1K"

For example:

```
<!--#config sizefmt="abbrev" -->
```

timefmt
The value is a string to be used by the strftime(3) library routine when printing dates.

For example:

```
<!--#config timefmt=""%R, %B %d, %Y"" -->
```

echo

This command prints one of the SSI variables defined below or environment variables. If the variable is unset, the result is determined by the "SSIUndefinedEcho" on page 481 directive. Dates are printed using config timefmt. The attributes are:

var

Specifies a SSI variable name or standard CGI environment variable name.

See the Environment variables on HTTP Server topic for a list of environment variables.

For example:

```
<!--#echo var="DATE_GMT" -->
```

Table 51. SSI variables for the echo command, for if and elif, and to any program invoked by the document

Variable Name	Description
DATE_GMT	The current date in Greenwich Mean Time.
DATE_LOCAL	The current date in the local time zone.
DOCUMENT_ARGS	This variable contains the query string of the active SSI document, or the empty string if a query string is not included. For subrequests invoked through the include SSI directive, QUERY_STRING will represent the query string of the subrequest and DOCUMENT_ARGS will represent the query string of the SSI document.
DOCUMENT_NAME	The filename (excluding directories) of the document requested by the user.
DOCUMENT_URI	The (%-decoded) URL path of the document requested by the user. Note that in the case of nested include files, this is not the URL for the current document. Note also that if the URL is modified internally (e.g. by an "Alias" on page 216 or "DirectoryIndex" on page 375), the modified URL is shown.
LAST_MODIFIED	The last modification date of the document requested by the user.
QUERY_STRING_UNESCAPED	If a query string is present in the request for the active SSI document, this variable contains the (%-decoded) query string, which is escaped for shell usage (special characters like & etc. are preceded by backslashes). It is not set if a query string is not present. Use DOCUMENT_ARGS if shell escaping is not desired.

decoding

Specifies whether HTTP Server should strip an encoding from the variable before processing the variable further. The default is none, where no decoding is done. If set to url, then URL decoding (also known as %-encoding) is performed. If set to urlencoded, application/x-www-form-urlencoded compatible encoding (found in query strings) is stripped. If set to base64, base64 is decoded, and if set to entity, HTML entity encoding is stripped. Decoding is done prior to any further encoding on the variable. Multiple encodings can be stripped by specifying more than one comma separated encoding. The decoding setting will remain in effect until the next decoding attribute is encountered, or the element ends.

The decoding attribute must *precede* the corresponding var attribute to be effective.

For example:

```
<!--#echo decoding="none" var="QUERY_STRING" -->
```

encoding

Specifies how the HTTP Server encodes special characters contained in the variable before outputting them. If set to none, no encoding is done. If set to url, then URL encoding (also known as %-encoding) is performed. If set to urlencoded, application/x-www-form-urlencoded compatible encoding is performed instead, and should be used with query strings. If set to base64, base64 encoding is performed. At the start of an echo element, if set to the default of entity, then entity encoding is performed. This can be changed by adding an encoding attribute, which will remain in effect until the next encoding attribute is encountered or the element ends, whichever comes first.

The encoding attribute must precede the corresponding var attribute to be effective.

For example:

```
<!--#echo encoding="entity" var="QUERY_STRING" -->
```

Note: In order to avoid cross-site scripting issues, you should *always* encode user supplied data.

exec

This command calls a CGI program. If "Options" on page 348 IncludesNOEXEC is set, this command is completely disabled. The attributes are:

cgi

Specifies the relative path and file name using URL encoding. If the path does not begin with a slash (/), then it is taken to be relative to the current document.

For example:

```
<!--#exec cgi="/cgi-bin/counter.pgm" -->
```

If the script returns a Location: header instead of output, then this will be translated into an HTML anchor.

The include virtual element should be used in preference to exec cgi. In particular, if you need to pass additional arguments to a CGI program, using the query string, this cannot be done with exec cgi, but can be done with include virtual, for example:

```
<!--#include virtual="/cgi-bin/example.pgm?argument=value" -->
```

fsize

This command prints the size of the specified file according to **config sizefmt**. The attributes are:

file

Specifies the relative path and file name. For example:

```
<!--#fsize virtual="/include/include.htm" -->
```

Note: The value of file cannot start with a slash (/), nor can it contain ../ so as to refer to a file above the current directory or outside of the document root.

virtual

Specifies the relative path and file name using URL encoding. If it does not begin with a slash (/) then it is taken to be relative to the current document. For example:

Note: This does not print the size of any CGI output, but the size of the CGI script itself.

```
<!--#fsize virtual="/include/include.htm" -->
```

Note: In many cases file and virtual attributes are exactly the same thing. However, the file attribute doesn't respect URL-space aliases.

flastmod

This command prints the last modification date of the specified file according to **config timefmt**. The attributes are:

file

Specifies the relative path and file name. For example:

```
<!--#flastmod file="/include/include.htm" -->
```

Note: The value of file cannot start with a slash (/), nor can it contain ../ so as to refer to a file above the current directory or outside of the document root.

virtual

Specifies the relative path and file name using URL encoding. If it does not begin with a slash (/) then it is taken to be relative to the current document.

Note: This does *not* print the size of any CGI output, but the size of the CGI script itself.

For example:

```
<!--#flastmod virtual="/include/include.htm" -->
```

Note: In many cases file and virtual attributes are exactly the same thing. However, the file attribute doesn't respect URL-space aliases.

global

This command is the same as the set command.

include

This command inserts the text of another document or file into the parsed file. Included files can be nested. The attributes are:

file

Specifies the relative path and file name. It cannot contain ../, nor can it be an absolute path. Therefore, you cannot include files that are outside of the document root, or above the current document in the directory structure. The virtual attribute should always be used in preference to this one.

For example:

```
<!--#include file="/include/include.htm" -->
```

virtual

Specifies the relative path and file name using URL encoding. The value cannot contain a scheme or hostname, only a path and an optional query string. If it does not begin with a slash (/) then it is taken to be relative to the current document.

For example:

```
<!--#include virtual="/include/include.htm" -->
```

If the specified value is a CGI program, the program will be executed and its output inserted in place of the directive in the parsed file. You may include a query string in a CGI url.

For example:

```
<!--#include virtual="/cgi-bin/example.pgm?argument=value" -->
```

include virtual should be used in preference to exec cgi to include the output of CGI programs into an HTML document.

If the "KeptBodySize" on page 566 directive is correctly configured and valid for this included file, attempts to POST requests to the enclosing HTML document will be passed through to subrequests as POST requests as well. Without the directive, all subrequests are processed as GET requests.

onerror

Using (%-encoded) URL-path to show a previous attempt to include a file or virtual attribute failed. For example:

```
<!--#include virtual="/not-exist.html" onerror="/error.html" -->
```

printenv

This command prints all existing environment variables and their values. Special characters are entity encoded (see the echo element for details) before being output. There are no attributes. For example:

```
<!--#printenv -->
```

set

This command sets the value of an environment variable. The attributes are:

var

Specifies an environment variable name.

See "Environment variables set by HTTP Server" on page 634 for a list of environment variables.

value

Specifies the value to assign to the environment variable name. For example:

```
<!--#set var="var1" value="yes" -->
```

If you want to use the value of standard environment variables or SSI variables like LAST_MODIFIED to set your environment variable, use the dollar sign ($) before the name of the variable. For example:

```
<!--#set var="modified" value="$LAST_MODIFIED" -->
```

If you want to insert a special character(i.e. dollar sign) in a string, precede it with a backslash . For example:

```
<!--#set var="cost" value="\$100" -->
```

decoding

Specifies whether HTTP Server should strip an encoding from the variable before processing the variable further. The default is none, where no decoding is done. If set to url, urlencoded, base64 or entity, URL decoding, application/x-www-form-urlencoded decoding, base64 decoding or HTML entity decoding is performed respectively. More than one decoding can be specified by separating with commas. The decoding setting will remain in effect until the next decoding attribute is encountered, or the element ends. The decoding attribute must precede the corresponding var attribute to be effective.

For example:

```
<!--#set decoding="none" var="val" value="$QUERY_STRING" -->
```

encoding

Specifies how HTTP Server encodes special characters contained in the variable before setting them. The default is none, where no encoding is done. If set to url, urlencoding, base64 or entity, URL encoding, application/x-www-form-urlencoded encoding, base64 encoding or HTML entity encoding is performed respectively. More than one encoding can be specified by separating with commas. The encoding setting will remain in effect until the next encoding attribute is encountered, or the element ends. The encoding attribute must precede the corresponding var attribute to be effective. Encodings are applied after all decodings have been stripped.

For example:

```
<!--#set encoding="entity" var="val" value="$QUERY_STRING" -->
```

Conditional commands

The basic flow control commands are:

```
<!--#if expr="test_condition" -->
<!--#elif expr="test_condition" -->
<!--#else -->
<!--#endif -->
```

There are four conditional or flow control commands. The **if** command tests a value. If the value is true, then processing continues with the next line. If the value is not true then processing continues with an **elif**, **else**, or **endif** command. The **elif** and **else** commands are optional. The **if** and **elif** commands have a parameter of **expr**. The **expr** parameter contains the test condition. An **endif** command is required for every if command. For example:

```
<!--#if expr="$USER_AGENT = /MSIE/" -->
<P>You are using Internet Explorer.</P>
<!--#elif expr="$USER_AGENT = /Mozilla/" -->
<P>You are using Netscape.</P>
<!--#else -->
<P>You are not using Internet Explorer or Netscape.</P>
<!--#endif -->
```

The test_condition of expr parameter is a boolean expression which now follows the new ap_expr syntax. The syntax can be changed to be compatible with HTTP server on older IBM i releases by using directive "SSILegacyExprParser" on page 480.

The SSI variables set with the var element are exported into the request environment and can be accessed with the reqenv function. As a short-cut, the function name v is also available inside mod_include . The below example will print "from local net" if client IP address belongs to the 10.0.0.0/8 subnet.

```
<!--#if expr='-R "10.0.0.0/8"' -->
from local net
<!--#else -->
from somewhere else
<!--#endif -->
```

The below example will print "foo is bar" if the variable foo is set to the value "bar".

```
<!--#if expr='v("foo") = "bar"'-->
foo is bar
<!--#endif -->
```

Legacy expression syntax

This section describes the syntax of the #**if expr** parameter if "SSILegacyExprParser" on page 480 is set to on.

Condition	Comments
`string`	True if the string is not empty

`-A string`	True if the URL represented by the string is accessible by configuration, false otherwise. This is useful where content on a page is to be hidden from users who are not authorized to view the URL, such as a link to that URL. Note that the URL is only tested for whether access would be granted, not whether the URL exists. For example:
	`<!--#if expr="-A /private" -->`
	`Click <a href="/private">here</a> to`
	`access private information.`
	`<!--#endif -->`

`string1 = string2 (equal)`	Compare string1 with string2. If string2 has the form /string/, then it is compared as a regular expression. See "Regular expression notation for HTTP Server" on page 631 for more information.
	If you are matching positive (= or ==), you can capture grouped parts of the regular expression. The captured parts are stored in the special variables $1 .. $9. The whole string matched by the regular expression is stored in the special variable $0
	For example:
	`<!--#if expr="$QUERY_STRING = /`
	`^sid=([a-zA-Z0-9]+)/" -->`
	`<!--#set var="session" value="$1" -->`
	`<!--#endif -->`
	Note: Regular expressions are now implemented by the PCRE engine in this release of HTTP Server for i. == is just an alias for = and behaves exactly the same way.

`string1 == string2 (equal)`	
`string1 != string2 (not equal)`	
`string1 < string2 (less than)`	Compare *string1* with *string2*. Note, that strings are compared *literally* (using strcmp(3)). Therefore the string "100" is less than "20".
`string1 <= string2 (less than or equal to)`	
`string1 > string2 (greater than)`	
`string1 > = string2 (greater than or equal to)`	
`( test_condition )`	True if test_condition is true.
`!test_condition`	True if test_condition is false.
`Test_condition1 && test_condition2`	True if both test_condition1 and test_condition2 are true.

Condition	Comments
`Test_condition1 || test_condition2`	True if either test_condition1 or test_condition2 are true.

Variable substitution

Values can be supplied in the following ways:

- Test can be supplied within a quoted string. For example:

  ```
  <!--#config timefmt="%b%d%y" -->
  ```

- A literal dollar sign can be supplied in a string using a backslash. For example:

  ```
  <!--#ifexpr="$a=\$test" -->
  ```

- A variable reference can be supplied within a character sequence using braces. For example:

  ```
  <!--#set var="ABC" value="${REMOTE_HOST}_${REQUEST_METHOD}" -->
  ```

  If `REMOTE_HOST` is equal to X and `REQUEST_METHOD` is equal to Y, then `$ABC` is equal to `X_Y`.

Additional notes

Server-side includes look for the variable, echoes where the variable is found, and proceeds with the function. You can have multiple variable references. When server-side includes encounter a variable reference inside a server-side include directive, it attempts to resolve it on the server side. The following example escapes the & so that server-side includes do not recognize it as a variable. In the second line of the example, the variable "&index" is a server-side variable and is used to construct the variable name "var1". The variable &ecirc; is a client side variable, so the & is escaped to create the value ":fr&ecirc;d" or "fred" with a circumflex over the e.

```
<!--#set var="index" value="1"  -->
<!--#set var+"var&index;" value+"fr\&ecirc;d" -->
<!--#echo var="var1" -->
```

The following characters can be escaped. Escape variables must be preceded with a backslash (\).

Escape variable	Meaning
`\a`	Alert (bell)
`\b`	Backslash
`\f`	Form feed (new page)
`\n`	New line
`\r`	Carriage return
`\t`	Vertical tab
`\v`	Vertical tab
`\'`	Single quote mark
`\''`	Double quote mark
`\?`	Question mark
`\\`	Backslash
`\-`	Hyphen
`\.`	Period

Escape variable	Meaning
\&	Ampersand

Time formats for HTTP Server

This topic provides information about time formats for server-side includes for the IBM HTTP Server for i Web server.

The following table contains formatting values used to specify time with server-side includes. See "Log formats for HTTP Server" on page 29 and "Server-side include commands for HTTP Server" on page 643 for proper use of the server-side include time format.

Table 52. Time formats for SSI incudes

Value	Description	Example
%%	Replace with %.	%
%a	Replace with the abbreviated weekday name.	Mon
%A	Replace with the full weekday name.	Monday
%b	Replace with the abbreviated month name.	Apr
%B	Replace with the full month name.	April
%c	Replace with the date and time.	
%C	Replace with the century number (year divided by 100 and truncated).	
%d	Replace with the day of the month (01-31).	20
%D	Insert the date as %m/%d/%y.	04/20/00
%e	Insert the month of the year as a decimal number (01-12)	03
%E[cCzyY]	If the alternative date and time format is not available, the %E descriptions are mapped to their unextended counterparts. For example %E is mapped to %C.	
%Ec	Replace with the alternative data and time representation.	
%EC	Replace with the name of the base year in the alternative representation.	
%Ex	Replace with the alternative data representation.	
%EX	Replace with the alternative time representation.	
%Ey	Replace with the offset from %EC (year only) in the alternative representation.	
%EY	Replace with the full alternative year representation.	
%h	Replace with the abbreviated month name. This is the same as %b.	Apr
%H	Replace with the hour (23-hour clock) as a decimal number (00-23).	22
%I	Replace with the hour (12-hour clock) as a decimal number(00-12).	04
%j	Replace with the day of the year (001-366).	222
%m	Replace with the month (01-12).	04

Table 52. Time formats for SSI incudes (continued)

Value	**Description**	**Example**
`%M`	Replace with the minute (00-59).	24
`%n`	Replace with a new line.	
`%O[deHlmMSUwWy]`	If the alternative date and time format is not available the %E descriptors are mapped to their extended counterparts. For example %Od is mapped to %d.	
`%Od`	Replace with the day of the month using the alternative numeric symbols. Fill as needed with leading zeros if there is any alternative symbol for zero otherwise with leading spaces.	
`%Oe`	Replace with the day of the month using the alternative numeric symbols filled as needed with leading spaces.	
`%OH`	Replace with the hour (24 hour clock) using the alternative numeric symbols.	
`%OI`	Replace with the hour (12 hour clock) using the alternative numeric symbols.	
`%Om`	Replace with the month using the alternative numeric symbols.	
`%OM`	Replace with the minutes using the alternative numeric symbols.	
`%OS`	Replace with the seconds using the alternative numeric symbols.	
`%OU`	Replace with the week number of the year (Sunday as the first day of the week, rules corresponding to %U) using alternative numeric symbols.	
`%Ow`	Replace with the weekday (Sunday=0) using the alternative numeric symbols.	
`%OW`	Replace with the week number of the year (Monday as the first day of the week) using the alternative numeric symbols.	
`%Oy`	Replace with the year (offset from %C) in the alternative representation and using the alternative numeric symbols.	
`%p`	Replace with the local equivalent of AM or PM.	
`%r`	Replace with the string equivalent to `%I:%M:%S %p`.	
`%R`	Replace with the time in 24 hour notation (%H:%M).	
`%S`	Replace with seconds (00-61).	
`%t`	Replace with a tab.	
`%T`	Replace with a string equivalent to %H:%M:%S.	`16:31:04`
`%u`	Replace with a weekday as a decimal number (1 to 7) with a 1 representing Monday.	3
`%U`	Replace with the week number of the year (00-53) where Sunday is the first day of the week.	24
`%V`	Replace with the week number of the year (01-53) where Monday is the first day of the week.	5
`%w`	Replace with the weekday (0-6) where Sunday is 0.	`0`

Table 52. Time formats for SSI incudes (continued)

Value	Description	Example
`%W`	Replace with the week number of the year (00-53) where Monday is the first day of the week.	`13`
`%x`	Replace with the appropriate date representation.	
`%X`	Replace with the appropriate time representation.	
`%y`	Replace with the year with the century.	`02`
`%Y`	Replace with the year with the current century.	`2002`

ap_expr expression parser

In previous version of Apache HTTP Server, there are several syntax variants for expressions used to express a condition in the different modules of the Apache HTTP Server. Since Apache HTTP Server 2.4.x, there is only one single variant, called ap_expr to be used for all configuration directives. This document describes the new ap_expr expression parser in HTTP Server.

Grammar in Backus-Naur Form notation

Backus-Naur Form (BNF) is a notation technique for context-free grammars, often used to describe the syntax of languages used in computing. In most cases, expressions are used to express boolean values. For these, the starting point in the BNF is expr. However, a few directives accept expressions that evaluate to a string value. For those, the starting point in the BNF is string.

```
expr
```

```
::= "true" | "false"
  | "!" expr
  | expr "&&" expr
  | expr "||" expr
  | "(" expr ")"
  | comp
```

```
comp
```

```
::= stringcomp
  | integercomp
  | unaryop word
  | word binaryop word
  | word "in" "{" wordlist "}"
  | word "in" listfunction
  | word "=~" regex
  | word "!~" regex
```

```
stringcomp
```

```
::= word "==" word
  | word "!=" word
  | word "<"  word
  | word "<=" word
  | word ">"  word
  | word ">=" word
```

```
integercomp
```

```
::= word "-eq" word | word "eq" word
  | word "-ne" word | word "ne" word
  | word "-lt" word | word "lt" word
  | word "-le" word | word "le" word
  | word "-gt" word | word "gt" word
  | word "-ge" word | word "ge" word
```

```
wordlist
```

```
::= word
  | wordlist "," word
```

```
word            ::= word "." word
                  | digit
                  | "'" string "'"
                  | """ string """
                  | variable
                  | rebackref
                  | function

string          ::= stringpart
                  | string stringpart

stringpart      ::= cstring
                  | variable
                  | rebackref

cstring         ::= ...
digit           ::= [0-9]+

variable        ::= "%{" varname "}"
                  | "%{" funcname ":" funcargs "}"

rebackref       ::= "$" [0-9]

function        ::= funcname "(" wordlist ")"

listfunction    ::= listfuncname "(" word ")"
```

Variables

The expression parser provides a number of variables of the form %{HTTP_HOST}. Note that the value of a variable may depend on the phase of the request processing in which it is evaluated. For example, an expression used in an <If> directive is evaluated before authentication is done. Therefore, %{REMOTE_USER} will not be set in this case.

The following variables provide the values of the named HTTP request headers. The values of other headers can be obtained with the req function(see below). Using these variables may cause the header name to be added to the Vary header of the HTTP response, except where otherwise noted for the directive accepting the expression. The req_novary function(see below) may be used to circumvent this behavior.

Table 53. HTTP request headers

Name
HTTP_ACCEPT
HTTP_COOKIE
HTTP_FORWARDED
HTTP_HOST
HTTP_PROXY_CONNECTION
HTTP_REFERER
HTTP_USER_AGENT

Example:

```
# Compare the host name to example.com and redirect to www.example.com if it matches
<If "%{HTTP_HOST} == 'example.com'">
    Redirect permanent "/" "http://www.example.com/"
</If>
```

Table 54. Other request related variables

Name	Description
REQUEST_METHOD	The HTTP method of the incoming request (e.g. GET)
REQUEST_SCHEME	The scheme part of the request's URI
REQUEST_URI	The path part of the request's URI
DOCUMENT_URI	Same as REQUEST_URI
REQUEST_FILENAME	The full local filesystem path to the file or script matching the request, if this has already been determined by the server at the time REQUEST_FILENAME is referenced. Otherwise, such as when used in virtual host context, the same value as REQUEST_URI
SCRIPT_FILENAME	Same as REQUEST_FILENAME
LAST_MODIFIED	The date and time of last modification of the file in the format 20101231235959, if this has already been determined by the server at the time LAST_MODIFIED is referenced.
PATH_INFO	The trailing path name information, see “AcceptPathInfo” on page 302
QUERY_STRING	The query string of the current request
IS_SUBREQ	"true" if the current request is a subrequest, "false" otherwise
THE_REQUEST	The complete request line (e.g., "GET /index.html HTTP/1.1")
REMOTE_ADDR	The IP address of the remote host
REMOTE_HOST	The host name of the remote host
REMOTE_USER	The name of the authenticated user, if any (not available during <If>)
REMOTE_IDENT	The user name set by mod_ident
SERVER_NAME	The “ServerName ” on page 355 of the current virtual host
SERVER_PORT	The server port of the current virtual host , see “ServerName ” on page 355
SERVER_ADMIN	The “ServerAdmin ” on page 354 of the current virtual host
SERVER_PROTOCOL	The protocol used by the request (e.g. HTTP/1.1). In some types of internal subrequests, this variable has the value INCLUDED.
DOCUMENT_ROOT	The “DocumentRoot ” on page 313 of the current virtual host
AUTH_TYPE	The configured “AuthType” on page 610(e.g. "basic")
CONTENT_TYPE	The content type of the response (not available during <If>)
HANDLER	The name of the Handler creating the response
HTTPS	"on" if the request uses https, "off" otherwise
IPV6	"on" if the connection uses IPv6, "off" otherwise
REQUEST_STATUS	The HTTP error status of the request (not available during <If>)

Table 54. Other request related variables (continued)

Name	Description
REQUEST_LOG_ID	The error log id of the request (see "ErrorLogFormat" on page 320)
CONN_LOG_ID	The error log id of the connection (see "ErrorLogFormat" on page 320)
CONN_REMOTE_ADDR	The peer IP address of the connection (see the mod_remoteip module)
CONTEXT_PREFIX	
CONTEXT_DOCUMENT_ROOT	

Example:

```
# Force text/plain if requesting a file with the query string contains 'forcetext'
<If "%{QUERY_STRING} =~ /forcetext/">
        ForceType text/plain
</If>
```

Table 55. Misc variables

Name	Description
TIME_YEAR	The current year (e.g. 2010)
TIME_MON	The current month (1, ..., 12)
TIME_DAY	The current day of the month
TIME_HOUR	The hour part of the current time (0, ..., 23)
TIME_MIN	The minute part of the current time
TIME_SEC	The second part of the current time
TIME_WDAY	The day of the week (starting with 0 for Sunday)
TIME	The date and time in the format 20101231235959
SERVER_SOFTWARE	The server version string
API_VERSION	The date of the API version (module magic number)

See "Environment variables set by HTTP Server" on page 634 for more variables information.

Example:

```
#  Only allow access to this content during business hours
<Directory "/www/webserver/htdocs/business">
        Require expr %{TIME_HOUR} -gt 9 && %{TIME_HOUR} -lt 17
</Directory>
```

Binary operators

Binary operators have the form "-[a-zA-Z][a-zA-Z0-9_]+", i.e. a minus and at least two characters. The name is not case sensitive.

Table 56. Comparison operators

Name	Alternative	Description
==	=	String equality
!=		String inequality
<		String less than

Table 56. Comparison operators (continued)

Name	Alternative	Description
<=		String less than or equal
>		String greater than
>=		String greater than or equal
=~		String matches the regular expression
!~		String does not match the regular expression
-eq	eq	Integer equality
-ne	ne	Integer inequality
-lt	lt	Integer less than
-le	le	Integer less than or equal
-gt	gt	Integer greater than
-ge	ge	Integer greater than or equal

Table 57. Other binary operators

Name	Description
-ipmatch	IP address matches address/netmask
-strmatch	left string matches pattern given by right string (containing wildcards *, ?, [])
-strcmatch	same as -strmatch, but case insensitive
-fnmatch	same as -strmatch, but slashes are not matched by wildcards

Example:

```
# Compare the IP address of the remote host to 127.0.0.1/8 and redirect to localhost:8080 if it
matches
<If "%{REMOTE_ADDR} -ipmatch '127.0.0.1/8'">
   Redirect permanent "/" "http://localhost:8080/"
</If>
```

Unary operators

Unary operators take one argument and have the form "-[a-zA-Z]", i.e. a minus and one character. The name is case sensitive.

Table 58. Unary operators

Name	Description	Restricted
-d	The argument is treated as a filename. True if the file exists and is a directory	yes
-e	The argument is treated as a filename. True if the file (or dir or special) exists	yes
-f	The argument is treated as a filename. True if the file exists and is regular file	yes
-s	The argument is treated as a filename. True if the file exists and is not empty	yes

Table 58. Unary operators (continued)

Name	Description	Restricted
-L	The argument is treated as a filename. True if the file exists and is symlink	yes
-h	The argument is treated as a filename. True if the file exists and is symlink (same as -L)	yes
-F	True if string is a valid file, accessible via all the server's currently-configured access controls for that path. **Note:** This uses an internal subrequest to do the check, so use it with care - it can impact your server's performance!	
-U	True if string is a valid URL, accessible via all the server's currently-configured access controls for that path. **Note:** This uses an internal subrequest to do the check, so use it with care - it can impact your server's performance!	
-A	Alias for -U	
-n	True if string is not empty	
-z	True if string is empty	
-T	False if string is empty, "0", "off", "false", or "no" (case insensitive). True otherwise.	
-R	Same as "%{REMOTE_ADDR} -ipmatch ...", but more efficient	

Note: The operators marked as "restricted" are not available in some modules like mod_include .

Example:

```
# Check result of URI mapping by running in Directory context with -f
<Directory "/www/webserver/htdocs">
     AddEncoding x-gzip gz
<If "-f '%{REQUEST_FILENAME}.unzipme' && ! %{HTTP:Accept-Encoding} =~ /gzip/">
      SetOutputFilter INFLATE
</If>
</Directory>
```

Functions

Normal string-valued functions take one string as argument and return a string. Functions names are not case sensitive.

Table 59. Functions

Name	Description	Restricted
req, http	Get HTTP request header; header names may be added to the Vary header(see below)	
req_novary	Same as req, but header names will not be added to the Vary header	
resp	Get HTTP response header (most response headers will not yet be set during <If>)	
reqenv	Lookup request environment variable (as a shortcut, v can be used too to access variables)	

Table 59. Functions (continued)

Name	Description	Restricted
osenv	Lookup operating system environment variable	
note	Lookup request note	
env	Return first match of note, reqenv, osenv	
tolower	Convert string to lower case	
toupper	Convert string to upper case	
escape	Escape special characters in %hex encoding	
unescape	Unescape %hex encoded string, leaving encoded slashes alone; return empty string if %00 is found	
base64	Encode the string using base64 encoding	
unbase64	Decode base64 encoded string, return truncated string if 0x00 is found	
md5	Hash the string using MD5, then encode the hash with hexadecimal encoding	
sha1	Hash the string using SHA1, then encode the hash with hexadecimal encoding	
file	Read contents from a file (including line endings, when present)	yes
filesize	Return size of a file (or 0 if file does not exist or is not regular file)	yes

Note: The functions marked as "restricted" are not available in some modules like mod_include .

When the functions req or http are used, the header name will automatically be added to the Vary header of the HTTP response, except where otherwise noted for the directive accepting the expression. The req_novary function can be used to prevent names from being added to the Vary header.

In addition to string-valued functions, there are also list-valued functions which take one string as argument and return a wordlist, i.e. a list of strings. The wordlist can be used with the special -in operator (see below). Functions names are not case sensitive. There are no built-in list-valued functions.

Examples:

```
# Check an environment variable for a regular expression, negated.
<If "! reqenv('REDIRECT_FOO') =~ /bar/">
     Header set matched true
</If>

# Function examples in boolean context
<If "md5('foo') == 'acbd18db4cc2f85cedef654fccc4a4d8'">
     Header set checksum-matched true
</If>
<If "md5('foo') == replace('md5:XXXd18db4cc2f85cedef654fccc4a4d8', 'md5:XXX', 'acb')>
     Header set checksum-matched-2 true
</If>

# Function example in string context
Header set foo-checksum "expr=%{md5:foo}"

# This delays the evaluation of the condition clause compared to <If>
Header always set CustomHeader my-value "expr=%{REQUEST_URI} =~ m#^/special_path\.php$#"
```

Other

Table 60. Other

Name	Alternative	Description
-in	in	string contained in wordlist
/regexp/	m#regexp#	Regular expression (the second form allows different delimiters than /)
/regexp/i	m#regexp#i	Case insensitive regular expression
$0 ... $9		Regular expression backreferences

Note: The strings $0 ... $9 allow to reference the capture groups from a previously executed, successfully matching regular expressions. They can normally only be used in the same expression as the matching regex, but some modules allow special uses.

Example:

```
# Check a HTTP header for a list of values
<If "%{HTTP:X-example-header} in { 'foo', 'bar', 'baz' }">
     Header set matched true
</If>
```

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IBM Redbooks publications and Web sites contain information that relates to the IBM HTTP Server for i topic collection. You can view or print any of the PDF files.

IBM Redbooks

- AS/400 HTTP Server Performance and Capacity Planning
- IBM HTTP for iSeries: Features of the HTTP Server (original and powered by Apache)
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- IBM HTTP Server for i product page
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