IBM Tivoli Monitoring for Virtual
Environments Agent for VMware VI
7.3 Fix Pack 5

Installation and Configuration Guide

IBM

Note

Before using this information and the product it supports, read the information in "Notices" on page 35.

This edition applies to agent version 07.30.05 of IBM® Tivoli® Monitoring for Virtual Environments Agent for VMware VI (product number 5724-L92) and to all subsequent releases and modifications until otherwise indicated in new editions.

Contents

Chapter 1. Overview of the agent

The IBM Tivoli Monitoring for Virtual Environments Agent for VMware VI (product code VM) provides you with the capability to monitor VMware Virtual Center. You can also use the agent to take basic actions with the VMware Virtual Center.

IBM Tivoli Monitoring is the base software for the VMware VI agent.

IBM Tivoli Monitoring

IBM Tivoli Monitoring provides a way to monitor the availability and performance of all the systems in your enterprise from one or several designated workstations. It also provides useful historical data that you can use to track trends and to troubleshoot system problems.

You can use IBM Tivoli Monitoring to achieve the following tasks:

- Monitor for alerts on the systems that you are managing by using predefined situations or custom situations.
- Establish your own performance thresholds.
- Trace the causes leading to an alert.
- Gather comprehensive data about system conditions.
- Use policies to take actions, schedule work, and automate manual tasks.

The Tivoli Enterprise Portal is the interface for IBM Tivoli Monitoring products. You can use the consolidated view of your environment as seen in the Tivoli Enterprise Portal to monitor and resolve performance issues throughout the enterprise.

See the IBM Tivoli Monitoring publications listed in "Prerequisite publications" in the Documentation library topic for complete information about IBM Tivoli Monitoring and the Tivoli Enterprise Portal.

Functions of the monitoring agent

Resource monitoring
Collects monitoring information for memory, CPU, system, disk, and network usage for the VMware ESX server and the virtual machines. In addition, the agent collects monitoring information for power usage for the VMware ESX server.

Actions
Provides actions to start and stop the virtual machines installed on the VMware ESX server.

Integration
Uses additional IBM Tivoli Monitoring components to provide an in-depth view of the environment. Navigation links are provided to operating system agents that can be installed within virtual machines and the service console of ESX. Data views from the IBM Tivoli Monitoring for Virtual Environments Agent for NetApp Storage provide information for NAS data stores and detailed physical device metrics. The agent also integrates with IBM Systems Director V6.1.1.2, which provides additional management functions.

Historical data
Provides a history enablement file that provides the ability to generate reports for all metrics collected.

Event monitoring
Monitors events, tasks, and alarms generated by VMware Virtual Center and VMware ESX servers.

New in this release

For agent version 07.30.05 of the VMware VI agent, the following enhancements were made since agent version 7.30.04.

The following enhancements were made:

- Added support for Windows Server 2022 Operating System (Datacenter and Standard editions)
- Upgraded JRE version to 1.8.0_321
- Added support for ITM 6.3.0 FP 07 Service Pack 12
- You can request hostname of ESX server instead of its IP address in situations and event fields. To enable such a request, you must add the ESX server hostname to vCenter Server, and in the environment file, set the following variable value:

  KVM_ESX_HOSTNAME_IN_EVENTS = Y

- You can request events and messages in a specific locale from vCenter Server. To enable such a request, in the environment variable, set the following value:

  KVM_EVENTS_LOCALE = <supported_locale>

  Where, **<supported_locale>** is the language code.

Components of the IBM Tivoli Monitoring environment

After you install and set up the VMware VI agent, you have an environment that contains the client, server, and monitoring agent implementation for Tivoli Monitoring.

This Tivoli Monitoring environment contains the following components:

Tivoli Enterprise Portal client
The portal has a user interface based on Java™ for viewing and monitoring your enterprise.

Tivoli Enterprise Portal Server
The portal server is placed between the client and the Tivoli Enterprise Monitoring Server and enables retrieval, manipulation, and analysis of data from the monitoring agents. The Tivoli Enterprise Portal Server is the central repository for all user data.

Tivoli Enterprise Monitoring Server
The monitoring server acts as a collection and control point for alerts received from the monitoring agents, and collects their performance and availability data. The Tivoli Enterprise Monitoring Server is also a repository for historical data.

Tivoli Enterprise Monitoring Agent, VMware VI agent
This monitoring agent collects data and distributes the data to the Tivoli Enterprise Monitoring Server, Tivoli Enterprise Portal Server, Tivoli Enterprise Portal, Tivoli Data Warehouse, and Tivoli Integrated Portal.

This agent can run on a separate system from the system where the VMware Virtual Center is running.

Multiple copies of this agent can run on the same system.

IBM Tivoli Netcool/OMNIbus
Tivoli Netcool/OMNIbus is an optional component and the recommended event management component. The Netcool/OMNIbus software is a service level management (SLM) system that delivers real-time, centralized monitoring of complex networks and IT domain events. Event information is tracked in a high-performance, in-memory database and presented to specific users through individually configurable filters and views. The software includes automation functions that you can use to perform intelligent processing on managed events. You can use this software to forward events for Tivoli Monitoring situations to Tivoli Netcool/OMNIbus.

IBM Tivoli Enterprise Console
The Tivoli Enterprise Console® is an optional component that acts as a central collection point for events from various sources, including events from other Tivoli software applications, Tivoli partner

applications, custom applications, network management platforms, and relational database systems. You can view these events through the Tivoli Enterprise Portal (by using the event viewer), and you can forward events from Tivoli Monitoring situations to the Tivoli Enterprise Console component. If you do not already use Tivoli Enterprise Console and need an event management component, you can choose to use IBM Tivoli Netcool/OMNIbus.

IBM Tivoli Common Reporting
Tivoli Common Reporting is a separately installable feature available to users of Tivoli software that provides a consistent approach to generating and customizing reports. Some individual products provide reports that are designed for use with Tivoli Common Reporting and have a consistent look and feel. For IBM Tivoli Monitoring for Virtual Environments, you can use Tivoli Common Reporting as a separate installation or as part of the IBM Tivoli Monitoring for Virtual Environments Performance and Capacity Management Reports capability.

IBM Tivoli Monitoring for Virtual Environments Dashboard, reporting, and Capacity Planner capabilities
The dashboard capability provides a summary view of the health of the entire environment so you can quickly assess if a problem exists and take action to address the problem. Predefined performance and capacity management reports provide a complete assessment of the capacity (including forecast) of the virtual environment based on actual historical usage. With capacity planner analytics and reports you can create what-if planning scenarios that can be used to optimize and consolidate the virtual environment.

IBM Tivoli Application Dependency Discovery Manager (TADDM)
TADDM delivers automated discovery and configuration tracking capabilities to build application maps that provide real-time visibility into application complexity.

IBM Tivoli Business Service Manager
The Tivoli Business Service Manager component delivers real-time information to help you respond to alerts effectively based on business requirements. Optionally, you can use this component to meet service-level agreements (SLAs). Use the Tivoli Business Service Manager tools to help build a service model that you can integrate with Tivoli Netcool/OMNIbus alerts or optionally integrate with data from an SQL data source. Optional components provide access to data from other IBM Tivoli applications such as Tivoli Monitoring and TADDM.

IBM Dashboard Application Services Hub
The Dashboard Application Services Hub has a core set of components that provide such administrative essentials as network security and database management. This component replaces the Tivoli Integrated Portal component after version 2.2.

Tivoli Integrated Portal
Tivoli Integrated Portal helps the interaction and secure passing of data between Tivoli products through a common portal. Within the same dashboard view, you can launch from one application to another and research different aspects of your managed enterprise. This component is installed automatically with the first Tivoli product that uses the Tivoli Integrated Portal framework. Subsequent products can install updated versions of Tivoli Integrated Portal. After version 2.2, this component is replaced by the Dashboard Application Services Hub.

Agent Management Services

You can use IBM Tivoli Monitoring Agent Management Services to manage the VMware VI agent.

Agent Management Services is available for the following IBM Tivoli Monitoring OS agents: Windows, Linux®, and UNIX. The services are designed to keep the VMware VI agent available, and to provide information about the status of the product to the Tivoli Enterprise Portal. IBM Tivoli Monitoring V6.2.2, Fix Pack 2 or later provides support for Agent Management Services. For more information about Agent Management Services, see "Agent Management Services" in the *IBM Tivoli Monitoring Administrator's Guide*.

User interface options

Installation of the base IBM Tivoli Monitoring software and other integrated applications provides various interfaces that you can use to work with your resources and data.

The following interfaces are available:

Tivoli Enterprise Portal user interface
You can run the Tivoli Enterprise Portal as a desktop application or a browser application. The client interface is a graphical user interface (GUI) based on Java on a Windows or Linux workstation. The browser application is automatically installed with the Tivoli Enterprise Portal Server. The desktop application is installed by using the Tivoli Monitoring installation media or with a Java Web Start application. To start the Tivoli Enterprise Portal browser client in your Internet browser, enter the URL for a specific Tivoli Enterprise Portal browser client installed on your web server.

Command-line interface
You can use Tivoli Monitoring commands to manage the Tivoli Monitoring components and their configuration. You can also run commands at the Tivoli Enterprise Console event server or the Tivoli Netcool/OMNIbus ObjectServer to configure event synchronization for enterprise situations.

Manage Tivoli Enterprise Monitoring Services window
You can use the window for the Manage Tivoli Enterprise Monitoring Services utility to configure the agent and start Tivoli services not designated to start automatically.

IBM Tivoli Netcool/OMNIbus event list
You can use the Netcool/OMNIbus event list to monitor and manage events. An event is created when the Netcool/OMNIbus ObjectServer receives an event, alert, message, or data item. Each event is made up of columns (or fields) of information that are displayed in a row in the ObjectServer alerts.status table. The Tivoli Netcool/OMNIbus web GUI is also a web-based application that processes network events from one or more data sources and presents the event data in various graphical formats.

IBM Tivoli Enterprise Console
You can use the Tivoli Enterprise Console to help ensure the optimal availability of an IT service for an organization. The Tivoli Enterprise Console is an event management application that integrates system, network, database, and application management. If you do not already use Tivoli Enterprise Console and need an event management component, you can choose to use Tivoli Netcool/OMNIbus.

IBM Tivoli Common Reporting
Use the Tivoli Common Reporting web user interface for specifying report parameters and other report properties, generating formatted reports, scheduling reports, and viewing reports. This user interface is based on the Dashboard Application Services Hub for Tivoli Common Reporting 3.1 and on Tivoli Integrated Portal for earlier versions.Use the Tivoli Common Reporting web user interface when you installed Tivoli Common Reporting separately. In this interface, you specify report parameters and other report properties, generate formatted reports, schedule reports, and view reports. This user interface is based on the Dashboard Application Services Hub for Tivoli Common Reporting 3.1 and on Tivoli Integrated Portal for earlier versions.

IBM Tivoli Monitoring for Virtual Environments Dashboard, reporting, and Capacity Planner capabilities
This user interface is based on the Tivoli Integrated Portal. The Dashboard provides predefined contextual summary views of the health (availability, performance, and capacity) of the complete virtual environment. Performance and Capacity Management Reports provides predefined Cognos-based reports that contain historical data, and a data model with tools for creating ad hoc reports. Capacity Planner provides you with a tool to import data for analysis and observe trends and patterns that you use to generate recommendations and create reports in the dashboard.

IBM Tivoli Application Dependency Discovery Manager
The Discovery Management Console is the TADDM client user interface for managing discoveries.

IBM Tivoli Business Service Manager
The Tivoli Business Service Manager console provides a graphical user interface that you can use to logically link services and business requirements within the service model. The service model

provides an operator with a second-by-second view of how an enterprise is performing at any moment in time or how the enterprise performed over a time period.

IBM Dashboard Application Services Hub
The Dashboard Application Services Hub provides an administrative console for applications that use this framework. It is a web-based console that provides common task navigation for products, aggregation of data from multiple products into a single view, and the passing of messages between views from different products. This interface replaces the Tivoli Integrated Portal component after version 2.2.

Tivoli Integrated Portal
Web-based products that are built on the Tivoli Integrated Portal framework share a common user interface where you can launch applications and share information. After version 2.2, this interface is replaced by the Dashboard Application Services Hub.

Data sources

The VMware VI agent collects data from the following sources:

vSphere SDK
The agent uses application-specific API calls to gather metrics.

Scripts
The agent uses application-specific commands and interfaces to gather metrics.

SNMP
SNMP (Simple Network Management Protocol) is the network management protocol used almost exclusively in TCP/IP networks. By using SNMP, you can monitor and control network devices, and manage configurations, statistics collection, performance, and security. This agent supports SNMP V1, V2c, and V3.

SNMP Events
SNMP is the network management protocol used almost exclusively in TCP/IP networks. SNMP resources send asynchronous notifications in the form of traps or informs to a manager. This agent receives traps or informs and makes them available in IBM Tivoli Monitoring. This agent supports SNMP V1, V2c, and V3.

WMI
By using WMI (Windows Management Instrumentation), you can monitor and control managed resources throughout the network. Resources include hard drives, file systems, operating system settings, processes, services, shares, registry settings, networking components, event logs, users, and groups. WMI is built into clients with Windows 2000 or later, and can be installed on any 32-bit Windows client.

Perfmon
Use the Windows Performance Monitor, or Perfmon, to view various system and application performance metrics for collection and use by management applications. You typically view system metrics on a Windows system through the 'perfmon' application.

JMX
Use the Java Management Extensions (JMX) interface to gather various metrics from Java applications supporting the monitored resource.

JDBC
Use the Java Database Connectivity (JDBC) interface to gather information from database tables supporting the monitored resource.

Availability
Use the agent to monitor availability of the application and related components in the following ways:

SSH Scripts
The agent uses application-specific commands and interfaces to gather metrics remotely by using an SSH connection to the monitored resource.

Log files
The agent uses the file system to monitor application log files or other data files to gather metrics.

Windows Event Log
The agent collects Windows Event Log entries related to the monitored resource and forwards them to IBM Tivoli Monitoring.

HTTP
Use Hypertext Transfer Protocol (HTTP) to monitor the availability and basic content of URLs supporting the monitored application.

ICMP Ping
Use ICMP packets commonly known as "ping" to monitor systems that support the monitored resource.

CIM
Use Common Information Model (CIM) messages over HTTP to gather data related to the monitored resource.

Chapter 2. Installing and configuring the agent

Agent installation and configuration requires the use of the *IBM Tivoli Monitoring Installation and Setup Guide* and agent-specific installation and configuration information.

To install and configure the VMware VI agent, use the *Installing monitoring agents* procedures in the *IBM Tivoli Monitoring Installation and Setup Guide* along with the agent-specific installation and configuration information.

If you are installing silently by using a response file, see "Performing a silent installation of IBM Tivoli Monitoring" in the *IBM Tivoli Monitoring Installation and Setup Guide*.

Requirements

Before installing and configuring the agent, make sure your environment meets the requirements for the IBM Tivoli Monitoring for Virtual Environments Agent for VMware VI.

For the most up-to-date information about system requirements, see the Software product compatibility reports (http://publib.boulder.ibm.com/infocenter/prodguid/v1r0/clarity/index.html). Search for the Tivoli Monitoring for Virtual Environments product.

Installing language packs

The steps for installing language packs depend on which operating system and mode of installation you are using.

To install a language pack for the agent support files on the Tivoli Enterprise Monitoring Server, the Tivoli Enterprise Monitoring Agent, and the Tivoli Enterprise Portal Server, make sure that you installed the product in the English language. Then, use the steps for installing on Windows systems, installing on UNIX or Linux systems, or installing silently.

Installing language packs on Windows systems

You can install the language packs on a Windows system.

First, make sure that you installed the product in the English language.

1. On the language pack CD, double-click the `lpinstaller.bat` file to start the installation program.
2. Select the language of the installer and click **OK**.
3. In the Introduction panel, click **Next**
4. Click **Add/Update** and click **Next**.
5. Select the folder where the National Language Support package (NLSPackage) files are located. Typically, the NLSPackage files are located in the `nlspackage` folder where the installer executable file is located.
6. Select the language support for the agent of your choice and click **Next**. To make multiple selections, press Ctrl and select the language that you want.
7. Select the languages that you want to install and click **Next**.
8. Examine the installation summary page and click **Next** to begin installation.
9. After installation completes, click **Finish** to exit the installer.
10. Restart the Tivoli Enterprise Portal, Tivoli Enterprise Portal Server, and Eclipse Help Server if any of these components are installed.

Installing language packs on UNIX or Linux systems

You can install the language packs on a UNIX or Linux system.

First, make sure that you installed the product in the English language.

1. Enter the `mkdir` command to create a temporary directory on the computer, for example, `mkdir dir_name`. Make sure that the full path of the directory does not contain any spaces.
2. Mount the language pack CD to the temporary directory that you created.
3. Enter the following command to start the installation program:

   ```
   cd dir_name lpinstaller.sh -c install_dir
   ```

   Where: *install_dir* is where you installed IBM Tivoli Monitoring. Typically, the directory name is `/opt/IBM/ITM` for UNIX and Linux systems.
4. Select the language of the installer and click **OK**.
5. In the Introduction panel, click **Next**.
6. Click **Add/Update** and click **Next**.
7. Select the folder where the National Language Support package (NLSPackage) files are located. Typically, the NLSPackage files are located in the `nlspackage` folder where the installer executable file is located.
8. Select the language support for the agent of your choice and click **Next**. To make multiple selections, press Ctrl and select the language that you want.
9. Select the languages that you want to install and click **Next**.
10. Examine the installation summary page and click **Next** to begin installation.
11. After installation completes, click **Finish** to exit the installer.
12. Restart the Tivoli Enterprise Portal, Tivoli Enterprise Portal Server, and Eclipse Help Server if any of these components are installed.

Installing language packs on Windows, UNIX, or Linux systems silently

You can use the silent-mode installation method to install the language packs. In silent mode, the installation process obtains the installation settings from a predefined response file. It does not prompt you for any information.

First, make sure that you installed the product in the English language.

1. Copy and paste the `ITM_Agent_LP_silent.rsp` response file template as shown in .
2. Change the following parameter settings:

   NLS_PACKAGE_FOLDER
   Folder where the National Language Support package (NLSPackage) files are located. Typically, the NLSPackage files are located in the `nlspackage` folder, for example: NLS_PACKAGE_FOLDER = //tmp//LP//nlspackage.

   PROD_SELECTION_PKG
   Name of the language pack to install. Several product components can be included in one language package. You might want to install only some of the available components in a language pack.

   BASE_AGENT_FOUND_PKG_LIST
   Agent for which you are installing language support. This value is usually the same as *PROD_SELECTION_PKG*.

   LANG_SELECTION_LIST
   Language you want to install.
3. Enter the command to install the language pack with a response file (silent installation):
   - For Windows systems:

     ```
     lpinstaller.bat -f path_to_response_file
     ```

   - For UNIX or Linux systems:

     ```
     lpinstaller.sh -c candle_home -f path_to_response_file
     ```

where *candle_home* is the IBM Tivoli Monitoring base directory.

Response file example

```
#     IBM Tivoli Monitoring Agent Language Pack Silent Installation Operation
#
#This is a sample response file for silent installation mode for the IBM Tivoli
#Monitoring Common Language Pack Installer.
#.
#This file uses the IBM Tivoli Monitoring Common Agent Language Pack with the
#install package as an example.
#Note:
#This response file is for the INSTALLATION of language packs only.
#This file does not support UNINSTALLATION of language packs in silent mode.
#---------------------------------------------------------------------------------
#---------------------------------------------------------------------------------
#To successfully complete a silent installation of the the example of Common Agent
#localization pack, complete the following steps:
#
#1.Copy ITM_Agent_LP_silent.rsp to the directory where lpinstaller.bat or
#lpinstaller.sh is located (IBM Tivoli Monitoring Agent Language Pack build
#location).
#
#2.Modify the response file so that it is customized correctly and completely for
#your site.
#  Complete all of the following steps in the response file.
#
#3.After customizing the response file, invoke the silent installation using the
#following command:
#For Windows:
#    lpinstaller.bat -f <path_to_response_file>
#For UNIX and Linux:
#    lpinstaller.sh -c <candle_home> -f <path_to_response_file>
#Note:<candle_home> is the IBM Tivoli Monitoring base directory.
#---------------------------------------------------------------------------------
#---------------------------------------------------------------------------------
#Force silent install mode.
#---------------------------------------------------------------------------------
INSTALLER_UI=silent
#---------------------------------------------------------------------------------
#Run add and update actions.
#---------------------------------------------------------------------------------
CHOSEN_INSTALL_SET=ADDUPD_SET
#---------------------------------------------------------------------------------
#NLS Package Folder, where the NLS Packages exist.
#For Windows:
#   Use the backslash-backslash(\\) as a file separator (for example,
#C:\\zosgmv\\LCD7-3583-01\\nlspackage).
#For UNIX and Linux:
#   Use the slash-slash (//) as a file separator (for example,
#//installtivoli//lpsilenttest//nlspackage).
#---------------------------------------------------------------------------------
#NLS_PACKAGE_FOLDER=C:\\zosgmv\\LCD7-3583-01\\nlspackage
NLS_PACKAGE_FOLDER=//tmp//LP//nlspackage
#---------------------------------------------------------------------------------
#List the packages to process; both variables are required.
#Each variable requires that full paths are specified.
#Separate multiple entries with a semicolon (;).
#For Windows:
#         Use the backslash-backslash(\\) as a file separator.
#For Unix and Linux:
#         Use the slash-slash (//) as a file separator.
#---------------------------------------------------------------------------------
#PROD_SELECTION_PKG=C:\\zosgmv\\LCD7-3583-01\\nlspackage\\KIP_NLS.nlspkg
#BASE_AGENT_FOUND_PKG_LIST=C:\\zosgmv\\LCD7-3583-01\\nlspackage\\KIP_NLS.nlspkg
PROD_SELECTION_PKG=//tmp//LP//nlspackage//kex_nls.nlspkg;//tmp//LP//nlspackage//
koq_nls.nlspkg
BASE_AGENT_FOUND_PKG_LIST=//tmp//LP//nlspackage//kex_nls.nlspkg;//
tmp//LP//nlspackage//koq_nls.nlspkg
#---------------------------------------------------------------------------------
#List the languages to process.
#Separate multiple entries with semicolons.
#---------------------------------------------------------------------------------
LANG_SELECTION_LIST=pt_BR;fr;de;it;ja;ko;zh_CN;es;zh_TW
```

Prerequisites checking

The Prerequisite Scanner utility verifies whether all prerequisites that are required for the agent installation are met. The Prerequisite Scanner creates a log file that contains a report of all prerequisites checks when the Prerequisite Scanner was run.

For the VMware VI agent, the Prerequisite Scanner verifies the following requirements:

- Memory
- Disk
- Operating systems
- VMware Virtual Center versions

Additionally, the Prerequisite Scanner verifies whether the user, who installs the agent, is a member of the Administrators group.

For detailed, up-to-date information about installation prerequisites, see the Software product compatibility reports (http://publib.boulder.ibm.com/infocenter/prodguid/v1r0/clarity/index.html).

You can run the Prerequisite Scanner in stand-alone mode or remotely. For more information about the Prerequisite Scanner, see "Prerequisite Checking for IBM Tivoli Monitoring agents" in the *IBM Tivoli Monitoring Installation and Setup Guide*.

Installing and configuring: agent-specific

In addition to the installation and configuration information in the *IBM Tivoli Monitoring Installation and Setup Guide*, use this agent-specific installation and configuration information to install the VMware VI agent.

Before you begin installation and configuration

Complete the following tasks before you begin any installation or configuration steps:

1. Review the hardware and software prerequisites.
2. Review the installation and configuration information in *Monitoring Agent for VMWare VI Troubleshooting Guide*.
3. Create a user ID in your VMware Virtual Infrastructure.

   This user ID is used by the VMware VI agent to communicate with the VMware Virtual Center. The monitoring agent requires a user ID with System.View and System.Read privileges on all data source objects that are being monitored. To enable the PowerOnVM and PowerOffVM Take Action commands in the monitoring agent, the user ID must also have the following privileges:

   - Virtual Machine-Interaction-Power On
   - Virtual Machine-Interaction-Power Off

   For more information about how to create the user ID in your VMware Virtual Infrastructure, see the VMware documentation for details on managing users, groups, permissions, and roles.
4. If the VMware VI agent is configured to communicate with its VMware VI data sources using the SSL agent, it might be necessary to add the SSL certificate of the data source to the certificate truststore of the agent. For complete details, see"Enabling SSL communication with VMware VI data sources" on page 12.
5. The IBM Systems Director Server requires user ID and password authentication. By default, the Tivoli Enterprise Portal user ID and password is in the encoded URL properties, eliminating the need for you to enter a user ID and password manually. However, you can also manually configure by entering a user ID and password. In this case, the session stays authenticated until the Tivoli Enterprise Portal is closed, or the IBM Systems Director session times out because of inactivity, allowing you to complete subsequent launches without re-entering the user ID and password. In either case, the user ID and

password information is protected using the HTTPS protocol between the Tivoli Enterprise Portal and the IBM Systems Director Server.

6. If you plan to use optional integration with the IBM Tivoli Monitoring for Virtual Servers Agent for NetApp Storage, determine the MSN for the agent using the following information:

   - The MSN is in the following form: *instance name*:*system name*:NU.
   - The instance name is the instance name that was chosen for the NetApp Storage agent when it was configured.
   - The system name is the name of the computer where the agent is running.
   - The instance name and system name are followed by a colon.
   - A single instance of the Netapp Storage agent is supported at this time.
   - The correct managed system name is listed in the Tivoli Enterprise Portal Server client.
   - Select the **Enterprise** navigation item. Then, right-click, select the workspace, and select **Managed System Status**. The resulting workspace lists all the managed systems. The Netapp Storage agent managed system name ends with the letters NU.

Keep the number of instances of the VMware VI agent that you configure for the same data source to a minimum, preferably one. Additional instances of this monitoring agent increase the load on the VMware server, and provide redundant information.

Selecting an installation location

The VMware VI agent can be installed on the same system as the vCenter, as long as it has sufficient capacity to do so. The VMware VI agent cannot be installed on v Center Server Appliance.

Some advantages are as follows:

- No additional servers or administrative costs are required to manage your VMware environment.
- If network connectivity to the vCenter is lost, monitoring continues to run.
- Thresholds continue to be evaluated, automated corrective actions continue to run, and historical performance data continue to be gathered.
- Network traffic is reduced because of the monitoring of VMware.

If you plan to install the monitoring agent and the vCenter on the same system, ensure that there is sufficient capacity for both, including primary metrics of CPU, memory, disk space, disk I/O, and network bandwidth. The operating system level and patches for the system must meet the requirements of both the VMware VI agent and vCenter.

If you deploy an operating system cluster for the vCenter to achieve High Availability, then the monitoring agent can use clustering to achieve High Availability as well.

Note: Deploy the VMware VI agent on the same system as the vCenter if you have the available capacity.

If you do not have the required capacity on a vCenter system, be sure to select an appropriate server. To avoid installing and managing additional servers, find an existing server that has the capacity for the VMware VI agent.

If you have multiple vCenters, assign monitoring agents that monitor vCenters to a single server dedicated to monitoring VMware. Because monitoring is done remotely, choose a server close in proximity to your vCenter system to ensure higher availability for your data collection.

Local installation

After the VMware VI agent is installed, if the monitoring agent is to communicate with the VMware VI component using SSL, determine whether you must add Signer Certificates to the VMware VI agent certificate database.

For complete details, see"Enabling SSL communication with VMware VI data sources" on page 12.

VMware VI application support

All agents require that you install application support files that contain agent-specific information about the monitoring server, portal server, and portal desktop client.

See the *IBM Tivoli Monitoring Installation and Setup Guide*.

Enabling SSL communication with VMware VI data sources

The VMware VI agent can be configured to securely communicate with its VMware data sources using SSL. In this configuration, you must add a data source SSL certificate to the certificate truststore of the agent.

Important: The following information applies only if the agent is configured to validate SSL certificates.

If SSL certificate validation is turned off, the VMware VI agent connects to VMware data sources even if their SSL certificates are expired, untrusted, or invalid. However, turning off SSL certificate validation is potentially not secure and must be done with care.

If a VMware data source uses an SSL certificate that is signed by a common Certificate Authority (for example, Verisign, Entrust, or Thawte), then it is not necessary to add certificates to the VMware VI agent certificate truststore. However, if the data source uses a certificate that is not signed by a common Certificate Authority, as is the case by default, the certificate must be added to the truststore to allow the agent to successfully connect and collect data.

To add a certificate, use the following procedure:

Note:

1. The default VMware certificate file is named `rui.crt`. To retrieve SSL certificates refer the links given as follows:

   - Appliance based vCenter:Obtaining Server certificates
   - Non-appliance based vCenter: Obtaining Server certificates

Steps

1. Copy the certificate file from your data source to the agent computer.

2. Place the certificate file in a directory of your choosing on the agent computer. Do not overlay certificate files. Use unique file names for each certificate. Use a unique label for each certificate that you add.

3. Use the `keytool` command to add the data source certificate to the certificate truststore of the agent:

   ```
   keytool -import -noprompt -trustcacerts -alias CertificateAlias -file
   CertificateFile -keystore Truststore -storepass TruststorePassword
   ```

   where:

   CertificateAlias

   > A unique reference for each certificate added to the certificate truststore of the agent, for example, an appropriate alias for the certificate from *datasource.example.com* is *datasource*.

   CertificateFile
   > The complete path and file name to the VMware data source certificate being added to the truststore.

   Truststore

   > Complete path and file name to the VMware VI agent certificate database. Use the following path and file name:

   - Windows (32-bit): *install_dir*\tmaitm6\kvm.truststore
   - Windows (64-bit): *install_dir*\tmaitm6_x64\kvm.truststore
   - Linux (32-bit): *install_dir*/li6263/vm/etc/kvm.truststore

- Linux (64-bit): *install_dir*/lx8266/vm/etc/kvm.truststore

TruststorePassword

ITMVMWAREVI is the default password for the VMware VI agent truststore. To change this password, consult the Java Runtime documentation for information about the tools to use.

Important: To use the `keytool` command, the Java Runtime bin directory must be in your path. Use the following commands:

- Windows (32-bit): `set PATH=%PATH%;`*install_dir*`\CNPSJ\java\bin`
- Windows (64-bit): `set PATH=%PATH%;`*install_dir*`\CNPSJ\java\bin`
- Linux (32-bit): `PATH="$PATH":`*install_dir*`/JRE/li6263/bin`
- Linux (64-bit): `PATH="$PATH":`*install_dir*`/JRE/lx8266/bin`

4. After all data source certificates have been added, you can start the monitoring agent.

Local configuration

Use the procedure in the IBM Tivoli Monitoring Installation and Setup Guide to configure the agent on a Windows or Linux system.

The configuration attributes define which VMware VI data sources are monitored. The attributes define a connection to either a VMware Virtual Center 4.0+ or directly to an individual VMware ESX Server 3.5+. Multiple data sources can be defined for each VMware VI agent instance. More than one instance of the monitoring agent can be configured on a remote monitoring host system. One instance can monitor all VMware Virtual Infrastructure, or separate instances can be defined to monitor specific groups of VMware Virtual Infrastructure.

Monitor the VMware Virtual Center that manages the VMware Virtual Infrastructure instead of managing individual ESX Servers.

Configuration values

For both local and remote configuration, you provide the configuration values for the agent to operate.

When you are configuring an agent, a panel is displayed so you can enter each value. When a default value exists, this value is pre-entered into the field. If a field represents a password, two entry fields are displayed. You must enter the same value in each field. The values that you type are not displayed to help maintain the security of these values.

The configuration for this agent is organized into the following groups:

Data Provider (DATA_PROVIDER)

The configuration elements defined in this group are always present in the agent's configuration.

This group defines information that applies to the entire agent.

Java Keystore Password (KEY_STORE_PASSWORD)
Java Keystore Password

The type is password.

This value is optional.

Default value: None

Maximum Number of Data Provider Log Files (KVM_LOG_FILE_MAX_COUNT)
The maximum number of data provider log files that are created.

The type is numeric.

This value is required.

Default value: 10

Maximum Size in KB of Each Data Provider Log (KVM_LOG_FILE_MAX_SIZE)

The maximum size in KB that a data provider log file may reach before a new log file is created.

The type is numeric.

This value is required.

Default value: 5190

Level of Detail in Data Provider Log (KVM_LOG_LEVEL)

The maximum size in KB that a data provider log file may reach before a new log file is created.

The type is one of the following values: "Off", "Severe", "Warning", "Info", "Fine", "Finer", "Finest", "All".

This value is required.

Default value: INFO

Validate SSL Certificates. (KVM_SSL_VALIDATE_CERTIFICATES)

The type is one of the following values: "Yes (Recommended)", "No (Potentially Insecure)".

This value is required.

Default value: Yes

IBM Systems Director (DIRECTOR)

The configuration elements defined in this group are always present in the agent's configuration.

This group defines information that applies to the entire agent.

Use Tivoli Enterprise Portal credentials to authenticate to IBM Systems Director Server (KVM_DIRECTOR_AUTHENTICATION)

The type is one of the following values: "Yes", "No".

This value is optional.

Default value: Yes

IBM Systems Director Server Address (KVM_DIRECTOR_HOST_ADDRESS)

The hostname or IP address of an IBM Systems Director Server managing the VMware environment to which the agent can launch.

The type is string.

This value is optional.

Default value: None

IBM Systems Director Server Port Number (KVM_DIRECTOR_PORT_NUMBER)

The port number to use to connect to an IBM Systems Director Server managing the VMware environment to which the agent can launch.

The type is string.

This value is optional.

Default value: 8422

Storage Agent (STORAGE_AGENT)

The configuration elements defined in this group are always present in the agent's configuration.

This group defines information that applies to the entire agent.

ITM MSN of Storage Agent (KVM_STORAGE_AGENT_MSN)

The IBM Tivoli Monitoring managed system name of the IBM Tivoli Monitoring storage agent.

The type is string.

This value is optional.

Default value: None

Data Source (DATASOURCE)

The configuration elements defined in this group are always present in the agent's configuration.

Use the information in this group to create additional subnodes.

Data Source ID (Data Source ID)
Unique identifier for this data source.

The type is string.

This value is required.

Default value: None

Data Source Address (HOST_ADDRESS)
The hostname or IP address of the VMware Virtual Center or ESX server being monitored.

The type is string.

This value is required.

Default value: None

Data Source Password (PASSWORD)
The password for the user ID.

The type is password.

This value is required.

Default value: None

Data Source User ID (USERNAME)
A user ID known to the data source that has sufficient privileges to collect monitoring data.

The type is string.

This value is required.

Default value: None

Use SSL Connection to Data Source (USES_SSL)

The type is one of the following values: "Yes", "No".

This value is required.

Default value: Yes

Remote installation and configuration

You can install the monitoring agent remotely from the Tivoli Enterprise Portal or from the command line.

When you install the agent remotely, you must provide the configuration values for the agent to operate. See .

To install from the portal, see the *IBM Tivoli Monitoring Installation and Setup Guide*.

To remotely install or configure an agent through the Tivoli Enterprise Portal, application support for that agent must be installed (Tivoli Enterprise Monitoring Server, Tivoli Enterprise Portal Server, and Tivoli Enterprise Portal). Also, the agent bundle must be installed in the Remote Deploy Depot.

For information about displaying the configuration options that are available to use with the **configureSystem** command, see "tacmd describeSystemType" in the *IBM Tivoli Monitoring Command Reference*.

If you are using the command line, the following commands are examples of remote installation and configuration for Windows operating systems:

Remote installation

```
tacmd addSystem -t VM -n Primary:sample.node.name:NT
-p  DATASOURCE.HOST_ADDRESS=value
 DATASOURCE.PASSWORD=value
 DATASOURCE.USERNAME=value
 DATASOURCE.USES_SSL=value
 DATA_PROVIDER.KEY_STORE_PASSWORD=value
 DATA_PROVIDER.KVM_LOG_FILE_MAX_COUNT=value
 DATA_PROVIDER.KVM_LOG_FILE_MAX_SIZE=value
 DATA_PROVIDER.KVM_LOG_LEVEL=value
 DATA_PROVIDER.KVM_SSL_VALIDATE_CERTIFICATES=value
 DIRECTOR.KVM_DIRECTOR_AUTHENTICATION=value
 DIRECTOR.KVM_DIRECTOR_HOST_ADDRESS=value
 DIRECTOR.KVM_DIRECTOR_PORT_NUMBER=value
 STORAGE_AGENT.KVM_STORAGE_AGENT_MSN=value
 Virtual Center or ESX Server.Data Source ID=None
INSTANCE="inst1"
```

Remote configuration

The following example illustrates configuration by using all configuration variables. Typically, you specify only the variables and values that you want to change.

```
tacmd configureSystem -m instance.name:hostname:VM
-p  DATASOURCE.HOST_ADDRESS=value
 DATASOURCE.PASSWORD=value
 DATASOURCE.USERNAME=value
 DATASOURCE.USES_SSL=value
 DATA_PROVIDER.KEY_STORE_PASSWORD=value
 DATA_PROVIDER.KVM_LOG_FILE_MAX_COUNT=value
 DATA_PROVIDER.KVM_LOG_FILE_MAX_SIZE=value
 DATA_PROVIDER.KVM_LOG_LEVEL=value
 DATA_PROVIDER.KVM_SSL_VALIDATE_CERTIFICATES=value
 DIRECTOR.KVM_DIRECTOR_AUTHENTICATION=value
 DIRECTOR.KVM_DIRECTOR_HOST_ADDRESS=value
 DIRECTOR.KVM_DIRECTOR_PORT_NUMBER=value
 STORAGE_AGENT.KVM_STORAGE_AGENT_MSN=value
 Virtual Center or ESX Server.Data Source ID=None
INSTANCE="inst1"
```

Deploying through the portal

See the IBM Tivoli Monitoring Installation and Setup Guide for detailed information about deploying non-operating system agents.

Deploying through the command line

See the IBM Tivoli Monitoring Installation and Setup Guide for detailed information about deploying non-operating system agents.

To deploy the VMware VI agent from the command line, use the **tacmd addSystem** command. See the *IBM Tivoli Monitoring Command Reference* for the full syntax of this command.

The VMware VI agent requires the following command:

```
tacmd addsystem -t vm -n OS_Agent_ManagedSystemName \
    -p INSTANCE=InstanceName \
    DATA_PROVIDER.KVM_SSL_VALIDATE_CERTIFICATES=ValidatesSSLCertificates\
    DATA_PROVIDER.KVM_LOG_FILE_MAX_COUNT=MaxLogFileCount \
    DATA_PROVIDER.KVM_LOG_FILE_MAX_SIZE=MaxLogFileSize \
    DATA_PROVIDER.KVM_LOG_LEVEL=LogLevel\
    DIRECTOR.KVM_DIRECTOR_AUTHENTICATION=DirectorAuthentication \
    DIRECTOR.KVM_DIRECTOR_HOST_ADDRESS=DirectorHostAddress \
    DIRECTOR.KVM_DIRECTOR_PORT_NUMBER=DirectorPortNumber \
    STORAGE_AGENT.KVM_STORAGE_AGENT_MSN=StorageAgentMSN \
    DATASOURCE:UniqueDataSourceID.HOST_ADDRESS=DataSourceHostAddress \
    DATASOURCE:UniqueDataSourceID.USERNAME=DataSourceUserID \
    DATASOURCE:UniqueDataSourceID.PASSWORD=DataSourcePassword \
    DATASOURCE:UniqueDataSourceID.USES_SSL=DataSourceUsesSSL
```

For additional data sources, repeat the DATASOURCE Section Parameters with a new *UniqueDataSourceID*.

In this command, the fields are defined as follows. For more information, refer to "Configuration values" on page 13.

OS_Agent_ManagedSystemName
The managed system name of the operating system agent that is running on the system where the VMware agent is to be remotely deployed.

InstanceName
The name of the instance

ValidateSSLCertificates
Whether the agent validates SSL certificates when using SSL to communicate over the network. Valid values are Yes and No.

MaxLogFileCount
The maximum number of data provider log files. Valid values are positive integers.

MaxLogFileSize
The maximum size in KB of each data provider log. Valid values are positive integers.

LogLevel
The level of detail in data provider logs. Valid values are OFF, SEVERE, WARNING, INFO, FINE, FINER, FINEST, and ALL.

DirectorAuthentication
Whether to authenticate to the IBM Systems Director Server using the IBM Tivoli Monitoring Tivoli Enterprise Portal user ID and password. This configuration parameter is optional. Valid values are Yes and No.

DirectorHostAddress
The IBM Systems Director host name. This value is optional.

DirectorPortNumber
The IBM Systems Director port number. Valid values are valid TCP port numbers. This value is optional.

StorageAgentMSN
The managed system name (MSN) of the IBM Tivoli Monitoring storage agent that monitors the physical storage devices for the VMware environment. This managed system name must belong to a NetApp Storage agent instance.

UniqueDataSourceID
The data source ID

DataSourceHostAddress
The data source host name

DataSourceUserName
The data source user ID

DataSourcePassword
The data source password

DataSourceUsesSSL
Whether to use SSL to connect to the data source. Valid values are Yes and No.

To configure several data sources, repeat the DATASOURCE section parameters with a new *UniqueDataSourceID*.

Increasing the Java heap size

After you configure the VMware VI agent, if you are monitoring a large VMware environment, then you might need to increase the heap size for the Java™ data provider.

The default heap size for the Java data provider is 256 megabytes. In large VMware environments, if the following problems arise, then you might need to increase the heap size:

- The Java data provider stops because of a `javacore` problem, and creates a file that is named `javacore.date.time.number.txt` in the CANDLEHOME\tmaitm6_x64 directory.
- The `javacore.date.time.number.txt` file contains the string `java/lang/OutOfMemoryError`.

Use the following heap size values according to the number of ESX servers that you want to monitor:

Table 1. VMware environment and Java heap size	
VMware environment	**Java heap size**
Small environment: A vCenter server that manages up to 125 ESX(i) servers and 300 to 1500 guests.	2 GB **Note:** For a very small environment with a vCenter that manages 15 to 20 ESX(i) servers, use the default java heap size that is provided by the data provider.
Medium environment: A vCenter server that manages between 125 to 250 ESX(i) servers and 1500 to 4000 guests.	4 GB
Large environment: A vCenter server that manages between 250 to 500 ESX(i) servers and 4000 to 7500 guests.	8 GB
Very large environment: A vCenter server that manages more than 500 ESX(i) servers and more than 7500 guests.	16 GB

To increase the heap size for the Java data provider, complete the following steps:

- Stop the agent instance.
- On a Windows system:

    1. Open the file %CANDLE_HOME%\<architecture>\KVMENV_INSTANCE_NAME

        – For 32-bit Agent system `<architecture>` is TMAITM6
        – For 62-bit Agent system `<architecture>` is TMAITM6_x64

    2. Search for ENVIRONMENT VARIABLES SPECIFIC TO THE AGENT section and add following variable:

        ```
        SET KVM_CUSTOM_JVM_ARGS=-Xmx512m
        ```

        Note: The value 512m in `-Xmx512m` specifies that the current heap size is 512MB. You can change the increase size as per requirement.

    3. Restart the agent.

- On a Linux system:

    1. Open the file $CANDLEHOME/platform/vm/bin/vm_INSTANCE_NAME.config

        – For 32-bit Agent system `platform` is `li6263`
        – For 62-bit Agent system `platform` is `lx8266`

    2. Search for ENVIRONMENT VARIABLES SPECIFIC TO THE AGENT section and add following variable:

        ```
        KVM_CUSTOM_JVM_ARGS=-Xmx512m
        ```

        Note: The value 512m in `-Xmx512m` specifies that the current heap size is 512MB. You can change the increase size as per requirement.

    3. Restart the agent.

Configuring environment variables

Refer this topic to configure environment variables.

1. Stop all the agent instances
2. Follow the procedure given in this step for Windows and Unix platforms
   a) On Windows platforms, locate the agent instance file KVMENV_<instance_name> in the given paths:
      - 32-bit agent system: %CANDLEHOME%\TMAITM6
      - 64-bit agent system: %CANDLEHOME%\TMAITM6_x64
   b) On Unix platforms, locate the agent instance file vm.ini in the given paths:
      - 32-bit Agent system: $CANDLEHOME/config
      - 64-bit Agent system: $CANDLEHOME/config
3. Set the required environment variable with desired value in the agent instance file located in Step 2

   For example, *KVM_RETRIEVE_HOSTNAME_FROM_API=Y*
4. Start the agent instances

Upgrade notes

See the IBM Tivoli Monitoring Installation and Setup Guide for more information about upgrading.

After version 6.1, the VMware VI agents changed the format in which VMware data source certificates are stored, because of changes in the underlying SSL implementation. Because of these changes, after upgrading you must add data source certificates to the certificate truststore of the agent, even if those certificates were in the certificate database of the previous agent. See "Enabling SSL communication with VMware VI data sources" on page 12.

Appendix A. Discovery Library Adapter for the VMware monitoring agent

The Discovery Library Adapter discovers VMware components.

The Tivoli Management Services Discovery Library Adapter discovers resources and relationships, and creates a Discovery Library Book file. The Book file follows the Discovery Library IdML schema and is used to populate the Configuration Management Database (CMDB) and Tivoli Business Service Management products. The Tivoli Management Services Discovery Library Adapter discovers VMware resources. For all VMware systems that are active and online at the Tivoli Enterprise Portal Server, information is included in the discovery book for those resources. The Tivoli Management Services Discovery Library Adapter discovers active resources. It is run on demand and can be run periodically to discover resources that were not active during previous discoveries.

More information about Discovery Library Adapters

The following sources contain additional information about using the Discovery Library Adapter program with all monitoring agents:

- The *IBM Tivoli Monitoring Administrator's Guide* contains information about using the Tivoli Management Services Discovery Library Adapter.
- For information about using a Discovery Library Adapter with Tivoli Application Dependency Discovery Manager (TADDM), see the information center(http://publib.boulder.ibm.com/infocenter/tivihelp/v10r1/topic/com.ibm.taddm.doc_7.2/welcome_page/welcome.html).

VMware Discovery Library Adapter data model class types represented in CDM

This section contains information about how the various source application data objects map to classes in the Common Data Model (CDM) for the VMware agent.

The following information is provided for each class:

CDM class name
Class name for which the agent is providing information

Relationships
CDM relationships (hierarchical) between currently identified model objects

CDM attributes, agent attributes, descriptions, and examples
CDM and agent attributes that are required to create an instance of a resource, descriptions of the attributes, and examples of the attributes

VMware Discovery Library Adapter data model classes

This section describes the Discovery Library Adapter data model classes.

Virtual Center class

A Virtual Center manages multiple data centers and clusters.

CDM class name
sys.VMware.VirtualCenter

Relationships

contains

- Source: kvm-*KVMVCENTER.IP_ADDRESS*-VirtualCenter

- Target: kvm-*KVMVCENTER.IP_ADDRESS-KVMCLUSTRT.DATACENTER*-DataCenter
- Example: `contains source="kvm-9.42.17.191-VirtualCenter" target="kvm-9.42.17.191-Bld-510-DataCenter"`

accessedVia

- Source: kvm-*KVMVCENTER.IP_ADDRESS*-VirtualCenter
- Target: kvm-*KVMVCENTER.IP_ADDRESS*-PrimarySAP
- Example: `accessedVia source="kvm-9.42.17.191-VirtualCenter" target="kvm-9.42.17.191-PrimarySAP"`

CDM attributes, agent attributes, descriptions, and examples

- CDM attribute: KeyName

  Agent attribute: Not applicable (hardcoded value)
  Description: Always `Virtual Center`, with no quotation marks
  Example: `Virtual Center`

- CDM attribute: WebServiceHttpPort

  Agent attribute: Not applicable (hardcoded value)
  Description: Port for Web service on HTTP
  Example: 80

- CDM attribute: ManagedSystemName

  Agent attribute: INODESTS.NODE
  Description: Name of the IBM Tivoli Monitoring component that provides data for the management of the VMware VI agent instance
  Example: `kb2kas:ANDREA:VM`

- CDM attribute: Label

  Agent attribute: KVMVCENTER.FQDN:80
  Description: String that represents the name of this Virtual Center.
  Example: `kb2kas.tivlab.raleigh.ibm.com:80`

Primary SAP class

The Primary SAP class represents an IP address and port combination.

CDM class name
  `net.BindAddress`

Relationships

bindsTo

- Source: kvm-*KVMVCENTER.IP_ADDRESS*-PrimarySAP
- Target: kvm-*KVMVCENTER.IP_ADDRESS*-IpV4Address
- Example: `bindsTo source="kvm-9.42.17.191-PrimarySAP" target="kvm-9.42.17.191-IpV4Address"`

bindsAsPrimary

- Source: kvm-*KVMVCENTER.IP_ADDRESS*-PrimarySAP
- Target: kvm-*KVMVCENTER.IP_ADDRESS*-IpV4Address
- Example: `bindsAsPrimary source="kvm-9.42.17.191-PrimarySAP" target="kvm-9.42.17.191-IpV4Address"`

CDM attributes, agent attributes, descriptions, and examples

- CDM attribute: PortNumber

  Agent attribute: Not applicable (hardcoded value)

Description: Web service http port number
Example: 80

- CDM attribute: Path

    Agent attribute: Not applicable (hardcoded value)
    Description: Path set to (none)
    Example: (none)

IpV4Adress class

The IpV4Address class represents the Virtual Center IP V4 address.

CDM class name
    net.IpV4Address

Relationships
    This class has no relationships.

CDM attributes, agent attributes, descriptions, and examples

- CDM attribute: StringNotation

    Agent attribute: KVMVCENTER.IP_ADDRESS
    Description: IP address in string form
    Example: 9.42.17.191

- CDM attribute: DotNotation

    Agent attribute: KVMVCENTER.IP_ADDRESS
    Description: IPv4 address in string form
    Example: 9.42.17.191

Fqdn class

The Fqdn class represents the fully qualified domain name (FQDN) attribute of an IpAddress.

CDM class name
    net.Fqdn

Relationships

    assignedTo

- Source: kvm-*KVMVCENTER.IP_ADDRESS*-Fqdn

- Target: kvm-*KVMVCENTER.IP_ADDRESS*-IpV4Address

- Example: assignedTo source="kvm-9.42.17.191-Fqdn"
  target="kvm-9.42.17.191-IpV4Address"

CDM attributes, agent attributes, descriptions, and examples

- CDM attribute: Fqdn

    Agent attribute: KVMVCENTER.FQDN
    Description: Virtual Center fully qualified domain name (FQDN)
    Example: kb2kas.tivlab.raleigh.ibm.com

Data Center class

The Data Center class represents a grouping of individual ESX hosts or clusters.

CDM class name
    sys.VMware.DataCenter

Relationships

    contains

- Source: kvm-*KVMVCENTER.IP_ADDRESS-KVMCLUSTRT.DATACENTER*-DataCenter

- Target: kvm-*KVMVCENTER.IP_ADDRESS-KVMCLUSTRT.DATACENTER-KVMCLUSTRT.CN*-Cluster
- Example: `contains source="kvm-9.42.17.191-Bld-510-DataCenter" target="kvm-9.42.17.191-Bld-510-Cluster E-Cluster"`

federates

- Source: kvm-*KVMVCENTER.IP_ADDRESS-KVMCLUSTRT.DATACENTER*-DataCenter
- Target: kvm-*KVMDAG.SN_RES*-ESXServer
- Example: `federates source="kvm-9.42.17.191-Bld-510-DataCenter" target="kvm-itm64vm6.tivlab.raleigh.ibm.com-ESXServer"`

contains

- Source: kvm-*KVMVCENTER.IP_ADDRESS-KVMCLUSTRT.DATACENTER*-DataCenter
- Target: kvm-*KVMVCENTER.IP_ADDRESS-KVMCLUSTRT.DATACENTER-KVMDSTORES.NAME*-DataStore
- Example: `contains source="kvm-9.42.17.191-Bld-510-DataCenter" target="kvm-9.42.17.191-Bld-510-itm64vm6:storage1-DataStore"`

CDM attributes, agent attributes, descriptions, and examples

- CDM attribute: Name

  Agent attribute: KVMVCLUSTRT.DM
  Description: Unique managed object ID that represents this entity
  Example: `datacenter-2`
- CDM attribute: Label

  Agent attribute: KVMVCLUSTRT.DATACENTER
  Description: User-specified string that represents the name of this entity, unique relative to its parent (Virtual Center)
  Example: `dBld-510`

Cluster class

A Cluster is a group of ESX hosts that hierarchically share CPU and memory resources among their virtual machines.

CDM class name
sys.VMware.VMWareCluster

Relationships

federates

- Source: kvm-*KVMVCENTER.IP_ADDRESS-KVMCLUSTRT.DATACENTER-KVMCLUSTRT.CN*-Cluster
- Target: kvm-*KVMDAG.SN_RES*-ESXServer
- Example: `federates source="kvm-9.42.17.191-Bld-510-Cluster A-Cluster" target="kvm-itm64vm2.tivlab.raleigh.ibm.com-ESXServer"`

CDM attributes, agent attributes, descriptions, and examples

- CDM attribute: Name

  Agent attribute: KVMVCLUSTRT.DM
  Description: Unique managed object ID that represents this entity
  Example: `domain-c455`
- CDM attribute: Label

  Agent attribute: KVMVCLUSTRT.CN

Description: User-specified string that represents the name of this entity, unique relative to its parent (Data Center)

Example: `Cluster A`

Data store class

A Data Store can be viewed as a storage appliance that serves up storage space for many virtual machines across multiple physical hosts.

CDM class name

sys.VMware.VMWareDataStore

Relationships

basedOn

- Source: kvm-*KVMDAG.SN_RES-KVMSERVRDS.NAME*-DataStore
- Target: kvm-*KVMVCENTER.IP_ADDRESS-KVMCLUSTRT.DATACENTER-KVMDSTORES.NAME*-DataStore
- Example: `basedOn source="kvm-itm64vm4.tivlab.raleigh.ibm.com-iSCSI Disk 1-DataStore" target="kvm-9.42.17.191-Bld-510-iSCSI Disk 1-DataStore"`

CDM attributes, agent attributes, descriptions, and examples

- CDM attribute: Name

   Agent attribute: KVMDSTORES.DM
   Description: Unique managed object ID that represents this entity
   Example: `datastore-13`

- CDM attribute: Label

   Agent attribute: KVMDSTORES.NAME
   Description: User-specified string that represents the name of this entity
   Example: `iSCSI Disk 1`

- CDM attribute: Type

   Agent attribute: KVMDSTORES.TYPE
   Description: Type of volume (NFS or VMFS)
   Example: VMFS

- CDM attribute: DataStoreURL

   Agent attribute: KVMDSTORES.URL
   Description: Unique locator of the data store. Used for managing virtual disks and data stores through virtualdiskmanager, which takes data store path as one of the parameters.
   Example: `sanfs://vmfs_uuid:46715901-25a31b06-3cf6-000e0c42b828`

- CDM attribute: Capacity

   Agent attribute: KVMDSTORES.CAPACITY
   Description: Storage capacity of the data store
   Example: 476672

- CDM attribute: FreeSpace

   Agent attribute: KVMDSTORES.FREE_SPACE
   Description: Amount of available storage for this data store
   Example: 152240

- CDM attribute: IsAccessible

   Agent attribute: KVMDSTORES.ACCESSIBLE
   Description: Connectivity status of this data store
   Example: 1

ESX Server class

The ESX Server class represents the core hypervisor where virtual machines are running.

CDM class name
    sys.VmwareUnitaryComputerSystem

Relationships

contains

- Source: kvm-*KVMSERVERG.SH*-ESXServer
- Target: kvm-*KVMDAG.SN_RES-KVMSERVRDS.NAME*-DataStore
- Example: `contains source="kvm-itm64vm4.tivlab.raleigh.ibm.com-ESXServer" target="kvm-itm64vm4.tivlab.raleigh.ibm.com-iSCSI Disk 1-DataStore"`

contains

- Source: kvm-*KVMSERVERG.SH*-ESXServer
- Target: kvm-*KVMSERVERG.SH*-ESXServer-Memory
- Example: `contains source="kvm-itm64vm4.tivlab.raleigh.ibm.com-ESXServer" target="kvm-itm64vm4.tivlab.raleigh.ibm.com-ESXServer-Memory"`

CDM attributes, agent attributes, descriptions, and examples

- CDM attribute: Name

  Agent attribute: KVMSERVERG.SH
  Description: A name for the computer system as it is commonly known in the datacenter
  Example: `itm64vm4.tivlab.raleigh.ibm.com`

- CDM attribute: Label

  Agent attribute: KVMSERVERG.SH
  Description: User-specified string used when displaying a managed element
  Example: `itm64vm4.tivlab.raleigh.ibm.com`

- CDM attribute: UUID

  Agent attribute: KVMSERVERG.UUID
  Description: Attribute to store the UUID (universally unique identifier) of a VMware virtual machine
  Example: `7255E89D-634E-38DB-8D28-D0C083FBDC98`

- CDM attribute: SystemBoardUUID

  Agent attribute: KVMSERVERG.UUID
  Description: Burned-in Globally Unique Identifier (GUID) of the motherboard in the computer
  Example: `7255E89D-634E-38DB-8D28-D0C083FBDC98`

- CDM attribute: Fqdn

  Agent attribute: KVMSERVERG.SH
  Description: Fully qualified host name of the computer system
  Example: `itm64vm4.tivlab.raleigh.ibm.com`

- CDM attribute: NumCPUs

  Agent attribute: KVMSERVERG.PC
  Description: Count of CPU instances contained by the computer system
  Example: 4

- CDM attribute: CPUCoresInstalled

  Agent attribute: KVMSERVERG.PC
  Description: Number of CPUCore instances
  Example: 4

- CDM attribute: MemorySize

  Agent attribute: KVMSERVERG.PM (converted to bytes)
  Description: Size of physical memory present in the computer system
  Example: 8588886016
- CDM attribute: ServiceConsoleMemorySize

  Agent attribute: KVMDSTORES.ACCESSIBLE (converted to bytes)
  Description: Amount of memory reserved for the service console
  Example: 285212672
- CDM attribute: VmotionEnabled

  Agent attribute: KVMSERVERG.VE
  Description: Indicates whether VMotion is enabled for this host
  Example: `true`
- CDM attribute: ManagedSystemName

  Agent attribute: INODESTS.NODE
  Description: Name of the IBM Tivoli Monitoring component that provides data for the
  management of the VMware VI agent instance
  Example: `VM:kb2kas-itm64vm4.tivlab:ESX`

VMwareESX class

VMware ESX is the virtualization operating system that supports a virtual infrastructure within a single
physical device, or across multiple physical devices. This operating system currently supports the
ability to run on the x86-compatible platform.

CDM class name
    sys.VMware.VmwareESX

Relationships

    runsOn

- Source: `kvm-`*`KVMSERVERG.SH`*`-ESX`
- Target: `kvm-`*`KVMSERVERG.SH`*`-ESXServer`
- Example: `runsOn source="kvm-itm64vm4.tivlab.raleigh.ibm.com-ESX"`
  `target="kvm-itm64vm4.tivlab.raleigh.ibm.com-ESXServer"`

    installedOn

- Source: `kvm-`*`KVMSERVERG.SH`*`-ESX`
- Target: `kvm-`*`KVMSERVERG.SH`*`-ESXServer`
- Example: `installedOn source="kvm-itm64vm4.tivlab.raleigh.ibm.com-ESX"`
  `target="kvm-itm64vm4.tivlab.raleigh.ibm.com-ESXServer"`

CDM attributes, agent attributes, descriptions, and examples

- CDM attribute: Name

  Agent attribute: Not applicable (hardcoded value)
  Description: Name of the operating system
  Example: Vmnix
- CDM attribute: OSName

  Agent attribute: String representation of the operating system name.
  Description: Not applicable (hardcoded value)
  Example: Vmnix
- CDM attribute: Label

  Agent attribute: KVMSERVERG.SH

Description: User-specified string used when displaying a managed element
Example: `itm64vm4.tivlab.raleigh.ibm.com`

- CDM attribute: OSVersion

   Agent attribute: KVMSERVERG.PRODUCT KVMSERVERG.VERSION build-KVMSERVERG.BN
   Description: Raw text representation of the Operating System version, as reported by the operating system instance using the operating system-specific command to get the version of the operating system.
   Example: VMware ESX Server 3.5.0 build-199239

ESX Server Memory class

The ESX Server Memory class represents the memory configuration of an ESX Server.

CDM class name
   sys.Memory

Relationships
   This class has no relationships.

CDM attributes, agent attributes, descriptions, and examples

- CDM attribute: MemorySize

   Agent attribute: KVMSERVERG.PM
   Description: Amount of memory reserved
   Example: 8588886016

Virtual Machine class

The Virtual Machine class represents a software implementation of a computer that executes programs like a physical machine.

CDM class name

```
sys.darwin.DarwinUnitaryComputerSystemsys.dos.
DosUnitaryComputerSystemsys.freebsd.
FreeBSDUnitaryComputerSystemsys.linux.LinuxUnitaryComputerSystemsys.
netware.NetwareUnitaryComputerSystemsys.sun.
SunSPARCUnitaryComputerSystemsys.windows.
WindowsComputerSystemsys.UnitaryComputerSystem
```

Relationships

virtualizes

- Source: kvm-*KVMVM_GEN.VSN*-*KVMVM_GEN.VM_NAME*-VirtualMachine
- Target: kvm-*KVMVM_GEN.VSN*-ESXServer
- Example: `virtualizes source="kvm-itm64vm4.tivlab.raleigh.ibm.com-vi4win2k3-VirtualMachine" target="kvm-itm64vm4.tivlab.raleigh.ibm.com-ESXServer"`

CDM attributes, agent attributes, descriptions, and examples

- CDM attribute: Name

   Agent attribute: KVMVM_GEN.VM_NAME
   Description: Name for the computer system as it is commonly known in the data center
   Example: `vi4win2k3`

- CDM attribute: Label

   Agent attribute: KVMVM_GEN.VM_NAME
   Description: User-specified string used when displaying a managed element
   Example: `vi4win2k3`

- CDM attribute: UUID

Agent attribute: KVMVM_GEN.UUID
Description: Attribute to store UUID (universally unique identifier) of a VMware virtual machine
Example: 502A1106-04AE-9B2A-E266-37CB16B2E7DB

- CDM attribute: SystemBoardUUID

  Agent attribute: KVMVM_GEN.UUID
  Description: Burned-in globally unique identifier (GUID) of the motherboard in the computer
  Example: 502A1106-04AE-9B2A-E266-37CB16B2E7DB

- CDM attribute: MemoryLimit

  Agent attribute: KVMVM_GEN.ML
  Description: Maximum memory that can be used by this virtual machine even if more memory or CPU is available in the resource pool
  Example: 1

- CDM attribute: MemoryReservation

  Agent attribute: KVMVM_GEN.MIN_ALLOC
  Description: Memory guaranteed for this virtual machine.
  Example: 0

- CDM attribute: MemorySharedValue

  Agent attribute: KVMVM_GEN.MS0 (MB)
  Description: Actual value of memory shares (used only when level of memory or CPU shares is set to **Custom**).
  Example: 2560

- CDM attribute: MemorySize

  Agent attribute: KVMVM_GEN.MS0 (converted to bytes)
  Description: Size of physical memory present in the computer system
  Example: Ex - 2684354560

- CDM attribute: CPUSharedValue

  Agent attribute: KVMVM_GEN.CPU_SHARES
  Description: Actual value of CPU shares (used only when level of memory or CPU shares is set to **Custom**)
  Example: 2000

TMSAgent class

The TMSAgent class represents the Tivoli Management Services agent.

CDM class name
app.TMSAgent

Relationships
This class has no relationships.

CDM attributes, agent attributes, descriptions, and examples

- CDM attribute: ManagedObjectName

  Agent attribute: INODESTS.NODE
  Description: Name of the IBM Tivoli Monitoring component that provides data for the management of the VMware VI agent instance
  Example: p@kb2kas:ANDREA:VM

- CDM attribute: SoftwareVersion

  Agent attribute: INODESTS.VERSION
  Description: Version of the VMware VI agent

Example: 06.22.01

- CDM attribute: ProductCode

    Agent attribute: INODESTS.PRODUCT
    Description: Product code of the VMware VI agent
    Example: VM

- CDM attribute: Affinity

    Agent attribute: INODESTS.AFFINITIES
    Description: Affinity of the VMware VI agent
    Example: 0001000000000000000000000000000G0003yw0a7

- CDM attribute: Label

    Agent attribute: INODESTS.NODE - VMware
    Description: Label of the VMware VI agent
    Example: kb2kas:ANDREA:VM - VMware

Appendix B. Documentation library

A variety of documentation is available for insert the short product name from the list.

IBM Knowledge Center contains topics of information for the product and links to relevant PDFs. In IBM Knowledge Center, you can create a custom PDF that contains only the topics in which you are interested. See the directions for Creating your own set of topics (http://www.ibm.com/support/knowledgecenter/doc/kc_help.html#create).

Prerequisite documentation

To use the information about the components effectively, you must have some prerequisite knowledge.

The following information for Tivoli Monitoring is available in the IBM Knowledge Center (http://www.ibm.com/support/knowledgecenter) to gain prerequisite knowledge:

- *IBM Tivoli Monitoring Administrator's Guide*
- *IBM Tivoli Monitoring Installation and Setup Guide*
- *IBM Tivoli Monitoring High Availability Guide for Distributed Systems*
- IBM Tivoli Monitoring: Installation and Configuration Guides for the following agents: Operating System agents and Warehouse agents
- IBM Tivoli Monitoring: User's Guides for the following agents: Agentless OS monitors, Log File agent, System p agents, Systems Director base agent
- *IBM Tivoli Monitoring Agent Builder User's Guide*
- *IBM Tivoli Monitoring Command Reference*
- *IBM Tivoli Monitoring: Messages*
- *IBM Tivoli Monitoring Troubleshooting Guide*
- IBM Tivoli Monitoring: References for the following agents: Operating System agents and Warehouse agents
- IBM Tivoli Monitoring: Troubleshooting Guides for the following agents: Operating System agents and Warehouse agents
- *Tivoli Enterprise Portal User's Guide*

Related documentation

The documentation for related products provides useful information.

See the following products in IBM Knowledge Center (http://www.ibm.com/support/knowledgecenter/):

- Tivoli Monitoring
- Tivoli Application Dependency Discovery Manager
- Tivoli Business Service Manager
- Tivoli Common Reporting
- Tivoli Enterprise Console
- Tivoli Netcool/OMNIbus

Terminology that is relevant to IBM products is consolidated in one convenient locations at the IBM Terminology website (http://www.ibm.com/software/globalization/terminology).

Tivoli Monitoring Community on Service Management Connect

Service Management Connect (SMC) is a repository of technical information that is organized by communities.

Access Service Management Connect at https://www.ibm.com/developerworks/servicemanagement.

For information about Tivoli products, see the Application Performance Management community (http://www.ibm.com/developerworks/servicemanagement/apm/index.html).

Connect, learn, and share with Service Management professionals. Get access to developers and product support technical experts who provide their perspectives and expertise. You can use SMC for these purposes:

- Become involved with transparent development, an ongoing, open engagement between other users and IBM developers of Tivoli products. You can access early designs, sprint demonstrations, product roadmaps, and prerelease code.
- Connect one-on-one with the experts to collaborate and network about Tivoli and the Application Performance Management community.
- Read blogs to benefit from the expertise and experience of others.
- Use wikis and forums to collaborate with the broader user community.

Other sources of documentation

You can obtain additional technical documentation about monitoring products from other sources.

See the following sources of technical documentation about monitoring products:

- IBM Integrated Service Management Library (http://www.ibm.com/software/brandcatalog/ismlibrary/) is an online catalog that contains integration documentation as well as other downloadable product extensions.
- IBM Redbook publications (http://www.redbooks.ibm.com/) include Redbooks® publications, Redpapers, and Redbooks technotes that provide information about products from platform and solution perspectives.
- Technotes (http://www.ibm.com/support/entry/portal/software), which are found through the IBM Software Support website, provide the latest information about known product limitations and workarounds.

Conventions used in the documentation

Several conventions are used in the documentation for special terms, actions, commands, and paths that are dependent on your operating system.

Typeface conventions

The following typeface conventions are used in the documentation:

Bold

- Lowercase commands, mixed-case commands, parameters, and environment variables that are otherwise difficult to distinguish from the surrounding text
- Interface controls (check boxes, push buttons, radio buttons, spin buttons, fields, folders, icons, list boxes, items inside list boxes, multicolumn lists, containers, menu choices, menu names, tabs, property sheets), labels (such as **Tip:**)
- Keywords and parameters in text

Italic

- Citations (examples: titles of publications, CDs, and DVDs)
- Words and phrases defined in text (example: a nonswitched line is called a *point-to-point line*)

- Emphasis of words and letters (example: The LUN address must start with the letter *L*.)
- New terms in text , except in a definition list (example: a *view* is a frame in a workspace that contains data.)
- Variables and values you must provide (example: where *myname* represents...)

Monospace

- Examples and code examples
- File names, directory names, path names, programming keywords, properties, and other elements that are difficult to distinguish from the surrounding text
- Message text and prompts
- Text that you must type
- Values for arguments or command options

Bold monospace

- Command names, and names of macros and utilities that you can type as commands
- Environment variable names in text
- Keywords
- Parameter names in text: API structure parameters, command parameters and arguments, and configuration parameters
- Process names
- Registry variable names in text
- Script names

Operating system-dependent variables and paths

The direction of the slash for directory paths might vary in the documentation. Regardless of what you see in the documentation, follow these guidelines:

- For UNIX or Linux, use a forward slash (**/**).
- For Windows, use a backslash (****).

The names of environment variables are not always the same in Windows and UNIX. For example, %TEMP% in Windows is equivalent to $TMPDIR in UNIX or Linux.

For environment variables, follow these guidelines:

- For UNIX or Linux, use **$**variable.
- For Windows, use **%**variable**%**.

If you are using the bash shell on a Windows system, you can use the UNIX conventions.

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Index

O

operating systems 7
overview
    IBM Tivoli Monitoring 1

P

path conventions 32
portal
    deploy 16
    deploying 16
prerequisite documentation 31
Prerequisite Scanner 10
prerequisites 10
prerequisites, hardware and software 10
privacy policy 37
privileges for Take Action commands 10
publications
    Service Management Connect 32
    SMC 32
    See also Service Management Connect
    See also documentation

R

Redbooks 32
remote
    installation and configuration 15
remote installation, configuration
    deploy
        command line 16
requirements 7
response file template 7
rui.crt file 12

S

select installation location 11
Service Management Connect 32
signer certificate 12
silent installation 7
silent installation of language packs 7
SMC 32
    See also Service Management Connect
software prerequisites 10
SSL certificates
    collecting 10
SSL communication, enabling 12

T

tacmd addSystem command 15
Take Action commands
    enabling PowerOffVM 10
    enabling PowerOnVM 10
    privileges 10
Technotes 32
terms 31
TMSAgent class
    CDM class name 29
    Relationships 29
typeface conventions 32

U

user ID, creating 10
user interface options 4

V

variables conventions 32
VMware certificate file 12