

IBM Operational Decision Manager V8.9.1

What's new

November 2017

© 2017 IBM Corporation



ODM 8.9.1 new content

- [Summary](#)
- [New automation support for Decision Center](#)
- [Performance and scalability improvements in Decision Center](#)
- [Additional features in Business Console](#)
- [Targeted improvements in Decision Server Rules](#)
- [New sample and tutorial projects](#)
- [Enhanced usage metering with Cloud Product Insights](#)
- [Platform support updates](#)
- [Public contributions to facilitate ODM on Docker and Kubernetes](#)
- [Targeted improvements in ODM Standard for z/OS](#)
- [Targeted improvements in Decision Server Insights](#)

ODM 8.9.1 summary

- Electronic delivery on Nov.10, 2017.
- Announcements:
 - [ODM 8.9.1](#)
 - [ODM Standard for z/OS 8.9.1](#)
- ODM 8.9.1 is a maintenance release for ODM 8.9.
 - Contains fixes, improvements,
and a few additional features and supported platforms
 - Fully compatible with ODM 8.9 and fix pack 8.9.0.2
- ODM 8.9 users are encouraged to apply ODM 8.9.1.

New automation support for Decision Center

- REST API to build, test, and deploy decision services
- Simplified decision deployment from Decision Center, with XOMs embedded in RuleApp archives

Decision Center REST API

- Decision Center exposes a REST API that you can use to build, test, and deploy decision services.
- With the relevant permissions, you can use the endpoints provided by the REST API to do the following tasks:
 - Retrieve the decision services of your repository, their branches, deployment configurations, and test suites.
 - Retrieve the list of available servers.
 - Build, download, or deploy a RuleApp for a deployment configuration.
 - Run a test suite.
 - Import and export decision services.
- For more information, see [Decision Center REST API](#)

IBM ODM Decision Center API
Explore, build, test and deploy decision services stored in Decision Center

Method	Endpoint	Permissions	Description
GET	/v1/about	Decision Center	Get version, product and release information
POST	/v1/deployments/{deploymentId}/build	Decision Center	Build a RuleApp for the given deployment configuration
POST	/v1/deployments/{deploymentId}/deploy	Decision Center	Deploy a RuleApp to an available server (RHS)
POST	/v1/deployments/{deploymentId}/download	Decision Center	Download the release archive for the given deployment configuration
POST	/v1/testsuites/{testSuiteId}/run	Decision Center	Execute a test suite
POST	/v1/decisionmanagements/import	Decision Center	Import a Decision Service in the repository
POST	/v1/decisionmanagements/decision-services/import	Decision Center	Export a Decision Service to a DS
POST	/v1/decisionmanagements/decision-services/import	Decision Center	Import a Decision Service to top of an existing service
POST	/v1/repository/validate	Decision Center	Validate the repository with the ODM server associated to it (RHS)
POST	/v1/repository/matrix	Decision Center	Get repository matrix
POST	/v1/servers	Decision Center	Refresh the servers for the system user
POST	/v1/servers	Decision Center	Generate an access token for the system user
POST	/v1/export	Decision Center	Export a Decision Service
POST	/v1/decisionmanagements/decision-services/export	Decision Center	Export a Decision Service
POST	/v1/decisionmanagements/decision-services/export	Decision Center	Export a Decision Service



Use the Decision Center REST API to build, test, and deploy decision services, and to run continuous deployment in the programming language of your choice.

API to support embedded managed Java XOMs

- Embedded managed Java XOMs are managed Java XOM resources (.jar) and libraries that are included in a RuleApp archive.
 - By embedding managed Java XOMs in a RuleApp archive, you can easily maintain the version of the managed Java XOM and the version of the corresponding ruleset together.
- Decision Center API (Java and REST) is now available for you to download RuleApp archives with embedded managed Java XOMs in the Decision Center:
- For more information, see [Embedded managed Java XOM in Decision Center](#)

Performance and scalability improvements in Decision Center

Outcome of major effort and collaboration with customers

- Major performance improvements visible in the Decision Center Business Console:
 - User experience in the Decision Artifacts tab is much better when working with large decision services.
 - Decision table preview and editing are faster and have been validated with large tables.
 - Builds with decision engine are faster by an order of magnitude when compiling 1000+ artifacts.
- Improved Decision Center scalability on the following dimensions:
 - Size of decision tables, with faster preview and editing of large tables
 - Number of artifacts in the repository
 - Number of concurrent users, with no action that could block all users
 - Number of decision services and branches
- Validation and collaboration with ODM customers

Many of these improvements have also been introduced in ODM fix packs 8.9.0.2 and 8.8.1.3.

Additional features in Business Console

- Improved integration with LDAP
- Enhanced interface for managing decision service snapshots
- Improved content display in the Business Console
- Ability to export, import, and delete decision services
- Tool to help migration of rule projects

Improved integration with LDAP

- Decision Center now offers three modes for importing users and groups from LDAP directories: semi-automatic, automatic, and manual.
 - For more information, see [Importing users and groups from LDAP directories](#)
- You can now use LDAP query expressions to filter the lists of users and groups that you upload from an LDAP server to Decision Center.
 - For more information, see [Establishing an LDAP connection in the Business console](#)

Automatic import of groups and users

You can now automatically import users based on Lightweight Directory Access Protocol (LDAP) connection parameters.

There are three possible modes to import groups and users:

- Groups and users are imported manually
 - The modes provides Decision Center with groups and users that can be organized with no restrictions. Group organization in Decision Center does not reflect groups in LDAP directories.
- Groups and users are automatically imported
 - Group and user organization in Decision Center exactly reflects groups and users in LDAP directories.
- Groups are manually imported, and users are automatically imported for these groups
 - Same as the previous mode but only on selected groups.

Decision Center does not modify the LDAP directories that it is connected to. Importation is unidirectional from LDAP directories to Decision Center repository.

LDAPv3-style query to retrieve groups and users (RFC2254)

You can now use LDAP query expressions to filter the lists of user groups that you upload from an LDAP server to Decision Center.

This allows complex queries to retrieve groups and users such as `(|(cn=*Offering*)(objectCategory=ACME))`.

Editing LDAP connection in Business Console

The screenshot shows the Business Console interface for editing an LDAP connection. The 'Edit Connection' dialog is open, displaying the following fields:

- Connection name*: Acme Corp Directory
- LDAP URL*: ldap://9.128.94.107:10389
- Bind DN or user: uid=admin,ou=system
- Bind password: *****
- Group search base*: ou=Groups,dc=example,dc=com
- Group search filter*: (cn=*)
- Group name attribute*: cn
- Group member attribute*: member
- User login id attribute*: uid
- User name attribute*: sn
- User email attribute: mail

Red boxes highlight the 'Automatic import of user groups' checkbox and the 'Group search filter' field containing '(cn=*)'. A red arrow points from the 'LDAP query to filter user groups' text to the 'Group search filter' field.

Illustration shows the editing interface for an LDAP connection in the Business Console.

Enhanced interface for managing decision service snapshots

- Snapshots can now be sorted and filtered.

Visualize, compare and restore snapshots

Total: 7 Selected: 0

10 | 50 | 100 | All

<input type="checkbox"/> Name	Type	Created By	Created On
<input type="checkbox"/> Deployment_2017-10-05T14_51_25Z	Deployment Snapshot	rtsAdmin	October 5, 2017 at 4:51 PM
<input type="checkbox"/> Deployment_2017-10-05T14_52_24Z	Deployment Snapshot	rtsAdmin	October 5, 2017 at 4:52 PM
<input checked="" type="checkbox"/> Initial snapshot	Standard Snapshot	rtsAdmin	October 5, 2017 at 4:52 PM
<input checked="" type="checkbox"/> Tuesday Snapshot	Standard Snapshot	rtsAdmin	October 5, 2017 at 4:52 PM
<input checked="" type="checkbox"/> Winter Snapshot	Standard Snapshot	rtsAdmin	October 5, 2017 at 4:52 PM
<input type="checkbox"/> Deployment_2017-10-05T14_53_06Z	Deployment Snapshot	rtsAdmin	October 5, 2017 at 4:53 PM
<input checked="" type="checkbox"/> Spring Snapshot	Standard Snapshot	rtsAdmin	October 5, 2017 at 4:53 PM

12

© 2017 IBM Corporation



Enhanced interface for managing decision service snapshots

Snapshots play a key role in editing, validating, and deploying decision services. New features for sorting and filtering can shorten your search time for finding snapshots. The enhancement can be very useful when working with numerous versions of a decision service.

Improved content display in the Business Console

- All lists in the Business Console use pagination to browse more easily.

The screenshot shows a list of items in the Business Console. At the top, there are icons for adding, deleting, copying, downloading, and favoriting, along with a search filter. Below these is a pagination bar with the text "Total: 32 Selected: 0" and page numbers "1 2 3 4". A red box highlights this pagination bar, and a red arrow points to the page number "1". The list below has columns for "Name", "Last Changed By", and "Last Changed On".

<input type="checkbox"/>	Name	Last Changed By	Last Changed On
<input type="checkbox"/>	bankruptcyScore	rtsAdmin	September 21, 2017 ...
<input type="checkbox"/>	checkAge	rtsAdmin	September 21, 2017 ...
<input type="checkbox"/>	checkCountry	rtsAdmin	September 21, 2017 ...
<input type="checkbox"/>	checkName	rtsAdmin	September 21, 2017 ...
<input type="checkbox"/>	checkSSNareanumber	rtsAdmin	September 21, 2017 ...
<input type="checkbox"/>	checkSSNdigits	rtsAdmin	September 21, 2017 ...
<input type="checkbox"/>	checkZipcode	rtsAdmin	September 21, 2017 ...

13

© 2017 IBM Corporation

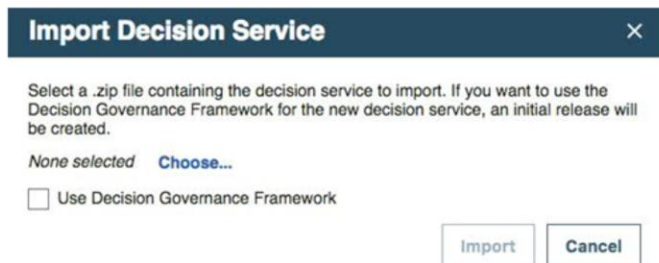


Improved content display in the Business Console

The Business Console tabs (Decision Artifacts, Queries, Tests, Simulations, Deployment, and Snapshots) can now display their contents on multiple pages. Previously, each tab had only one page. Now as a tab fills up, its contents are automatically spread to additional pages. The tab sorting and filtering mechanisms work across the pages.

Ability to export, import, and delete decision services

- Features transitioning from Enterprise Console to Business Console:
 - Export of the working branch of a decision service to a compressed file
 - Import of a decision service from a compressed file
 - Possible to import the decision service inside Decision Governance Framework (DGF)
 - Deletion of a decision service



14

© 2017 IBM Corporation



Administrators and configuration managers can now benefit from additional decision service management features to transition from the Enterprise Console to the Business Console.

Exporting and importing decision service projects in the Business Console

In the Business Console, administrators and configuration managers can now use compressed files to import a decision service (one or more projects) or export the working branch of a decision service.

Deleting a decision service in the Business Console

Administrators can now delete decision services from the Business Console. This operation used to be limited to the Enterprise Console, and required administrators to work in two environments.

Tool to help migration of rule projects

- Migrate classic rule projects to decision service projects within Decision Center
 - Business Console manages decision services only.
- Use new Decision Center Ant task for this migration:
 - No need to synchronize and perform migration in Rule Designer
 - Compatible with Decision Governance Framework
- For more information, see [Migrating classic rule projects to decision services with Ant tasks](#)

Migrating classic rule projects to decision services

New Ant tasks let you migrate your classic rule projects to decision services. You can migrate a project to a decision service that is either simple or governed. You can more easily upgrade older business rule solutions to take advantage of the current functionality based on decision services.

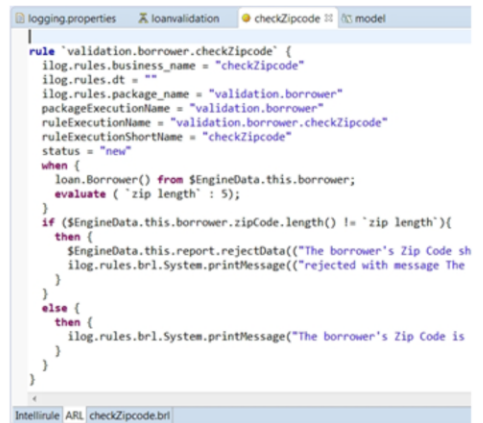
Targeted improvements in Decision Server Rules

- Advanced Rule Language
- Improved error reporting in Decision Service execution (HTDS REST)
- Clean delete in Rule Execution Server
- Build command available as CLI

Advanced Rule Language

Advanced Rule Language (ARL) is the decision engine technical language.

- New ARL tab in Rule Designer:
 - Displays generated ARL code for business rules and decision tables
 - Checks and debugs ARL code for the decision engine
- Automatic importation of common packages when editing ARL in BOM to XOM editor



```
rule 'validation.borrower.checkZipcode' {
  ilog.rules.business_name = "checkZipcode"
  ilog.rules.dt = ""
  ilog.rules.package_name = "validation.borrower"
  packageExecutionName = "validation.borrower"
  ruleExecutionName = "validation.borrower.checkZipcode"
  ruleExecutionShortName = "checkZipcode"
  status = "new"
  when {
    loan.Borrower() from $EngineData.this.borrower;
    evaluate ( `zip length` : 5);
  }
  if ($EngineData.this.borrower.zipCode.length() != `zip length`){
    then {
      $EngineData.this.report.rejectData("The borrower's Zip Code sh
      ilog.rules.br1.System.printMessage("rejected with message The
    )
  }
  else {
    then {
      ilog.rules.br1.System.printMessage("The borrower's Zip Code is
    )
  }
}
}
```

When you use the decision engine, your action rules and decision tables are compiled into the advanced rule language (ARL). Now you can check the compilation results in the ARL tab. For example, if your project model contains similar objects, you can check that the rules use the correct objects.

Also for ARL editing in BOM to XOM (B2X), these frequently used packages are now automatically imported:

- java.lang.*
- com.ibm.rules.engine.runtime.*
- com.ibm.rules.engine.ruledef.runtime.*
- com.ibm.rules.engine.ruleflow.runtime.*

Improved error reporting in decision service execution (HTDS REST)

- Better error codes and more user friendly messages in addition to exception traces
 - Earlier versions:

```
<data contentType="text/plain;charset=UTF-8" contentLength="160"><![CDATA[Error when extracting the ruleset parameter value from the request. The element type "par:request" must be terminated by the matching end-tag "</par:request">."]]></data>
```

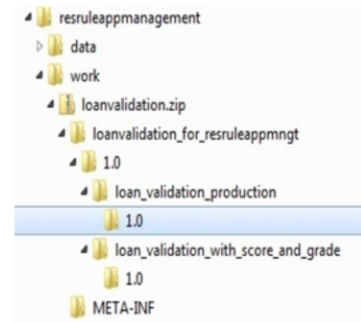
- Now:

```
<error>  
  <code>500</code>  
  <message>An error occurred while interpreting the request: either it contains invalid data, or it does not correctly include the mandatory parameters, or there is a problem with your execution object model.</message>  
  <details>Error when extracting the ruleset parameter value from the request.  
  The element type "par:request" must be terminated by the matching end-tag "</par:request">.</details>  
  <errorCode>GBRXH0502E</errorCode>  
</error>
```

- Consistent error messages across WADL generation, payload generation and execution
- More specific HTTP status codes: Instead of HTTP 500 status code for all errors, you now have more specific error codes such as HTTP 400 and HTTP 404.
- Improved logging: Errors are now systematically logged.

Clean delete in Rule Execution Server

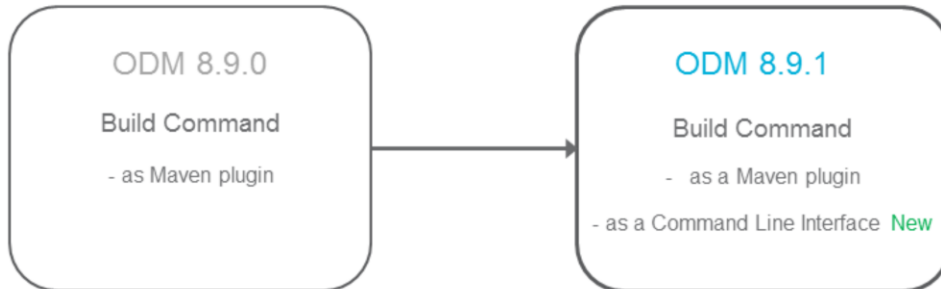
- Use the RES Console, REST API or Ant tasks to do a clean delete of managed Java XOM resources
 - Delete resources and libraries, and their ties to other artifacts
 - Stop errors resulting from artifacts looking for deleted files
- For more information, see [Removing referenced Java XOM resources and libraries](#)



Your Java™ XOM resource or library might not be alone. It could reference, or be referenced by, other artifacts. Now you can sever all ties in one go by using the Rule Execution Server Console, REST API, or Ant tasks, giving you a clean delete. You reduce the likelihood of errors from artifacts trying to access deleted files.

Build Command with Command Line Interface

- Integrated in ODM since 8.9.0 and enhanced in ODM 8.9.1



- Benefits:
 - Facilitate RuleApp build in a DevOps pipeline, following industry standards.
 - Remove the need to rely on a full Rule Designer installation for each build agent.

Command Line Interface (CLI)

- CLI and Maven plug-ins are both wrapping the same compiler.
- CLI can be invoked from anywhere: shell, build tool, Gradle, Jenkins, etc.
- One-time setup: Just add to your classpath.
- Usage sample:



Lighter than headless Eclipse
Small size (53 MB)

Build Command – Improvements

- Build Command has been improved with the following features:
 - Value-info support
 - Performance enhancement
 - In-memory cache
 - Only one compilation for shared decision resource
 - Automatic exception handling support

- Value-info: Properties that you can use (in the POM in Maven, or in the configuration file in CLI) to allow the integration of customer-defined values.
- Cache principle: No longer write to disk, but keep all in memory so to save execution time.
- Automatic exception handling: Functionality that is managed by the engine (starting ODM 8.9.0), and that is now also supported at the CLI level (starting ODM 8.9.1).

New sample and tutorial projects

Sample and tutorials

Decision Center:

- **REST API in Java (sample)**
Learn how to use the Decision Center REST API in Java™ to build, test, and deploy a decision service [More...](#)
- **Merging branches in the Business Console (tutorial)**
Merge changes between branches in a decision service [More...](#)
- **Using the REST API tool (tutorial)**
Build, test, and deploy a decision service by using the REST API tool [More...](#)

Rule Designer:

- **Debugging a decision service (tutorial)**
Updated tutorial to debug a decision service in Rule Designer [More...](#)

Operational Decision Manager comes with several samples and tutorials that show you how to create and deploy rule solutions. These include the following new projects:

Decision Center sample: REST API in Java

This sample demonstrates how to use the Decision Center REST API in Java™ to build, test, and deploy a decision service. The REST API in Java allows you to do several operations outside Decision Center.

Decision Center tutorial: Merging branches in the Business Console

This tutorial shows you how to merge changes between branches in a decision service in the Decision Center Business Console. You can work on a decision service in one branch, and then merge selected changes to a decision service in another branch.

Decision Center tutorial: Using the REST API tool

This tutorial shows you how to build, test, and deploy a decision service by using the REST API tool. The REST API tool include many of the primary

operations that are performed in the Business Console.

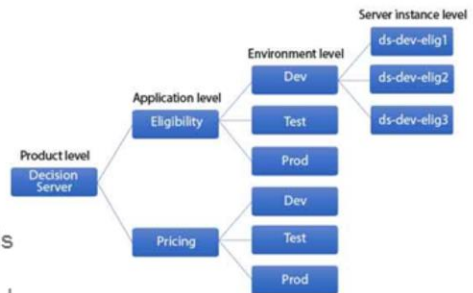
Rule Designer tutorial: Debugging a decision service

This tutorial shows you how to debug a decision service in Rule Designer. The tutorial takes you through a process for finding and fixing errors in rules and a ruleflow.

Enhanced usage metering with Cloud Product Insights

Enhanced usage metering with Cloud Product Insights

- Improved metering with support for grouping and aggregates:
 - To browse usage reports at:
 - Server Instance level (cluster node level)
 - Environment level (cluster level)
 - Application level (multi-environment level)
 - Product level (Decision Server or Decision Center)
 - Configurable Instance, Environment and Application levels
 - Aggregated usage to see:
 - In Decision Server, all decisions executed at any level
 - In Decision Center, all artifacts managed across any level
- Export in CSV files (for each metric, at each grouping level, for selected time period)
- Support for WAS-ND V8.5.5 and Tomcat 8.x, in addition to WAS Liberty
- Same reporting as in ODM on Cloud, applicable to ODM Hybrid Entitlement
- For more information, see [Integrating with IBM Cloud Product Insights](#)



IBM Cloud Product Insights shows how IBM software is being used across an organization. Product Insights now offers improved metering with support for groupings and aggregates, exportable comma-separated value (CSV) files for metrics, and support for application servers WAS-ND V8.5.5 and Tomcat 8. Also, the same reporting for ODM on Cloud is applicable to ODM Hybrid Entitlement.

You can use IBM Cloud Product Insights with the on-premises and cloud versions of Operational Decision Manager. It helps you optimize usage, reduce waste, and plan projects. By using cloud-based dashboards, administrators and operations staff can review performance metrics on applications to understand how the software is being used. Administrators can optimize efficiency within their environment, and organizations can use the metrics in planning the extension of cloud services to their current products.

You can find information about IBM Cloud Product Insights at <https://developer.ibm.com/product-insights/>.

Platform Support Updates

For Decision Center and Decision Server Rules

Platform Updates (Decision Server Rules, Decision Center)

- Added support for:
 - Oracle WebLogic 12.2.1
 - Windows Server 2016
 - Tomcat 8.5
 - MariaDB 10.1.20
 - Docker 17.x
 - Kubernetes 1.7
- Deprecated support:
 - Java 7
 - Windows Server 2008, SP1, SP2 and R2
 - DB2 9.7 FP6 and 10.1
 - Oracle Database 11g Release 2

For Docker 17.x and Kubernetes 1.7, it means IBM support will accept support requests when ODM 8.9.1 is used in conjunction with these versions of Docker and Kubernetes. But there is no predefined deliverable for Docker in ODM 8.9.1. Please refer to the next section on public contributions to facilitate ODM on Docker and Kubernetes

Public contributions to facilitate ODM on Docker and Kubernetes

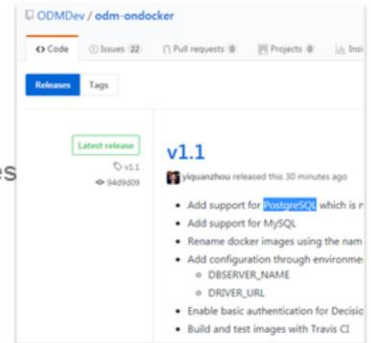
Public contributions to facilitate ODM on Docker and Kubernetes

- Parallel to the delivery of ODM V8.9.1, public files to facilitate the creation and the deployment of ODM images on Docker are available and regularly updated on GitHub at <https://github.com/ODMDev/odm-ondocker>.
- Content:
 - Dockerfiles to build ODM Docker images
 - Tutorial to deploy an ODM topology with Docker Compose
 - Articles and configuration files for Kubernetes
- Content is available under Apache license.
- There are no predefined ODM Docker images.
 - Users must install ODM before building the Docker images.
- The ODM product team is committed to updating this content frequently, and responding to questions and suggestions.



Open contributions

- Contributions available for ODM 8.9.x and ODM 8.8.x
 - Tested with Docker 17 and Kubernetes 1.7
- Latest contributions for Docker (release 1.1):
 - Dockerfile to build a standalone ODM Docker image:
 - All ODM components in one image
 - Easy to use for demos
 - Dockerfiles to build ODM images for production level topologies
 - One image per ODM component
 - Configurable DB datasource (PostgreSQL by default)
 - Deployable in cluster topologies
- Contributions for Kubernetes:
 - Tutorials, helm charts
 - Tested with Minikube for dev purpose and other Kubernetes platforms



Targeted improvements for ODM Standard for z/OS

zRule Execution Server for z/OS New Features

- **Batched request API**

You can use the batched request API to send batches of request parameters to zRule Execution Server for z/OS for execution. Introduced with Operational Decision Manager 8.9.0, this API has been further improved and stabilized for greater performance.

[More...](#)

- **Enhanced integration with IBM CICS® Transaction Server**

Operational Decision Manager now uses CICS® Link with Liberty to improve performance when running a zRule Execution Server for z/OS in the CICS JVM server. The link is available for CICS 5.3 and 5.4. [More...](#)

- **Improved rule engine management in Liberty**

Now you can enable TCP/IP management, SMF records, file system persistence, and other configuration options for the HTDS, DR, DVS, and WOLA applications running in Liberty. [More...](#)

33

© 2017 IBM Corporation



In this rule execution environment, you offload rule execution from your z/OS applications (COBOL or PL/I applications) to zRule Execution Server for z/OS, where your rules are executed on a server running a JVM.

Batched request API

Instead of sending a single set of parameters, you can send a batch of parameters from a COBOL client application to the zRule Execution Server for z/OS®. Use the HBRA-CONN-AREA data area to pass the RuleApp path and multiple sets of input parameters and to receive the outputs of the ruleset execution for each set of the parameters provided.

Enhanced integration with IBM CICS® Transaction Server

After you configure a zRule Execution Server for z/OS® server group, you can optionally configure the server group to run on a CICS® JVM server. You can configure CICS JVM Server as a highly available, scalable environment by using standard CICSplex® System Management (CPSM) capabilities.

Improved rule engine management in Liberty

You can enable the SMF recording feature to collect execution data by setting a property. You must be authorized to the BPX.SMF profile of the FACILITY class to write System Management Facility (SMF) records.

Targeted improvements for Decision Server Insights

Decision Server Insights New Features

These features improve the performance of Decision Server Insights

- **Offloading entities to a database to reduce memory requirements**
Entity offloading can be enabled in a cluster to reduce memory usage, shorten load and preload times, and stabilize the grid [More...](#)
- **Offloading mementos to a database to reduce the memory requirements**
Memento offloading can be enabled in a cluster to reduce memory usage and stabilize the grid [More...](#)
- **Reducing the size of the memento in a database**
Use a concise JSON format to store the externalized state of rule agents [More...](#)
- **DDL statements to create indexes on BATCHID columns**
The database tables now have indexes for the BATCHID columns [More...](#)

35

© 2017 IBM Corporation



Decision Server Insights continuously monitors your business to help you respond quickly to risks and opportunities. The following changes improve the performance of Decision Server Insights:

Offloading entities to a database to reduce memory requirements

Entity offloading can be enabled in a cluster to reduce memory usage, shorten load and preload times, and stabilize the grid. When entity offloading is enabled, entities are restored from the database only when they are needed, which can reduce memory requirements. The eviction time (a date and time) is based on the evictor type, which is defined in the objectgrid.xml file.

Offloading mementos to a database to reduce the memory requirements

Memento offloading can be enabled in a cluster to reduce memory usage and stabilize the grid. When memento offloading is enabled, mementos are restored from the database only when they are needed. The eviction is based on the evictor type, which is defined in the objectgrid.xml file.

Reducing the size of the memento in a database

It is now possible to use a concise JSON format to store the externalized state of rule agents. Switching the format from XML to JSON reduces the size of the data that is communicated between the run time and the database, and the time to load and save the memento.

DDL statements to create indexes on BATCHID columns

The Decision Server Insights database tables now have indexes for the BATCHID columns. Finding data with an index is much faster than reading every row sequentially. The beneficial effect of the indexes is likely to be seen during a cluster startup, especially if your database is large. The new BATCHID indexes are included in the .sql files under `<InstallDir>/runtime/ia/persistence/sql`.

Trademarks, Copyrights, and Disclaimers

IBM, the IBM logo, ibm.com, and Rational are trademarks or registered trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of other IBM trademarks is available on the web at "Copyright and trademark information" at <http://www.ibm.com/legal/copytrade.shtml>

THE INFORMATION CONTAINED IN THIS PRESENTATION IS PROVIDED FOR INFORMATIONAL PURPOSES ONLY. WHILE EFFORTS WERE MADE TO VERIFY THE COMPLETENESS AND ACCURACY OF THE INFORMATION CONTAINED IN THIS PRESENTATION, IT IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. IN ADDITION, THIS INFORMATION IS BASED ON IBM'S CURRENT PRODUCT PLANS AND STRATEGY, WHICH ARE SUBJECT TO CHANGE BY IBM WITHOUT NOTICE. IBM SHALL NOT BE RESPONSIBLE FOR ANY DAMAGES ARISING OUT OF THE USE OF, OR OTHERWISE RELATED TO, THIS PRESENTATION OR ANY OTHER DOCUMENTATION. NOTHING CONTAINED IN THIS PRESENTATION IS INTENDED TO, NOR SHALL HAVE THE EFFECT OF, CREATING ANY WARRANTIES OR REPRESENTATIONS FROM IBM (OR ITS SUPPLIERS OR LICENSORS), OR ALTERING THE TERMS AND CONDITIONS OF ANY AGREEMENT OR LICENSE GOVERNING THE USE OF IBM PRODUCTS OR SOFTWARE.

© Copyright International Business Machines Corporation 2017. All rights reserved.