

IBM Workload Automation



# Dynamic Workload Console User's Guide

*Version 9 Release 4*



IBM Workload Automation



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**Note**

Before using this information and the product it supports, read the information in "Notices" on page 307.

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## About this publication

IBM Workload Scheduler simplifies systems management across distributed environments by integrating systems management functions. IBM Workload Scheduler plans, automates, and controls the processing of your enterprise's entire production workload. The *IBM Dynamic Workload Console User's Guide* provides detailed information about how to configure and use the Dynamic Workload Console to manage your IBM Workload Scheduler environment.

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## What is new in this release

For information about the new or changed functions in this release, see *IBM Workload Automation: Overview*, section *Summary of enhancements*.

For information about the APARs that this release addresses, the Dynamic Workload Console Release Notes at <http://www-01.ibm.com/support/docview.wss?rs=672&uid=swg27048864>.

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## Who should read this publication

This publication is intended for the following audience:

- IBM Workload Scheduler operators
- IBM Workload Scheduler administrators

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## Accessibility

Accessibility features help users with a physical disability, such as restricted mobility or limited vision, to use software products successfully.

With this product, you can use assistive technologies to hear and navigate the interface. You can also use the keyboard instead of the mouse to operate all features of the graphical user interface.

For full information, see the Accessibility Appendix in the *IBM Workload Scheduler User's Guide and Reference*.

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## Technical training

Cloud & Smarter Infrastructure provides technical training.

For Cloud & Smarter Infrastructure technical training information, see: <http://www.ibm.com/software/tivoli/education>

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## Support information

IBM provides several ways for you to obtain support when you encounter a problem.

If you have a problem with your IBM software, you want to resolve it quickly. IBM provides the following ways for you to obtain the support you need:

- Searching knowledge bases: You can search across a large collection of known problems and workarounds, Technotes, and other information.

- Obtaining fixes: You can locate the latest fixes that are already available for your product.
- Contacting IBM Software Support: If you still cannot solve your problem, and you need to work with someone from IBM, you can use a variety of ways to contact IBM Software Support.

For more information about these three ways of resolving problems, see the appendix about support information in *IBM Workload Scheduler: Troubleshooting Guide*.

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## Chapter 1. Navigating the Dynamic Workload Console

An overview to the Dynamic Workload Console.

For an interactive overview of the product and its features, you can view several demo scenarios, available (in English only) on the IBM Workload Automation YouTube channel.

To have a quick and rapid overview of the portal and of its use, after logging in, the Welcome page for the Dynamic Workload Console is displayed in the Dashboard Application Services Hub console window. This window has a navigation menu across the top, organized in categories. Each category drops down to display a number of options that when clicked, display a portlet in the work area on the right. Each portlet displays with a title in its tabbed window in the work area. Just as the navigation menu items are customized according to the role of the logged in user, the welcome page is also customized for the user. The **Quick start** tasks available on the **Welcome** page allow you to access a related how-to video and launch the related portlet. Only the tasks corresponding to the logged in user's role are displayed. To get oriented with the navigation bar, take the tour and explore the available items. The tour brings into focus each of the navigation bar categories and corresponding descriptive text is displayed.

There are other helpful links on the page such a link to the embedded online help, the IBM Workload Automation YouTube channel, and a QR code to scan with your mobile device to launch the mobile applications.

Several products can be integrated in this portal and their related entries are listed together with those belonging to the Dynamic Workload Console in the navigation bar displayed at the top of the page.

The navigation bar at the top of the page is your entry point to the Dynamic Workload Console.

### **Related tasks:**

“Accessing online product documentation” on page 253

Accessing the products online publications in IBM® Knowledge Center.

“Adding tasks to your favorite bookmarks” on page 25

How to save a task to the favorite bookmarks of your browser.

“Creating a dashboard for monitoring” on page 198

Customize your console by creating pages with personalized dashboards to use for monitoring.

“Customizing your startup page” on page 23

How to customize the startup page

“Customizing the welcome page” on page 21

How to customize the welcome page

### **Related information:**

Chapter 16, “Scenarios,” on page 241

Scenarios demonstrating practical application of IBM Workload Scheduler in a business environment.

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## Naming conventions for scheduling objects

The Dynamic Workload Console allows you to manage and control IBM Workload Scheduler production for z/OS and distributed environments.

There are some differences in the processing and behavior between the IBM Workload Scheduler products for z/OS and distributed environments. When there are differences, the descriptions and related actions of scheduling objects are explained for both environments.

Table 1 lists the objects and object names typical of the IBM Workload Scheduler environment where they are defined.

*Table 1. Naming convention for scheduling objects*

<b>Object description</b>	<b>Object name in a distributed environment</b>	<b>Object name in a z/OS environment</b>
An ordered list of activities in plan for the current production period. The production plan contains information about the processes to run, on which workstation, and what dependencies must be satisfied before each process is launched. The production plan is automatically created and managed by the product and requires no user intervention. The production plan is generated daily at 05:00 CDT time.	Production Plan	Current Plan
A unit of work that is part of an application or a job stream and that is processed at a workstation.	Job	Operation. An operation can contain a list of steps to run.
A list of jobs that run as a unit to accomplish a task (such as calculating payroll), together with times, priorities, and other dependencies that determine the order in which the jobs run.	Job stream	Application
A run of a job stream or an application scheduled in the plan.	Instance	Occurrence

Table 1. Naming convention for scheduling objects (continued)

Object description	Object name in a distributed environment	Object name in a z/OS environment
A type of application description related to run cycle, calendar information, or job descriptions common to all applications defined as members of the group.	N/A	Application Group
A physical or logical asset where job processing occurs.	Workstation. It is qualified according to its position in the topology of the scheduling network and on its ability to interact with the information contained in the current plan.	Workstation. It is qualified according to the type of job processing it does in computer workstation, general workstation, print workstation.
IBM Workload Scheduler database	A customized set of tables in a relational database containing definitions for all scheduling objects, network topology, variables, and job processing statistics.	A collection of six sets of data, acting as a flat database, that contain information about calendars, periods, workstation descriptions, JCL variable tables, application descriptions, and operator instructions.

**Related concepts:**

“Workstation” on page 47

Using workstations for scheduling jobs and job streams.

“Job” on page 55

Information about jobs, which are scheduling objects used to define and run activities in the scheduling environment.

“Job stream” on page 56

“Production process” on page 82

Generating the IBM Workload Scheduler production plan.

---

## Convention for specific platform information

Icons to identify the information related only to specific platforms.

This publication uses the following icons to identify the information related only to specific platforms:

**Distributed**

The information applies only to IBM Workload Scheduler running in a distributed environment.

**z/OS**

The information applies only to IBM Workload Scheduler running in a z/OS environment.

All information that is not marked by an icon applies to all the supported environments.





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## Chapter 2. Getting Started

Information about the Dynamic Workload Console installation and configuration.

For more information about this installation, see the *IBM Workload Scheduler: Planning and Installation*.

To configure the Dynamic Workload Console, see the section about configuring the Dynamic Workload Console in the *IBM Workload Scheduler: Administration Guide* to find information about:

- Launching in context with the Dynamic Workload Console
- Configuring access to the Dynamic Workload Console
- Configuring Dynamic Workload Console to use Single Sign-On
- Configuring the use of Lightweight Third-Party Authentication
- Configuring Dynamic Workload Console to use SSL
- Customizing your global settings
- Configuring Dynamic Workload Console to view reports

You can access the Dynamic Workload Console from any computer in your environment using a web browser through either the secure HTTPS or HTTP protocol.

The first and main actions that you perform when you connect to the Dynamic Workload Console are:

### **Creating a connection to a IBM Workload Scheduler engine**

You specify the details (such as IP address, user name, and password) to access a IBM Workload Scheduler engine, and, optionally, a database to operate with objects defined in plans or stored in the database.

From the Dynamic Workload Console, you can access the current plan, a trial plan, a forecast plan, or an archived plan for the distributed environment or the current plan for the z/OS® environment.

You might want to access the database to perform actions against objects stored in it or to generate reports showing historical or statistical data.

In addition, working both on the database and on plans, you can create and run *event rules* to define and trigger actions that you want to run in response to events occurring on IBM Workload Scheduler nodes.

### **Defining a scheduling environment**

You define your IBM Workload Scheduler network. You create workstation definitions in the database to represent the physical machines or computer systems on which your workload is scheduled to run. A IBM Workload Scheduler network is made up of the workstations where job and job stream processing occurs. When you design your network, you assign roles to these workstations to suit your specific business requirements. You can design your network with multiple domains, to divide control of a large network into smaller manageable groups. A typical IBM Workload Scheduler network consists of a workstation acting as the master domain manager and at least one domain.

### Defining scheduling objects in the database

You define your workload, which consists of jobs that are concatenated in job streams. Then, you specify the calendars and run cycles according to which job streams must run. You can also define dependencies to condition the workload processing. All these definitions can be done within the Workload Designer.

### Creating tasks to manage IBM Workload Scheduler objects in the plan

You specify some filtering criteria to query a list of scheduling objects whose attributes satisfy the criteria you specified. Starting from this list, you can navigate and modify the content of the plan, switch between objects, open more lists, and access other plans or other IBM Workload Scheduler environments.

#### Related concepts:

“Designing your Scheduling Environment” on page 101  
How to create your Scheduling Environment.

“Monitoring your Workload” on page 179  
Controlling and managing scheduling activities and objects on plans with *tasks*.

#### Related tasks:

“Creating and managing engine connections”  
How you can create, modify, or delete engine connections.

“Designing your Workload” on page 107  
Create and editing workload definitions in the database.

---

## Creating and managing engine connections

How you can create, modify, or delete engine connections.

### About this task

To create, modify, or delete an engine connection, perform the following steps.

**Note:** You can modify or delete only engine connections that you have created.

### Procedure

1. From the navigation toolbar, click **System Configuration > Manage Engines**.
2. From the displayed panel you can create, edit, delete, or share an engine connection, and test the connection to the remote server where IBM Workload Scheduler is installed. You can order the list of engine connections displayed in this panel by using sorting criteria that you select with the buttons at the top left corner of the table.

#### Related concepts:

“Scheduling objects” on page 54  
Scheduling objects that you can view and manage using the Dynamic Workload Console.

“Engine connections” on page 87  
An engine connection is a set of configuration information that identifies a specific workstation in the IBM Workload Scheduler environment in the network.

---

## Setting user preferences

You can set user preferences to use in the output of tasks and reports.

## About this task

To set the preferences to use in the output of tasks and reports, perform the following steps.

**Note:** The preferences that you set in this panel are not used in the output of plan reports. Those reports follow the preferences set on the workstation where the query is run.

## Procedure

1. From the navigation toolbar, click **System Configuration > Set User Preferences**. The Set User Preferences panel opens, containing the current settings.
2. To modify the current settings click **Edit**. In this panel you can specify the:
  - Number of rows that are displayed in the table of results of all your tasks as the default setting
  - Options to display dates, times, and time zones
  - Layout and the refresh rate for the dashboard
3. Click **Save changes** to save the changes you made or **Discard changes** to exit the page without saving.

## Results

In the Manage User Preferences panel, you can also enable again the news notification. For details, see “Disabling news notification” on page 27.

---

## Event management configuration

Authorizations needed to use event management.

You can use the event management feature both from the IBM Workload Scheduler command line interface and from the Dynamic Workload Console.

You need the following authorizations to perform event management operations from the Dynamic Workload Console:

### On Dashboard Application Services Hub

The user ID you use to log in to Dynamic Workload Console must be defined as user on Dashboard Application Services Hub and must be defined within one of the following groups:

*Table 2. Event Management Authorizations*

Groups	Event management operations you can perform
TWSWEBUIOperator	List and manage Event Rule Instances, Log Messages, and Triggered Actions.
TWSWEBUIDeveloper	Create, list, and manage Event Rules.

**Note:** Dynamic Workload Console users belonging to the **TWSWEBUIAdministrator** group can perform all operations available in the web-based user interface.

### On IBM Workload Scheduler

The IBM Workload Scheduler user credentials defined in the engine

connection must belong to a IBM Workload Scheduler user authorized to perform event management operations in the IBM Workload Scheduler security file.

You need the *create* permission set for the *rule* object. You also need the *use* permission on the objects (job, job stream, and so on) that you want to use as events.

For more information about how to define and manage user authorizations in the security file, see *IBM Workload Scheduler: Administration Guide*.

**Related concepts:**

“Event management” on page 88

What the event management feature is and how to use it.

---

## Chapter 3. Installing and configuring the Dynamic Workload Console

For more information about this installation, see *Planning and Installation* or *Planning and Installation*

To configure the Dynamic Workload Console, see the *Administration Guide* to find information about:

- Launching in context with the Dynamic Workload Console
- Configuring access to the Dynamic Workload Console
- Configuring Dynamic Workload Console to use Single Sign-On
- Configuring Dynamic Workload Console to use SSL
- Customizing your global settings
- Configuring High Availability for Dynamic Workload Console
- Configuring Dynamic Workload Console to view reports

For more information about z/OS connector instances configuration by using WebSphere Application Server tools, see *IBM Workload Scheduler for z/OS Planning and Installation* > *IBM Workload Scheduler for z/OS connector* > *Installing, Upgrading and Uninstalling IBM Workload Scheduler for z/OS connector on distributed systems*.



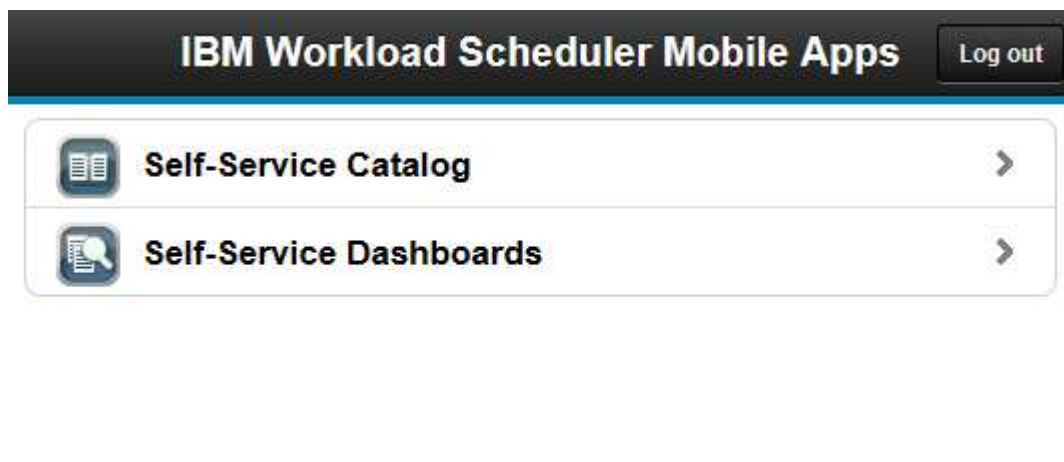
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## Chapter 4. Running IBM Workload Scheduler from a mobile device

Use your mobile device to easily and quickly interact with your IBM Workload Scheduler environment.

The IT market is moving towards mobile devices, which help you perform a large number of tasks, such as manage your sales workforce, read your email, check your accounting system, or attend a web conference. Applications designed for mobile devices must be intuitive and user-friendly while remaining robust and reliable, and providing instant access to business and client data wherever they are.

You can interact with IBM Workload Scheduler by using the Self-Service Catalog and Self-Service Dashboards applications.



To open this home page on your mobile device, access the following URL:  
`https://host_name:port_number/dwc/mobile.jsp`

where *host\_name* and *port\_number* are the host name and port number of the Dynamic Workload Console you are connecting to.

You can open the applications also from the Single Entry Point page.

For details refer to the section about product user interfaces in *IBM Workload Automation: Overview*.

To use an engine connection from a mobile device, ensure the engine credentials are shared or the Dynamic Workload Console is configured to use Single-Sign On. For more information, see the section about configuring the Dynamic Workload Console to use Single Sign-On in the IBM Workload Scheduler Administration Guide.

### Self-Service Catalog

Define services that correspond to IBM Workload Scheduler job streams and submit them from your mobile, even if you do not have any experience with IBM Workload Scheduler. Services are organized into catalogs.

Launch the Self-Service Catalog from your mobile device by connecting to the following URL:

`https://host_name:port_number/dwc/sscatalog.jsp`

where *host\_name* and *port\_number* are the host name and port number of the Dynamic Workload Console you are connecting to.

To launch and use this application, you must have one of the following roles:

**dwcAnalyst**

This is the minimum role required to access Self-Service Catalog. Users with this role can view catalogs and services to which they are authorized and submit service requests. They cannot modify services or catalogs.

**dwcAdministrator**

Users with this role can create, edit, and delete catalogs and services. They can also associate roles to services and catalogs to authorize other users to work with them.

**Self-Service Dashboards**

By defining filter criteria to be applied to your jobs and workstations, you can view dashboards and drill down to more detailed information about the jobs and workstations that match the criteria. You can also perform recovery actions on the jobs and workstations.

Launch the Self-Service Dashboards app from your mobile device by connecting to the following URL:

`https://host_name:port_number/dwc/ssmanagement.jsp`

where *host\_name* and *port\_number* are the host name and port number of the Dynamic Workload Console you are connecting to.

To launch and use this application, you must have one of the following roles:

**dwcAnalyst**

This is the minimum role required to access Self-Service Dashboards. Users with this role can view dashboards for which they are authorized but they cannot modify dashboards.

**dwcAdministrator**

Users with this role can create, edit, and delete dashboards. They can also associate roles to dashboards to authorize other users to work with them.

**Related concepts:**

“Monitoring the progress of your plan” on page 171

Request a graphical view of the progress of the current plan.



---

## Chapter 5. Managing users and repositories

How to configure, change, and share your settings repository and change the DB2 user. How to manage the user settings.

The user settings such as user preferences, saved tasks, and engine connections, which by default are stored in a settings repository that is a local XML file, must be exported and stored in a settings repository on a DB2 database. Using a database as your repository, all your existing user settings relating to current Dynamic Workload Console are saved in the database, and all the operations involving user settings are run using the settings in this repository.

---

### Managing user settings

How to export the user settings and import them into a new Dynamic Workload Console

#### Before you begin

To perform this task you need to have the TWSWEBUIAdministrator role.

#### About this task

User settings such as user preferences, saved tasks, and engine connections are stored in the settings repository, which by default is a local file. However, you can decide to have your settings repository on a database for all Dynamic Workload Console operations that involve user settings.

You can export the content of your settings repository as an XML file, optionally modify it, and then import it into the same or another instance of Dynamic Workload Console.

This is particularly useful for migration purposes or if you want to modify the same settings in multiple Dynamic Workload Console instances.

To export the settings and import them into a new Dynamic Workload Console, perform the following procedure.

**Note:** Import and export operations are performed from and to the currently-selected repository.

#### Procedure

1. From the navigation toolbar, click **System Configuration > Manage Settings**.
2. In the Manage Settings panel, click **Export Settings** and save the XML file in a directory of your choice.
3. Optionally, edit the file using an XML editor and save it.
4. Log in to the Dynamic Workload Console where you want to import the settings and open the Manage Settings panel.
5. Click **Import Settings** and browse to the XML file containing the settings you want to import. During the import operation, you choose to update or to overwrite the existing settings with the new settings.

6. If you are using a local file as repository, restart the Dynamic Workload Console to make the change effective or click **Undo** before restarting it to restore previous settings. This is not required if you are using a database as your repository, but in this case you must ensure that during the import operation there are no other users connected to the Dynamic Workload Console while the repository content is being updated.

---

## Changing settings repository

Changing the settings repository.

### Before you begin

- To perform this task you need to have the TWSWEBUIAdministrator role.
- You need to have access to an installed DB2® where a database has already been created. If you need information about how to create a DB2 database, see IBM DB2 Database for Linux, UNIX, and Windows Information Center.
- You must have Administrator rights on that database.

### About this task

User settings such as user preferences, saved tasks, and engine connections are stored in the settings repository, which by default is a local file. However, you can decide to have your settings repository on a database for all Dynamic Workload Console operations that involve user settings.

This can be useful, for example, for scalability purposes or to have multiple Dynamic Workload Console instances sharing the same user settings.

To use a database for your settings repository, you must configure the database settings, as described in the following procedure:

### Procedure

1. Run the wastool:
  - a. Specify the connection details of the DB2 database in the TDWCDatasource.properties file, located in the following path:*install\_dir*\wastools, where *install\_dir* is the IBM Workload Scheduler installation path.
  - b. To create the data source, submit the **installTDWCDatasource** command from the wastools directory (*install\_dir*\wastools), specifying the TDWCDatasource.properties file you modified in the previous step:  
**On Windows:**

```
installTDWCDatasource.bat TDWCDatasource.properties
```

**On UNIX and Linux:**

```
./installTDWCDatasource.sh TDWCDatasource.properties
```
2. Restart the Dynamic Workload Console.
3. Export your settings:
  - a. From the navigation toolbar, click **System Configuration > Manage Settings**.
  - b. Optionally, in the Manage Settings panel, click **Export Settings** and save the XML file in a directory of your choice. In this way you save your user settings in a local file to load them on the database, when it becomes your settings repository.

4. Switch repository to DB2.
  - a. In the same panel, click **Configure settings repository > Use database as settings repository** to specify that settings must be saved in the database instead of a local file.
  - b. In the **Database connection properties** section, specify the credentials required to connect to the database.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.
  - c. Optionally, you can test the connection.
  - d. Save the new configuration.
5. Import your settings or initialize the database:
  - a. Optionally, click **Import settings** to import your user settings from the XML file to the database repository. During the import operation, keep the default choice, which overwrites the existing settings with the new settings. Performing this step, the database is automatically initialized.
  - b. If you have not performed previous step, click **Configure settings repository >Initialize database** .

## Results

As a result, all your existing user settings relating to current Dynamic Workload Console are saved in the database, and all the operations involving user settings are run using the settings in this repository.

---

## Sharing a settings repository

How to share a settings repository on multiple Dynamic Workload Console instances.

### Before you begin

To perform this task you need to have the TWSWEBUIAdministrator role.

### About this task

User settings such as user preferences, saved tasks, and engine connections are stored in the settings repository, which by default is a local file. However, you can decide to have your settings repository on a database for all Dynamic Workload Console operations that involve user settings.

This can be useful, for example, for scalability purposes or to have multiple Dynamic Workload Console instances sharing the same user settings.

To use a database for your settings repository, you must configure the database settings, as described in the following procedure:

### Procedure

1. Ensure that all the Dynamic Workload Console instances that will share the same settings repository, also use the same user registry.
2. Ensure that one Dynamic Workload Console settings repository has been switched to database, as described in Switch repository to DB2.

3. Specify this repository as the default one for all the other Dynamic Workload Console instances that must share it:
  - a. From the IBM Workload Scheduler installation path, open the `install_dir\wastools` directory and run `installTDWCdatasource wastool` to create the data source, specifying the same database settings as in the first Dynamic Workload Console instance.
  - b. Restart the Dynamic Workload Console.
  - c. From the navigation toolbar, click **System Configuration > Manage Settings**.
  - d. In the same panel, click **Configure settings repository > Use database as settings repository** to specify that settings must be saved in the database instead of a local file.
  - e. In the **Database connection properties** section, specify the credentials required to connect to the database.
  - f. Optionally, you can test the connection.
  - g. Save the new configuration.

## Results

As a result, all user settings are saved in the database, shared by all the Dynamic Workload Console instances, and all the operations involving user settings are run using the settings in this repository.

---

## Changing the Dynamic Workload Console user of DB repository

How to change the Dynamic Workload Console user that updates the settings repository on DB2.

### Before you begin

To perform this task you need to have the TWSWEBUIAdministrator role.

You must have switched the Dynamic Workload Console settings repository from a local file to a database repository, as described in Changing settings repository.

### About this task

Only users with database administrator rights are authorized to initialize the Dynamic Workload Console related tables on the database.

If you want the Dynamic Workload Console to access the database repository with a user without database administrator privileges you must follow these steps:

### Procedure

1. Create a new DB2 user and grant this user with SELECT, INSERT, UPDATE, DELETE rights on all the following tables, belonging to TDWC schema:
  - TDWC\_EngineConnection
  - TDWC\_QueryTask
  - TDWC\_ReportTask
  - TDWC\_MEQueryTask
  - TDWC\_Credential
  - TDWC\_ConfigurationProperty
  - TDWC\_Preferenceable

The above are the default permissions. However, if you need to restrict your policy, you can give the following permissions to the new DB2user:

```
revoke connect,bindadd, createtab, implicit_schema on database from public;  
revoke use of tablespace USERSPACE1 from public;
```

```
grant use of tablespace userspace1 to user twsdb2;  
grant createtab on database to user twsdb2;  
grant implicit_schema on database to user twsdb2;
```

2. Change Dynamic Workload Console user accessing DB2
  - a. From the navigation toolbar, click **System Configuration > Manage Settings**.
  - b. In the **Database Settings** section, specify the credentials of the newly created user that must to connect to the database.

**Note:** As a result of this user switch, theDynamic Workload Console without database administrator privileges will no longer be authorized to the following actions in the Manage Settings panel:

- **Initialize database**
- **Import settings** with **Cancel and re-create** option.



---

## Chapter 6. Configuring High Availability

How to configure, change, and share your settings repository.

Performance can be highly improved by migrating the Dynamic Workload Console to High Availability Configuration, so as to have multiple console instances working at the same time as one console.

If you use a Dynamic Workload Console in High Availability configuration, when you connect to a Dynamic Workload Console you are not actually connecting to a specific console but to a load balancer that dispatches and redirects the connections among the nodes in the configuration. Therefore, for example, if a node fails, new user sessions are directed to other active nodes in the configuration and this change is completely transparent to users.

To implement this kind of configuration, you must perform the following steps:

1. Change your settings repository as described in *Changing settings repository*.
2. Perform and verify the High Availability configuration for the Dynamic Workload Console as described in *Administration guide > Configuring the Dynamic Workload Console > Configuring High Availability for Dynamic Workload Console*

If you need to upgrade an existing high availability configuration refer to the high availability configuration topics in the *IBM Workload Scheduler: Administration Guide*.

---

### Changing settings repository

Changing the settings repository.

#### Before you begin

- To perform this task you need to have the TWSWEBUIAdministrator role.
- You need to have access to an installed DB2 where a database has already been created. If you need information about how to create a DB2 database, see IBM DB2 Database for Linux, UNIX, and Windows Information Center.
- You must have Administrator rights on that database.

#### About this task

User settings such as user preferences, saved tasks, and engine connections are stored in the settings repository, which by default is a local file. However, you can decide to have your settings repository on a database for all Dynamic Workload Console operations that involve user settings.

This can be useful, for example, for scalability purposes or to have multiple Dynamic Workload Console instances sharing the same user settings.

To use a database for your settings repository, you must configure the database settings, as described in the following procedure:

#### Procedure

1. Run the wastool:

- a. Specify the connection details of the DB2 database in the TDWCDatasource.properties file, located in the following path:*install\_dir*\wastools, where *install\_dir* is the IBM Workload Scheduler installation path.
- b. To create the data source, submit the **installTDWCDatasource** command from the wastools directory (*install\_dir*\wastools), specifying the TDWCDatasource.properties file you modified in the previous step:

**On Windows:**

```
installTDWCDatasource.bat TDWCDatasource.properties
```

**On UNIX and Linux:**

```
./installTDWCDatasource.sh TDWCDatasource.properties
```

2. Restart the Dynamic Workload Console.
3. Export your settings:
  - a. From the navigation toolbar, click **System Configuration > Manage Settings**.
  - b. Optionally, in the Manage Settings panel, click **Export Settings** and save the XML file in a directory of your choice. In this way you save your user settings in a local file to load them on the database, when it becomes your settings repository.
4. Switch repository to DB2.
  - a. In the same panel, click **Configure settings repository > Use database as settings repository** to specify that settings must be saved in the database instead of a local file.
  - b. In the **Database connection properties** section, specify the credentials required to connect to the database.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

  - c. Optionally, you can test the connection.
  - d. Save the new configuration.
5. Import your settings or initialize the database:
  - a. Optionally, click **Import settings** to import your user settings from the XML file to the database repository. During the import operation, keep the default choice, which overwrites the existing settings with the new settings. Performing this step, the database is automatically initialized.
  - b. If you have not performed previous step, click **Configure settings repository >Initialize database** .

## Results

As a result, all your existing user settings relating to current Dynamic Workload Console are saved in the database, and all the operations involving user settings are run using the settings in this repository.



---

## Chapter 7. Customizing your console

You can customize your console to have it display just the tasks that you want to access.

When you log in to the Dynamic Workload Console, a welcome page containing quickstart information is displayed with links to additional information such as the online documentation, a product tour, demos and videos, and more. A horizontal navigation bar across the top contains categories of tasks for each product installed on the Dashboard Application Services Hub.

The following sections describe how you can customize the welcome page customize the list of your tasks and the startup page to include only the entries and the pages that you really need to access. In addition to this, you can see how to customize the tasks that you need to run and how to enable or disable the notification about product updates.

For information about customizing user interface labels on the Dynamic Workload Console, see Console identity string.

For information about customizing user interface labels on the Dynamic Workload Console, see Console identity string in the Administering applications and their environment of the WebSphere Application Server product documentation.

---

### Customizing the welcome page

How to customize the welcome page

#### About this task

In the Dashboard Application Services Hub, Administrators can set the console welcome page using the Console Properties page available in Console Settings in the navigation toolbar.

The content of the default Dynamic Workload Console welcome page is customized for the role of the logged in user. The quick start tasks available on the welcome page allow you to access a related how-to video and launch the related portlet. Only the tasks corresponding to the logged in user's role are displayed. To get oriented with the navigation bar, take the tour the visit the items available. The tour brings into focus each of the navigation bar categories and corresponding descriptive text is displayed. There are other helpful links on the page such as link to the embedded online help, the Workload Automation YouTube channel, and a QR code to scan with your mobile device to launch the mobile applications.

The administrator can modify the content of the welcome page through the **Edit Page** option when you click the Page Actions icon. You can modify the widgets, add new widgets and remove existing widgets. This page is an arrangement of widgets. Compose the welcome page with the widgets needed to complete tasks. Widgets are populated with data from datasets. The Dashboard Application Services Hub provides a set of widgets and the Dynamic Workload Console also provides datasets related to your workload.

To customize the welcome page, perform the following steps.

## Procedure

1. From the default Dynamic Workload Console welcome page, click the **Page Actions** icon and then **Edit Page** . If you have startup tasks defined, close the tabs of the startup tasks to return to the welcome page.
2. Add, remove, or modify the widgets on the page using a combination of the Dashboard Application Services Hub widgets and the Dynamic Workload Console widgets.
3. Click **Save** and exit to save your changes.

## Results

The new welcome page is launched every time you log into the console.

For additional information about the Dashboard Application Services Hub, click ? at the top right hand corner of the console window and launch the Dashboard Application Services Hub information center.

For more information about customizing dashboards see “Creating a dashboard for monitoring” on page 198.

### Related concepts:

“Monitoring your Workload” on page 179

Controlling and managing scheduling activities and objects on plans with *tasks*.

“Monitoring your Scheduling Environment” on page 176

Tasks to monitor the workstations and domains of your environment.

Chapter 1, “Navigating the Dynamic Workload Console,” on page 1

An overview to the Dynamic Workload Console.

---

## Customizing your portfolio

How to customize your portfolio.

### About this task

Several products might be integrated in this portal and their related entries are listed together with the ones belonging to the Dynamic Workload Console in the navigation toolbar across the top.

You can create a list of your favorite pages, including only the tasks you use most often.

The **Favorites** icon , lets you access your daily tasks. Entries previously displayed in the **My Tasks** list have been automatically added to **Favorites**.

To add a task to Favorites, simply drag it to the Favorites icon. To remove an item from your list of favorites, click and drag the item that you want to remove away from the list.

Alternatively, to add new tasks or manage existing tasks contained in your Favorites list, perform the following procedure:

### Procedure

1. From the welcome page, click **User > Favorites**.
2. Select only the pages that you want to include among your favorites and click **Apply**.

## Results

Your customized list is displayed in the **Favorites** list.

You can also define which pages must be automatically launched when logging into the Dashboard Application Services Hub by adding them to your startup pages.

For additional information about the Dashboard Application Services Hub console customization, refer Dashboard Application Services Hub **Help** section **Customizing the console**.

---

## Customizing your startup page

How to customize the startup page

### About this task

In the Dashboard Application Services Hub, you can define the list of pages that are launched every time you log in to the console. Use **My Startup Pages** to add or remove dashboards from the list of dashboards or pages that are launched every time you log into the console. Only single task and multiple task dashboards can be added to the startup list. You can set which dashboard is to be opened as the default tab. When you log in, the page or dashboard set as the default startup page is in focus. All other startup pages are opened in secondary tabs. To open one of your startup dashboards, click the link for that page in the Page name column. Close all tabs to return to the welcome page.

To add a page to your startup pages, perform the following steps.

### Procedure

1. Open the page you want to be launched when you log in to the console.
2. Click the **Page Actions** icon at the top right of the panel and select **Add to My Startup Pages**.
3. To remove a page, click **User > My Startup Pages**, select the page in the list and click **Remove**. To specify the page that will be displayed at login time, select **Default**.

## Results

The page that you added is launched every time you log in to the console.

To manage the pages you added, click **User > My Startup Pages** in the toolbar. From this page you can remove the pages from the list or define the default page to be displayed when you log in.

For additional information about the Dashboard Application Services Hub, click **Help** at the top right hand corner of the panel.

### Related concepts:

“Monitoring your Workload” on page 179

Controlling and managing scheduling activities and objects on plans with *tasks*.

“Monitoring your Scheduling Environment” on page 176

Tasks to monitor the workstations and domains of your environment.

## Customizing your tasks

How you edit your task properties.

### Before you begin

To customize a task, you must be the task owner.

### About this task

Configured tasks are provided with default values. However, you can customize their properties and save the newly-modified tasks. You can modify the properties, such as filters and columns, of all the tasks that you own. Starting from a task, you can also customize the properties of secondary queries that are launched starting from the objects resulting from the task.

If you have administrator's rights, you can configure a global setting so as to limit the number of results retrieved by monitor tasks. You can specify the maximum number of items that must be retrieved by the queries, and this configuration will apply to *all* monitor tasks run by current Dynamic Workload Console, except for Monitor Critical jobs. For more information, see “Limit the number of objects retrieved by queries” on page 38.

To customize your tasks, perform the following steps:

### Procedure

1. Click **System Status and Health > All Configured Tasks**.
2. In the All Configured Tasks panel, select a task and click **Task Properties**. The task opens displaying some tabs on the left.
3. Click the tabs that refer to the properties you want to customize.
4. Modify the values as required and click **Save** to save the modified task.

### Results

You have personalized your task. Consider that any customization only applies to the single task you edited. For example, if you change the columns to be displayed in a task named **All Jobs in plan**, this change does not affect any other task to monitor jobs.

### What to do next

#### Customizing secondary queries

While editing or creating a task, you can also choose the columns to display in *secondary* queries. Secondary queries are those that are run from the table of results of a task. For example, from the list of jobs resulting from a task named **My Jobs**, you can run a secondary query to list all job streams and workstations associated to one of the listed jobs.

You can also customize these secondary queries from the Columns Definition panel of any task. In the Columns Definition panel of **My Jobs** task, you can also choose the columns to display in job stream and workstation tasks. However, this column

selection only applies to the lists of job streams and workstations obtained by drilling down from the results of the **My Jobs** task; it does not apply to any other generic monitoring task about job streams or workstations.

For more information on Customizing your tasks refer to: “Creating a monitoring task query” on page 174.

---

## Adding tasks to your favorite bookmarks

How to save a task to the favorite bookmarks of your browser.

### About this task

When you run a task, you can save it as one of the favorite bookmarks of your browser so that you can launch it directly from the browser.

To add a task to your favorite bookmarks, from the panel displaying your task

results, click the user icon  and select **Favorites**.

#### Related concepts:

“Monitoring your Workload” on page 179

Controlling and managing scheduling activities and objects on plans with *tasks*.

“Monitoring your Scheduling Environment” on page 176

Tasks to monitor the workstations and domains of your environment.

Chapter 1, “Navigating the Dynamic Workload Console,” on page 1

An overview to the Dynamic Workload Console.

---

## Accessing hidden portlets

How to access hidden portlets

### About this task

When the **Monitor Workload** portlet was introduced, several of the monitoring portlets were hidden, not removed. If you prefer to work with one of these portlets, you can make them visible again in the navigation toolbar.

Define a task to monitor objects in the plan by specifying a query in a query line using the **Monitor Workload** portlet. The objects for which you can create a monitoring task query are: jobs, critical jobs, job streams, workstations, files, resources, domains, and prompts. In previous versions, there were multiple portlet entries in portfolio, one for each object to monitor. These entries have been condensed into a single entry, the **Monitor Workload**.

### Procedure

1. From the **Console Settings** page, select **Pages**.
2. Expand the **System Status and Health** search and click the portlet name you want to make visible. In **General Properties**, under the **Navigation visibility** option, select **Visible**.
3. Expand the **Roles** link, click on the **Add** button and select the role for example TWSWEBUIOperator and **Save**.
4. From the **Console Settings** page, click **Widget**. A new page is displayed showing all the widgets. Search for the widget name corresponding to the

portlet that you previously modified. If the same name appears more than once, perform the following action for each entry. Click on the Widget name and a new panel is shown. Click **Next** and you will be directed to the security tab under the **Edit** section.

5. From the **Security** tab select the roles you previously added in step 3 and click **Finish**. To see the changes, log out and log in.

## Results

For additional information on the Dashboard Application Services Hub console customization, refer to Dashboard Application Services Hub **Help** section **Customizing the console**.

Refer to [http://www-01.ibm.com/support/knowledgecenter/SSEKCU\\_1.1.0.3/com.ibm.psc.doc\\_1.1.0.3/tip\\_original/edit\\_page.html?cp=SSEKCU\\_1.1.0.3%2F8-2-1-6&lang=en](http://www-01.ibm.com/support/knowledgecenter/SSEKCU_1.1.0.3/com.ibm.psc.doc_1.1.0.3/tip_original/edit_page.html?cp=SSEKCU_1.1.0.3%2F8-2-1-6&lang=en) for more information on editing dashboard content and how to make hide or make visible the navigation bar. To enable the former monitoring portlets such as the Monitoring Jobs portlet, see the Monitor Workload topic.

---

## Using the news notification beacon

How to be always up to date with the latest news and information about the product and receive internal communications from the environment administrator.

### About this task

A beacon appears on your screen when an update for the product or an internal communication from the administrator is made available. Click the beacon to open a pop-up that describes the update and gives you a direct link to it.

Update and news notifications relate to different topics, belonging to categories, such as:

- APARs
- Fixes and utilities
- News
- Technotes
- Product documentation and publications
- Internal communications

By default, the news notification is enabled for all users to all the categories, however, optionally, the TWSWEBUIAdministrator can customize this behavior specifying which user roles must receive all the notifications or only some of them or even none. For more information, see: “Disable and customize NewsFeed function” on page 33.

The news notification is enabled by default, however, to unsubscribe from all the news, or only form the displayed news category, you can select the related check-box in the news pop-up.

In the pop-up window that displays the latest news, you can also navigate through past news and notifications and provide your feedback on a piece of news through a feedback form.

If you have TWSWEBUIAdministrator role or writing rights on the system where Dynamic Workload Console, is installed, you can add multiple **NewsFeed** sections in the `TdwcGlobalSettings.xml` file to transmit different notifications to different user roles. For more information, see “Sending internal communications” on page 28.

## Disabling news notification

How to enable and disable news notification preventing the beacon from appearing on your screen when an update for the product is made available.

### About this task

By default, all users receive all the news notifications. However, optionally, you can customize this behavior by preventing all or only some specific news from being notified to you.

When the beacon appears on your screen and you click it, the first notification displays in a pop-up. If you do not want to receive any notifications at all, or if you want to unsubscribe from some specific categories of notifications, select the related checkbox in the news pop-up.

To enable again all the news notifications, perform the following steps:

1. From the navigation toolbar, click **System Configuration > Set User Preferences**. The Set User Preferences panel containing the current settings is displayed.
2. Click **Restore beacon defaults**.

#### Related reference:

“Disable and customize NewsFeed function” on page 33

## Customizing the list of notification recipients

How to customize the list of recipients of the news notification beacon, by specifying who must receive what kind of notification or communication.

### Before you begin

You must have TWSWEBUIAdministrator role or writing rights on the system where Dynamic Workload Console is installed.

### About this task

By default, the news notification is enabled for all users to all the categories, however, optionally, the TWSWEBUIAdministrator can customize this behavior specifying which user roles must receive all the notifications and internal communications, or only some of them or even none. You can send multiple feeds, containing different communications, addressed to different recipients by customizing the `TdwcGlobalSettings.xml` file and providing multiple feeds, as explained in “Sending internal communications” on page 28.

For example, often operators do not need to have information about new patches and fix packs to be installed or about product events. Analysts are only interested in information and updates about reporting. Whereas, Administrators want to receive all notifications (and, optionally, force the default settings and send a notification to those who are normally excluded from a category).

## Procedure

Customize the `TdwcGlobalSettings.xml` file to specify the news categories that must be notified to users, based on their roles.

You can find a copy of this file also on the installation media in the directory `/utilities/TdwcGlobalSettings.xml`.

The `TdwcGlobalSettings.xml` file is organized into several sections that can be repeated multiple times in the same file and applied differently to different user roles. Therefore, to customize a behavior based on the user role, uncomment the section corresponding to the user role and include the sections that must apply to this role.

The **Disable and customize NewsFeed function** section contains the configuration details regarding the notification beacon. Therefore, for example, to enable the notifications of specific categories only to a specific user role, you can insert a section like the following:

```
<settings role="TWSWEBUIAdministrator">
<NewsFeed>
<property name="NewsFeed" type="RSS" value="http://www.my.company.com/
RSS_administrators.xml" />
<property name="NewsFeedCategory" value="Administrators"
icon="http://www.my.company.com/
administrator.png" />
</NewsFeed>
</settings>
<settings role="TWSWEBUIOperator">
<NewsFeed>
<property name="NewsFeed" type="RSS" value="http://www.my.company.com
/RSS_operators.xml" />
<property name="NewsFeedCategory" value="Operators"
icon="http://www.my.company.com/operators.png" />
</NewsFeed>
</settings>
```

## Example

If no customized feed is specified, the default feed is used, which retrieves the latest product information from official support sites. To disable any notification, comment the entire section. To disable only external notifications about product information updates, assign an empty string as value to the `FeedURL` property of JSONP feed like:

```
<property name="FeedURL" type="JSONP" value="" />
```

### Related reference:

“Disable and customize NewsFeed function” on page 33

## Sending internal communications

How to use the news feed beacon to transmit internal communications to all or some Dynamic Workload Console users.

### Before you begin

You must have `TWSWEBUIAdministrator` role or writing rights on the system where Dynamic Workload Console, is installed.

### About this task

You can use the news notification beacon to send specific communications to internal Dynamic Workload Console users, simply by storing these



communications on the Dynamic Workload Console server. For example, administrators can use this feature to broadcast maintenance notices or company related announcements.

**Note:**

If no customized feed is specified, the default feed is used, which retrieves the latest product information from official support sites. To disable any notification, comment the entire section. To disable only external notifications about product information updates, assign an empty string as value to the FeedURL property of JSONP feed like:

```
<property name="FeedURL" type="JSONP" value="" />
```

To add customized feeds, specify a list of sections named **NewsFeed** in the `TdwcGlobalSettings.xml` file by performing the following procedure:

### Procedure

1. Edit the `TdwcGlobalSettings.xml` file by adding the properties specifying the name and format of the file in the **NewsFeed** section. **Example:**

```
<property name="NewsFeed" type="RSS"
value="http://www.DWC_hostname:portnumber.com/news_rss.xml"/>
```

For more details, see the “Customizing your global settings” on page 30.

2. Optionally, specify a polling interval for the feed reading and an image associated to the notification. **Example:**

```
<property name="PollInterval" value="600" />
<property name="PollInitialDelay" value="1" />
<property name="NewsFeedCategory" value="my company info"
icon="http://www.my.company.com/info.png" />
<property name="NewsFeedCategory" value="my company alert"
icon="http://www.my.company.com/alert.png" />
```

**Note:** To specify multiple feeds, you must specify multiple **NewsFeed** properties.

3. Optionally, specify a list of feeds that must be taken into consideration by the notification feature. The browser detects new items from all the specified feeds and merge them sorting them by date in a single list.
4. Write the communication in ATOM 1.0 or RSS 2.0 format and store this file in the an HTTP server complying with the *same origin policy*. For browser security reasons, this policy permits to access information only on server using the same protocol, hostname and port number as the one to which you are connected.
5. Optionally, if you want to store your customized feed on an external server, you must configure an HTTP reverse proxy server mapping the external server address.

### Results

The notification beacon function reads all the feeds specified in the **NewsFeed** section, detects new information and aggregates all in a single file ordering it by date. Then, it transmits notifications and internal communications to the recipients based on the roles specified in the `TdwcGlobalSettings.xml` file.

**Related reference:**

“Disable and customize NewsFeed function” on page 33

---

## Customizing your global settings

How to customize global settings.

### About this task

To customize the behavior of the Dynamic Workload Console, you can optionally configure some advanced settings. These settings are specified in a customizable file named `TdwcGlobalSettings.xml.template`.

By default, the customizable file is copied into the following path after you install the Dynamic Workload Console:

#### For Windows systems:

```
C:\Program Files\IBM\JazzSM\profile\registry\  
TdwcGlobalSettings.xml.template
```

#### For UNIX and Linux systems:

```
/opt/IBM/JazzSM/profile/registry/TdwcGlobalSettings.xml.template
```

You can find a copy of this file also on the installation media in the directory `/utilities/TdwcGlobalSettings.xml`.

If you have Administrator privileges, you can modify the file to replace default values with customized ones and enable commented sections. To enable commented sections, remove the `<!--` and `-->` tags that enclose the section. You then save the file locally with the name `TdwcGlobalSettings.xml`.

You can add and modify some customizable information, such as:

- The URLs that link to videos in the Dynamic Workload Console. For example, you can link to a company intranet server to view help videos rather than to a public video site.
- The maximum number of objects to be shown in the graphical views.
- The setting to display the plan view in a new window.
- The auto refresh interval for the **Show Plan View** graphical view.
- The configuration details to enable the news notification beacon and be constantly up-to-date with product information. See [Disabling news notification](#).
- The creation of predefined tasks.
- The URLs where you can store customized documentation about your jobs or job streams to associate customized documentation to them.
- The current user registry in use.
- The timeout to read and write information on a IBM Workload Scheduler for z/OS engine.
- The maximum number of objects to be retrieved with a query, the maximum number of rows to display in a table, and the maximum number of direct queries to maintain in history.
- Allowing or preventing users from sharing tasks and engine connections.
- The display of all dependencies, both satisfied and unsatisfied.
- The use of audit files to track activities in the Self-Service Catalog and Self-Service Dashboards mobile applications.
- Displaying or hiding all predecessors from the What-if Analysis Gantt view.

This file is accessed at each login, and all configurations specified in the file are immediately applied, except for the **precannedTaskCreation** property. This property is read only when a user logs in for the first time and is then used whenever this user logs in again.

You can use any text or XML editor to edit this file, but ensure that you save it as a valid XML file.

The file is organized into sections that group similar properties. An explanation of each section is available in the file. For more information, see “TdwcGlobalSettings.xml sample” on page 43.

Sections can also be repeated multiple times in the same file and applied differently to different user roles. To apply a section only to the users belonging to a role, the section must be included within the tags `<settings role="user_role">` and `</settings>`, where:

`<user_role>`

The user for which the enclosed configuration must be applied. The default value is all users, unless otherwise specified.

Only one **settings** section can be specified for each role. If a user has more than one role, the settings associated to the higher role are used.

#### Example:

```
<?xml version="1.0"?>
<tdwc>
.
.
<settings>
<graphViews>
<property name="planViewNewWindow" value="true"/>
</graphViews>
</settings>

<settings role="TWSWEBUIOperator">
<graphViews>
<property name="planViewNewWindow" value="false"/>
</graphViews>
</settings>
.
.
</tdwc>
```

To view the complete syntax for the file, see “TdwcGlobalSettings.xml sample” on page 43.

## Customize video URLs

This section shows how you should customize your URLs that link video content in the Dynamic Workload Console so that you can link to a company intranet server to view help videos rather than a public video site.

The `_baseUrl` prefix will be added to all your video URLs. If you do not specify a link for your video the default setting will automatically be used.

```
<codeblock><?xml version="1.0"?>
<tdwc>
.
.
<settings>
```

```

-<videoGallery>
<property name="_baseUrl" value=""></property>
<property name="depLoop" value=""></property>
<property name="highlightRelDep" value=""></property>
<property name="viewDepPrompt" value=""></property>
<property name="usingImpactView" value=""></property>
<property name="createUseTasks" value=""></property>
<property name="weAddRemoveFile" value=""></property>
<property name="weCreateDeps" value=""></property>
<property name="weAddJob" value=""></property>
<property name="weHighlightDeps" value=""></property>
<property name="weCreateJCL" value=""></property>
</videoGallery>
<!-- </settings>
.
.
</tdwc>

```

## Override graphical view limits

This section contains the configuration parameters that apply to the graphical views in the plan, such as the maximum number of objects shown in each view.

### planViewMaxJobstreams

The maximum number of job streams displayed in the Plan View. Default value is **1000**. Values greater than **1000** are not supported.

### preProdPlanViewMaxJobstreams

The maximum number of job streams displayed in the preproduction plan view. Default value is **1000**. Values greater than **1000** are not supported.

```

<?xml version="1.0"?>
<tdwc>
.
.
<settings>
<graphViews>
<property name="planViewMaxJobstreams" value="1000"></property>
<property name="preProdPlanViewMaxJobstreams" value="1000"></property>
</graphViews>
</settings>.
.
</tdwc>

```

See “TdwcGlobalSettings.xml sample” on page 43 to view the complete syntax for the file.

## Plan View in new window

This section is used to prevent Internet Explorer 7 from freezing while using the Plan View. To solve the problem, set value to **true**.

### planViewNewWindow

Set it to **true** if you want the plan view to be displayed in a new window each time it is launched. Default value is **false**.

```

<?xml version="1.0"?>
<tdwc>
.
.
<settings>
<graphViews>
<property name="planViewNewWindow" value="true"/>
</graphViews>

```

```
.  
.  
</settings>  
</tdwc>
```

See “TdwGlobalSettings.xml sample” on page 43 to view the complete syntax for the file.

## Plan View auto refresh interval

Use this section to change the default setting of the auto refresh interval for the Show Plan View graphical view for all users. By default, the auto refresh interval is 300 seconds (five minutes).

### PlanViewAutorefresh

The graphical representation of the Plan View is automatically refresh every 300 seconds by default. To change this setting, edit the value assigned to the **DefaultTime** property. The minimum value you can set is 30 seconds. Any value specified below this value is reset to 30 seconds. You must restart the Dynamic Workload Console application server after modifying this value.

```
<?xml version="1.0"?>  
<tdwc>  
.  
.  
  <settings>  
    <PlanViewAutorefresh>  
      <property name="DefaultTime" value="300"/>  
    </PlanViewAutorefresh>  
  .  
  </settings>  
</tdwc>
```

See “TdwGlobalSettings.xml sample” on page 43 to view the complete syntax for the file.

## Disable and customize NewsFeed function

This section contains the configuration details to be constantly up-to-date with product information.

### FeedURL

Contains the URL from which you receive news and updates. Default value is: <https://www.ibm.com/developerworks/community/wikis/form/anonymous/api/wiki/585f5525-a7f5-48ef-9222-50ad582e85f4/page/e599dd3c-8dc3-4ab6-89fd-33f81a994799/attachment/de677e63-5a9d-46db-a010-18ca38f05812/media/tws.jsonp>

### FeedType

A string that identifies the format of update information. Default value is **JSONP**.

### PollInterval

The interval in seconds between two checks for updates. Default value is **600**.

### PollInitialDelay

An initial delay in seconds before the first attempt to read the news feeds. After the initial load, the poll interval is used. Default value is **120**.

## NewsFeed

Property used to add further customized news feeds. Specify the format and address of the file that contains the customized communication. Supported formats are RSS 2.0 and ATOM 1.0. You must write the communication in ATOM 1.0 or RSS 2.0 format and store this file in the an HTTP server complying with the *same origin policy*. For browser security reasons, this policy permits to access information only on server using the same protocol, hostname and port number as the one to which you are connected. Optionally, if you want to store your customized feed on an external server, you must configure an HTTP reverse proxy server mapping the external server address.

```
<property name="NewsFeed" type="RSS"
value="http://DWC_hostname:portnumber.com/news.rss" />
```

**Note:** To specify multiple feeds, you must specify multiple **NewsFeed** properties.

## NewsFeedCategory

The name of the customized information. It can be used to identify informational, warning or alert messages, for example. The path to an image can also be added to better identify the information with an icon.

To add more category images, specify a list of properties named **NewsFeedCategory**, for example:

```
<property name="NewsFeedCategory" value="my company info"
icon="http://www.my.company.com/info.png" />
<property name="NewsFeedCategory" value="my company alert"
icon="http://www.my.company.com/alert.png" />
```

If no customized feed is specified, the default feed is used, which retrieves the latest product information from official support sites. To disable any notification, comment the entire section. To disable only external notifications about product information updates, assign an empty string as value to the FeedURL property of JSONP feed like:

```
<property name="FeedURL" type="JSONP" value="" />
```

## Example:

```
<?xml version="1.0"?>
<tdwc>
.
.
  <settings>
<NewsFeed>
<property name="NewsFeed" type="RSS"
value="http://www.DWC_hostname:portnumber.com/my_rss.xml" />
<property name="NewsFeed" type="ATOM"
value="http://www.DWC_hostname:portnumber.com/my_atom.xml" />

<property name="PollInterval" value="600" />
<property name="PollInitialDelay" value="1" />

<property name="FeedURL" type="JSONP" value="" />

<property name="NewsFeedCategory"
value="my company info" icon="http://www.DWC_hostname:portnumber.com
/info.png" />
<property name="NewsFeedCategory"
value="my company alert" icon="http://www.DWC_hostname:portnumber.com
/alert.png" />
```

```

</NewsFeed>
  </settings>
  .
  .
</tdwc>

```

See “TdwGlobalSettings.xml sample” on page 43 to view the complete syntax for the file.

**Related tasks:**

“Customizing the list of notification recipients” on page 27

How to customize the list of recipients of the news notification beacon, by specifying who must receive what kind of notification or communication.

“Disabling news notification” on page 27

How to enable and disable news notification preventing the beacon from appearing on your screen when an update for the product is made available.

“Sending internal communications” on page 28

How to use the news feed beacon to transmit internal communications to all or some Dynamic Workload Console users.

## Disable and customize the creation of predefined tasks

This section defines the environment for which predefined tasks are created.

**precannedTaskCreation**

Some predefined tasks are created by default and are available when you log in to the console. There is a predefined Monitor task for every object, for both z/OS and distributed engines. Default value is **all**. To change this setting, use one of the following values:

**all** All predefined tasks are created. This is the default.

**distributed** Only predefined tasks for distributed engines are created

**zos** Only predefined tasks for z/OS engines are created

**none** No predefined task is created.

```

<?xml version="1.0"?>
<tdwc>
  .
  .
  <settings>
<application>
<property name="precannedTaskCreation" value="all"/>
</application>
</settings>
  .
  .
</tdwc>

```

See “TdwGlobalSettings.xml sample” on page 43 to view the complete syntax for the file.

## Add customized URL to job and job streams

This section contains URLs where you can store customized documentation about your jobs or job streams. By default, this setting is not specified. If you want to associate customized documentation to a job or job stream, use this setting to specify the external address where this information is located.

If you want to specify a URL where customized documentation for a job and job stream is stored, uncomment the section lines, specify the required URL, and optionally assign a name to the UI label by specifying a value for the `customActionLabel` property. By default this name is **Open Documentation**. This label is then displayed in the **More Actions** menus in Monitor Jobs and Monitor Job Streams tasks, as well as in the graphical views of the plan (in the object's tooltips, context menus and properties). In this example, selecting **Open Documentation** accesses the relevant documentation making it possible to open the documentation while monitoring your job or job stream in the plan.

To implement this setting, assign values to the following keywords:

**customActionLabel**

The name of the action displayed in menus, object properties, and tooltips to access customized documentation about your jobs or job streams. By default this name is "Open Documentation" unless you customize the name with this keyword.

**jobUrlTemplate**

The address of your job documentation. No default value available.

**jobstreamUrlTemplate**

The address of your job stream documentation. No default value available.

```
<?xml version="1.0"?>
<tdwc>
.
.
<settings>
  <twsobjectDoc>
    <property name="jobstreamUrlTemplate"
      value="http://www.yourhost.com/tws/docs/jobstream/${js_name_w}"/>
    <property name="jobUrlTemplate"
      value="http://www.yourhost.com/docs/jobs/${job_name_w}"/>
    <property name="customActionLabel" value="Your Custom Label Name"/>
  </twsobjectDoc>
</settings>
.
.
</tdwc>
```

See "TdwGlobalSettings.xml sample" on page 43 to view the complete syntax for the file.

These properties must be valid URLs, containing one or more of the variables listed in the table below.

If you use any of the following special characters in the URL, you must write them as follows:

*Table 3. Syntax for special characters*

Special characters	Write them as...
<i>quote</i> (")	\"
<i>apostrophe</i> (')	&apos;
<i>ampersand</i> (&)	&amp;
<i>less than</i> (<)	&lt;
<i>greater than</i> (>)	&gt;
<i>backslash</i> (\)	\\



Multiple variables can be included in a URL and must be specified using the following syntax: `${variable}`:

*Table 4. Variables used in the URL definition*

Name	Object	Description
job_number_w	Job z/OS	The number of the job
job_wkst_w	Job	The name of the workstation on which the job runs
job_jsname_w	Job	The name of the job stream that contains the job
job_jswkst_w	Job	The name of the workstation on which the job stream runs
job_actualarrival_w	Job z/OS	The actual start time of the job (date format: YYYY-MM-DDThh:mm:ss)
job_actualend_w	Job z/OS	When the job actually completed (date format: YYYY-MM-DDThh:mm:ss)
job_starttime_w	Job	The start time of the job (date format: YYYY-MM-DDThh:mm:ss)
job_id_w	Job	The ID of the job
job_returncode_w	Job	The return code of the job
js_name_w	Job stream	The name of the job stream that contains the job
js_wkst_w	Job stream	The name of the workstation on which the job stream runs
js_id_w	Job stream	The job stream ID
js_latest_start_w	Job stream	The latest time at which a job stream can start (date format: YYYY-MM-DDThh:mm:ss)
engine_name_w	Engine	The name of the engine connection
engine_host_w	Engine	The hostname of the engine connection
engine_port_w	Engine	The port number of the engine connection
engine_plan_w	Engine	The ID of selected plan
engine_serv_w	Engine	The remote server name of the engine connection

## User registry

Use this section to configure some properties related to the User Registry in use.

### groupIdMap

The property is related to the groups of User Registry, and can be modified to map and display the specified value of each group. The default is the common name of the group.

### Examples:

```

<?xml version="1.0"?>
<tdwc>
.
.
<settings>
<security>
<property name="groupIdMap" value="cn"></property>
</security>
</settings>
.
.
</tdwc>

```

Therefore, if you need to change the default value "cn" to "racfid", you can define this property as follows:

```
<property name="groupIdMap" value="racfid"></property>
```

See “TdwGlobalSettings.xml sample” on page 43 to view the complete syntax for the file.

## z/OS http connections

Use this section to configure the timeout to read and write information on IBM Workload Scheduler for z/OS engine. When you connect to the IBM Workload Scheduler for z/OS engine to retrieve a list of defined objects, you receive an error message if the list is not returned within the timeout period. The value is expressed in milliseconds.

### Example:

```

<?xml version="1.0"?>
<tdwc>
.
.
<settings>
<http>
<property name="zosHttpTimeout" value="90000" />
</http>
.
.
</settings>
</tdwc>

```

See “TdwGlobalSettings.xml sample” on page 43 to view the complete syntax for the file.

## Limit the number of objects retrieved by queries

If you are connected to engines V9.1 this setting is ignored.

Use this section to configure: the number of results displayed for Monitor tasks, the maximum number of rows to display on each page, and the number of direct queries to maintain in history.

If you want to limit the number of results produced by your queries, you can specify the maximum number of items that must be retrieved using the monitorMaxObjectsPM property. The minimum number of retrieved results is 500.

The default value is -1; any value lower than 0 means that there is no limit in the number of objects retrieved.

Because data is extracted in blocks of 250 rows, the value you enter is adjusted to complete an entire block. For example, if you specify a limit of 500, only 500 elements are retrieved, while if you specify a limit of 600, 750 elements are retrieved.

For Multiple engine tasks, this limit is applied to each engine included in the query. Therefore, if you specify a limit of 500 results and, for example, you run a Monitor jobs on multiple engine task on three engines, the results produced by your query will be no more than 500 *for each engine*, for a maximum of 1500 rows.

**Note:** This setting does not apply to Monitor critical jobs tasks.

To set the maximum number of rows to display in a table view, configure the `maxRowsToDisplay` property.

To set the maximum number of direct queries to maintain in history, configure the `maxHistoryCount` property. These queries are available from the pull-down for the Query field on the Monitor Workload page.

```
<?xml version="1.0"?>
<tdwc>
.
.
<settings>
  <monitor>
    <property name="monitorMaxObjectsPM" value="2000"></property>
  </monitor>

  <monitor>
    <property name="maxRowsToDisplay" value="25"></property>
  </monitor>

  <monitor>
    <property name="maxHistoryCount" value="100"></property>
  </monitor>
</settings>
.
.
</tdwc>
```

See “TdwGlobalSettings.xml sample” on page 43 to view the complete syntax for the file.

**Related concepts:**

“Job” on page 55

Information about jobs, which are scheduling objects used to define and run activities in the scheduling environment.

“Job stream” on page 56

“Workload service assurance” on page 93

Basic concepts about critical jobs and the critical path, which are fundamental to take advantage of this feature.

“Monitoring jobs running on multiple engines” on page 245

Using the Dynamic Workload Console to create a task to simultaneously monitor jobs that run on multiple engines.

**Related tasks:**

“Creating a task to Monitor Jobs” on page 180

How you can create a Monitor Jobs task.

“Creating a task to Monitor Critical Jobs” on page 182

Why and how you can create a Monitor Critical Jobs task.

“Creating a task to Monitor Jobs on Multiple Engines” on page 185  
Why and how you create a Monitor Jobs task to run on multiple engines.

“Creating a task to Monitor Job Streams” on page 187  
How you can create a Monitor Job Streams task.

“Creating a task to Monitor Job Streams on Multiple Engines” on page 189  
Why and how you create a Monitor Job Streams task to run on multiple engines.

“Creating job stream definitions” on page 110  
How to define a new job stream definitions using the Dynamic Workload Console.

**Related information:**

“Using workload service assurance to monitor z/OS critical jobs” on page 243  
How to monitor jobs that are critical for the customer business and that must complete by their deadline.

## Limit task and engine sharing

Use this section to prevent users from sharing tasks and engines.

By default there is no limit to task and engine sharing and all users are authorized to share their tasks and engine connections. If you want to change this behavior, preventing users from sharing tasks and engines, set this property to **true**.

The property default value is **false**, set it to **true** to enable the limit:

**limitShareTask**

Set to true to prevent users from sharing tasks.

**limitShareEngine**

Set to true to prevent users from sharing engine connections.

```
<?xml version="1.0"?>
<tdwc>
.
.
<settings>
  <security>
    <property name="limitShareTask" value="false" />
    <property name="limitShareEngine" value="false" />
  </security>
</settings>
.
.
</tdwc>
```

See “TdwGlobalSettings.xml sample” on page 43 to view the complete syntax for the file.

## Entries in Workload Designer search windows

This section contains the configuration parameters that apply to the search views of Workload Designer.

**search\_max\_limit**

This optional parameter sets the maximum number of entries displayed in Workload Designer search windows. The default value is 250. It is recommended not to use values greater than 999.

**Example:**

```

<?xml version="1.0"?>
<tdwc>
.
.
<settings>
  <search>
    <property name="search_max_limit" value="500"></property>
  </search>
</settings>
.
.
</tdwc>

```

## Show all dependencies

This section defines whether to show all dependencies displayed, regardless of their being satisfied or not.

### ShowDependencies

When you open the dependencies panel from Monitor jobs and Monitor job streams task results, by default only **Not Satisfied** dependencies are shown. Uncomment this section and leave the value set to "**true**" to have all dependencies displayed, regardless of their being satisfied or not.

Possible values are:

**true** All dependencies displayed, regardless of their being satisfied or not.

**false** Only not satisfied dependencies are displayed.

```

<?xml version="1.0"?>
<tdwc>
.
.
<settings>
  <ShowDependencies>
    <property name = "AlwaysShowAllDependencies"
      value="true"></property>
  </ShowDependencies>
</settings>
.
.
</tdwc>

```

See "TdwcGlobalSettings.xml sample" on page 43 to view the complete syntax for the file.

## Auditing mobile app activity

This section defines whether to track activities performed in the Self-Service Catalog and Self-Service Dashboards applications in an auditing log file.

For information about the name and location of the log file, see the logs and traces section in the *Troubleshooting Guide*.

### SSAuditing

This value is set to "**true**" by default so that operations performed in the Self-Service Catalog and Self-Service Dashboards applications are written to a log file. The log file contains information such as creation, modification and deletion dates, the operations performed in the mobile apps, and the user performing the operations. Possible values are:

- true** Operations performed in the Self-Service Catalog and Self-Service Dashboards applications are tracked in an auditing log file.
- false** Operations performed in the Self-Service Catalog and Self-Service Dashboards applications are not tracked in an auditing log file.

#### **SSAuditingLogSize**

The maximum size of a log file in KB. When a log file reaches the maximum size, the system rolls that log file over and creates a new file. By default, the maximum size of a log file is 100 KB.

#### **SSAuditingLogFiles**

The default number of log files to create. When this number is met and the latest log file reaches its maximum size, the system deletes the oldest log file and rolls the latest file over and creates a new file.

```
<?xml version="1.0"?>
<tdwc>
.
.
<settings>
<SSCAuditing>
    <property name = "SSAuditing"          value="true"></property>
    <property name = "SSAuditingLogSize"  value="100"></property>
    <property name = "SSAuditingLogFiles" value="2"></property>
</settings>
.
.
</tdwc>
```

See “TdwGlobalSettings.xml sample” on page 43 to view the complete syntax for the file.

## **Modifying the number of archived plans displayed in the Dynamic Workload Console**

You can modify the number of archived plans displayed in the Monitor Workload view of the Dynamic Workload Console. The default number is 30 plans.

To modify the default number, configure the following property in the **TdwGlobalSettings.xml** file:

```
<monitor>
    <property name="maxArchivedPlan" value="30"></property>
</monitor>
```

See “TdwGlobalSettings.xml sample” on page 43 to view the complete syntax for the file.

## **Show or hide predecessors from What-if Analysis Gantt view**

When you have hundreds of predecessors, you can optimize performance by excluding them from the What-if Analysis Gantt view. By default, all predecessors are loaded into the What-if Analysis Gantt view. To exclude them, uncomment this section and leave the default setting of the property **whatIfAutoLoadPreds** to "false" . To revert back to the default behavior either set the property to "true" or comment the section again in the **TdwGlobalSettings.xml** file.

To modify the default setting, configure the following property in the **TdwGlobalSettings.xml** file:

```

=          <WhatifAnalysis>
=            <property name = "whatIfAutoLoadPreds" value="false"></property>
=          </WhatifAnalysis>
=

```

See "TdwcGlobalSettings.xml sample" to view the complete syntax for the file.

## TdwcGlobalSettings.xml sample

The following example is a sample of the file:

```

<?xml version="1.0"?>
<tdwc>
#####
##### SETTINGS FOR ALL USERS #####
#####
<settings>
#####
## CUSTOMIZE LINKS TO VIDEOS ##
#####
-->
<!--
This section shows how you should customize your URLs that link video content in
the Dynamic Workload Console so that you can link to a company intranet server to
view help videos rather than a public video site.
-->
<!--
<videoGallery>
<property name="_baseUrl" value=""></property>
<property name="depLoop" value=""></property>
<property name="highlightRelDep" value=""></property>
<property name="viewDepPrompt" value=""></property>
<property name="createUseTasks" value=""></property>
<property name="weAddRemoveFile" value=""></property>
<property name="weCreateDeps" value=""></property>
<property name="weAddJob" value=""></property>
<property name="weHighlightDeps" value=""></property>
<property name="weCreateJCL" value=""></property>
</videoGallery>
-->
<!--
#####
##### SECTION 1 - GRAPHICAL VIEW SETTINGS #####
#####
-->
<!--
This section specifies the maximum number of objects shown in each graphical view.
Default value is 1000 for all properties. Values greater than 1000 are not supported.
-->
<!--
<graphViews>
<property name="planViewMaxJobstreams" value="1000"></property>

<property name="preProdPlanViewMaxJobstreams" value="10"></property>

</graphViews>

#####
##### SECTION 2 - PLAN VIEW IN NEW WINDOW #####
#####
-->
<!--
This section is used to prevent Internet Explorer 7 from freezing while using the Plan View.
To solve the problem, set value to true. Default value is false.
-->
<!--
<graphViews>
<property name="planViewNewWindow" value="true"/>
</graphViews> <!--
#####
##### SECTION 3 - PLAN VIEW AUTO REFRESH #####
#####
-->
<!--
Use this section to change the default setting of the auto refresh interval for the
Show Plan View graphical view for all users. By default, the auto refresh interval is
300 seconds (five minutes). The minimum value you can set is 30 seconds.
Any value specified below this value is reset to 30 seconds. You must restart the
Dynamic Workload Console application server
after modifying this value.
-->
<!--
<PlanViewAutorefresh>
<property name="DefaultTime" value="300"></property>
</PlanViewAutorefresh> <!--
#####
##### SECTION 4 - DISABLE / CUSTOMIZE NEWS FEED FUNCTION #####
#####
-->
<!--
This section allows overriding the properties concerning the "NewsFeed" function.
Default values are as follows:
<NewsFeed>
<property name="FeedURL" value="https://www.ibm.com/developerworks/community/wikis/form/
anonymous/api/wiki/585f525-a7f5-48ef-9222-50ad582e85f4/page/e599dd3c-8dc3-4ab6-89fd-
33f81a994799/attachment/de677e63-5a9d-46db-a010-18ca38f05812/media/tws.jsonp"
<property name="FeedType" value="JSONP" />

```

```

<property name="PollInterval" value="3600" />
</NewsFeed>
-->
<!--
To disable the function
-->
<!--
<NewsFeed>
<property name="FeedURL" value="" />
<property name="FeedType" value="JSONP" />
<property name="PollInterval" value="3600" />
</NewsFeed>
-->
<!--
#####
##### SECTION 5 - DISABLE /CUSTOMIZE CREATION OF PREDEFINED TASKS #####
#####
-->
<!--
To avoid or customize the creation of predefined tasks at first logon.
Possible values are:
all          both distributed and z/OS tasks are created. This is the default value
none         no task is created
distributed  only distributed tasks are created
zos          only z/OS tasks are created
-->
<!--
<application>
<property name="precannedTaskCreation" value="all"/>
</application>
-->

<!--
#####
##### SECTION 6 - ADD A CUSTOM DOCUMENTATION URL TO JOB/JOB STREAM #####
#####
-->
<!--
This section contains URLs where you can store customized documentation about your jobs
or job streams. By default this setting is not specified. If you want to associate
customized documentation to a job or job stream, use this setting to specify the
external address where this information is located. If you want to specify a URL to be
opened as related documentation for job and job stream, uncomment the section lines so
that a new action, Open Documentation, is inserted in the More Actions menu for Monitor
Jobs and Monitor Job Streams tasks. The new action links to the specified URL

You can customize the URL template by using variables. The variables have the syntax
    ${<variable_name>}

For the complete list of variables, see the documentation.
-->
<!--
<twObjectDoc>
<property name="jobstreamUrlTemplate" value="http://www.yourhost.com/tws/docs/jobstream/${js_name_w}" />
<property name="jobUrlTemplate" value="http://www.yourhost.com/docs/jobs/${job_name_w}" />
<property name="customActionLabel" value="Custom Action" />
</twObjectDoc>
-->

<!--
#####
##### SECTION 7 - USER REGISTRY #####
#####
In this section you can configure some properties about the User Registry in use.
The property groupIdMap is related to the groups of User Registry, and can be modified
to map and display the specified value of each group. By default the common name of the
group is displayed.
-->
<!--
<security>
<property name="groupIdMap" value="cn"></property>
</security>
-->

<!--
#####
##### SECTION 8 - Z/OS HTTP CONNECTIONS #####
#####
Use this section for increase or decrease timeout for http connection in Z/OS
environment. Change this setting if you receive a connection timeout using plugin
actions/picklists.

The setting is in milliseconds.
-->
<!--
<http>
<property name="zosHttpTimeout" value="90000" />
</http>
-->
<!--
#####
##### SECTION 9 - LIMIT THE NUMBER OF OBJECTS RETURNED BY THE QUERIES #####
#####
<!--
Use this section to configure: the number of results displayed for Monitor tasks, the
maximum number of rows to display on each page, and the number of direct queries to
maintain in history. This setting applies to all tasks except for Monitor critical jobs
and Monitor jobs on multiple engines.
If you want to limit the number of results produced by your queries, you can specify the
maximum number of items that must be retrieved. The default value is -1; any value lower
than 0 means that there is no limit in the number of objects retrieved. The minimum number
of retrieved results is 500. Because data is extracted in blocks of 250 rows, the value
you enter is adjusted to complete an entire block. For example, if you specify a limit of
500, only 500 elements are retrieved, while if you specify a limit of 600, 750 elements
are retrieved.

```



To set the maximum number of rows to display in a table view, configure the `maxRowsToDisplay` property.  
 To set the maximum number of direct queries to maintain in history, configure the `maxHistoryCount` property. These queries are available from the pull-down for the Query field on the Direct Query page.

```

<monitor>
  <property name="monitorMaxObjectsPM" value="2000"></property>
</monitor>

<monitor>
  <property name="maxRowsToDisplay" value="25"></property>
</monitor>

<monitor>
  <property name="maxHistoryCount" value="100"></property>
</monitor>
-->

<!--
#####
##### SECTION 10 - LIMIT TASK AND ENGINE SHARING #####
#####
Use this section to prevent users from sharing tasks and engines.
By default there is no limit to task and engine sharing and all users are authorized to share
their tasks and engine connections. If you want to change this behavior, preventing users from
sharing tasks and engines, set this property to true. The property default value is false,
set it to true to enable the limit:
-->
<!--
<security>
<property name="limitShareTask" value="false" />
<property name="limitShareEngine" value="false" />
</security>
-->

<!--
#####
##### SECTION 11 - CHANGE DEFAULT BEHAVIOR FOR DEPENDENCIES PANEL #####
#####
Use this section to change the default behavior of the UI when displaying dependencies in
the dependencies panel. By setting this value to true, by default, all dependencies are
displayed, and not just the unsatisfied ones.
-->
<!--
<ShowDependencies>
  <property name = "AlwaysShowAllDependencies"
value="true"></property>
</ShowDependencies>
-->

#####
##### SECTION 12 - CHANGE DEFAULT BEHAVIOR FOR SSC AND SSD AUDITING #####
#####
Use this section to change the default behavior of the auditing of activities performed
using the Self-Service Catalog and the Self-Service Dashboards applications. By default,
auditing is enabled. You can also set the maximum size of the log file before it rolls
over to a new log file, and the maximum number of log files maintained.
-->
<!-- <SSCAuditing>
  <property name = "SSAuditing" value="true"></property>
  <property name = "SSAuditingLogSize" value="100"></property>
  <property name = "SSAuditingLogFiles" value="2"></property>
-->

#####
##### SECTION 13 - URL FOR AGENT LICENSE #####
#####
Use this section to change the default Agent License URL.
-->
<!-- <AgentLicense>
  <property name = "URL" value="https://controller.wa.ibm.serviceengage.com/SaaSGovernorWeb
/LicenseServlet"></property>
</AgentLicense>#####
##### SECTION 14 - WHAT-IF ANALYSIS #####
#####
Use this section to show or hide predecessors from the What-If Analysis Gantt view.
By default, all predecessors are loaded in the view. To exclude them, uncomment this
section and leave the setting of the property whatIfAutoLoadPreds to
"false". To revert back to the default behavior, either set the property to "true"
or comment this section again so that it is ignored.
-->
<!-- <WhatifAnalysis>
  <property name = "whatIfAutoLoadPreds" value="false"></property>
</WhatifAnalysis>
-->

</settings>

<!--
#####
##### SETTINGS FOR ALL TWSWEBUIAdministrators users #####
#####
-->
<settings role="TWSWEBUIAdministrator">

```

```

==
==
==
==
==
==
==
==
==
==
==

```

```

<!-- Put here setting to be applied only to users with TWSWEBUIAdministrator role -->
</settings>
<!--
#####
##### SETTINGS FOR ALL TWSWEBUIOperators users #####
#####
-->
<settings role="TWSWEBUIOperator">
</settings>
<!--
#####
##### SETTINGS FOR ALL TWSWEBUIConfigurator users #####
#####
-->
<settings role="TWSWEBUIConfigurator">
</settings>
<!--
#####
##### SETTINGS FOR ALL TWSWEBUIDeveloper users #####
#####
-->
<settings role="TWSWEBUIDeveloper">
</settings>
<!--
#####
##### SETTINGS FOR ALL TWSWEBUIAnalyst users #####
#####
-->
<settings role="TWSWEBUIAnalyst">
</settings>
</tdwc>

```

---

## Chapter 8. IBM Workload Scheduler Concepts

Conceptual information about IBM Workload Scheduler

This section provides conceptual information about IBM Workload Scheduler and the Dynamic Workload Console.

---

### Scheduling environment

This section contains the main concepts that help you to understand what a scheduling environment is and what it comprises.

#### Workstation

Using workstations for scheduling jobs and job streams.

**Note:** This section provides information relating to the use of workstations for scheduling jobs and job streams.

If, instead, you want to learn about workstations because you are planning your network, see *IBM Workload Scheduler: Planning and Installation* or *IBM Workload Scheduler for z/OS: Planning and Installation*.

The computer system where you run your jobs and job streams is called a *workstation*.

Workstations can be grouped logically into *workstation classes* and organized hierarchically into *domains*, managed by *domain managers*.

When you create a workstation definition for a system in your network you define a set of characteristics that uniquely identify the system and that control how jobs run on it. For example, the IP address of the workstation, if it is behind a firewall, if communications with it must be secure, what time zone it is in, and the identity of its domain manager.

Workstations in the IBM Workload Scheduler scheduling network perform job and job stream processing, but can also have other roles. When your network is designed, these roles are assigned to these workstations to suit the specific needs of your business. The following types of workstation are available:

**Distributed** **Master domain manager**

A workstation acting as the management hub for the network. It manages all your scheduling objects. The master domain manager workstation must be installed with this role.

**Distributed** **Backup master domain manager**

A workstation that can act as a backup for the master domain manager when problems occur. It is a master domain manager, waiting to be activated. Its use is optional. This workstation must be installed as a master domain manager workstation.

Learn more about switching to a backup master domain manager in *IBM Workload Scheduler: Administration Guide*.

**Distributed** **Domain manager**

A workstation that controls a domain and that shares management

responsibilities for part of the IBM Workload Scheduler network. It is installed as an agent, and then configured as a domain manager workstation when you define the workstation in the database.

### **Dynamic domain manager**

An installed component in a distributed IBM Workload Scheduler network that is the management hub in a domain. All communication to and from the agents in the domain is routed through the dynamic domain manager. When you install a dynamic domain manager the workstation types listed below are created in the database:

**fta** Fault-tolerant agent component manually configured as domain manager

**broker** Broker server component

**agent** Dynamic agent component

### **Backup dynamic domain manager**

A workstation which can act as a backup for the dynamic domain manager, when problems occur. It is effectively a dynamic domain manager, waiting to be activated. Its use is optional.

Learn more about switching to a backup dynamic domain manager in *IBM Workload Scheduler: Administration Guide*. When you install a dynamic domain manager the workstation types listed below are created in the database:

**fta** Fault-tolerant agent component.

**broker** Broker server component

**agent** Dynamic agent component

### **Fault-tolerant agent**

A workstation that receives and runs jobs. If there are communication problems with its domain manager, it can run jobs locally. It is installed as an agent, and then configured as a fault-tolerant agent workstation when you define the workstation in the database. This workstation is recorded in the IBM Workload Scheduler database as **fta**.

### **Standard agent**

A workstation that receives and runs jobs only under the control of its domain manager. It is installed as an agent, and then configured as a standard agent workstation when you define the workstation in the database.

### **Extended agent**

A workstation that has a host and an access method. The host is any other workstation, except another extended agent. The access method is an IBM-supplied or user-supplied script or program that is run by the host whenever the extended agent is referenced in the production plan. Extended agents are used to extend the job scheduling functions of IBM Workload Scheduler to other systems and applications. For example, to launch a job on an extended agent, the host runs the access method, passing it job details as command line options. The access method communicates with the external system or application to launch the job and return the status of the job.

Also it is a workstation where a IBM Workload Scheduler access method has been installed as a bridge so that you can schedule jobs in the SAP R/3, PeopleSoft, z/OS, or custom applications. It must be physically hosted by a fault-tolerant agent (up to 255 extended agents per fault-tolerant agent) and then defined as an extended agent in the database.

For more information, see *IBM Workload Scheduler: User's Guide and Reference* and *IBM Workload Automation: Scheduling Applications with IBM Workload Automation*.

### **Workload broker agent**

A workstation that manages the lifecycle of Workload Broker jobs in Workload Broker. It is installed and configured as a dynamic workload broker workstation in the database.

### **z/OS agent**

A distributed workstation that runs jobs scheduled from IBM Workload Scheduler for z/OS. Like fault-tolerant workstations, it is installed in a IBM Workload Scheduler distributed domain. Unlike fault-tolerant workstations, it does not:

- Have fault tolerance
- Require an end-to-end server
- Need topology definitions

Communication with the agents is handled directly by the controller. For more information about the end-to-end scheduling with fault tolerance capabilities, see *IBM Workload Scheduler for z/OS: Scheduling End-to-end with Fault Tolerance Capabilities*.

z/OS

### **Virtual workstation**

A workstation that is created with the automatic reporting attribute and the virtual option, defining a list of destinations, for the workload submission, that are used to spread the workload across trackers. When the scheduler processes the jobs submitted to a virtual workstation, it distributes the workload according to a sequenced turn criteria, based on a round-robin algorithm. To submit the job, at least one of the destinations in the list must be available.

You can associate open intervals, parallel servers, and fixed resources to each destination belonging to the defined pool. The association is disabled at virtual workstation level, because the jobs that you submit on a virtual workstation are actually run on a single destination. When you associate parallel servers with a virtual workstation destination, you can specify a value up to 65535. The alternative workstation definition is not applicable either at workstation level or at single destination level.

### **Remote engine**

A workstation that represents locally a remote IBM Workload Scheduler engine. It is a workstation used to run only *shadow jobs*. A shadow job is a job that runs locally and is used to map another job running on a remote engine. This relationship between the two jobs is called a *cross dependency*. You define a remote engine workstation if you want to federate your environment with another IBM Workload Scheduler environment, either distributed or z/OS, to add and monitor dependencies on jobs running in the other scheduling environment. This type of workstation uses a connection based on HTTP protocol to allow the two environments to communicate.

### **Dynamic agent**

A workstation that manages a wide variety of job types, for example, specific database or FTP jobs, in addition to existing job types. This workstation is automatically created and registered when you install the dynamic agent. Because the installation and registration processes are performed automatically, when you view the agent in the Dynamic Workload Console, it results as updated by the Resource Advisor Agent. You can group agents in pools and dynamic pools.

In a simple configuration, dynamic agents connect directly to a master domain manager or to a dynamic domain manager. However, in more complex network topologies, if the network configuration prevents the master domain manager or the dynamic domain manager from directly communicating with the dynamic agent, then you can configure your dynamic agents to use a local or remote gateway.

**Pool** A workstation grouping a set of dynamic agents with similar hardware or software characteristics to submit jobs to. IBM Workload Scheduler balances the jobs among the dynamic agents within the pool and automatically reassigns jobs to available dynamic agents if an agent is no longer available. To create a pool of dynamic agents in your IBM Workload Scheduler environment, define a workstation of type **pool** hosted by the workload broker workstation, then select the dynamic agents you want to add to the pool. A computer system group is automatically defined in the workload broker database together with its associated dynamic agents.

### **Dynamic pool**

A workstation grouping a set of dynamic agents that is dynamically defined based on the resource requirements you specify. For example, if you require a workstation with low CPU usage and the Windows operating system installed to run your job, you specify these requirements using the Dynamic Workload Console or the **composer** command. When you save the set of requirements, a new workstation is automatically created in the IBM Workload Scheduler database. This workstation is hosted by the workload broker workstation. This workstation maps all the dynamic agents in your environment that meet the requirements you specified. The resulting pool is dynamically updated whenever a new suitable agent becomes available. Jobs scheduled on this workstation automatically inherit the requirements defined for the workstation.

#### **Related tasks:**

“Creating distributed workstations” on page 101

Creating distributed workstation definitions in the IBM Workload Scheduler database.

“Creating z/OS workstations” on page 102

Creating z/OS workstation definitions in the IBM Workload Scheduler database.

“Creating z/OS virtual workstations” on page 103

This topic describes how to create z/OS virtual workstation definitions in the IBM Workload Scheduler database.

“Creating a task to Monitor Workstations” on page 177

How you can create a Monitor Workstations task.

“Creating Workload Broker objects” on page 139

Creating Workload Broker workstations and jobs.

#### **Related reference:**

“Workstation types” on page 264

The following are the main workstation types and their attributes.

# Domain

## Distributed

The domain.

All the workstations in a distributed IBM Workload Scheduler network are organized into one or more *domains*, each of which consists of one or more agents and a domain manager acting as the management hub. Most communication to and from the agents in the domain is routed through the domain manager. If the agent has the "behind firewall" designation, all of it is.

All the networks have a master domain where the domain manager is the master domain manager. It maintains the database of all the scheduling objects in the domain and the central configuration files. The master domain manager generates the plan and creates and distributes the Symphony file. In addition, logs and reports for the network are maintained on the master domain manager.

You can organize all the agents in your network into a single domain or into multiple domains.

### Single-domain network

A single domain network consists of a master domain manager and any number of agents. Figure 1 on page 52 shows an example of a single-domain network. A single-domain network is well suited to companies that have few locations and business functions. All the communication in the network is routed through the master domain manager. With a single location, you are concerned only with the reliability of your local network and the amount of traffic it can handle.

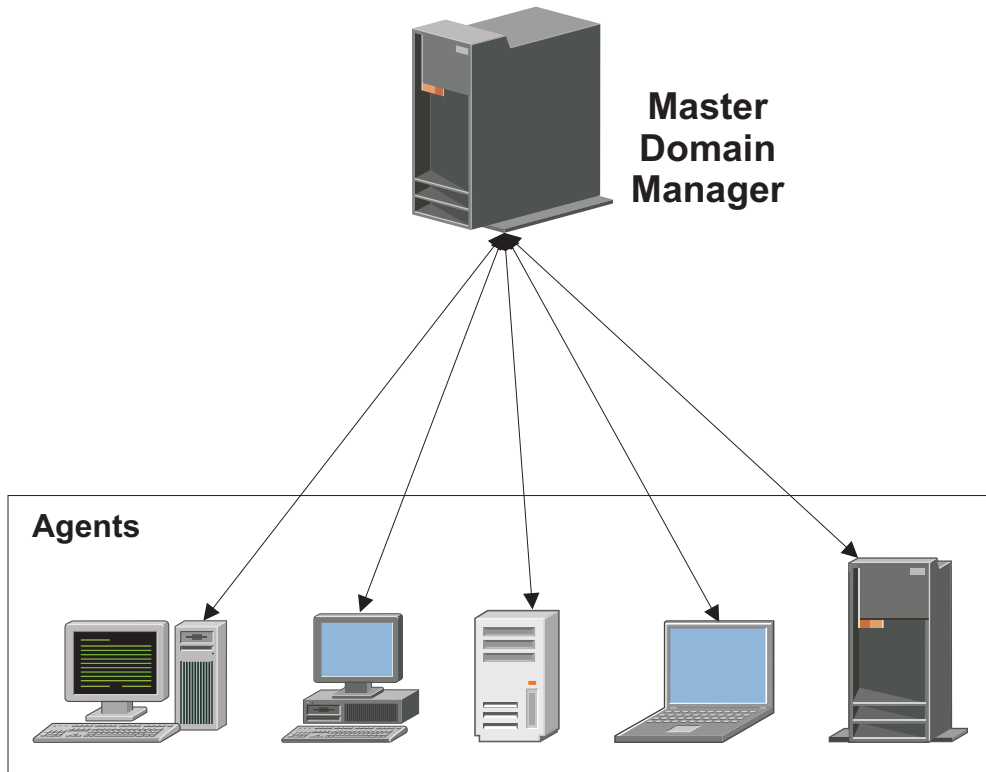


Figure 1. Single-domain network

### Multiple-domain network

Multiple-domain networks are especially suited to companies that span multiple locations, departments, or business functions. A multiple-domain network consists of a master domain manager, any number of lower tier domain managers, and any number of agents in each domain. Agents communicate only with their domain managers, and domain managers communicate with their parent domain managers. The hierarchy of domains can have any number of levels.



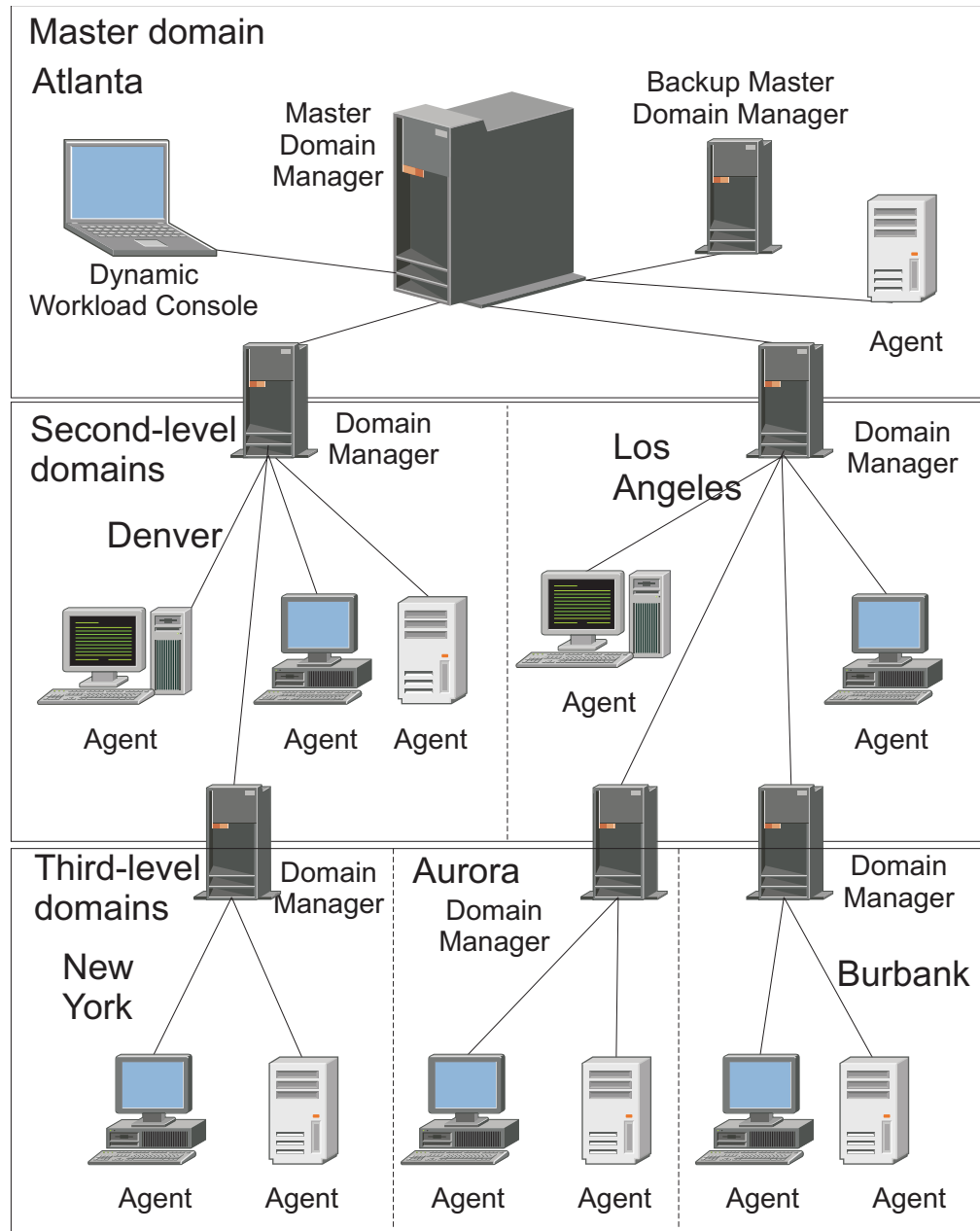


Figure 2. Multiple-domain network

In Figure 2, the master domain manager is located in Atlanta. The master domain manager contains the database files used to document the scheduling objects, and distributes the Symphony file to its agents and to the domain managers in Denver and Los Angeles. The Denver and Los Angeles domain managers then distribute the Symphony file to their agents and subordinate domain managers in New York, Aurora, and Burbank. The master domain manager in Atlanta is responsible for broadcasting inter-domain information throughout the network.

All the communication to and from the New York domain manager is routed through its parent domain manager in Denver. If there are schedules or jobs in the New York domain that are dependent on schedules or jobs in the Aurora domain, those dependencies are resolved

by the Denver domain manager. Most inter-agent dependencies are handled locally by the lower tier domain managers, greatly reducing traffic on the network.

You can change the domain infrastructure dynamically as you develop your network. You move a workstation to a different domain, by changing the domain name in its database definition. The change takes effect when the master generates/extends the plan.

**Tip:** You cannot schedule jobs or job streams to run on all workstations in a domain by identifying the domain in the job or job stream definition. To achieve this, you must create a *workstation class* that contains all the workstations in the domain.

For more information about domain definitions, see "Defining objects in the database" in the *User's Guide and Reference*.

For more information about workstation classes, see "Workstation class" on page 80

**Related tasks:**

"Creating a domain" on page 105

Creating domain definitions in the IBM Workload Scheduler database.

"Creating distributed workstations" on page 101

Creating distributed workstation definitions in the IBM Workload Scheduler database.

"Creating a task to Monitor Domains" on page 178

Why and how you can create a Monitor Domains task.

---

## Scheduling objects

Scheduling objects that you can view and manage using the Dynamic Workload Console.

The set of scheduling objects described in the current plan is a subset of all the scheduling objects stored in the database. The scheduling objects accessible from the Dynamic Workload Console depend on your IBM Workload Scheduler environment.

**Distributed** For distributed environments, the scheduling objects reported in the production plan are:

- All the active workstations defined in the database. These are the workstations whose definition does not have the *ignore* flag set to on.
- All the domains.
- All the job streams scheduled to start in the production period and all jobs belonging to these job streams.
- All the resources, files, parameters, variables, and prompts defined in the job streams.

**z/OS** For z/OS environments, the scheduling objects reported in the current plan are:

- All the active workstations defined in the database.
- All the job streams scheduled to start in the production period and all jobs belonging to these job streams.

- All the resources that these jobs and job streams depend on.

To differentiate between jobs and job streams defined in the database and jobs and job streams scheduled to run within the production period, according to the IBM Workload Scheduler standard naming convention, each occurrence of a job or a job stream scheduled to run in the current plan is called an *instance*. A current plan can contain more than one instance of the same job or job stream.

**Related concepts:**

“Designing your Scheduling Environment” on page 101

How to create your Scheduling Environment.

“Monitoring your Workload” on page 179

Controlling and managing scheduling activities and objects on plans with *tasks*.

**Related tasks:**

“Creating and managing engine connections” on page 6

How you can create, modify, or delete engine connections.

“Designing your Workload” on page 107

Create and editing workload definitions in the database.

## Job

Information about jobs, which are scheduling objects used to define and run activities in the scheduling environment.

A *job* is a unit of work that specifies an action, such as a weekly data backup, to be performed on specific workstations in the IBM Workload Scheduler network.

**Distributed** In a IBM Workload Scheduler distributed environment, jobs can be defined either independently from job streams or within a job stream definition.

**z/OS** In a IBM Workload Scheduler for z/OS environment, jobs can be defined only within a job stream and are called *operations*. You can have started-task operations, which are operations run on a computer workstation that are used to start and stop started tasks.

Regardless of whether the IBM Workload Scheduler engine is distributed or z/OS based, you can define locally a *shadow job* to map a remote job instance running on a different IBM Workload Scheduler engine.

For more information about the job definition, see "Defining and scheduling objects" in the *User's Guide and Reference*.

\*  
\*  
\*  
\*

Once job definitions have been submitted into the production plan, you still have the opportunity to make one-off changes to the definitions before they run, or after they have run. You can update the definition of a job that has already run and then rerun it. The job definition in the database remains unchanged.

**Related tasks:**

“Creating a task to Monitor Jobs” on page 180

How you can create a Monitor Jobs task.

“Creating a task to Monitor Critical Jobs” on page 182

Why and how you can create a Monitor Critical Jobs task.

“Creating a task to Monitor Jobs on Multiple Engines” on page 185

Why and how you create a Monitor Jobs task to run on multiple engines.

“Adding a job to a job stream” on page 125  
How to add an existing job to a job stream using the Dynamic Workload Console.  
“Listing jobs and job streams” on page 147  
“Creating job stream definitions” on page 110  
How to define a new job stream definitions using the Dynamic Workload Console.

“Creating job definitions” on page 111  
How to define a new job definition using the Dynamic Workload Console.  
“Prerequisite steps to create job types with advanced options” on page 122  
How to define a new job definitions using the Dynamic Workload Console.

**Related reference:**

“Status description and mapping for distributed jobs” on page 256  
The job status as described in Dynamic Workload Console and how it is defined in IBM Workload Scheduler.

“Status description and mapping for z/OS jobs” on page 259  
z/OS job status displayed by Dynamic Workload Console and how it is defined in IBM Workload Scheduler for z/OS.

“Limit the number of objects retrieved by queries” on page 38

## Job stream

A *job stream* is a sequence of jobs to be run, together with times, priorities, and other dependencies that determine the order of processing. Each job stream is assigned a time to run, represented by run cycle with type calendar, set of dates, or repetition rates.

**z/OS** In a IBM Workload Scheduler for z/OS environment, job streams are called *applications*.

**Related concepts:**

“Customizing your job stream” on page 241  
Using the Dynamic Workload Console to create and customize a job stream.

**Related tasks:**

“Creating a task to Monitor Job Streams” on page 187  
How you can create a Monitor Job Streams task.

“Creating a task to Monitor Job Streams on Multiple Engines” on page 189  
Why and how you create a Monitor Job Streams task to run on multiple engines.

“Creating job stream definitions” on page 110  
How to define a new job stream definitions using the Dynamic Workload Console.

“Adding a job to a job stream” on page 125  
How to add an existing job to a job stream using the Dynamic Workload Console.  
“Listing jobs and job streams” on page 147

**Related reference:**

“Status description and mapping for distributed job streams” on page 261  
The job stream status in Dynamic Workload Console and how it is defined in IBM Workload Scheduler.

“Status description and mapping for z/OS job streams” on page 263  
The z/OS job stream status in Dynamic Workload Console and how it is defined in IBM Workload Scheduler for z/OS.

“Limit the number of objects retrieved by queries” on page 38

## Workload application

A workload application is one or more job streams together with all the referenced jobs that can be shared with other IBM Workload Scheduler environments through an easy deployment process.

A workload application is an IBM Workload Scheduler database object that acts as a container for one or more job streams. You can use workload applications to standardize a workload automation solution so that the solution can be reused in one or more IBM Workload Scheduler environments thereby automating business processes.

You can prepare a workload application template in a source IBM Workload Scheduler environment and then export it so that it can be deployed in a target environment. The export process extracts from the source environment all of the elements necessary to reproduce the solution in another environment. It produces a compressed file containing a number of files required to import the workload application into the target environment. These files contain a definition of the objects in the source environment extracted from the IBM Workload Scheduler database. For those elements that depend on the topology of the target environment, some manual configuration is required. For example, the definitions extracted from the source environment contain references to workstations that do not exist in the target environment. For this reason, before proceeding with the import, a mapping of some of the elements must be made associating the name of the object in the target environment.

The exported workload application template contains definitions or references for all of the following objects:

- Job streams
- Jobs
- Workstations, workstation classes
- Calendars
- Prompts
- Run cycles
- Run cycle groups
- Resources
- Internetwork dependencies
- External dependencies
- Event rules

For information about how to define workload application templates, see "Defining workload application" in the *IBM Workload Scheduler: User's Guide and Reference*.

## Period

z/OS

Periods are either *cyclic*, such as a week or 28-day period, or *noncyclic*, such as an academic semester.

### Cyclic periods

Defined by their origin date and their length: a cyclic period starts on a specific date and has a specified number of days. There are two kinds of cyclic periods:

**work-days-only cyclic periods**

Only working days are considered.

**all-days cyclic periods**

All the days are considered.

**Noncyclic periods**

Defined by the origin date of each interval and can optionally have an end date for each interval.

Periods can be combined with offsets to create run cycles and define when a job stream runs. For example, an offset of 1 in a weekly period specifies Monday. An offset of 10 in a monthly period specifies the tenth day of each month.

The long-term planning process uses the calendar information, the period definitions, and the run cycle, to determine the days on which an application is scheduled to run.

If you run workload on fixed days of the week, month, or year, and take one of the standard IBM Workload Scheduler for z/OS actions when this day falls on a non-working day, you do not need to create your own periods. You can describe most cases with rules such as:

- First Sunday in June
- First working day in the week
- Last Friday in the year
- Last non-working day in the month

If you use rules with their built-in calendar cycles (days of the week, months of the year, and so on), you probably need to create only special noncyclic periods, such as university semesters and tax years. The following sections show some examples of types of periods.

**Cyclic period examples**

Examples of cyclic periods are a day, a week, and a fortnight, with fixed intervals of 1 day, 7 days, and 14 days, respectively. An academic semester cannot be described as a cyclic period, because spring, summer, and fall semesters have different lengths. The following example shows a lunar calendar month, assumed to be 28 days:

**Period name**

Moon

**Type** Cyclic based on all days

**Interval**

28 days

**Interval origin**

7 February 2009 (date of a new moon)

**Non-cyclic period examples**

Examples of non-cyclic periods are a quarter and a payroll period. You specify the start of each interval of a non-cyclic period with an origin date. This example shows a period for university semesters, with the interval origin and end specified for each semester:

**Period name**

Semester

**Type** Non-cyclic**Interval origin**

26 August 2009, 13 January 2010, 9 June 2010.

**Interval end**

13 December 2009, 16 May 2010, 28 June 2010

Non-cyclic periods have a once-a-year maintenance overhead when you must create the intervals for the coming months. For this reason, carefully consider how flexible your period definitions are, and remove potentially duplicated definitions.

## Calendar

A *calendar* is a list of dates that define when a job stream runs.

**Distributed**

### Calendar in a distributed environment

A calendar can also be designated as a *non-working days* calendar in a job stream. A non-working days calendar is a calendar that is assigned to a job stream to represent the days when the job stream and its jobs do not run. It can also be used to designate Saturdays or Sundays, or both, as workdays. The default non-working days calendar for all job streams is called the *holidays* calendar.

**z/OS**

### Calendar in a z/OS environment

The calendar specifies normal working days and public holidays. IBM Workload Scheduler for z/OS uses the calendar to determine when job streams are scheduled and to calculate dates for JCL tailoring.

You can specify the calendar when you create a job stream. If no calendar is specified for the job stream, IBM Workload Scheduler for z/OS uses the calendar in the CALENDAR keyword of the BATCHOPT initialization statement, for batch services such as extending the long-term plan, or the calendar specified under the IBM Workload Scheduler for z/OS options, for online services such as testing a rule with GENDAYS.

If no calendar is specified, a calendar with the name DEFAULT is used. If the DEFAULT calendar does not exist, all days are considered as working days. You can have several calendars, but always name your default calendar DEFAULT, and specify the same calendar name on BATCHOPT or in the IBM Workload Scheduler for z/OS options. A calendar must contain at least one working day.

**Related tasks:**

“Designing your Workload” on page 107

Create and editing workload definitions in the database.

“Listing workload objects” on page 146

## Run cycle

A *run cycle* specifies the days that a job stream is scheduled to run. Each run cycle is defined for a specific job stream and cannot be used by other job streams. You can specify the following types of run cycle:

**Distributed simple**

A specific set of user-defined days when a job stream is run.

**daily** A run cycle that specifies that the job stream runs according to a day frequency and type that you set. For example, it might run daily, every three days, or just on working days.

**weekly**

A run cycle that specifies the days of the week when a job stream is run. For example, a job stream can be run every Monday, Wednesday, and Friday using a weekly run cycle.

**monthly**

A run cycle that specifies that the job stream runs according to a monthly day or date that you set. For example, it might run every 1st and 2nd day of the month, or every 1st Monday and 2nd Tuesday of the month.

**Distributed** It can also run, for example, every 1st and 2nd day of the month every two months.

**yearly** A run cycle that specifies that a job stream runs, for example, yearly.

**Distributed** It can also run, for example, every three years.

**exclusive**

A run cycle that specifies the days and times when a job stream cannot be run. Exclusive run cycles take precedence over inclusive run cycles.

**inclusive**

A run cycle that specifies the days and times when a job stream is scheduled to run. Exclusive run cycles take precedence over inclusive run cycles.

**offset-based**

A run cycle that uses a combination of user-defined periods and offsets. For example, an offset of 3 in a period of 15 days is the third day from the beginning of the period. It is more practical to use offset-based run cycles when the cycle is based on cyclic periods. This term is used only in IBM Workload Scheduler for z/OS, but the concept applies also to the distributed product.

**rule-based**

A run cycle that uses rules based on lists of ordinal numbers, types of days, and common calendar intervals (or period names in IBM Workload Scheduler for z/OS). For example, the last Thursday of every month. Rule-based run cycles are based on conventional periods, such as calendar months, weeks of the year, and days of the week. In IBM Workload Scheduler for z/OS, run cycles can also be based on periods that you define, such as a semester. This term is used only in IBM Workload Scheduler for z/OS, but the concept applies also to the distributed product. You can also specify a rule to establish when a job stream runs if it falls on a free day.

**Related concepts:**

“Creating and managing run cycle groups and their run cycles” on page 132

**Related information:**

“Run Cycle Preview” on page 281

This view applies only to job streams and shows the run cycles defined for the selected job stream.



## Run cycle group

You can optionally define a run cycle group for your job stream instead of, or in addition to, a number of single run cycles.

A run cycle group is a list of run cycles that are combined together to produce a set of run dates.

By using run cycle groups, you can benefit from the following advantages:

### A run cycle group is a distinct database object

It is defined by itself and can be matched with one or more job streams. It is not defined as part of a specific job stream like single run cycles.

### The same run cycle group can be used on different job streams

This improves the overall usability of the run cycles, because you can specify the same run cycle group in multiple job streams, avoiding the need to have multiple run cycle definitions for the same scheduling rules.

### Run cycle groups enhance the use of exclusive run cycles

Exclusive (or negative) run cycles are used to generate negative occurrences, which identify the days when a job stream would normally be scheduled but is not required. The sum of the exclusive run cycles are subtracted from the inclusive ones. A negative occurrence always cancels any matching positive occurrences and you can specify a negative occurrence only if the positive equivalent already exists. An exact matching of the days, as well as any time restrictions, is required between the exclusive and inclusive run cycles for the cancellation to occur. Run cycle groups add much flexibility by allowing users to apply exclusive run cycles to a subset of the positive ones rather than to all of them. Group your run cycles into *subsets* so that the exclusive run cycles can be applied only to the positive occurrences generated by the run cycles belonging to the same set.

Run cycles must be organized into *subsets* within a run cycle group. The subsets are always in a logical **OR** relationship with each other. The result of the run cycle group is always a date or set of dates; it cannot be negative.

For example, you might want your job stream to run every day of the month except the last day of the month. But, you also want it to be scheduled on the last day of the year (the last day of December). You can define a run cycle group using subsets, as follows:

#### Subset 1

- **Run cycle 1** - Inclusive run cycle every day of the month
- **Run cycle 2** - Exclusive run cycle on the last day of the month

#### Subset 2

- **Run cycle 3** - Inclusive run cycle on December 31st

where, run cycle 2 cancels the last day of each month in Subset 1, while run cycle 3 generates December 31st as a separate date and therefore you can schedule the job stream on Dec 31st.

### Run cycle groups allow the use of a logical AND between individual run cycles in the subset

By default, the run cycles within a subset are in a logical **OR** relationship but you can change this to a logical **AND**, if the run cycle group result is a

positive date or set of dates (Inclusive). For each run cycle, you can specify either operator (**AND** ,**OR**), obtaining the following behavior:

1. All the run cycles of the group that are in *AND* relationship are calculated first. The result of this calculation is a date or a set of dates.
2. Then, all the run cycles in an *OR* relationship are added to the result of the previous step.

A similar behavior is applied to inclusive and exclusive run cycles to determine the final date or set of dates of a group.

**Inclusive (A)**

Rule-based run cycle. Select days when the job stream is to be run if they belong to all A types of the set of run cycles.

**Exclusive (D)**

Exclusion rule-based run cycle. Select days when the job stream is NOT to be run if they belong to all D types of the set of run cycles.

For example, you can add two conditions together:

Run on Wednesday "AND" the 8th workday of the month.

In this way, the only scheduled dates are any 8th work day of the month that falls on a Wednesday.

**Full compatibility with *traditional* run cycles**

The *traditional* run cycles specified in the job stream definition can reference run cycle groups, with the possibility to specify shift or offsets on them (as with periods for z/OS or calendars for distributed systems).

A set of dates (interval starts) is created automatically either at run cycle level directly (inclusively or exclusively with offsets, or in the rule. This is a two-step process with run cycles:

1. Define the key "business event", such as, Month End, using run cycles and free day rules
2. Define rules that use the dates of the "business event" as the intervals against which the other batch run can be scheduled relative to.

For example, you have a *Month End process* that runs on the Last Friday of a month, but that moves forward to the next working day, except in December when it runs on the 3rd Friday of the month. This scheduling rule can be defined with a few rules, run cycles, and free day rules.

Two working days before Month End you need to run a pre-validation process to allow problems to be addressed before the run. You cannot choose the last Wednesday of the month, because in some months this might occur after the last Friday. Similarly, if the last Friday was a free day, the last Wednesday will not be 2 working days before it, because the Free Day rule applies ONLY to the day the rule falls on, it cannot look at anything else.

Many other batch runs might also need to be run on a certain number of days before or after the Month End, but the same restrictions apply.

You can now define work to run relative to something defined by a combination of run cycles and free day rules.

**Use of calendars with run cycles within a run cycle group**

Optionally, you can specify more than one calendar to calculate the working and non-working days definition for a run cycle. The primary

calendar is used to calculate which working days are valid, and a secondary calendar is used to calculate specific non-working dates. If the dates calculated according to the secondary calendar match with the working days in the primary calendar, the job is scheduled; if they do not match, the job is not scheduled.

For example, a global company that runs workload in the United States for many other countries needs many calendar combinations to ensure that the batch jobs only run on a day that is a working day both in the United States and the other country. The calendar can be defined at job stream level and, if not specified, a default calendar is used. However, the calendar at run cycle level, whenever defined, can be used as secondary calendar and the job stream (or default) calendar can be used as the primary calendar.

**For example**, Primary calendar can be *WORKDAYS*, which is defined as MONDAY to FRIDAY excluding US holiday dates. You might also need to calculate the job runs based on calendar *HKWORK*, which is defined as Monday to Friday excluding Hong Kong holiday dates. The job might have several schedules:

- Run on working days, but not the last working day and not Mondays
- Run on Mondays, but not on the last working day
- Run on the last working day

Because each schedule is calculated against the *WORKHK* calendar it is also checked against the *WORKDAYS* calendar to ensure that it is scheduled on a US working day.

### **The use of time restrictions with run cycle groups**

You can specify time constraints to define the time when processing must start or the time after which processing must no longer start. To do this, you can associate *time restrictions* to job, job streams, run cycles, and run cycle groups. When you define a time restriction, you basically obtain a *time*. Because you can associate time restrictions to multiple objects, the following hierarchy shows the order by which the different time restrictions are taken into consideration to actually define when to start the processing:

1. Time restriction defined in the run cycle into the job stream
2. Time restriction defined in the job stream
3. Time restriction defined in the run cycle contained in the run cycle group associated to the job stream.
4. Time restriction defined in the run cycle group associated to the job stream.
5. Start of Day

This means that:

#### **Time restrictions in the job stream**

Override and take precedence *over any other time restrictions* defined in the run cycles or run cycle groups associated to the job stream.

#### **No time restrictions in the job stream nor in the run cycle group**

The group generates only a date that is the *Start Of Day*. If offsets and free day rules are to be calculated, the calculation always starts from the *Start Of Day*.

### Time restrictions in the run cycle group (not in the job stream)

Time restrictions (and possible offset) are calculated starting from the *Start Of Day* and the resulting date and time indicate the start of processing.

### Examples

Table 5. Scenario 1. No time restriction in the run cycle group

Run cycle group	Scheduled date	Earliest Start
Run cycle group	10/24	10/24
Run cycle group with offset (+ 3 days)	10/27 (Saturday)	10/27/ (Saturday)
Run cycle group with free day rule	10/29/ (Monday)	0/29/ (Monday)
<b>Run cycle in the job stream with time restrictions</b>		
Run cycle in the job stream with + 4 working days shift	11/02 (Friday)	11/02 (Friday)
Run cycle in the job stream with free day rule	11/02 (Friday)	11/02 (Friday)
Run cycle in the job stream with earliest start +1 1pm	11/02 (Friday)	11/03 (Saturday) 1pm
<b>Run cycle in the job stream without time restrictions</b>		
Run cycle in the job stream with + 4 working days shift	11/02 (Friday)	11/02 (Friday) Start of Day
Run cycle in the job stream with free day rule	11/02 (Friday)	11/02 (Friday) Start of Day

Table 6. Scenario 2. Time restriction in the run cycle group without offset

Run cycle group	Scheduled date	Earliest Start
Run cycle group	10/24	10/24
Run cycle group with calendar offset (+ 3 days)	10/27/ (Saturday)	10/27/ (Saturday)
Run cycle group with free day rule	10/29/ (Monday)	0/29/ (Monday)
<b>Run cycle in the job stream with time restrictions</b>		
Run cycle in the job stream with + 4 working days shift	11/02 (Friday)	11/02 (Friday)
Run cycle in the job stream with free day rule	11/02 (Friday)	11/02 (Friday)
Run cycle in the job stream with earliest start +1 1pm	11/02 (Friday)	11/03 (Saturday) 1pm
<b>Run cycle in the job stream without time restrictions</b>		
Run cycle in the job stream with + 4 working days shift	11/02 (Friday)	11/02 (Friday) Start of Day

Table 6. Scenario 2. Time restriction in the run cycle group without offset (continued)

Run cycle group	Scheduled date	Earliest Start
Run cycle in the job stream with free day rule	11/02 (Friday)	11/02 (Friday) Start of Day

Table 7. Scenario 3. Time restriction in the run cycle group with offset (+1 12:00)

Run cycle group	Scheduled date	Earliest Start
Run cycle group	10/24	10/24
Run cycle group with calendar offset (+ 3 days)	10/27/ (Saturday)	10/27/ (Saturday)
Run cycle group with free day rule	10/29/ (Monday)	10/29/ (Monday)
Run cycle group with offset +1 12:00	10/29/ (Monday)	10/30 12:00 (Tuesday)
<b>Run cycle in the job stream with time restrictions</b>		
Run cycle in the job stream with + 4 working days shift	11/02 (Friday)	11/02 (Friday)
Run cycle in the job stream with free day rule	11/02 (Friday)	11/02 (Friday)
Run cycle in the job stream with earliest start +1 1pm	11/02 (Friday)	11/03 (Saturday) 1pm
<b>Run cycle in the job stream without time restrictions</b>		
Run cycle in the job stream with + 4 working days shift	11/02 (Friday)	11/03 12:00 (Saturday)
Run cycle in the job stream with free day rule	11/02 (Friday)	11/03 12:00 (Saturday)

**z/OS Availability of the GENDAYS command at run cycle group level**

Using GENDAYS, you can check the result of the combination of all the run cycles in the group.

**Related concepts:**

“Creating and managing run cycle groups and their run cycles” on page 132

**Related information:**

“Run Cycle Preview” on page 281

This view applies only to job streams and shows the run cycles defined for the selected job stream.

## Operator instructions

**z/OS**

In a IBM Workload Scheduler for z/OS environment, some jobs might require specific instructions about how they are to be handled. These instructions are called operator instructions.

An *operator instruction* can be permanent or temporary. A temporary instruction has a validity period associated with it, which specifies when the instruction is valid.

## Parameter

A *parameter* is an object to which you assign different values to be substituted in jobs and job streams, either from values in the database or at run time.

**Note:** You cannot use parameters with extended agent jobs.

Parameters are useful when you have values that change depending on your job or job stream. Job and job stream definitions that use parameters are updated automatically with the value at the start of the production cycle.

Use parameters as substitutes for repetitive values when defining jobs and job streams. For example, using parameters for user logon and script file names in job definitions and for file and prompt dependencies allows the use of values that can be maintained centrally in the database on the master.

For more information about how to define parameters, see "Variable and parameter definition" in the *User's Guide and Reference*.

## Dependencies

Controlling processing using dependencies

When defining job streams and managing the workload in the plan, you can control process flow using dependencies.

You can specify the following types of dependencies:

### **Distributed** Dependencies in a distributed environment:

You can have dependencies between jobs, between job streams, or between jobs and job streams. They can be:

#### **Internal dependencies**

These are dependencies established between jobs belonging to the same job stream.

#### **External dependencies**

These are dependencies between job streams, between job streams and jobs belonging to other job streams, or between jobs belonging to different job streams. The following resolution criteria are used to satisfy these dependencies:

##### **Closest preceding**

The closest preceding in time before the instance that includes the dependency.

##### **Same scheduled date**

The instance planned to run on the same day.

##### **Within a relative interval**

The closest preceding instance within the relative time interval you chose, or, if none is found, the closest following instance within the relative time interval you chose.

##### **Within an absolute interval**

The closest preceding instance within an absolute time interval you chose, or, if none is found, the closest following instance within the absolute time interval you chose.

Regardless of the used matching criteria, if multiple instances of potential predecessor job streams exist in the specified time interval, the rule used by the product to identify the correct predecessor instance is the following:

1. IBM Workload Scheduler searches for the closest instance that precedes the depending job or job stream start time. If such an instance exists, this is the predecessor instance.
2. If there is no preceding instance, IBM Workload Scheduler considers the correct predecessor instance as the closest instance that starts after the depending job or job stream start time.

### **Internetwork dependencies**

These are dependencies on jobs or job streams running in another IBM Workload Scheduler network. Internetwork dependencies require a network agent workstation to communicate with the external IBM Workload Scheduler network.

### **Conditional dependencies (distributed)**

A relationship between one job, named the *successor*, and one or more jobs or job streams, named *predecessors*, stating that the successor can run only when a specific combination of conditions occur or are satisfied by the predecessor job. Job output conditions are set on the job definition and when a conditional dependency is added to a job in a job stream, the output conditions that must be satisfied by the predecessor job are specified. Conditions can include if the job has started, the state of the job, and any number of custom defined conditions, often expressed as job return or exit codes. You can specify that only a single condition must be satisfied, all conditions must be satisfied, or specify a subset of conditions that must be satisfied.

When the conditions are not met by the predecessor, then any successor jobs with a conditional dependency associated to them are put in **suppress** state. Successor jobs with a standard dependency or no dependency at all defined run normally.

### **z/OS Dependencies in a z/OS environment:**

You can have different kind of dependencies between jobs and job streams. They can be:

#### **Internal dependencies**

These are dependencies established between jobs belonging to the same job stream.

#### **External dependencies**

These are dependencies between job streams, between job streams and jobs belonging to other job streams, or between jobs belonging to different job streams. The following resolution criteria are used to satisfy these dependencies:

##### **Closest preceding**

The closest preceding in time before the instance that includes the dependency.

##### **Same scheduled date**

The instance planned to run on the same day.

##### **Within a relative interval**

The closest preceding instance within the relative time

interval you chose, or, if none is found, the closest following instance within the relative time interval you chose.

#### **Within an absolute interval**

The closest preceding instance within an absolute time interval you chose, or, if none is found, the closest following instance within the absolute time interval you chose.

Regardless of the used matching criteria, if multiple instances of potential predecessor job streams exist in the specified time interval, the rule used by the product to identify the correct predecessor instance is the following:

1. IBM Workload Scheduler searches for the closest instance that precedes the depending job or job stream start time. If such an instance exists, this is the predecessor instance.
2. If there is no preceding instance, IBM Workload Scheduler considers the correct predecessor instance as the closest instance that starts after the depending job or job stream start time.

#### **“Condition dependencies (z/OS)” on page 73**

It is a relationship between one job, named a *conditional successor*, and one or more jobs, named *conditional predecessors*, stating that the conditional successor can run only when a specific combination of conditional predecessor status and return code values occurs. You can define a conditional dependency where the conditional successor starts if its conditional predecessors are in ended-in-error or started status.

**Note:** Condition dependencies are always managed as external dependencies, even if they link jobs belonging to the same job stream occurrence in the plan.

Job streams in a z/OS environment do not support dependencies on files or prompts.

#### **“Cross dependencies” on page 78**

In multiple heterogeneous scheduling environments you can define dependencies on batch activities managed by other IBM Workload Scheduler environments. To define a cross dependency on a job running on a different IBM Workload Scheduler engine, you must define a dependency on a locally-defined *shadow job* pointing to the remote job instance and running on a *remote engine workstation*. The remote engine workstation manages the communication with the remote engine using an HTTP or HTTPS connection.

Dependencies on resources are supported by IBM Workload Scheduler in both the distributed and z/OS environments.

#### **Related tasks:**

“Adding a dependency” on page 129

“Removing a dependency” on page 130

#### **Prompt**

**Distributed**



Information about prompts, which are textual messages presented to the operator to pause the job or job stream processing.

A *prompt* identifies a text message that is displayed to the operator and halts processing of the job or job stream until an affirmative answer is received (either manually from the operator or automatically by an event rule action). After the prompt is replied to, processing continues. You can use prompts as dependencies in jobs and job streams. You can also use prompts to alert an operator that a specific task was performed. In this case, an operator response is not required.

There are the following types of prompt:

**global or named**

A prompt that is defined in the database as a scheduling object. It is identified by a unique name and can be used by any job or job stream.

**local or ad-hoc**

A prompt that is defined within a job or job stream definition. It does not have a name, and it is not defined as a scheduling object in the database, therefore it cannot be used by other jobs or job streams.

**recovery or abend**

A special type of prompt that you define to be used when a job ends abnormally. The response to this prompt determines the outcome of the job or job stream to which the job belongs. A recovery prompt can also be associated to an action and to a special type of job called a *recovery job*.

For information about how to define prompts, see "Defining scheduling objects" in the *User's Guide and Reference*.

**Related tasks:**

"Creating a task to Monitor Prompts" on page 193

Why and how you can create a Monitor Prompts task.

"Adding a dependency" on page 129

"Removing a dependency" on page 130

"Designing your Workload" on page 107

Create and editing workload definitions in the database.

"Listing workload objects" on page 146

**Resource**

Information about resources.

A *resource* is either a physical or logical system resource that you use as a dependency for jobs and job streams. A job or job stream with a resource dependency cannot start to run until the required quantity of the defined resource is available.

For information about how to define resources, see the section about resources in IBM Workload Scheduler User's Guide and Reference.

**Related tasks:**

"Creating a task to Monitor Resources" on page 191

How you can create a Monitor Resources task.

"Adding a dependency" on page 129

"Removing a dependency" on page 130

"Designing your Workload" on page 107

Create and editing workload definitions in the database.

“Listing workload objects” on page 146

## File

### Distributed

A *file* is used as a dependency for jobs and job streams. A job or job stream with a file dependency cannot start to run until the file exists with the characteristics defined in the dependency.

#### Related tasks:

“Creating a task to Monitor Files” on page 190

Why and how you can create a Monitor Files task to Monitor Files.

“Adding a dependency” on page 129

“Removing a dependency” on page 130

“Designing your Workload” on page 107

Create and editing workload definitions in the database.

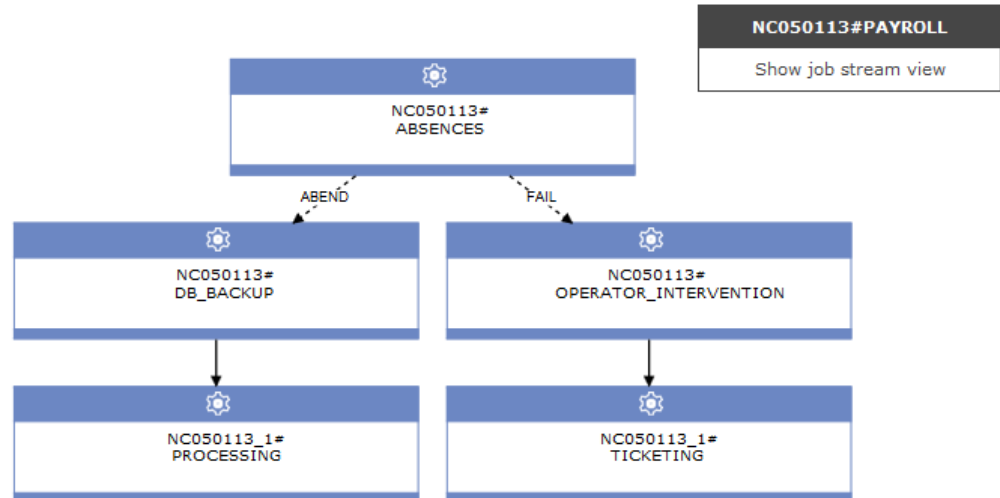
“Listing workload objects” on page 146

## Applying conditional branching logic

With IBM Workload Scheduler you can define jobs to run when and as often as necessary. Sometimes some jobs might have to wait for other jobs to finish successfully before they start. Add even more flexibility to your job flows by choosing which job to run depending on the result of the job status or output of a previous job. Whenever you have conditions that specify whether or not a segment of your job flow should run, then that is a conditional dependency.

When specifying dependencies, you can define job flows with alternative branches based on conditions, specifically to achieve the same results as using IF/THEN/ELSE statements. You can use return codes, job status, output variables, and job log content as *conditional logic* elements to determine the start of a successor job. In addition to providing flexibility to your job flows, the Graphical View provides a graphical representation of the relationships between the jobs and job streams, including the dependencies and conditions. This at-a-glance view of your job flow is easy to read and you can also edit your job flow from this view.

The following example shows the PAYROLL job stream that starts with the ABSENCES job, which is a predecessor job and is then followed by two possible branches of jobs that can run. The branch that runs depends on the outcome of the initial job, the predecessor ABSENCES job. Possible outcomes of the ABSENCES job are defined in *output conditions*. Any jobs in the flow that do not run, because the output conditions were not satisfied, are put in SUPPRESSED state, which is different from regular dependencies where jobs are put in Hold until the predecessor is in successful (SUCC) state. Predecessors can be either jobs or job streams.



Conditions can be **status conditions**, based on job status, or **other output conditions**, based on a mapping expression such as a return code, output variables, or output in a job log. When the predecessor is a job stream, the conditional dependency can only be a status condition.

#### Status conditions

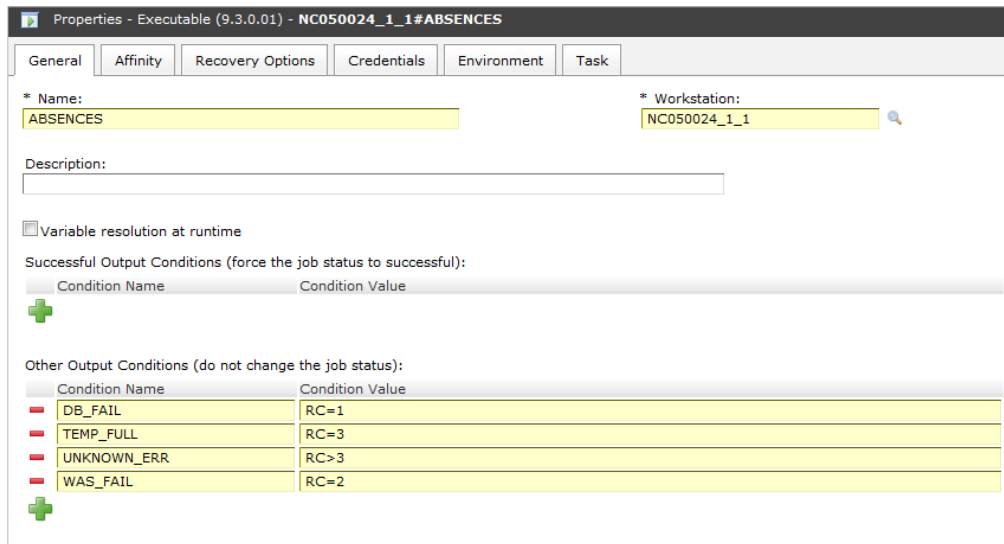
These are conditions based on job status, such as if the job started, or if the job completes in FAIL, ABEND, SUCC, or SUPPR state. For job streams, the valid statuses are SUCC, SUPPR, and ABEND.

#### Other output conditions

Other types of conditions, including successful output conditions, can be specified using a mapping expression, which can be:

- A return code (fault-tolerant and dynamic agents)
- Output variables (dynamic agents)
- Job log content (dynamic agents)

A condition dependency relationship is set up by using a *condition*. You specify the output conditions in the job definition. You can define an unlimited number of conditional dependencies. When you choose to add a conditional dependency on this job, you select the status and output conditions that you want to be considered during the job processing. The following example shows other output conditions defined in the job definition.



You can define both successful output conditions, conditions that when satisfied signify that the job completed successfully, and other output conditions, which when satisfied determine which successor job to run. The output conditions are evaluated in "OR".

When this job is added to a job stream as a successor job, and a conditional dependency is added to the job preceding this job (predecessor job), then a selection of the conditions is made. The properties panel for the internal or external dependency is dynamically updated to include the conditions originally specified in the job definition. In addition to the conditions originating from the job definition, you can select conditions based on job status. If the selected conditions are satisfied during job processing, then the corresponding successor job runs.

Properties - Internal Job Dependency - **ABSENCES**

**General**

\* Name:

\* Workstation:

Conditional Dependency

NOTE: The successor job will be suppressed if the conditional dependency is not satisfied. [More information](#)

**Conditional Dependency Resolution Criteria**

Job started

Successor job runs if the predecessor job or job stream completes with any of these statuses

ABEND    FAIL    SUCC    SUPPRESS

Successor job runs if any of these conditions are satisfied

UNKNOWN\_ERR ?   [Add a condition](#)

DB\_FAIL ?

TEMP\_FULL ?

WAS\_FAIL ?

You can also join or aggregate conditional dependencies related to different predecessors. A join contains multiple dependencies, but you decide how many of those dependencies must be satisfied for the join to be considered satisfied. You can define an unlimited number of conditional dependencies, standard dependencies, or both in a join.

Conditional dependencies are supported only for dependencies where the predecessor is a job or a job stream in the same network and where all the components are at least at the Version 9.3 Fix Pack 2 level. They are not supported on internetwork dependencies, nor on Limited Fault-Tolerant Agents for IBM i.

## Condition dependencies (z/OS)

z/OS

*Conditional logic* feature in IBM Workload Scheduler for z/OS.

In IBM Workload Scheduler for z/OS, you can specify that jobs are dependent on other jobs. For example, if job A1 must complete before job A2 can start, then A1 is a *predecessor* of A2, and A2 is a *successor* of A1. These relationships between jobs are called dependencies.

When specifying dependencies, you can also define work flows with alternative branches based on conditions, specifically to achieve the same results as using IF/THEN/ELSE statements in the job JCL. You can use both job return code and job status as *conditional logic* elements to determine the start of a successor job. The following example shows how this works.

A condition dependency relationship is set up by using a *condition*.

You can define condition dependencies at the following levels:

#### Job level

By conditioning the start of the successor to the check on job return code or status of the predecessor.

#### Step level

By conditioning the start of the successor to a specific step return code of the predecessor.

### How condition dependencies work

A *condition dependency* is a specific check of the status or return code of a predecessor job or of the return code of a job step.

The job processing flow is affected by the conditions set and their final status.

The status of a condition is set based on the rule defined and on the statuses of its condition dependencies.

The condition dependency is evaluated only when a path in the plan exists, otherwise the condition dependency remains Undefined until a manual intervention or a rerun is done.

A possible path for the conditional predecessor exists when at least one of the following conditions occurs:

- The job has status **Completed** and a normal successor exists.
- There is at least one conditional successor that has *all* the subsets of conditions, referencing that conditional predecessor, set to **true**, according to the condition rules.

For example:

- A conditional predecessor (Job A) has several conditional successors (Jobs B, C, D)
- Each conditional successor has a set of condition dependencies, relating to job A, that must be satisfied to make it possible for the successor to start.
- Job A runs and changes its status.
- If at least one subset of conditions between job A and one of its successors is **true**, the path in plan exists and all the successors' condition dependencies related to job A are evaluated. Otherwise all condition dependencies are left undefined.

When specifying predecessors in the database, you can define a list of *conditions* by combining single *condition dependencies* on predecessor job status or return code. You cannot define a job both as a conditional and as a normal predecessor of another job. For each condition you can specify one of the following rules:

- At least *n* number of conditions out of all the condition dependencies must be satisfied. This rule corresponds to the OR operator in Boolean logic.
- All the condition dependencies in the list must be satisfied. This rule corresponds to the AND operator in Boolean logic.

At run time, the scheduler evaluates the condition status resulting from the condition dependencies statuses, based on the selected rule. The condition status can be:

**True** When ALL condition dependencies are true.

**If the rule is set to AND**

When ALL condition dependencies are true.

**If the rule is set to OR (at least  $n$  condition dependencies must be true)**

When at least  $n$  condition dependencies are true.

**False** The condition was not satisfied.

**If the rule is set to AND**

When at least one condition dependency is false.

**If the rule is set to OR (at least  $n$  condition dependencies must be true)**

When at least  $n$  condition dependencies cannot be true.

**Undefined**

When the rule cannot be evaluated yet.

A set of conditions results as satisfied if all the conditions are satisfied, according to the logic of the AND operator.

When a predecessor ends, the successor job status changes to one of the following statuses:

**Waiting**

Undefined, until the scheduler evaluates all the defined conditions. At least one normal predecessor is not in **Completed** or **Suppressed by Condition** status or at least one condition is U (Undefined). The scheduler processes all subsequent statuses as usual, up to a final status.

**Ready**

Ready, when all the defined conditions are satisfied. Job normal predecessors are in **Completed** or **Suppressed by Condition** status and all its conditions are **True**. The scheduler processes all subsequent statuses as usual, up to a final status.

**Suppressed by Condition**

Suppressed by condition, when the defined condition dependency is not satisfied. At least one condition is **False**.

**Note:** When evaluating conditional successors status, predecessor jobs in status **Suppressed by Condition** are considered equal to predecessor operations in status **Completed**.

## Examples of condition dependencies

Use a job-level condition dependency when you want a successor job to start depending on a combination of one or more return codes or statuses of predecessor jobs.

Figure 3 on page 76 shows the two different types of job level conditions, one based on the predecessor return code and the other based on the predecessor job status. For example, using the return code as condition type, you can define that job OP2 is dependent on job OP1, specifying that OP2 must run when OP1 ends with a return code in the range from 1 to 3. Similarly, using job status as condition, you can define job OP4 as dependent on job OP3, specifying that OP4 must run if OP3 ends with status **Error**.

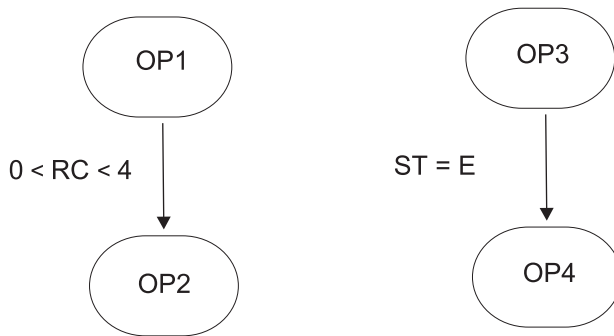


Figure 3. Example of a condition dependency definition

In this example, OP1 is a *conditional predecessor* of OP2 and OP3 is a *conditional predecessor* of OP4.

In the previous example, if OP1 ends with return code of 8, the scheduler sets OP2 to status **Suppressed by Condition**, because the condition is not satisfied.

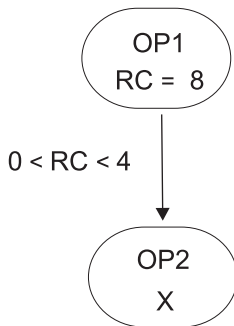


Figure 4. Example of a condition dependency at run time

For further information about conditional logic, see *IBM Workload Scheduler for z/OS Managing the Workload*

### Step level dependency

If you configured IBM Workload Scheduler for z/OS to track step-end events, then the step dependencies are checked at step-end time when the return code value is available.

This section contains an example showing how job processing flow is affected when using step-level conditions.

If the predecessor job is associated to a job comprising several steps, you can specify a dependency on step return codes. Figure 5 on page 77 shows an example of conditional dependency logic at job step level, to obtain auto-recovery applications with recovery jobs that can start without waiting for the end of predecessor jobs, depending on the result of specific steps.



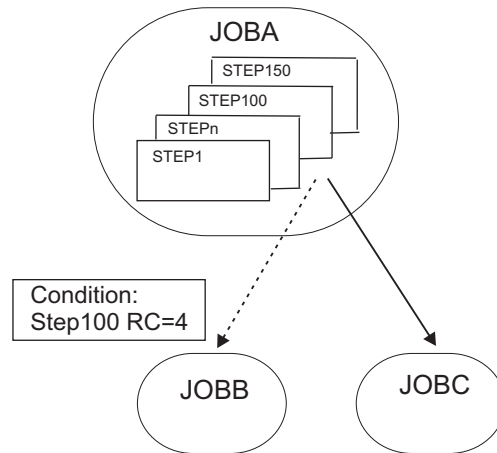


Figure 5. Auto-recovery job stream with step level dependency

In this example:

- JOBB can start if STEP100, belonging to JOBA, ends with RC=4.
- JOBC is a normal successor of JOBA and therefore starts if JOBA status is **Completed**.

### Handling recovery using condition dependencies

Using condition dependencies, the error status of a job can be used as a criteria for starting a successor, when this successor is used as a recovery job.

By specifying the conditional recovery job option, you can define that the job is used as the recovery job for a conditional predecessor.

Any conditional predecessor that Ended-in-Error, with a status or error code matching a condition dependency defined for the job, does not prevent the daily plan process from removing the occurrence to which the predecessor belongs. To check if the status **Ended-in-error** can be ignored at occurrence removal phase, the daily plan process uses a field automatically set by the scheduler, corresponding to **Recovered by condition**.

**Note:** As soon as a recovery job becomes ready, the scheduler checks the predecessors in error status at that time. Any predecessor that ends in error after the recovery job runs cannot be flagged as **Recovered by condition**. The daily plan process removes the occurrence in the following cases:

- The occurrence status is **Completed**.
- The occurrence status is **Ended-in-error** , and includes only jobs in one of the following statuses:
  - **Completed**
  - **Suppressed by condition**
  - **Ended-in-error** with the **Recovered by condition** option specified.

For example, suppose that either JOBR1 or JOBR2 must run when JOBB ends with an error. You can specify JOBB as their conditional predecessor, as shown in Figure 6 on page 78.

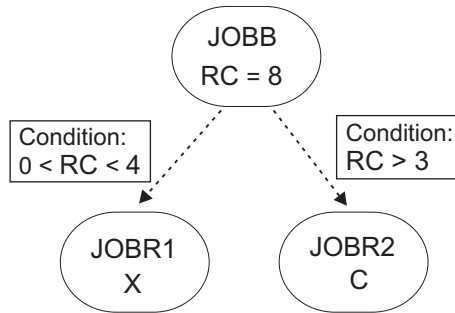


Figure 6. Example of recovery job with condition dependencies

When defining JOBR1 and JOBR2 and specifying JOBB as conditional predecessor, you can also set the **Conditional recovery job** option to have the daily plan process remove the occurrence containing JOBB, because it ended with an error code matching one of the defined condition dependencies.

## Cross dependencies

Using cross dependencies and *shadow jobs*.

A cross dependency is a dependency of a *local job* on a *remote job* running in a different scheduling environment. It is achieved by using a *shadow job*, which runs in the same environment as the local job and maps the remote job processing.

Cross dependencies help you integrate workload running on more than one engine. They can be both IBM Workload Scheduler for z/OS engines (controller) and IBM Workload Scheduler engines (master domain manager).

The following objects allow you to define and manage cross dependencies:

### Remote engine

A workstation that represents locally a remote IBM Workload Scheduler engine. It is a workstation used to run only *shadow jobs*. A shadow job is a job that runs locally and is used to map another job running on a remote engine. This relationship between the two jobs is called a *cross dependency*. You define a remote engine workstation if you want to federate your environment with another IBM Workload Scheduler environment, either distributed or z/OS, to add and monitor dependencies on jobs running in the other scheduling environment. This type of workstation uses a connection based on HTTP protocol to allow the two environments to communicate.

### Shadow job

A job running locally that is used to map a job running on the remote engine. This job is called a *remote job*. Shadow jobs can run only on remote engine workstations. The shadow job definition contains all the information needed to correctly match the remote job in the plan of the remote engine. The status transition of the shadow job reflects the status transition of the remote job.

### Remote job

A job that runs on a remote scheduling environment and is mapped by a shadow job to become a dependency for a job that runs in a local environment.

To add a cross dependency to a local job on a job that is defined on a remote engine, you must define a normal dependency for your local job on a shadow job that:

- Points to the remote job on which you want to create the cross dependency
- Is defined on a local workstation of remote engine type, that points to the engine where the remote job is defined.

To do this, you must

1. Create a remote engine workstation where the shadow job runs.
2. Create a shadow job pointing to a specific job instance defined on a remote engine.

Shadow jobs can be added to the plan by the plan creation process or dynamically at run time. The shadow job scheduled time identifies the remote job instance in the remote engine plan.

The **bind** process is the process to associate a shadow job with a job instance in the remote engine plan.

As soon as the bind is established, the remote engine sends back an HTTP notification containing the status of the bind and, if the bind was successful, the information to identify the remote job instance bound. This information is saved in the shadow job instance details.

3. Add the shadow job as a dependency of the local job.

The resolution of the cross dependency depends on the status of the shadow job, which reflects at any time the status of the remote job. Because the remote job status transition is mapped into the shadow job status transition, the status of the cross dependency is represented by the status of the normal dependency.

The key attributes to identify the remote job instance and the matching criteria depend on the type of remote engine where the remote job instance is defined. z/OS engines support only *closest preceding* matching criteria. Distributed shadow jobs, instead, support the four matching criteria available for external dependencies. See “Dependencies” on page 66 for more details.

The scheduled time of the job stream containing the shadow job is used to find the match.

To avoid incongruence, at plan creation or extension time, consistency checks are performed to ensure that no mismatch has occurred in between the definition of jobs and workstations in the database and their inclusion in the current plan.

Figure 7 on page 80 summarizes how cross dependencies work.

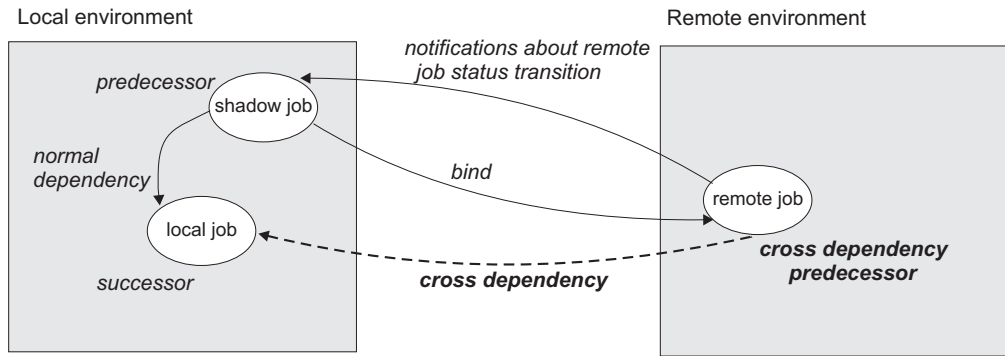


Figure 7. Cross dependencies

For more information about cross dependencies, see the sections about defining and managing cross dependencies in *User's Guide and Reference* and in *Managing the Workload*.

**Related tasks:**

"Creating cross dependencies" on page 131

Creating a cross dependency using the Dynamic Workload Console.

## User

**Distributed**

A *User* is the user name used as the login value for several operating system job definition. Users must be defined in the database.

If you schedule a job on an agent, on a pool, or on a dynamic pool, the job runs with the user defined on the pool or dynamic pool. However, the User must exist on all workstations in the pool or dynamic pool where you plan to run the job.

**Related tasks:**

"Designing your Workload" on page 107

Create and editing workload definitions in the database.

"Listing workload objects" on page 146

## Workstation class

A *workstation class* is a group of workstations with similar job scheduling characteristics. Any number of workstations can be grouped in a class, and a workstation can be included in many classes. Jobs and job streams can be assigned to run on a specific workstation class and this makes the running of jobs and job streams across multiple workstations easier.

For example, you can set up the following types of workstation classes:

- Workstation classes that group workstations according to your internal departmental structure, so that you can define a job to run on all the workstations in a department
- Workstation classes that group workstations according to the software installed on them, so that you can define a job to run on all the workstations that have a particular application installed
- Workstation classes that group workstations according to the role of the user, so that you can define a job to run on all the workstations belonging to, for example, managers

In the previous example, an individual workstation can be in one workstation class for its department, another for its user, and several for the software installed on it.

**Distributed** Workstations can also be grouped into domains when your network is set up. Because the domain name is not one of the selection criteria used when choosing where to run a job, you might need to mirror your domain structure with workstation classes if you want to schedule a job to run on all workstations in a domain.

For more information about how to define workstation classes, see the section about workstation class definition in *Dynamic Workload Console User's Guide*.

**Related tasks:**

“Designing your Workload” on page 107

Create and editing workload definitions in the database.

“Listing workload objects” on page 146

## Variable table

A *variable table* is a table containing multiple variables and their values. All global parameters, now called *variables*, are contained in at least one variable table.

You can filter the list of variables by clicking the column headers and sorting them by their name or by their values.

You are not required to create variable tables to be able to use variables, because the scheduler provides a default variable table.

However, you might want to define a variable with the same name, but different values, depending on when and where it is used. You do this by assigning different values to the same variable in different variable tables. You can then use the same variable name in different job definitions and when defining prompts and file dependencies. Variable tables can be assigned at run cycle, job stream, and workstation level.

You can also define verification criteria and dependency list and associate them to variables.

Variable tables can be particularly useful in job definitions when a job definition is used as a template for a job that belongs to more than one job stream. For example, you can assign different values to the same variable and reuse the same job definition in different job streams.

For information about how to define variable tables, see the section about variable tables in *IBM Workload Scheduler User's Guide and Reference*.

**Related tasks:**

“Designing your Workload” on page 107

Create and editing workload definitions in the database.

“Listing workload objects” on page 146

## Workload Broker job definition

A *Workload Broker job definition* is a text file in Job Submission Description Language (JSDL) schema file format, which contains all the parameters necessary to run a job.

The Job Brokering Definition Console provides an easy-to-use graphical interface that you can install locally to create and edit job definitions. Job definitions, saved in the JSDL schema, are created by your input into the Job Brokering Definition Console.

The JSDL schema offers great flexibility and supports a wide variety of criteria to determine job requirements, scheduling and load-balancing.

Examples of how to define a job to achieve different objectives are provided in IBM Workload Scheduler Scheduling Workload Dynamically.

From the Dynamic Workload Console, you can create Workload Broker job definitions that map Workload Broker jobs. You can also monitor Workload Broker jobs and browse the corresponding job logs.

**Related tasks:**

“Creating Workload Broker objects” on page 139  
Creating Workload Broker workstations and jobs.

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## Production process

Generating the IBM Workload Scheduler production plan.

IBM Workload Scheduler production is based on a plan that runs in a production period.

You can define the production period when creating or extending the *production plan* and it can span from a few hours to multiple days (by default it lasts 24 hours).

The production plan contains information about the jobs to run, on which fault-tolerant agent, and what dependencies must be satisfied before each job can start.

**Distributed** You use the JnextPlan script to generate the production plan and distribute it across the IBM Workload Scheduler network. Then, if you want to extend your production plan at a fixed time interval, for example every day, you have the option to automate the extension by using the final job stream at the end of each production period. A sample job stream helps you to automate plan management and runs the sequence of script files included in JnextPlan to generate the new production plan.

When the production plan is generated, all of the required information about that production period is taken from the scheduling environment and object definitions and is included in the plan.

During the production period, the production plan is regularly updated to show what work is completed, in progress, and left to process.

In IBM Workload Scheduler for distributed environments or in a z/OS end-to-end network, a file called *Symphony* contains all the information about the production plan. This file is sent to all the subordinate domain managers and fault-tolerant agents in the scheduling environment. This allows the fault-tolerant agents throughout the network to continue their processing even if the network connection to their domain manager is down.

IBM Workload Scheduler processes monitor the production plan and make calls to the operating system to launch jobs as required. The operating system runs the jobs, and informs IBM Workload Scheduler if the job completed successfully. This information is used to update the production plan to indicate the status of the job.

From the Dynamic Workload Console or the command line interface, you can view and make changes in the current production plan.

\*  
\*  
\*  
\*  
\*  
\*

Even once job definitions have been submitted into the production plan, you still have the opportunity to make one-off changes to the definitions before they run, or after they have run. You can update the definition of a job that has already run and then rerun it. You can update a job definition from either the Job Stream Graphical view, the job monitoring view, or from the **conman** command line. The job definition in the database remains unchanged.

## Database

The IBM Workload Scheduler database.

The IBM Workload Scheduler database, hereafter referred to as the database, is a relational database that is accessible by the master domain manager and contains all the definitions for scheduling objects, such as jobs, job streams, resources, and workstations. It also holds statistics of job and job stream execution, as well as information about the user ID that created an object and when an object was last modified.

For more information about the types and versions of the supported relational database, see the IBM Workload Scheduler documentation.

### Related tasks:

“Designing your Workload” on page 107  
Create and editing workload definitions in the database.

## Plans

Different types of plans you can access to manage the objects and the activities they contain.

A plan contains all jobs and job-related scheduling objects that are scheduled for a selected time interval. There are different types of plans based on the type of IBM Workload Scheduler environment you are connected to.

**Note:** z/OS The only type of plan that you can access through the Dynamic Workload Console is the current plan.

The following plans are available:

### Production plan (current plan)

A production plan (in distributed environment) or current plan (in z/OS environment) is the master control for all job scheduling activity planned for a user-defined time interval, named the *production period*. Scheduling object definitions stored in the database, such as jobs and job streams, become instances in the production plan, where they can be monitored and modified.

\*  
\*  
\*

The production plan is created on the master domain manager and contains all the jobs and job streams that are scheduled to run within the production period together with their depending objects and all

\* workstation definitions. You do have the opportunity to make additional  
\* changes to job definitions even once they are in the plan as long as the job  
\* has not yet started running. If the job has already run, you can update the  
\* definition and rerun the job. Only the job instance is modified. The job  
\* definition in the database remains the same. The production plan can be  
\* extended to cover future time intervals. Any job streams that did not  
\* complete successfully within the production period or that are either  
\* running or still waiting to be run, can be carried forward into the plan  
\* extension.

The production plan data is stored in the Symphony file and replicated in the database. With IBM Workload Scheduler version 9.1, accessing this information from the Dynamic Workload Console directly queries the database thereby improving response times.

### **Preproduction plan**

A preproduction plan is used to identify in advance the job stream instances and the job stream dependencies involved in a specified time period.

This improves performance when generating the production plan by preparing in advance a high-level schedule of the anticipated production workload.

The preproduction plan contains:

- The job stream instances to be run during the covered time period.
- The external dependencies that exist between the job streams and jobs included in different job streams.

### **Symnew plan**

A Symnew plan is a temporary plan. It is an intermediate production plan that covers the whole time the new production plan that is being generated will cover. It is replaced by the production plan as soon as it starts.

### **Archived Plan**

An archived plan is a copy of an old production plan that ran in the IBM Workload Scheduler environment and that is now stored in the IBM Workload Scheduler database.

Using this type of plan you can, for example, see the result of running a past production plan. The difference between using an archived plan and a forecast plan covering the same time interval is that an archived plan shows how the real production was based on the job and job stream processing results, while a forecast plan shows how the production was planned to be.

### **Trial plan**

A trial plan is a projection of what a production plan would be if it covered a longer period of time. For example, if you generate a production plan that covers two days, but you want to know what the plan would be if it covered three days, you can generate a trial plan.

A trial plan is typically created to extend a production plan and to have an idea of future impacts on the scheduling environment. Therefore, if there is a valid production plan, the start time option is greyed out. By default, the trial plan start date is the same as the production plan end date.

Using this type of plan you can, for example, see how the current production evolves based on the job and job stream dependencies defined in the production plan, if available, or in the preproduction plan. Trial



plans are based on the information contained either in the production or in the preproduction plan. If neither is available, a trial plan cannot be created.

### **Forecast plan**

A forecast plan is a projection of what the production plan would be in a chosen time interval. For example, if you generate a production plan that covers two days and you want to know what the plan would be for the next week you can generate a forecast plan.

A forecast plan is typically created to anticipate and solve any kind of scheduling problems, therefore the start time is always enabled and it is a mandatory field.

Using this type of plan you can, for example, see how the production will be in a future time interval based on the job and job stream dependencies defined in the IBM Workload Scheduler database. Based on this information, you can modify some information in the database, if needed, before extending the production plan.

When workload service assurance is enabled, it can calculate the predicted start time of each job in the job stream. You can enable and disable this feature using the **enForecastStartTime** global option. IBM Workload Scheduler calculates the average run for each job based on all previous runs. For complex plans, enabling this feature could negatively impact the time taken to generate the forecast plan.

**Note:** Neither the trial nor the forecast plan takes into account any dynamic updates made to the Symphony file while the production plan is being processed. Therefore, all the job streams it contains are in one of the following states:

#### **HOLD**

If they are dependent on other job streams or if their start time is later than the plan start time.

#### **READY**

If they are free from dependencies and their start time has elapsed.

#### **Related concepts:**

“Selecting the working plan” on page 211

How to select the plan against which tasks are run.

“Monitoring the progress of your plan” on page 171

Request a graphical view of the progress of the current plan.

#### **Related tasks:**

“Display a graphical plan view” on page 213

Specify filter criteria and display a graphical representation of the plan in the Plan View.

“Generating Trial and Forecast Plans” on page 213

How you create either a new trial or forecast plan.

#### **Related information:**

“Graphical views in the plan” on page 269

Views to monitor the progress of your job streams in the plan in a graphical map.

## **Preproduction plan**

The preproduction plan is used to identify in advance the job stream instances and the job stream dependencies involved in a specified time period.

This improves performance when generating the production plan by preparing in advance a high-level schedule of the predicted production workload.

The preproduction plan contains:

- The job stream instances to be run during the time interval of the plan.
- The external follows dependencies that exist between the job streams and jobs included in different job streams.

A job or job stream that cannot start before another specific external job or job stream is successfully completed is named *successor*. An external job or job stream that must complete successfully before the successor job or job stream can start is named *predecessor*.

IBM Workload Scheduler automatically generates, expands, and updates, if necessary, the preproduction plan by completing the following steps:

- Removes any job stream instances that are in COMPLETE or CANCEL state.
- Selects all the job streams that are scheduled to run after the end of the current production plan and generates their instances.
- Resolves all job and job stream dependencies, including external follows dependencies, according to the defined matching criteria.

To avoid any conflicts, the database is locked during the generation of the preproduction plan and unlocked when the generation completes or if an error condition occurs.

At this stage only the job streams with the time they are scheduled to start and their dependencies are highlighted. All the remaining information about the job streams and the other scheduling objects (calendars, prompts, domains, workstations, resources, files, and users) that will be involved in the production plan for that time period are not included, but are retrieved from the database as soon as the production plan is generated.

When the production plan is extended, old job stream instances are automatically removed. The criteria used to remove these instances is based on the following conditions:

- The first job stream instance that is not in COMPLETE state when the new plan is generated (FNCJSI). This job stream instance can be both a planned instance, that is an instance added to the plan when the production plan is generated, and a job stream instance submitted from the command line during production using the **conman sbs** command.
- The time period (T) between the time FNCJSI is planned to start and the end time of the old production plan.

Assuming T is this time period, the algorithm used to calculate which job stream instances are removed from the preproduction plan is the following:

**if T < 7**

All job stream instances older than 7 days from the start time of the new production plan are removed from the preproduction plan; all job stream instances closer than 7 days to the start time of the new production plan are kept regardless of their states.

**if T > 7**

All job stream instances older than FNCJSI are removed from the preproduction plan; all job stream instances younger than FNCJSI are kept.

This algorithm is used to ensure that the preproduction plan size does not increase continuously and, at the same time, to ensure that no job stream instance that is a potential predecessor of a job stream newly added to the new preproduction plan is deleted.

For more information about how you can open the preproduction plan in view mode from the Dynamic Workload Console, see the section about how to view preproduction plan in the Dynamic Workload Console User's Guide.

**Note:** In the IBM Workload Scheduler for z/OS terminology the concept that corresponds to the preproduction plan is *long term plan* (LTP).

**Related tasks:**

“Display a graphical preproduction plan” on page 215

How to view a graphical representation of a preproduction plan from the Dynamic Workload Console.

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## Engine connections

An engine connection is a set of configuration information that identifies a specific workstation in the IBM Workload Scheduler environment in the network.

An engine connection is a set of configuration information that identifies a specific workstation in the IBM Workload Scheduler environment in the network.

To manage scheduling objects you must connect from the Dynamic Workload Console to a IBM Workload Scheduler environment. In Dynamic Workload Console you do this by defining engine connections.

You can connect to both IBM Workload Scheduler distributed and z/OS environments and you can create as many engine connections as you need.

When you create an engine connection, you give it a name and select the plan that you want it to access. The selected plan must be accessible from that workstation.

**z/OS** If you connect to a IBM Workload Scheduler for z/OS environment, the plan that you access is the current plan and the engine that you connect to is the controller workstation, which is the management hub of the IBM Workload Scheduler for z/OS environment.

**Distributed** If you connect to a IBM Workload Scheduler distributed environment, you can access different types of plans and connect to different types of engines. Based on the type of plan that you select and the engine that you connect to, you can get different results when running your tasks in the same IBM Workload Scheduler distributed environment. You can connect to:

**The master domain manager workstation**

The top management hub. Select this workstation if you want to access the entire set of objects involved in the current plan, or if you want to access a trial plan, a forecast plan, or an archived plan. You can define and use different engine connections to the master domain manager, each accessing a different plan.

**A fault-tolerant agent if the connector is installed**

A workstation where jobs and job streams are run. Select this workstation if you want to access the set of objects involved in the current plan and

scheduled to run in that fault-tolerant agent. You choose this option if you need up-to-date information regarding job status on this workstation.

**Related tasks:**

“Creating and managing engine connections” on page 6  
How you can create, modify, or delete engine connections.

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## Event management

What the event management feature is and how to use it.

You can use the *event management* feature to launch a predefined set of actions in response to events that occur on the nodes where IBM Workload Scheduler runs.

The main elements of event management are:

- “Events”
- “Actions” on page 89
- “Event rules” on page 90

You can use event management capabilities to:

- Create Event Rules
- Create and run Workload Events tasks

### Events

An event represents a set of circumstances that match selected criteria. Events are divided into the following major categories:

**Note:** The topics listed below are .html files referenced by the PDF. Ensure you are connected to the Internet before clicking on the links.

#### IBM Workload Scheduler object related events

All the events relating to scheduling objects such as jobs, job streams, workstations, and prompts. This type of event is described in more detail in IBM Workload Scheduler Object Monitor.

**Note:** Any change performed on a workstation referenced in a rule is not reported in the rule. For example if you modify, update, or delete a workstation that is referenced in a rule, the rule ignores the change and continues to consider the workstation as it was when it was included in the rule.

#### File monitoring events

Events relating to changes to files and logs.

File monitoring events are not supported on IBM i systems.

This type of event is described in more detail in File Monitor.

#### Application monitoring events

Events relating to IBM Workload Scheduler processes, file system, and message box. Application monitoring events are not supported on IBM i systems.

This type of event is described in more detail in Application Monitor.

#### SAP related events

These events are available only if you have installed IBM Workload

Scheduler for Applications and they are generated by external SAP systems. This type of event is described in more detail in SAP Monitor.

### **Data set monitoring**

These events are available only if you are using the agent for z/OS on IBM Workload Scheduler. This type of event is described in more detail in Data set Monitor.

### **Generic events**

Events used to manage custom events sent by external applications. You can write an XML file to define a custom event. A schema is provided to validate your XML, as well as a basic event template that you can use as a starting point. For more information, see the schemas for generic events. Events of this category are:

- Changes in a resource of the operating system, such as processes and memory
- Email received

## **Actions**

When one or more of the above events occurs, you can specify which actions to perform. Actions are divided into the following main categories:

### **Operational actions**

Actions that cause a change in the status of one or more IBM Workload Scheduler objects. Actions in this category include:

- Submitting jobs or job streams
- Submitting ad hoc jobs
- Replying to a prompt

This type of action is described in more detail in IBM Workload Scheduler actions.

- Adding an application occurrence (job stream) to the current plan on IBM Workload Scheduler for z/OS in IBM Workload Scheduler-IBM Workload Scheduler for z/OS end-to-end scheduling configurations.

This type of action is described in more detail in IBM Workload Scheduler for z/OS actions.

### **Notification actions**

Actions such as:

- Sending email's or SMS. For details, see Mail sender plug-in.
- Forwarding IBM Enterprise Console events. For details, see Message logger.
- Writing messages in a logging repository. For details, see IBM Enterprise Console event forwarder.
- Forwarding events to a IBM Business Services Manager server. For details, see IBM Business Services Manager Console event forwarder.
- Opening a ticket to a SmartCloud Control Desk. For details, see Smart Cloud Control Desk.
- Opening an incident in ServiceNow incident management. For details see Service Now.

### **Generic actions**

Actions performed by running a command. This type of action is described in more detail in Generic Action plug-in.

## Event rules

Use *event rules* to associate one or more events to the response actions that you want to perform. When you create an event rule, you are actually creating an *event rule definition* in the database. While the event rule is in **Draft** status, it is not deployed to the IBM Workload Scheduler. All new and modified non-draft rules saved in the database are periodically (by default every five minutes) found, built, and deployed by an internal process named rule builder. At this time they become active. Meanwhile, an event processing server, which is normally located in the master domain manager, receives all events from the agents and processes them. The updated monitoring configurations are downloaded to the agent and activated. The occurrence of an event rule that has performed the corresponding actions is called the *event rule instance*.

### Related concepts:

“Event management configuration” on page 7  
Authorizations needed to use event management.

---

## Reports

How to customize and generate IBM Workload Scheduler reports.

Create a *report* task to customize and generate IBM Workload Scheduler reports, which you can then view, print, and save, in different kinds of output. Reports help you in many business-related activities, such as:

### Tuning the workload on the workstations

- Workstation Workload Summary
- Workstation Workload Runtimes

### Extract detailed information about the plan

- Planned Production Details
- Actual Production Details

### Detect jobs with exceptions

- Job Run History
- Job Run Statistics

To generate your reports, you can use either Business Intelligent Report Tool (BIRT) or Tivoli Common Reporting. For more information, see Chapter 15, “Reporting,” on page 229.

The following table shows the available reports, both for BIRT and Tivoli Common Reporting and their details.

Table 8. Report types

Report Name	Description	Supported environment	Supported by
Job Run History	Collects the historical job run data during a specified time interval. Use it to detect which jobs ended in error or were late. It also shows which jobs missed their deadline, long duration jobs, and rerun indicators for reruns.	Distributed and z/OS	Tivoli Common Reporting and BIRT

Table 8. Report types (continued)

Report Name	Description	Supported environment	Supported by
Job Run Statistics Chart	Collects the job run statistics. Use it to detect success, error rates; minimum, maximum, and average duration; late and long duration statistics.	Distributed	Tivoli Common Reporting and BIRT
Job Run Statistics Table	A report collecting the job run statistics, which returns output in table format. It is useful to detect success, error rates; minimum, maximum, and average duration; late and long duration statistics.	Distributed	Tivoli Common Reporting and BIRT
Job Run Statistics	A report collecting the job run statistics, which returns output in table format. It is useful to detect success, error rates; minimum, maximum, and average duration; late and long duration statistics.	z/OS	BIRT
Workstation Workload Summary	Shows the workload on the specified workstations. The workload is expressed in terms of number of jobs that ran on them. It helps for capacity planning adjustments (workload modelling and workstation tuning).	Distributed and z/OS	BIRT
Workstation Workload Runtimes	Shows job run times and duration on the specified workstations. It helps for capacity planning adjustments (workload modelling and workstation tuning).	Distributed and z/OS	BIRT
Custom SQL	Allows you to create reports that best fit your business needs. You can specify an SQL query or import SQL scripts.	Distributed	BIRT
Planned Production Details	Extracts information about planned production plans into either an XML or a CSV format, to be used respectively, with Microsoft Project and Microsoft Excel. This also allows users who do not know IBM Workload Scheduler to access plan information in a familiar format.	Distributed	BIRT

Table 8. Report types (continued)

Report Name	Description	Supported environment	Supported by
Actual Production Details	Extracts current plan information into either an XML or a CSV format, to be used, respectively, with Microsoft Project and Microsoft Excel. This also allows users who do not know IBM Workload Scheduler to access plan information in a familiar format.	Distributed	BIRT
Analysis Job Duration Estimation Error	A report that shows the average estimation error. It is useful to detect whether a job ends in frequent errors, ends in error, or if the jobs have unsatisfactory accuracy rates. You can then drill down to display all the jobs that are in that threshold and finally you can visualize charts that will help you to identify the jobs that have a high estimated error rate allowing you to intervene beforehand on those jobs.	Distributed and z/OS	Tivoli Common Reporting
Analysis Job Duration Standard Deviation	A report showing variances in job duration. The variance is calculated as a percentage and according to which variance level the jobs are they will be presented as follows: <b>High variability</b> , <b>Medium variability</b> or a <b>Low variability</b> . You can drill down to display all the jobs that are in that threshold which then returns output in a chart format. This report is useful to identify the run that had a greater duration.	Distributed and z/OS	Tivoli Common Reporting

The output of historical reports, which is extracted from the database, consists of the following main sections. The output of a Planned and Actual report is not structured because it is a file that must be opened with an external program.

**Report header**

Contains the report title, description, engine name, engine type, creation time, type, and the total number of the result set extracted.

**Report of content**

Contains a set of hyper-links to each section and subsection.

**Report format**

Depending on the kind of information you are processing, you can choose to view it in the most appropriate format. The report output can be in:

**Table format**

It shows information organized in rows and columns, in a CSV or HTML file.



### Graphical format (HTML)

If you choose the graphical formats, depending on the report type, and on the information you choose to include, you can have data displayed in pie charts, bar charts, line charts, or tables.

**Note:** To see report output correctly, make sure that you configure your browser as follows:

- Allow pop-up windows.
- Remove any optional browser toolbar that you installed, if its settings prevent new windows from opening.
- To see CSV reports, configure the browser security settings to automatically prompt for file downloads.

#### Related reference:

Chapter 15, “Reporting,” on page 229

“Regular expressions and SQL reports” on page 285

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## Workload service assurance

Basic concepts about critical jobs and the critical path, which are fundamental to take advantage of this feature.

Workload service assurance is an optional feature that allows you to identify critical jobs and to ensure that they are processed in a timely manner.

When the workload service assurance feature is enabled, you can indicate that a job is critical and define a deadline by which it must be completed when you add the job to a job stream. Defining a critical job and deadline triggers the calculation of timings for all jobs that make up the critical network. The critical network includes the critical job itself and any predecessors that are defined for the critical job. When changes that have an impact on timings are made to the critical network, for example addition or removal of jobs or follows dependencies, the critical start times are automatically recalculated.

The critical network is constantly monitored to ensure that the critical job deadline can be met. When a critical network job completes, timings of jobs that follow it are recalculated to take account of the actual duration of the job. The system also acts automatically to remedy delays by prioritizing jobs that are actually or potentially putting the target deadline at risk. Some conditions that cause delays might require your intervention. A series of specialized critical job views, available on the Dynamic Workload Console, allow you to monitor critical jobs, display their predecessors and the critical paths associated with them, identify jobs that are causing problems, and drill down to identify and remedy problems.

### Dynamic critical path

If a job is critical and must complete by the deadline set on the database you can mark it as a *critical job* thus specifying that it must be considered as the target of a *critical path*. The critical path consists of the critical job predecessors with the least *slack time*. In a critical job predecessor path, the slack time is the amount of time the predecessor processing can be delayed without exceeding the critical job deadline. It is the spare time calculated using the deadline, scheduled start, and duration settings of predecessor jobs. The calculation of critical path is performed dynamically. In this way, during daily planning processing, a critical path

including the internal and external predecessors of the critical job is calculated, and a table of predecessors is cached (in the local memory for z/OS and on the master domain manager for distributed systems). Every time a predecessor of the critical job starts delaying, the scheduler *dynamically* recalculates the critical path, to check whether a new path, involving different jobs, became more critical than the path calculated at daily planning phase.

You can launch a query for all the jobs included in a critical path by clicking **Critical Path** in the panels that show the results of monitor jobs tasks.

As well as jobs included in the critical path job list, there are other lists of jobs that might be important to manage to ensure that your critical job does not fail.

### **Hot list**

The *hot list* contains a subset of critical predecessors that can cause a delay to the critical job because they are states such as error, late, fence (for distributed systems only), suppressed (for distributed systems only), or long duration. If these jobs do not complete successfully on time, they prevent the critical job from completing on time. Using the hot list view, you can quickly see which jobs need you to take appropriate recovery actions. Jobs included in the hot list are not necessarily also included in the critical path.

You can launch a query for all the jobs in the hot list by clicking **Hot List** in the panels that show the results of monitor critical jobs tasks.

#### **Related tasks:**

“Creating a task to Monitor Critical Jobs” on page 182  
Why and how you can create a Monitor Critical Jobs task.

#### **Related reference:**

“Limit the number of objects retrieved by queries” on page 38

#### **Related information:**

“Using workload service assurance to monitor z/OS critical jobs” on page 243  
How to monitor jobs that are critical for the customer business and that must complete by their deadline.

## **Processing and monitoring critical jobs**

Automatic tracking and prioritizing of critical network jobs.

Workload service assurance provides automatic tracking and prioritizing of critical network jobs and online functions that allow you to monitor and intervene in the processing of critical network jobs.

### **Automatic tracking and prioritizing**

To ensure that critical deadlines can be met, workload service assurance provides the following automated services for critical jobs and for predecessor jobs that form their critical networks:

#### **Promotion**

When the critical start time of a job is approaching and the job has not started, the promotion mechanism is used. A promoted job is assigned additional operating system resources and its submission is prioritized.

The timing of promotions is controlled by the global option `promotionoffset`. Promoted jobs are selected for submission after jobs that

have priorities of "high" and "go", but before all other jobs. Prioritizing of operating system resources is controlled by the local options `jm promoted nice` (UNIX and Linux) and `jm promoted priority` (Windows).

### Calculation of the critical path

The critical path is the chain of dependencies, leading to the critical job, that is most at risk of causing the deadline to be missed at any given time. The critical path is calculated using the estimated end times of the critical job predecessors. Working back from the critical job, the path is constructed by selecting the predecessor with the latest estimated end time. If the actual end time differs substantially from the estimated end time, the critical path is automatically recalculated.

Figure 8 shows the critical path through a critical network at a specific time during the processing of the plan.

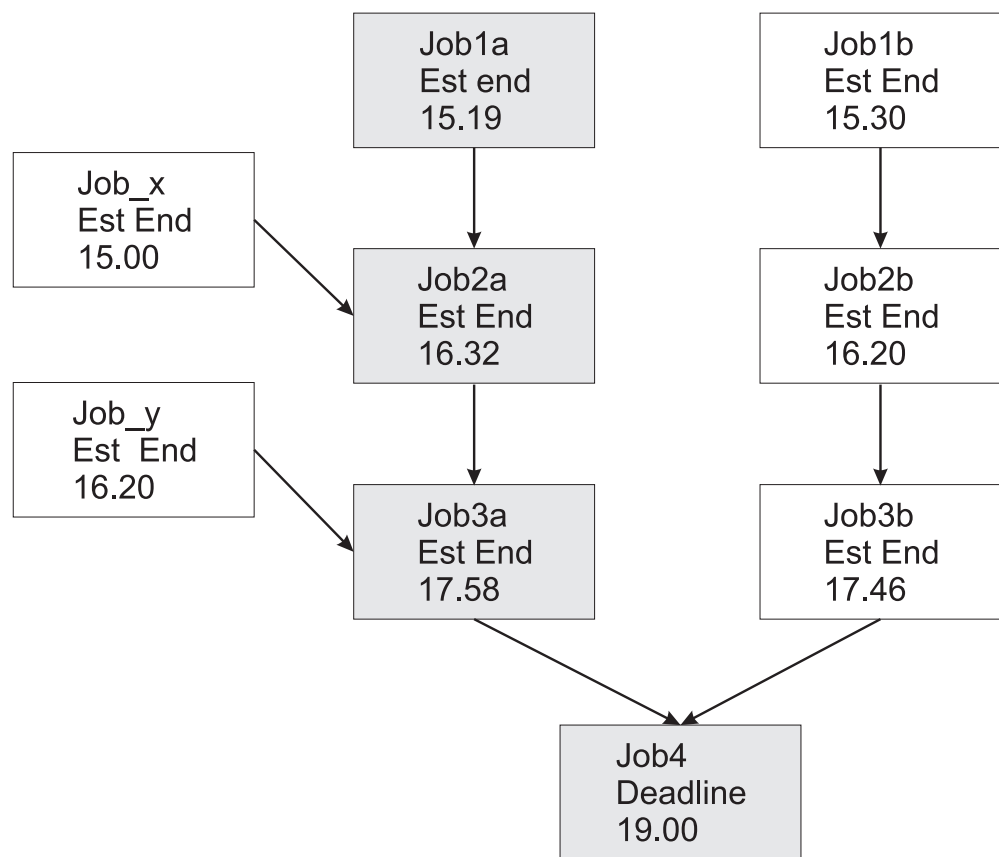


Figure 8. Critical path

At this specific time, the critical path includes Job3a, Job2a, and Job1a. Job3a and Job3b are the immediate predecessors of the critical job, job4, and Job3a has the later estimated end date. Job3a has two immediate predecessors, Job2a and Job\_y. Job2a has the later estimated end time, and so on.

### Addition of jobs to the hot list

Jobs that are part of the critical network are added to a hot list that is associated to the critical job itself. The hot list includes any critical network jobs that have a real or potential impact on the timely completion of the critical job. Jobs are added to the hot list for the one or more of the

following reasons. Note that only the jobs that begin the current critical network, for which there is no predecessor, can be included in the hot list.

- The job has stopped with an error. The length of time before the critical start time is determined by the `approachingLateOffset` global option.
- The job has been running longer than estimated by a factor defined in the `longDurationThreshold` global option.
- The job has still not started, although all its follows dependencies have either been resolved or released, and at least one of the following conditions is true:
  - The critical start time has nearly been reached.
  - The job is scheduled to run on a workstation where the limit is set to zero.
  - The job belongs to a job stream for which the limit is set to zero.
  - The job or its job stream has been suppressed.
  - The job or its job stream currently has a priority that is lower than the fence or is set to zero.

### Setting a high or potential risk status for the critical job

A critical job can be set to the following risk statuses:

#### High risk

Calculated timings show that the critical job will finish after its deadline.

Initially, estimated start and end times are used. As jobs are completed, timings are recalculated to take account of the actual start and end times of jobs.

#### Potential risk

Critical predecessor jobs have been added to the hot list.

## Online tracking of critical jobs

The Dynamic Workload Console provides specialized views for tracking the progress of critical jobs and their predecessors. You can access the views from the following sources:

- =
- =
- =
- =
- =
- =
- =
- Workload Dashboard: dedicated widgets to monitor the critical status: high risk, no risk, potential risk
- **Monitor Critical Jobs** tasks: lists all critical jobs for a selected engine with the possibility to run actions against the results. View jobs with a high risk level along a horizontal time axis.
- What-if analysis view: from a Gantt view, highlight the critical path and show the impact on critical jobs.

The list of results produced by the Monitor Critical Jobs query displays all critical jobs for the engine, showing their status: normal, potential risk, or high risk. From this view, you can navigate to see:

- The hot list of jobs that put the critical deadline at risk.
- The critical path.
- Details of all critical predecessors.
- Details of completed critical predecessors.
- Job logs of jobs that have already run.

Using the views, you can monitor the progress of the critical network, find out about current and potential problems, release dependencies, and rerun jobs.

The Monitor Critical jobs view provides a timeline, **Expand Timeline**, which displays the placement along a horizontal time axis of the jobs in the list and highlights jobs with high risk level. Only critical jobs that have not completed are displayed in the timeline. It also allows you to modify the plan deadline and quickly see how it would affect jobs. If you see a job that is late or in high risk state, right-click the job in the list of results and select **What-if** from the table toolbar to open the What-if Analysis and view them in a Gantt chart for further investigation.

## Planning critical jobs

Planning critical jobs.

Workload service assurance provides the means to identify critical jobs, define deadlines, and calculate timings for all jobs that must precede the critical job.

If it is critical that a job must be completed before a specific time, you can flag it as critical when you add it to a job stream using the Workload Designer functions on the Dynamic Workload Console. You can define the deadline either at job or job stream level.

Jobs can also be flagged as critical by including the **critical** key word on the job statement when you create or modify a job stream using the **composer** command line.

When you run the command to include the new job in the production plan, all jobs that are direct or indirect predecessors of the critical job are identified. These jobs, together with the critical job itself, form a critical network.

Because timing of jobs in the critical network must be tightly controlled, Time Planner calculates the following timing benchmarks for each critical network job:

### Critical start

Applies to distributed systems only and represents the latest time at which the job can start without causing the critical job to miss its deadline.

Critical start times are calculated starting with the deadline set for the critical job and working backwards using the estimated duration of each job to determine its critical start time. For example, if the critical job deadline is 19:00 and the estimated duration of the critical job is 30 minutes, the critical job will not finish by the deadline unless it starts by 18:30. If the immediate predecessor of the critical job has an estimated duration of 20 minutes, it must start at latest by 18:10.

**Note:** Only the deadline of the critical job is considered when calculating critical start times for jobs in the critical network. If other jobs have deadlines defined, their critical start times might be later than their deadlines.

### Earliest start

Represents the earliest time at which a job in the critical network can start, taking into consideration all dependencies and resource requirements.

Estimated start times are calculated starting with the earliest time at which the first job or jobs in the critical network can start and working forward using the estimated duration of each job to estimate the start time of the job that follows it.

#### **Estimated start and end time**

For the initial calculations, these values are set to the planned start and end time. They are subsequently recalculated to take into consideration any changes or delays in the plan.

#### **Estimated duration**

The estimated duration of a job is based on statistics collected from previous runs of the job. If the job has never run before, a default value of one minute is used. Take this into account when considering the accuracy of calculated timings for critical job networks that include jobs running for the first time.

The timings for each job in the critical network are added to the Symphony file, which includes all the plan information and is distributed to all workstations on which jobs are to be run.

As the plan is run, Plan Monitor monitors all critical networks: subsequent changes to the critical network that affect the timing of jobs trigger the recalculation of the critical and estimated start times. Changes might include manual changes, for example, releasing dependencies or rerunning jobs, and changes made automatically by the system in response to a potential or actual risk to the timely completion of the critical job.

Specific views for critical jobs and their predecessors, available from the Dynamic Workload Console, allow you to keep track of the processing of the critical network. The views can immediately identify problems in your planning of the critical job. For example, if the estimated start time of a job in the critical network is later than the critical start time, this is immediately signaled as a potential risk to the critical job.

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## **IBM Workload Scheduler for SAP**

With SAP R/3 support, you can use IBM Workload Scheduler to do the following tasks:

- Use IBM Workload Scheduler standard job dependencies and controls on SAP R/3 jobs.
- Create SAP R/3 jobs using the IBM Workload Scheduler interface.
- Schedule SAP R/3 jobs to run on specified days and times, and in a defined order.
- Define inter-dependencies between SAP R/3 jobs and jobs that run on different platforms.
- Define the national language support options.
- Use the SAP R/3 Business Warehouse Support function.
- Customize job execution return codes.
- Use SAP R/3 logon groups for load balancing and fault-tolerance.
- Work with SAP R/3 variants and placeholders.
- Use Business Component-eXternal Interface Background Processing (BC-XBP 2.0) interface support to:
  - Intercept jobs

- Track child jobs
- Keep all job attributes when you rerun a job
- Raise events

**Note:** For more information about SAP, see *IBM Workload Automation: Scheduling Applications with IBM Workload Automation*.

## **Scheduling process for the SAP R/3 extended agent**

IBM Workload Scheduler launches jobs in SAP R/3 by using jobs defined on the following workstations that support the r3batch access method:

- A IBM Workload Scheduler extended agent workstation. A workstation that is hosted by a fault-tolerant agent or master workstation.
- A dynamic agent workstation.
- A dynamic pool.
- A z-centric workstation.

These supported workstations use the r3batch access method to communicate with the SAP system. The access method is used to pass SAP R/3 job-specific information to predefined SAP R/3 instances. The access method uses information provided in an options file to connect and launch jobs on an SAP R/3 instance.

**Note:** For more information about this, see *IBM Workload Automation: Scheduling Applications with IBM Workload Automation*.

You can define multiple agent workstations to use the same host, by using multiple options entries or multiple options files. Using the SAP R/3 agent name as a key, r3batch uses the corresponding options file to determine which instance of SAP R/3 will run the job. It makes a copy of a template job in SAP R/3 and marks it as able to run with a start time of start immediate. It then monitors the job through to completion, writing job progress and status information to a job standard list found on the host workstation.





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## Chapter 9. Creating and Editing Objects in the Database

This section describes creating and editing objects in the database.

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### Designing your Scheduling Environment

How to create your Scheduling Environment.

To begin working with IBM Workload Scheduler you must design your scheduling environment.

The scheduling environment is composed of the following objects:

- Workstations
- **Distributed** Domains

Depending on whether your engine is distributed or z/OS, the steps to follow are different:

- **Distributed** You create workstations and domains. Depending on the business needs of your organization and the complexity of your network, you can decide to have a hierarchical domain structure.
- **z/OS** You define workstations.

#### Related concepts:

“Scheduling objects” on page 54

Scheduling objects that you can view and manage using the Dynamic Workload Console.

### Creating a workstation

How you can create distributed and z/OS workstation definitions from the Dynamic Workload Console.

#### About this task

To create a workstation definition in the database, perform the steps described in the following sections.

#### Creating distributed workstations

**Distributed**

Creating distributed workstation definitions in the IBM Workload Scheduler database.

#### About this task

You can create multiple workstation definitions.

For more information about the main workstation types and their attributes, see the section about workstation definition in the IBM Workload Scheduler User's Guide and Reference.

To add a workstation definition to the database and to assign it to a domain, perform the following procedure.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

### Procedure

1. From the navigation toolbar, click **Administration > Workload Environment Design > Create Workstations**.
2. Select a distributed engine from the list and click **Create Workstations**.
3. In the Workstations properties panel, specify the attributes for the workstation you are creating. Depending on the type of workstation you select, some attributes are mandatory.
4. To assign the workstation to an existing domain or to create a new domain, click **Assign to Domain**.
5. Click **Save**.

### Results

The workstation is now added to the database. Alternatively, click **Administration > Workload Environment Design > List Workstations**, select a distributed engine, and click **Display**. From the workstation table, click **New**.

**Note:** You can add workstation definitions to the database at any time, but you must run **JnextPlan -for 0000** to add the workstation definition to the plan, so that you can run jobs on this-workstation. For dynamic agent workstation definitions, if you have the `enAddWorkstation` global option set to "yes", the workstation definitions are automatically added to the plan after they are defined in the database.

#### Related concepts:

"Workstation" on page 47

Using workstations for scheduling jobs and job streams.

"Domain" on page 51

The domain.

#### Related reference:

"Workstation types" on page 264

The following are the main workstation types and their attributes.

"Type of communication based on SSL communication options" on page 255

How the SSL communication options for distributed workstations affect communication between workstations.

## Creating z/OS workstations

z/OS

Creating z/OS workstation definitions in the IBM Workload Scheduler database.

### About this task

To create a z/OS workstation definition in the database, perform the following steps.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

## Procedure

1. From the navigation toolbar, click **Administration > Workload Environment Design > Create Workstations**.
2. Select a z/OS engine from the list and click **Create Workstations**.
3. Specify the workstation attributes using the **General**, **Resources**, and **Open Time Intervals** tabs as appropriate. Depending on the type of workstation you select, some attributes are mandatory.
4. Click **Save**.

## Results

The workstation is now added to the database. Alternatively, click **Administration > Workload Environment Design > List Workstations** select a z/OS engine, and click **Display**. From the workstation table, click **New**.

### Related concepts:

“Workstation” on page 47

Using workstations for scheduling jobs and job streams.

### Related reference:

“Workstation types” on page 264

The following are the main workstation types and their attributes.

## Creating z/OS virtual workstations

z/OS

This topic describes how to create z/OS virtual workstation definitions in the IBM Workload Scheduler database.

### About this task

To create a z/OS virtual workstation definition in the database, perform the following steps.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

## Procedure

1. From the navigation toolbar, click **Administration > Workload Environment Design > Create Workstations**.
2. Select a z/OS engine from the list and click **Create Virtual Workstation**.
3. Specify the workstation attributes using the **General** and **Destinations** tabs as appropriate. Depending on the type of workstation you select, some attributes are mandatory.
4. Click **Save**.

## Results

The workstation is now added to the database. Alternatively, click **Administration > Workload Environment Design > List Workstations** select a z/OS engine, and click **Display**. From the workstation table, click **New Virtual**.

### Related concepts:

“Workstation” on page 47

Using workstations for scheduling jobs and job streams.

**Related reference:**

“Workstation types” on page 264

The following are the main workstation types and their attributes.

## Editing workstation definitions

Editing workstation definitions in the IBM Workload Scheduler Workload Automation on Cloud database.

### About this task

You can manage multiple workstation definitions.

For more information about the main workstation types and their attributes, see the section about workstation definition in the IBM Workload Scheduler Workload Automation on Cloud User's Guide and Reference.

To modify a workstation definition in the database and to assign it to a domain, perform the following steps.

### Procedure

1. From the navigation toolbar, click **Administration > Workload Environment Design > List Workstations** and select an engine.
2. Optionally, specify some filtering criteria that help you find the workstation you want to modify. You can also customize the workstation attribute that you want to display in the columns.
3. Click **Display**. From the workstation table, select a workstation click **Edit** to modify its properties or choose another action from the buttons and menu available.
4. In the Workstations properties panel, specify the attributes for the workstation you are modifying. Depending on the type of workstation you select, some attributes are mandatory.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

5. To assign the workstation to an existing domain or to create a new domain, click **Assign to Domain**.
6. Click **Save**.

### Results

The workstation definition is now modified in the database.

**Note:** You can add workstation definitions to the database at any time, but you must run `JnextPlan -for 0000` again to be able to run jobs on newly-created workstations. Every time you run **JnextPlan** all workstations are shut down and restarted.

## Creating a domain

### Distributed

Creating domain definitions in the IBM Workload Scheduler database.

### About this task

You add domain definitions to the IBM Workload Scheduler database in either of the following ways:

- When you are creating a distributed workstation, from the **Create Workstations** panel.
- When displaying the list of workstations, by clicking **Domains view**.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

### Procedure

To create a new domain when creating a workstation, perform the following steps:

1. From the navigation toolbar, click **Administration > Workload Environment Design > Create Workstations**.
2. Select a distributed engine from the list and click **Create Workstations**.
3. In the Workstations Properties panel, specify the attributes for the workstation you are creating, then click **Assign to Domain** and, on the **Select Domain** panel, click **New** to create a new domain.
4. Click **Save** to add the domain to the database and return to the **Select Domain** panel.
5. In the **Select Domain** panel click **OK** to assign the new domain to the workstation you are creating.

To add a new domain definition from the list of distributed workstations, perform the following steps:

1. Click **Administration > Workload Environment Design > List Workstations**.
2. Optionally, enter filtering criteria and click **Display**.
3. From the list of workstations, click **Domains View**.
4. Click **New** and, on the Domain properties panel, specify the properties for the domain.
5. Click **Save** to add the domain to the database or **Cancel** to exit without saving.

#### Related concepts:

"Domain" on page 51  
The domain.

## Creating a pool of agents

Creating distributed workstation definitions in the IBM Workload Scheduler database.

## About this task

You can define and schedule dynamic jobs to perform application specific operations, such as database, file transfer, Java, and Web Services operations. You can customize the sample files provided with the product to match the requirements of your environment.

To run these job types, you can use dynamic agents, a workstation type that you create by running the related installation process. The dynamic agents are automatically created and registered at installation time. You can also organize the dynamic agents into groups, called pools or dynamic pools.

For more information about dynamic scheduling, see *Scheduling Workload Dynamically*

To add this kind of workstation definition to the database and to assign it to a domain, perform the following steps.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

## Procedure

1. From the navigation toolbar, click **Administration > Workload Environment Design > Create Workstations**.
2. Select an engine from the list and click **Create Workstations**.
3. In the Workstations properties panel, specify the attributes for the pool of dynamic agents you are creating. In the **Workstation Type** menu, select **Pool** or **Dynamic Pool**, depending on the set of dynamic agents you are defining.
  - Select **Pool** to define a cluster of dynamic agents with similar hardware or software characteristics to submit jobs to. Then, in the **Member** table that displays the dynamic agents that belong to the Pool, click **Add** to add new dynamic agents and **Remove** to remove unwanted dynamic agents.  
You can also register an agent with a pool by directly editing the `pools.properties` file located in `<TWS_home>/ITA/cpa/config`. See the topic about automatically registering agents to a pool in the *Planning and Installation Guide*.
  - Select **Dynamic Pool** to define a set of dynamic agents that is dynamically defined based on the resource requirements you specify. Then click **Edit Requirements** to display a panel where you can specify the requirements necessary for running your jobs. All your selections produce an XML file, which is used to select a workstation with the characteristics you require, to run Workload Broker jobs. When you provide the requirements, you specify a list of workstation candidates to be included in the **Dynamic Pool** of dynamic agents and the preferred order in which they must be considered. You also specify the best criteria, which is used to change the workstation (workload balance, CPU utilization, or its use of logical resources).
4. Optionally, you can associate the new pool to a variable table.
5. Specify the Workload Broker hosting the workstation.

### Related concepts:

“Workstation” on page 47

Using workstations for scheduling jobs and job streams.

---

## Designing your Workload

Create and editing workload definitions in the database.

### Before you begin

To create and edit scheduling objects, open the Workload Designer, by performing the following steps:

1. From the navigation toolbar, click **Administration > Workload Design > Manage Workload Definitions**.
2. In the displayed panel, specify the engine connection you want to use. Only the categories of objects supported by the engine that you selected are available.

You can open multiple occurrences of the Workload Designer. The following scenarios are supported:

- Same user connected to multiple engines
- Multiple users connected to the same engine.

/  
/  
/

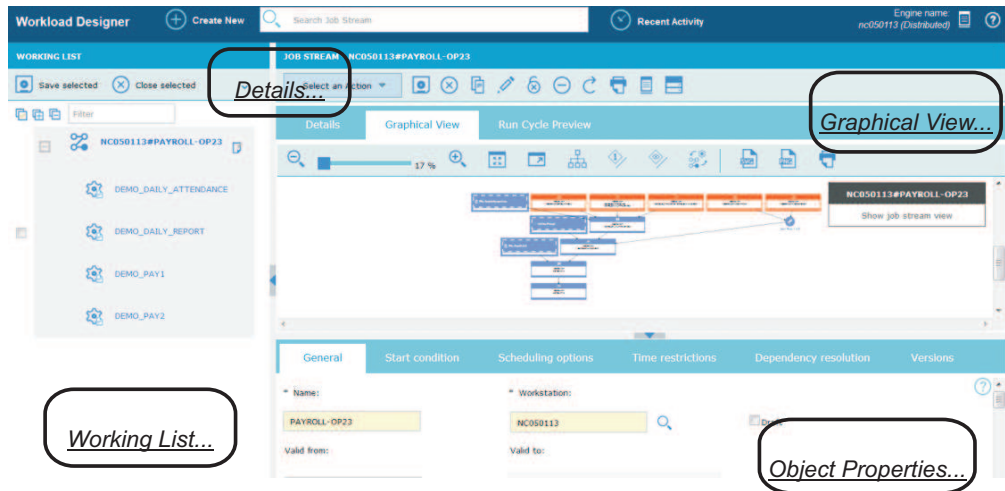
When you open the Workload Designer, the window displays a list of new objects you can create, and a list of the most recent objects that were edited, and a Search tab for searching on object names.

Select an object in the **Create New** list to create a new object definition or search for an object in the **Search** field. Click on **Advanced** to open the advanced search panel. Select one or more objects to open them in edit mode by clicking the **Edit** button. The open objects are locked in the database until you finish editing and save them.

When an object is open in edit mode, its properties are displayed in the right pane, where you can view and edit them either in the Details view or the Graphical View.

You can add additional objects to the object in edit mode by either right-clicking the object or searching for an object in the **Search** field. Select an object from the list of results, and click add (+) to add the object to the view of the existing object. For example, you can search for jobs and automatically add them to the job stream you are editing, or add other objects as dependencies, such as resources or prompts.

When you select the objects you want to work on, the following window is displayed, showing several working areas that you can use, depending on the task you want to perform.



### Related concepts:

“Scheduling objects” on page 54

Scheduling objects that you can view and manage using the Dynamic Workload Console.

## Editing objects from the Working List View

### About this task


To modify objects from the **Working List** view, perform the following steps:

### Procedure

1. Type an object name in the **Search** text field.
2. In the displayed lookup panel, select the required filtering criteria and click the search icon.
3. From the displayed list, select one or multiple objects and click one of the following action buttons:



#### Edit

To modify the properties of the selected objects. When an object is open in edit mode the edit icon  is displayed on the right of the object.



#### View

#### View

To open the selected objects in read-only mode.



#### Add

#### Add

To add the selected objects to existing objects in the **Details** view.




#### Create like

To create a new object with the same properties of the selected object.





### Edit

To modify the properties of the selected objects. When an object is open in edit mode the edit icon  is displayed on the right of the object.



### Unlock

To unlock the selected objects for further actions. When an object is unlocked, it is displayed in read-only mode.



### Delete

To delete the selected objects from the database.

## What to do next

All the selected objects are listed in the Working List view. When you select an object from this list, its properties are displayed in the right pane, where you can view or edit them, if you have the required authorization defined in the IBM Workload Scheduler security file.

By hovering with the cursor over the icons located on the toolbar, you can see all the actions you can perform on the selected objects.

### Related information:

“Working List” on page 275

Use this pane to view all the objects that you are working on, to create new objects and to search for existing ones.

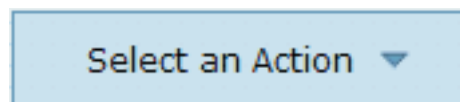
## Editing objects from the Details View

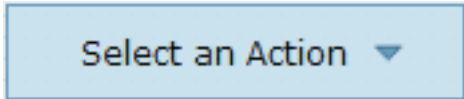
### About this task

To modify object from the **Details** view, perform the following steps:

### Procedure

1. Choose the object you want to modify and either:



- Select it and click the  button.
  - Right-click it and choose an action from the context menu.
2. Choose one of the displayed actions to act on the selected item. Only actions available for the selected item are displayed in the menus.

### What to do next

When an object is open in edit mode, its properties are displayed in the bottom pane, where you can view and edit them.

### Related information:

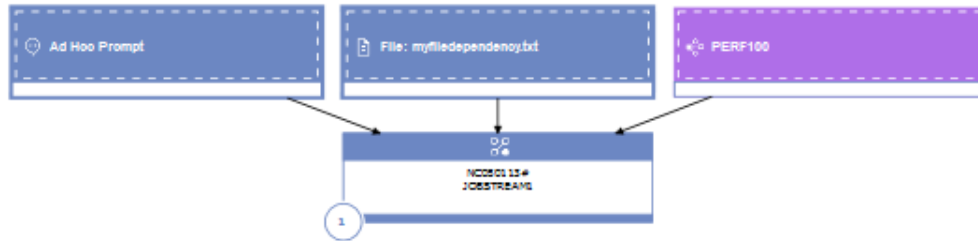
“Details view” on page 276

Details view displays the structure of the job streams, associated dependencies, and run cycles in a tree table.

## Editing objects from the Graphical View

### About this task

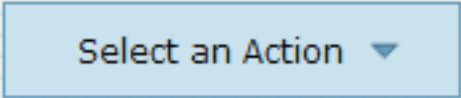
The **Graphical View** shows the job stream with the jobs it contains and related dependencies.



From the **Graphical View** you can edit an object in any of the following ways:

### Procedure

Select an Action ▾

- Select it and click the  button.
- Right-click it and choose an action from the context menu. Only actions available for the selected item are displayed in the menus.
- Select an object or an arrow and use the buttons on the graphical view toolbar to create or remove dependencies.

### Related information:

“Graphical View - modelling” on page 278

## Editing object properties

### About this task

Use the Properties pane, to modify the properties of the selected object.

The properties pane is divided into tabs, which contain options and properties relating to the object currently open.

If you have more than one object open in the **Working List**, the properties displayed in this pane are relating to the object currently selected in the **Details** or **Graphical** view above.

### Procedure

Enter the required information in the mandatory fields. An automatic check ensures you enter only supported characters.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

## Creating job stream definitions

How to define a new job stream definitions using the Dynamic Workload Console.

## About this task

From the Workload Designer panel of the Dynamic Workload Console, you can define job streams, running on both distributed and z/OS environments. Most of them can also be created using composer (on distributed systems) and ISPF (on z/OS systems) interfaces.

Optionally, you can quickly submit the job stream into the current plan to be run immediately. You might want to do this for testing purposes before implementing the job stream in large-scale production. See “Quick submit of jobs and job streams” on page 127.

To create a new job stream definition from the Dynamic Workload Console, perform the following procedure:

### Procedure

1. From the navigation toolbar, click **Administration > Workload Design > Manage Workload Definitions**
2. Specify an engine name, either distributed or z/OS. The Workload Designer opens. Job types and characteristics vary depending on whether you select a distributed or a z/OS engine.
3. In the Create New pane, select **Job Stream**.
4. In the properties panel, specify the attributes for the job stream definition you are creating. For all the details about available fields and options, see the online help by clicking the “?” on the top-right corner.
5. Click **Save** to save the job definition in the database.

### Related concepts:

“Job stream” on page 56

“Job” on page 55

Information about jobs, which are scheduling objects used to define and run activities in the scheduling environment.

### Related reference:

“Status description and mapping for distributed job streams” on page 261

The job stream status in Dynamic Workload Console and how it is defined in IBM Workload Scheduler.

“Status description and mapping for z/OS job streams” on page 263

The z/OS job stream status in Dynamic Workload Console and how it is defined in IBM Workload Scheduler for z/OS.

“Limit the number of objects retrieved by queries” on page 38

## Creating job definitions

How to define a new job definition using the Dynamic Workload Console.

### About this task

From the Workload Designer panel of the Dynamic Workload Console, you can define multiple types of jobs, running on both distributed and z/OS environments. Most of them can also be created using composer (on distributed systems) and ISPF (on z/OS systems) interfaces. Some predefined job types are organized into categories including native jobs, and job types with advanced options, which are specific job types that you use to perform operations on external applications. In addition to the existing ones, you can define your own job types and add them to

this list. To create a new job definition from the Dynamic Workload Console, perform the following procedure:

### Procedure

1. From the navigation toolbar, click **Administration > Workload Design > Manage Workload Definitions**
2. Specify an engine name, either distributed or z/OS. The Workload Designer opens. Job types and characteristics vary depending on whether you select a distributed or a z/OS engine.
3. In the Create New pane, select **Job Definition**.
4. Select the category and type of job you want to create.
5. In the properties panel, specify the attributes for the job definition you are creating. For all the details about available fields and options, see the online help by clicking the "?" on the top-right corner.
6. Click **Save** to save the job definition in the database.

### Results

When you define a job, IBM Workload Scheduler records the job type in the database without performing further checks. However, when the job is submitted, IBM Workload Scheduler checks the operating system on the target workstation and defines the job type accordingly.

Optionally, if you are connected to a distributed engine, you can quickly submit the job definition into the current plan to be run. You might want to do this for testing purposes before implementing the job in large-scale production. See "Quick submit of jobs and job streams" on page 127.

Once job definitions have been submitted into the production plan, you still have the opportunity to make one-off changes to the definitions before they run, or after they have run. You can update the definition of a job that has already run and then rerun it. The job definition in the database remains unchanged.

For more information about creating the plug-ins to support the definition and running of dynamic job types, see *Developer's Guide: Extending IBM Workload Automation*.

#### Related concepts:

"Job" on page 55

Information about jobs, which are scheduling objects used to define and run activities in the scheduling environment.

"Workstation" on page 47

Using workstations for scheduling jobs and job streams.

"Variable table" on page 81

"Run cycle" on page 59

"Dependencies" on page 66

Controlling processing using dependencies

"Customizing your job stream" on page 241

Using the Dynamic Workload Console to create and customize a job stream.

## Defining jobs based on the agent type

### About this task

How to create a job definition for supported agents using the Dynamic Workload Console.

Steps for defining a job for supported agents.

#### Fault-tolerant agents

To define jobs, follow these steps:

1. From the navigation toolbar, click **Administration>Workload Design>Manage Workload Definitions**.
2. Specify an engine name, either distributed or z/OS. The Workload Designer opens. Job types and characteristics vary depending on whether you select a distributed or a z/OS engine.
3. In the Working List pane, select
  - **Distributed** **New > Job Definition**
  - **z/OS** **New**
4. Select the category and type of job you want to create.
  - For IBM Workload Scheduler native jobs, click
    - **Distributed** **Native > Windows, UNIX or Other**.
    - **z/OS** **z/OS job**. See *Scheduling with the Agent for z/OS*.
5. In the properties panel, specify the attributes for the job definition you are creating. For all the details about available fields and options, see the online help by clicking the "?" in the top-right corner.
6. Click **Save** to save the job definition in the database.

#### Limited fault-tolerant agent

To define jobs, follow these steps:

1. From the navigation toolbar, click **Administration>Workload Design>Manage Workload Definitions**.
2. Specify an engine name, either distributed or z/OS. The Workload Designer opens. Job types and characteristics vary depending on whether you select a distributed or a z/OS engine.
3. In the Working List pane, select
  - **Distributed** **New > Job Definition**
  - **z/OS** **New**
4. Select the category and type of job you want to create.
  - For IBM Workload Scheduler native jobs, click
    - **Native > Other**. See *Limited Fault-tolerant Agent for IBMi*.
5. In the properties panel, specify the attributes for the job definition you are creating. For all the details about available fields and options, see the online help by clicking the "?" in the top-right corner.
6. Click **Save** to save the job definition in the database.

#### Agent for z/OS

To define jobs, follow these steps:

1. From the navigation toolbar, click **Administration>Workload Design>Manage Workload Definitions**.

2. Specify an engine name, either distributed or z/OS. The Workload Designer opens. Job types and characteristics vary depending on whether you select a distributed or a z/OS engine.
3. In the Working List pane, select
  - **Distributed** **New > Job Definition**
  - **z/OS** **New**
4. Select the category and type of job you want to create.
  - For IBM Workload Scheduler native jobs, click
    - **Native > z/OS**. See *Scheduling with the Agent for z/OS*.
5. In the properties panel, specify the attributes for the job definition you are creating. For all the details about available fields and options, see the online help by clicking the "?" in the top-right corner.
6. Click **Save** to save the job definition in the database.

### Remote engines

To define shadow jobs, follow these steps:

1. From the navigation toolbar, click **Administration>Workload Design>Manage Workload Definitions**.
2. Specify an engine name, either distributed or z/OS. The Workload Designer opens. Job types and characteristics vary depending on whether you select a distributed or a z/OS engine.
3. In the Working List pane, select
  - For IBM Workload Scheduler native jobs,
    - **Distributed** **New > Job Definition**.
    - **z/OS** **New**.
4. Select the category and type of job you want to create.
  - For IBM Workload Scheduler jobs,
    - For IBM Workload Scheduler native jobs,
      - **Distributed** **File Transfer and Coordination > Shadow Distributed or Shadow z/OS**. See IBM Workload Scheduler User's Guide and Reference, section about Job definition - Shadow jobs.
      - **z/OS** **Shadow Distributed or Shadow z/OS**. See IBM Workload Scheduler for z/OS Managing the Workload, section about Specifying cross dependencies and shadow jobs.
5. In the properties panel, specify the attributes for the job definition you are creating. For all the details about available fields and options, see the online help by clicking the "?" in the top-right corner.
6. Click **Save** to save the job definition in the database.

### Extended agents

To define jobs, follow these steps:

1. From the navigation toolbar, click **Administration>Workload Design>Manage Workload Definitions**.
2. Specify an engine name, either distributed or z/OS. The Workload Designer opens. Job types and characteristics vary depending on whether you select a distributed or a z/OS engine.
3. In the Working List pane, select **New > Job Definition**.
4. Select the category and type of job you want to create.

- For SAP jobs, **ERP > SAP Job on XA Workstations**. See Scheduling Applications with IBM Workload Automation, section about Creating SAP Standard R/3 jobs from the Dynamic Workload Console.
  - For MVS, **ERP > Access method**
  - For PeopleSoft, **ERP > Access method**.
  - For z/OS, **Native > z/OS**.
5. In the properties panel, specify the attributes for the job definition you are creating. For all the details about available fields and options, see the online help by clicking the "?" in the top-right corner.
  6. Click **Save** to save the job definition in the database.

### Dynamic agent and IBM Workload Scheduler for z/OS agents

The steps described here for defining a job are common to all access methods.

Follow these steps:

1. From the navigation toolbar, click **Administration > Workload Design > Manage Workload Definitions**.
2. Specify an engine name, either distributed or z/OS. The Workload Designer opens. Job types and characteristics vary depending on whether you select a distributed or a z/OS engine.
3. In the Working List pane, select
  - **Distributed** **New > Job Definition**
  - **z/OS** **New**
4. Select the category and type of job you want to create.
  - For SAP R/3 jobs, **ERP**,
    - **Distributed** **SAP Job on Dynamic Workstations**. See Scheduling Applications with IBM Workload Automation, section about Creating SAP Standard R/3 jobs from the Dynamic Workload Console.
    - **z/OS** **SAP**. See Scheduling Applications with IBM Workload Automation, section about Creating SAP Standard R/3 jobs from the Dynamic Workload Console.
    - **SAP PI Channel**, see Scheduling Applications with IBM Workload Automation, section about Defining a IBM Workload Scheduler job that runs an SAP PI Channel job.
  - For IBM Workload Scheduler native job types, **Native**
    - **Executable**, see IBM Workload Scheduler User's Guide and Reference, section about Job definition - Executable jobs
    - **IBM i**, see "Scheduling jobs on IBM i" in Limited Fault-Tolerant Agent IBM i.
    - **z/OS**, see IBM Workload Scheduler for z/OS Scheduling End-to-end with z-centric Capabilities.
    - **Remote command**, see IBM Workload Scheduler User's Guide and Reference, section about Job definition -remote command jobs.
  - For **Database and Integrations** job types with advanced options, **Database and Integrations**,
    - **Database**, see IBM Workload Scheduler User's Guide and Reference, section about Job definition - Database jobs.

- **J2EE**, see IBM Workload Scheduler User's Guide and Reference, section about Job definition - J2EE jobs.
  - **Java**, see IBM Workload Scheduler User's Guide and Reference, section about Job definition - Java jobs.
  - **MS SQL**, see IBM Workload Scheduler User's Guide and Reference, section about Creating job types with advanced options.
  - **Web Services**, see IBM Workload Scheduler User's Guide and Reference, section about Job definition - Web services jobs.
  - For **Business Analytics** job types with advanced options, **Business Analytics**,
    - InfoSphere® DataStage®, see Scheduling Applications with IBM Workload Automation, section about Defining a IBM Workload Scheduler job to run an InfoSphere DataStage job.
    - Cognos®, see Scheduling Applications with IBM Workload Automation, section about Defining jobs by using composer.
  - For **Cloud** environments, **Cloud > IBM SmartCloud® Provisioning**, see IBM Workload Scheduler User's Guide and Reference, section about Job definition - IBM SmartCloud Provisioning jobs
  - For **Access Method** job types, PeopleSoft, SAP r3batch and MVS, **ERP > Access Method**.
  - For **File Transfer and Coordination > File Transfer**, see IBM Workload Scheduler User's Guide and Reference, section about Job definition - File transfer jobs.
5. In the properties panel, specify the attributes for the job definition you are creating. For all the details about available fields and options, see the online help by clicking the "?" in the top-right corner.
  6. Click **Save** to save the job definition in the database.

**Note:** The access method for SAP R/3 provides supplementary features if you use the alternative steps described in Scheduling Applications with IBM Workload Automation, section about Create an SAP job and associate it to a IBM Workload Scheduler job or Creating SAP Standard R/3 jobs from the Dynamic Workload Console. You can create native SAP R/3 Standard jobs on a remoteSAP system directly from the Dynamic Workload Console.

## Prerequisite steps to create Provisioning jobs

How to define a new Provisioning job definition using the Dynamic Workload Console.

### About this task

To create a Provisioning job definition, you must first complete the prerequisite steps listed below.

### Procedure

1. Install IBM SmartCloud Provisioning. To find out the version supported by the product, generate the Data Integration report from the IBM Software Product Compatibility Reports web site, and select the **Supported Software** tab.
2. Obtain the SmartCloud HTTP server certificate and save it in a directory for later use. The Provisioning administrator can provide the certificate, or you can retrieve the certificate performing the following steps in your browser. The following example is based on Mozilla Firefox:
  - a. Log in to Provisioning server providing Provisioning credentials.



- b. To download the certificate, click:  
**Tools>Options>Advanced>Encryption>View Certificates**
  - c. Select **IBM> IBM WebSphere® Cloudburst Appliance** and click **Export**. A file, named `IBMWebSphereCloudBurstAppliance.crt` (X509 Certificate - PEM) is created.
3. Browse to the directory where a JRE is installed, for example: `C:\Program Files\IBM\TWS\javaExt\JRE\JRE`
4. Create a new truststore by launching the following command: `keytool -genkeypair -alias certificatekey -keyalg RSA -validity 7 -keystore keystore.jks,`  
 where, `keystore.jks` is the file path to the keystore.
5. Add IBM SmartCloud certificate to the truststore by launching the following command: `keytool -import -file certificate_directory\IBMWebSphereCloudBurstAppliance.crt -alias scp -keystore trustore_directory\keystore.jks,`
6. Open the `TWA_HOME\TWS\ITA\cpa\config\JobManager.ini` file, and locate JavaJobLauncher section, JVMOptions row.
7. Add the following instructions to the row: `"-Djavax.net.ssl.trustStore= DIRECTORY_TRUSTSTORE/keystore.jks -Djavax.net.ssl.trustStorePassword=TRUSTSTORE_PASSWORD"` For example:  
`JVMOptions = -Djavax.net.ssl.trustStore=C:/myUtils/keystore.jks -Djavax.net.ssl.trustStorePassword=passw0rd`
8. To complete the procedure, stop and restart the agent.

## Prerequisite steps to create OSLC Automation and OSLC Provisioning jobs

How to define a new OSLC Automation and OSLC Provisioning job definition by using the Dynamic Workload Console.

### About this task

To create an OSLC Automation or OSLC Provisioning job definition, you must first complete the prerequisite steps listed hereafter.

**Note:** Before performing the following procedure, ensure that you installed the Jazz for Service Management Registry Services from the Installation Manager.

### Procedure

1. Obtain the Registry Services server certificate and save it in a directory that you will later use. Registry Services administrator can provide the certificate, or, with Firefox browser, for example, you can retrieve the certificate performing the following steps:
  - a. Log in to a Registry Services (for example, `https://hostname:16311/oslc/pr`)
  - b. Download the certificate by clicking in the browser toolbar:  
**Tools>Options>Advanced>Encryption>View Certificates**
  - c. Select **IBM>Registry\_Services\_hostname:port** and click **Export**. A file is created with the name that you specify, for example `myserver:16311`.
2. Browse to the directory where a JRE is installed, for example: `C:\Program Files\IBM\TWA_<TWS_user>\TWS\JavaExt\jre\jre\bin`
3. Create a new truststore by launching the following command: `keytool -genkeypair -alias certificatekey -keyalg RSA -validity 7 -keystore trustore_directory\keystore.jks`

**Note:** Ensure that the *trustore\_directory* is not created in the javaExt\JRE path.

4. Add the IBM Registry Services certificate to the truststore by launching the following command: `keytool -import -file certificate_directory\certificate_name -alias oslc -keystore trustore_directory\keystore.jks`
5. Open the *TWA\_HOME*\TWS\ITA\cpa\config\JobManager.ini file, and locate JavaJobLauncher section, JVMOptions row.
6. Add the following instructions to the row:  
"-Djavax.net.ssl.trustStore=*DIRECTORY\_TRUSTSTORE*/keystore.jks  
-Djavax.net.ssl.trustStorePassword=*TRUSTSTORE\_PASSWORD*". For example:  
JVMOptions = -Djavax.net.ssl.trustStore=C:/myUtils/keystore.jks  
-Djavax.net.ssl.trustStorePassword=passw0rd
7. Stop and restart the agent.
8. Create the OSLCAutomation.properties and OSLCProvisioning.properties files, respectively for the OSLC Automation and OSLC Provisioning jobs, and locate them in <TWA\_Home>/TWS/JavaExt/cfg/.  
Specify the service provider catalogs (or Registry Services) that you will later use to create the job in the following format:  
*ServiceProviderCatalogName=RegistryServicesURI*
9. On the master domain manager, extract the security certificate from the keystore and add it to the Jazz for Service Management truststore. The file paths and names are as follows:

**Master domain manager keystore**

<TWA\_Home>/WAS/TWSPProfile/etc/TWSServerKeyFile.jks

**Jazz for Service Management truststore**

<JazzSM\_Home>/profile/config/cells/JazzSMNode01Cell/nodes/  
JazzSMNode01Cell/trust.p12

10. On the workstation where you installed Jazz for Service Management, extract the security certificate from the keystore and add it to the master domain manager truststore. The file paths and names are as follows:

**Jazz for Service Management keystore**

<JazzSM\_Home>/profile/config/cells/JazzSMNode01Cell/nodes/  
JazzSMNode01Cell/key.p12

**Master domain manager truststore**

<TWA\_Home>/WAS/TWSPProfile/etc/TWSServerTrustFile.jks

11. Close and restart the WebSphere Application Server on the master domain manager and on Jazz for Service Management.

## **Prerequisite steps to create IBM WebSphere MQ jobs**

How to define a new IBM WebSphere MQ job definition using the Dynamic Workload Console.

### **About this task**

To create a IBM WebSphere MQ job definition, you must first complete the prerequisite steps that are listed in the following procedure.

For more information about creating IBM WebSphere MQ job definitions, see the relevant chapter about Job definition - IBM WebSphere MQ jobs in the IBM Workload Scheduler User's Guide and Reference.

## Procedure

1. Install IBM WebSphere MQ, version 7.5.
2. On the IBM WebSphere MQ server workstation, create a user to use in the IBM Workload Scheduler jobs definition that is not a privileged user. On UNIX operating systems, the user must not belong to the mqm group created at installation time. On Windows operating systems, the user cannot be a member of the Administrators group.
3. Allow the user that is defined in step 2 to connect to its queue manager, queues, and channels. For the queue manager associated to the user, set the Display for the Administration authority, and the Connect and the Inquire for MQI authority. For more information about IBM WebSphere MQ users, see [http://pic.dhe.ibm.com/infocenter/wmqv7/v7r5/topic/com.ibm.mq.sec.doc/q013290\\_.htm](http://pic.dhe.ibm.com/infocenter/wmqv7/v7r5/topic/com.ibm.mq.sec.doc/q013290_.htm)

## Prerequisite steps to create Salesforce jobs

Prerequisite steps to create a Salesforce job definition.

## About this task

Before you start to create Salesforce job definition with IBM Workload Scheduler, consider the following limitations:

- The batch Apex classes (and related methods) that you want to run with the Salesforce plug-in, must be defined with **global** access level, in order to make them accessible by all Apex everywhere (the **public** access level is not enough).
- At job definition time, only Salesforce batch Apex classes can be run. If you select a non-batch Apex class, the job fails.

To create a Salesforce job definition, you must complete the prerequisite steps that are listed in the following procedure.

1. Register on Salesforce Server and ask for user ID and password.
2. Log in to Salesforce Server.
3. Create the following Apex classes that are needed for the communication between IBM Workload Scheduler and Salesforce Server. The IBM Workload Scheduler Apex classes must be defined outside any package.

### Class TWListApexClass

```
@RestResource(urlMapping='/TWListApexClass/*')
global with sharing class TWListApexClass{
//This Apex class exposes the TWListApexClass REST service
//which returns a list of all known Batchable Apex classes.
    @HttpGet
    global static List<ApexClass> doGet() {
        RestRequest req = RestContext.request;
        RestResponse res = RestContext.response;
        String fullName='';
        List<ApexClass> tempList =
        [SELECT NamespacePrefix,Name FROM ApexClass ORDER BY Name];
        List<ApexClass> result = new List<ApexClass>();
        for (ApexClass a: tempList){
            if (a.NamespacePrefix==null || a.NamespacePrefix.equals('')){
                fullName=a.Name;
            } else {
                fullName=a.NamespacePrefix+'.'+a.Name;
            }
            System.debug(LoggingLevel.Info, 'ApexClass: '+fullName);
            result.add(a);
        }
    }
}
```

```

    }
    return result;
}
}

```

#### Class TWSSubmitApexJob

```

@RestResource(urlMapping='/TWSSubmitApexJob/*')
global with sharing class TWSSubmitApexJob{
//This Apex class exposes the TWSSubmitApexJob REST service
//which submits an Apex class to the Salesforce server.
    @HttpGet
    global static ID doGet() {
        RestRequest req = RestContext.request;
        RestResponse res = RestContext.response;
        String apexClass = req.params.get('className');
        System.debug(LoggingLevel.Info, 'Execute Batch:'+apexClass);
        Type t = Type.forName(apexClass);
        if (t == null){
            throw new TWSException (apexClass + ' not found');
        }
        Object s = t.newInstance();
        ID batchprocessid =
        Database.executeBatch((Database.Batchable<sObject>)s);
        System.debug(LoggingLevel.Info, 'Job ID: '+batchprocessid);
        return batchprocessid;
    }
}
global class TWSException extends Exception{}
}

```

#### Class TWSMonitorApexJob

```

@RestResource(urlMapping='/TWSMonitorApexJob/*')
global with sharing class TWSMonitorApexJob{
//This Apex class exposes the TWSMonitorApexJob REST service
//which will monitor the progress of the backend Apex job.
    @HttpGet
    global static AsyncApexJob doGet() {
        RestRequest req = RestContext.request;
        RestResponse res = RestContext.response;
        ID i = (ID) req.params.get('jobID');
        AsyncApexJob a = [SELECT Id, Status, ExtendedStatus, NumberOfErrors,
        JobItemsProcessed, TotalJobItems FROM AsyncApexJob WHERE Id = :i];
        return a;
    }
}

```

#### Class TWSAbortApexJob

```

@RestResource(urlMapping='/TWSAbortApexJob/*')
global with sharing class TWSAbortApexJob{
//This Apex class exposes the TWSAbortApexJob REST service
//which will abort the Apex job on the Salesforce server.
    @HttpGet
    global static void doGet() {
        RestRequest req = RestContext.request;
        RestResponse res = RestContext.response;
        String jobID = req.params.get('jobID');
        System.abortJob(jobID);
    }
}

```

4. Verify the content of the Salesforce plug-in properties file:

```
<TWA_HOME>\TWS\javaExt\cfg\<plug-in_name>.properties
```

This file contains the plug-in properties that were set at installation time and that you can choose to override later. The plug-in properties are the following:

ProxyServer  
ProxyServerPort  
pollingPeriod  
pollingTimeout

where

#### **ProxyServer**

The IP address or the server name for the proxy server. Specify this property if you connect to the Salesforce server through a proxy server.

#### **ProxyServerPort**

The listening port of the proxy server.

#### **pollingPeriod**

The monitoring frequency. It determines how often the job is monitored during its execution. It is expressed in seconds.

#### **pollingTimeout**

The monitoring time. It determines for how long the job is monitored during its execution. At the end of the timeout interval, the job fails. It is expressed in seconds.

The values that you specify in the properties file are the values that are used at job definition time.

## **Prerequisite steps to create SAP BusinessObjects BI jobs**

How to define a new SAP BusinessObjects BI job definition using the Dynamic Workload Console.

### **About this task**

To create a SAP BusinessObjects Business Intelligence (BI) job definition, you must first complete the prerequisite steps that are listed in the following procedure:

1. Open the SAP BusinessObjects BI Central Management Console and find the access URL defined in the RESTful Web Service application (for example, `https://hostname:6405/biprws`), to be referenced as *server* in the SAP BusinessObjects BI job definition.

**Note:** Only reports scheduled for the single user specified in the SAP BusinessObjects BI server login are supported. The default setting for **Schedule for** field must be set to *Schedule only for myself*. Reports with default setting for **Schedule for** set to *Schedule for specified users and user groups* are not supported.

2. Verify the content of the file

```
<TWA_HOME>\TWS\javaExt\cfg\<plug-in_name>.properties
```

This file contains the plug-in properties that were set at installation time. The default content of the properties file for SAP BusinessObjects BI plug-in is the following:

```
server=  
username=  
password=  
authType=  
pollingPeriod=10  
pollingTimeout=7200
```

where

**server** The SAP BusinessObjects BI access URL defined in the SAP BusinessObjects BI RESTful Web Service application.

| **username**

| The name of the user authorized to access the SAP BusinessObjects BI  
| server.

| **password**

| The password that is associated with the user authorized to access the  
| SAP BusinessObjects BI server.

| **authType**

| The type of authentication supported by SAP BusinessObjects BI.

| Can be:

- | • secEnterprise
- | • secLDAP
- | • secWinAD
- | • secSAPR3

| **pollingPeriod**

| The monitoring frequency. It determines how often the job is  
| monitored. It is expressed in seconds.

| **pollingTimeout**

| The monitoring time. It determines for how long the job is monitored.  
| At the end of the timeout interval the job fails. It is expressed in  
| seconds.

| You can choose to override any of the default values set at installation time.  
| The values that you specify in the properties file are the values that are used at  
| job definition time.

| **Prerequisite steps to create job types with advanced options**

| How to define a new job definitions using the Dynamic Workload Console.

| **About this task**

| Perform the following steps before you define and schedule job types with  
| advanced options.

| **Procedure**

| **1. Install a number of dynamic agents and add the Java run time**

| To install dynamic agents, run the installation program. You can install the  
| dynamic agent during the full installation of IBM Workload Scheduler or in a  
| stand-alone installation of just the agent. During the installation, you have the  
| option of adding the Java run time to run job types with advanced options,  
| both those types supplied with the product and the additional types  
| implemented through the custom plug-ins.

| Follow the installation wizard to complete the installation.

| See the section about installation options in *Planning and Installation Guide* for  
| descriptions of the installation parameters and options.

| **2. Organize the dynamic agents in pools and dynamic pools.**

| Pools and dynamic pools help you organize the environment based on the  
| availability of your workstations and the requirements of the jobs you plan to  
| run.



- a. From the navigation toolbar, click **Administration > Workload Environment Design > Create Workstations**.
- b. Select a distributed or z/OS engine. The workstations you can create vary depending on the engine type you select.
- c. Select the workstation type you want to create.
  - To create a pool, define the dynamic agents you want to add to the pool and the workload broker workstation where the pool is hosted.
  - To create a dynamic pool, specify the requirements that each dynamic agent must meet to be added to the dynamic pool.

### 3. Grant the required authorization for defining job types with advanced options.

The IBM Workload Scheduler administrator has to grant specific authorizations in the security file to allow the operators to create job types with advanced options.

- **Distributed** In the distributed environment, perform the following steps:
  - a. Navigate to the *TWA\_home*/TWSdirectory from where the **dumpsec** and **makesec** commands must be run.
  - b. Run the **dumpsec** command to decrypt the current security file into an editable configuration file.

For more information, see the section about **dumpsec** in IBM Workload Scheduler Administration.
  - c. Add display and run access to the workstation, as follows:
    - If the operation is performed on the IBM Workload Scheduler Connector, display and run access is required on the CPU corresponding to the workstation where the job is created.
    - If the operation is performed on the workstation where the job runs, display access is required on the workload broker workstation.

For more information, see the section about configuring the security file in IBM Workload Scheduler Administration.
  - d. Close any open **conman** user interfaces using the **exit** command.
  - e. Stop any connectors on systems running Windows operating systems.
  - f. Run the **makesec** command to encrypt the security file and apply the modifications.

For more information, see the section about **makesec** in IBM Workload Scheduler Administration.
  - g. If you are using local security, the file is immediately available on the workstation where it has been updated.
    - 1) If you are using a backup master domain manager, copy the file to it.
    - 2) Distribute the centralized file manually to all fault-tolerant agents in the network (not standard, extended, or broker agents), and store it in the *TWA\_home*/TWS directory.
    - 3) Run **JnextPlan** to distribute the Symphony file that corresponds to the new security file.
- **z/OS** In the z/OS environment, perform the following steps:
  - a. Define the fixed resource that owns the subresource and give universal read access to it:

```
RDEFINE (CLASS_NAME) FIXED_RESOURCE UACC(READ)
```

- b. Give user *USER\_ID* update access to the *FIXED\_RESOURCE* fixed resource:  
`PERMIT FIXED_RESOURCE ID(USER_ID) ACCESS(UPDATE) CLASS(CLASS_NAME)`
  - c. Define a RACF resource, *JSORACF\_RESOURCE*, to RACF and give universal read access to it:  
`RDEFINE (OPCLASS) JSORACF_RESOURCE UACC(READ)`
- JSO is the 3-character code that RACF uses for JS.OWNER.
- d. Give user *USER\_ID* update access to *JSORACF\_RESOURCE*:  
`PERMIT JSORACF_RESOURCE ID(USER_ID) ACCESS(UPDATE) CLASS(CLASS_NAME)`
4. Define the job types with advanced options as described in “Creating job definitions” on page 111.

**Distributed** You can define job types with advanced options also using the **composer** command.

For more information, see the section about job definition in the IBM Workload Scheduler User's Guide and Reference

**z/OS** You can define job types with advanced options also using the **JOBREC** statement. See *IBM Workload Scheduler for z/OS: Scheduling End-to-end with Fault Tolerance Capabilities*.

**Related concepts:**

- “Job” on page 55  
Information about jobs, which are scheduling objects used to define and run activities in the scheduling environment.
- “Variable table” on page 81
- “Run cycle” on page 59
- “Dependencies” on page 66  
Controlling processing using dependencies
- “Customizing your job stream” on page 241  
Using the Dynamic Workload Console to create and customize a job stream.

## Specifying the parameter format for date, time, and time stamp

When defining reports either using the Dynamic Workload Console, Application Lab or **composer**, specify parameters of type date, time, and time stamp, using a specific syntax.

The following table shows the syntax you must use when defining reports containing date, time, and time stamp formats as parameters.

Table 9. Examples to use for parameters of date, time, and time stamp formats

Prompt type	Cognos parameter format	Cognos parameter format examples		
		Single value	List of values	Interval values
Date	CCYY-MM-DD	2012-02-03	2012-02-03-Value:2012-03-14	Between 2012-02-03 and 2012-04-15
Time	hh:mm:ss	01:00:00	01:00:00-Value:01:01:01	Between 01:00:00 and 23:59:30
Time Stamp	CCYY-MM-DDThh:mm:ss or CCYY-MM-DD hh:mm:ss	2012-02-03 15:05:00	2012-02-03 15:05:00-Value:2012-02-03T16:01:00-Value:2012-02-03T16:00:00	Between 2012-02-03 15:05:00 and 2012-04-15T16:00:00



**Note:** You must specify the parameter format exactly as they are shown in the table respecting lower case and upper case formats.

## Adding a job to a job stream

How to add an existing job to a job stream using the Dynamic Workload Console.

### Before you begin

To perform this task, ensure the IBM Workload Scheduler engine connection is up and running.

### About this task

Open an existing job stream and add an existing job definition to the job stream. To edit an existing object in the database you can use the different views available in the Workload Designer window.

### Procedure

1. From the navigation toolbar, click **Administration>Workload Design>Manage Workload Definitions**.
2. Specify the engine connection and the Workload Designer panel opens in a new window.
3. Open the job stream to which you want to add a job. To find the job stream you need, use the search field.
4. You can now work with the job stream by using either the **Graphical View** or the **Details** view. Select the tab for the view you want in the right pane.

### Related concepts:

“Job” on page 55

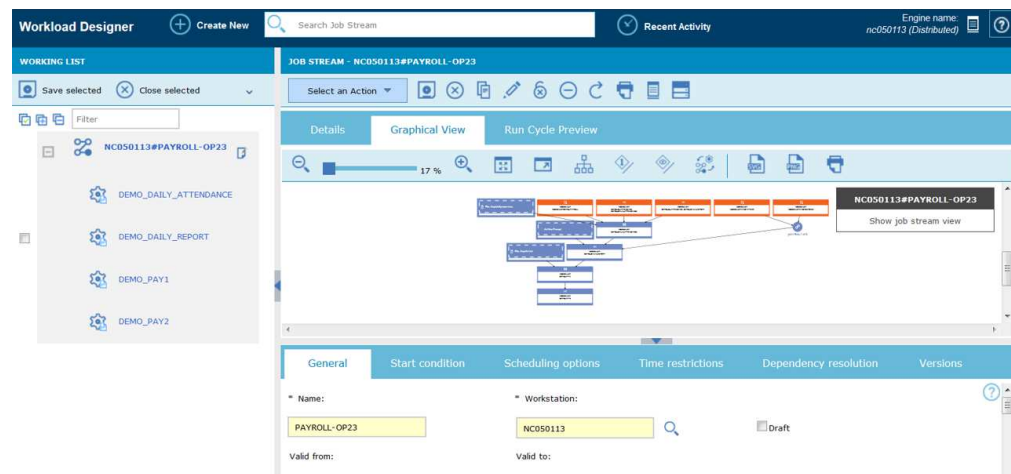
Information about jobs, which are scheduling objects used to define and run activities in the scheduling environment.

“Job stream” on page 56

## Adding a job from the Graphical View

### About this task

You can add a job to the job stream using the **Graphical View**.



From the **Graphical View** you can add a job to a job stream in either of the following ways:

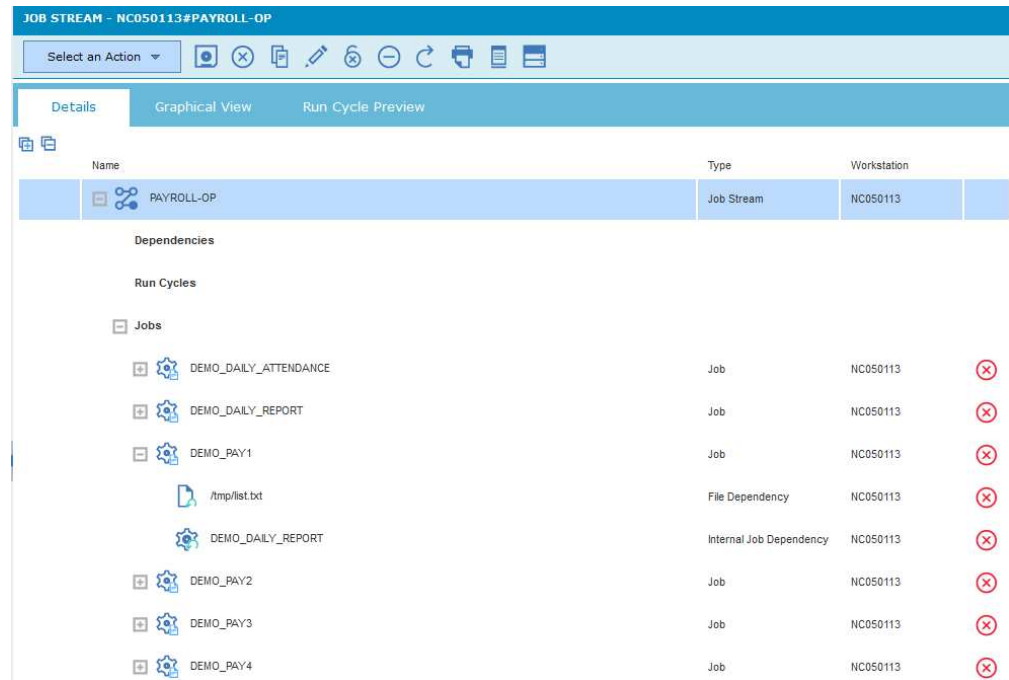
### Procedure

- Perform the following steps:
  1. Right-click inside the graphical view and select **Add Jobs** from the menu.
  2. Search for the required job by using the displayed Search field and add it to the job stream.
- Search for the job and click **Add**.
- You can then edit the properties of the newly added job, optionally specifying its scheduling options and time restrictions. For example, here you can set a job as **Critical** if the job is mission critical and must be processed accordingly.

### Adding a job from the Details View

#### About this task

If you use the **Details** view, you see a tree-table view of the job stream with all its jobs, dependencies, and run cycles.



From the **Details** view you can add a job to a job stream in either of the following ways:

### Procedure

- Perform the following steps:
  1. Right-click the job stream row and select **Add Jobs** from the menu.
  2. Search for the required job by using the Search field, and add it to the job stream.
- Search for the job and click **Add**.
- You can then edit the properties of the newly added job, optionally specifying its scheduling options and time restrictions. For example, here you can set a job as **Critical** if the job is mission critical and must be processed accordingly.

## What to do next

If you want to remove the job click the remove icon



at the end of the job row.

## Quick submit of jobs and job streams

Quickly submit a job or job stream from the Workload Designer. Supported on distributed engines only.

### Before you begin

To perform this task, ensure the IBM Workload Scheduler engine connection is up and running.

### About this task

You can quickly submit a job or job stream defined in the database into the current plan and run it immediately from the Workload Designer. This operation is supported only on distributed engines. You might want to do this for testing purposes before implementing the job or job stream in large-scale production to verify, for example, if the job or job stream completes successfully or how long the job takes to complete.


To manage objects in the database, open the Workload Designer window from the portfolio by clicking **Administration > Workload Design > Manage Workload Definitions**.

### Submitting a job stream

#### About this task

To submit a job stream from the Workload Designer:

#### Procedure

1. Open the job stream that you want to submit to be run. To find the job stream, do either of the following actions:
  - Search for it using the **Search** menu in the **Working List**.
  - Select the job stream icon  and launch a search (optionally filtered).
2. From the **Details** view, click **Select an Action > Submit Job Stream into Current Plan**.

#### Results


The job stream is submitted to the current plan to be run. You can now monitor the status of the job stream by clicking **System Status and Health > Workload Monitoring > Monitor Job Streams** from the navigation bar of the Dynamic Workload Console.

### Submitting a job

#### About this task

To submit a job from the Workload Designer:

## Procedure

1. Create a new job definition or open the job definition that you want to submit to be run. To find the job definition, do either of the following actions:
  - Search for it using the **Search** menu in the **Working List**.
  - Select the job icon  and launch a search (optionally filtered).
2. From the **Details** view, click **Select an Action > Submit Job into Current Plan**.
3. You are prompted to enter the following optional information:

### Job stream name

Type the name of the job stream into which you want to submit the job to run, or browse and select from a list of available job streams defined in the database. If you do not specify a job stream, the job is automatically submitted into the default JOBS job stream.

### Job stream workstation name

The name of the workstation where the job stream is defined. If you do not specify a (job stream) workstation name, then the name used is that of the workstation where the JOBS job stream is defined.

### Job alias

A name assigned to the job so that it can be easily recognized when monitoring the job run. If you do not specify an alias, it is automatically generated using the first six characters of the job **Name** followed by 10 numerical characters.

## Results

The job is submitted to the current plan to be run. You can now monitor the status



of the job by clicking **System Status and Health > Workload Monitoring > Monitor Jobs** from the navigation bar of the Dynamic Workload Console.

## What to do next

\* You still have an opportunity to modify the job definition, if necessary, in the plan.  
\* The job instance can be updated before the job runs, or after it has run and then  
\* the job with the updated definition can be rerun.

## Exporting a job stream definition as a workload application template

From the Workload Designer, you can export a job stream definition and save it as a workload application template in a compressed file. The job stream definition can then be imported in another environment.


### Before you begin

To perform this task, ensure the IBM Workload Scheduler engine connection is up and running.

### About this task

To export a job stream definition as a workload application template, run the following procedure from the Workload Designer :

## Procedure

1. Open the job stream whose definition that you want to export. To find the job stream, do either of the following actions:
  - Search for it using the **Search** menu in the **Working List**
  - Select the job stream icon  and launch a search.
2. You can now export the job stream by using either the **Details** or the **Graphical** view. Select the tab for the view you want.
  - From the **Details** view or the **Graphical** view, by using the menus, do the following:
    - a. Right-click the job stream and select the **Download Job Stream definition** option from the context menu or select the job stream and choose the same option from the **Select an Action** menu .
    - b. A system panel is displayed for you to specify the download location.

## Results

The job stream definition is exported as a workload application template, in a compressed file. The compressed file is named, by default, *job\_stream\_name.zip*. You can now import the job stream definition in a different environment.

## Adding and removing dependencies

How to add or remove dependencies using the Dynamic Workload Console.

### Before you begin

To perform this task, ensure the IBM Workload Scheduler engine connection is up and running.

### About this task


To manage objects in the database, open the Workload Designer window from the navigation bar by clicking **Administration >Workload Design>Manage Workload Definitions**.


### Adding a dependency

#### About this task

To add a dependency, from the Workload Designer, perform the following steps:

#### Procedure

1. Open the job stream to which you want to add a dependency or the job stream containing the job to which you want to add a dependency. To find the job stream, do either of the following actions:
  - Search for it using the **Search** menu in the **Working List**
  - Select the job stream icon  and launch a search.
2. You can now work on the job stream by using either the **Details** or the **Graphical** view. Select the tab for the view you want.
  - From the **Details** view, by using the menus, do the following steps:

- a. Right-click the job or job stream and select **Add Dependencies** from the context menu or select the object and choose an option from the **Select an Action** menu.
  - b. From the context menu, select the type of dependency you want to add.
  - c. From the **Search** panel, search for the required object and add it to the job or job stream.
- From the **Graphical** view, do either of the following actions:
    - by using the menus, do the following steps:
      - a. Right-click the job or job stream and select **Add Dependencies** from the context menu or select the object and choose an option from the **Select an Action** menu.
      - b. From the context menu, select the type of dependency you want to add.
      - c. From the **Search** panel, search for the required object and add it to the job or job stream.
    - by using the toolbar, do the following steps:
      - a. Select the create dependency icon  .
      - b. Draw a line from the dependency to the job or job stream that must depend on it. You can use this tool to create dependencies only between objects displayed in the view.

## What to do next

**Note:** If you add a dependency to a job or job stream after it has completed, it is not evaluated. However, any subsequent reruns of the job or job stream will process the dependency correctly.

### Related concepts:



“Dependencies” on page 66  
Controlling processing using dependencies

## Removing a dependency

### About this task

From the Workload Designer, you can remove a dependency in either of the following ways:

### Procedure

- From the **Details** view, click the remove icon  at the end of the dependency row.
- From the **Graphical View**, select the dependency by clicking the node (if it is an external dependency) or by right-clicking the arrow. When the arrow you want to remove is highlighted, click the remove icon  on the toolbar or from the context menu. If an object has multiple dependencies, click it again until the arrow you want to remove is highlighted.

### Related concepts:

“Dependencies” on page 66  
Controlling processing using dependencies

## Creating cross dependencies

Creating a cross dependency using the Dynamic Workload Console.

### About this task

To add a cross dependency to a local job on a job that is defined on a remote engine, you must define a normal dependency for your local job on a shadow job that:

- Points to the remote job on which you want to create the cross dependency
- Is defined on a local workstation of remote engine type, that points to the engine where the remote job is defined.

To define the cross dependency, perform the following steps:

### Procedure

#### 1. Define a remote engine workstation

On a remote engine workstation you can run only shadow jobs. As a prerequisite for creating a remote engine workstation, you must ensure that an HTTP or HTTPS destination to communicate with the remote engine exists. The name of this destination must be specified in the remote engine workstation definition.

- a. From the navigation toolbar, click **Administration > Workload Environment Design > Create Workstations**.
- b. Select an engine from the list and click **Create Workstations**.
- c. Specify the workstation attributes, selecting **Remote engine** as **Workstation Type**. For more details about the options to select, see the online help by clicking the question mark located at the top right corner of the panel.

#### 2. Define a shadow job

It runs on the remote engine workstation and must contain the key values to identify the remote job.

- a. Click **Administration > Workload Design > Manage Workload Definitions** to define a job of type **Shadow Job**.
- b. Select an engine from the list and click **Go**. You can select either a distributed engine (to create a shadow job as an independent object) or on a z/OS engine (to create a shadow job within an existing job stream.)
- c. The Workload Designer opens. In the Working List panel, create the new job.

z/OS

**New > File Transfer and Coordination**

Distributed

**New > Job Definition > File Transfer and Coordination**

- d. Select either **Shadow Distributed** or **Shadow z/OS**, depending on the type of remote engine on which the remote job is scheduled to run. For more details about the attributes to select, see the online help by clicking the question mark located at the top right corner of the panel.

Shadow jobs can be added to the plan by the plan creation process or dynamically at run time. The shadow job scheduled time is used to identify the job instance in the remote engine plan.

#### 3. Add the shadow job as a dependency of the local job

The dependency can be internal (distributed only) or external. In the **Details** view, right-click the local job and use the pop-up menu to add the shadow job as a dependency.

## Results

As soon as the shadow job status satisfies the dependency rule, the dependency of the local job on the shadow job is resolved, and the cross dependency for the local job on the remote job is also resolved.

For more information about cross dependencies, see the sections about defining and managing cross dependencies in *IBM Workload Scheduler: User's Guide and Reference* and in *IBM Workload Scheduler for z/OS: Managing the Workload*.

### Related concepts:

"Cross dependencies" on page 78

Using cross dependencies and *shadow jobs*.

## Creating and managing run cycle groups and their run cycles

### Why using run cycle groups

By using run cycle groups, you can benefit from the following advantages:

#### A run cycle group is a distinct database object

It is defined by itself and can be matched with one or more job streams. It is not defined as part of a specific job stream like single run cycles.

#### The same run cycle group can be used on different job streams

This improves the overall usability of the run cycles, because you can specify the same run cycle group in multiple job streams, avoiding the need to have multiple run cycle definitions for the same scheduling rules.

#### Run cycle groups enhance the use of exclusive run cycles

Exclusive (or negative) run cycles are used to generate negative occurrences, which identify the days when a job stream would normally be scheduled but is not required. The sum of the exclusive run cycles are subtracted from the inclusive ones. A negative occurrence always cancels any matching positive occurrences and you can specify a negative occurrence only if the positive equivalent already exists. An exact matching of the days, as well as any time restrictions, is required between the exclusive and inclusive run cycles for the cancellation to occur. Run cycle groups add much flexibility by allowing users to apply exclusive run cycles to a subset of the positive ones rather than to all of them. Group your run cycles into *subsets* so that the exclusive run cycles can be applied only to the positive occurrences generated by the run cycles belonging to the same set.

Run cycles must be organized into *subsets* within a run cycle group. The subsets are always in a logical **OR** relationship with each other. The result of the run cycle group is always a date or set of dates; it cannot be negative.

For example, you might want your job stream to run every day of the month except the last day of the month. But, you also want the



it to be scheduled on the last day of the year (the last day of December). You can define a run cycle group using subsets, as follows:

**Subset 1**

- **Run cycle 1** - Inclusive run cycle every day of the month
- **Run cycle 2** - Exclusive run cycle on the last day of the month

**Subset 2**

- **Run cycle 3** - Inclusive run cycle on December 31st

where, run cycle 2 cancels the last day of each month in Subset 1, while run cycle 3 generates December 31st as a separate date and therefore you can schedule the job stream on Dec 31st.

**Run cycle groups allow the use of a logical AND between individual run cycles in the subset**

By default, the run cycles within a subset are in a logical **OR** relationship but you can change this to a logical **AND**, if the run cycle group result is a positive date or set of dates (Inclusive). For each run cycle, you can specify either operator (**AND**, **OR**), obtaining the following behavior:

1. All the run cycles of the group that are in *AND* relationship are calculated first. The result of this calculation is a date or a set of dates.
2. Then, all the run cycles in an *OR* relationship are added to the result of the previous step.

A similar behavior is applied to inclusive and exclusive run cycles to determine the final date or set of dates of a group.

**Inclusive (A)**

Rule-based run cycle. Select days when the job stream is to be run if they belong to all A types of the set of run cycles.

**Exclusive (D)**

Exclusion rule-based run cycle. Select days when the job stream is NOT to be run if they belong to all D types of the set of run cycles.

For example, you can add two conditions together:

Run on Wednesday "AND" the 8th workday of the month.

In this way, the only scheduled dates are any 8th work day of the month that falls on a Wednesday.

**Full compatibility with traditional run cycles**

The *traditional* run cycles specified in the job stream definition can reference run cycle groups, with the possibility to specify shift or offsets on them (as with periods for z/OS or calendars for distributed systems).

A set of dates (interval starts) is created automatically either at run cycle level directly (inclusively or exclusively with offsets, or in the rule. This is a two-step process with run cycles:

1. Define the key "business event", such as, Month End, using run cycles and free day rules

2. Define rules that use the dates of the "business event" as the intervals against which the other batch run can be scheduled relative to.

For example, you have a *Month End process* that runs on the Last Friday of a month, but that moves forward to the next working day, except in December when it runs on the 3rd Friday of the month. This scheduling rule can be defined with a few rules, run cycles, and free day rules.

Two working days before Month End you need to run a pre-validation process to allow problems to be addressed before the run. You cannot choose the last Wednesday of the month, because in some months this might occur after the last Friday. Similarly, if the last Friday was a free day, the last Wednesday will not be 2 working days before it, because the Free Day rule applies ONLY to the day the rule falls on, it cannot look at anything else.

Many other batch runs might also need to be run on a certain number of days before or after the Month End, but the same restrictions apply.

You can now define work to run relative to something defined by a combination of run cycles and free day rules.

#### **Use of calendars with run cycles within a run cycle group**

Optionally, you can specify more than one calendar to calculate the working and non-working days definition for a run cycle. The primary calendar is used to calculate which working days are valid, and a secondary calendar is used to calculate specific non-working dates. If the dates calculated according to the secondary calendar match with the working days in the primary calendar, the job is scheduled; if they do not match, the job is not scheduled.

For example, a global company that runs workload in the United States for many other countries needs many calendar combinations to ensure that the batch jobs only run on a day that is a working day both in the United States and the other country. The calendar can be defined at job stream level and, if not specified, a default calendar is used. However, the calendar at run cycle level, whenever defined, can be used as secondary calendar and the job stream (or default) calendar can be used as the primary calendar.

**For example**, Primary calendar can be *WORKDAYS*, which is defined as MONDAY to FRIDAY excluding US holiday dates. You might also need to calculate the job runs based on calendar *HKWORK*, which is defined as Monday to Friday excluding Hong Kong holiday dates. The job might have several schedules:

- Run on working days, but not the last working day and not Mondays
- Run on Mondays, but not on the last working day
- Run on the last working day

Because each schedule is calculated against the *WORKHK* calendar it is also checked against the *WORKDAYS* calendar to ensure that it is scheduled on a US working day.

### The use of time restrictions with run cycle groups

You can specify time constraints to define the time when processing must start or the time after which processing must no longer start. To do this, you can associate *time restrictions* to job, job streams, run cycles, and run cycle groups. When you define a time restriction, you basically obtain a *time*. Because you can associate time restrictions to multiple objects, the following hierarchy shows the order by which the different time restrictions are taken into consideration to actually define when to start the processing:

1. Time restriction defined in the run cycle into the job stream
2. Time restriction defined in the job stream
3. Time restriction defined in the run cycle contained in the run cycle group associated to the job stream.
4. Time restriction defined in the run cycle group associated to the job stream.
5. Start of Day

This means that:

#### Time restrictions in the job stream

Override and take precedence *over any other time restrictions* defined in the run cycles or run cycle groups associated to the job stream.

#### No time restrictions in the job stream nor in the run cycle group

The group generates only a date that is the *Start Of Day*. If offsets and free day rules are to be calculated, the calculation always starts from the *Start Of Day*.

#### Time restrictions in the run cycle group (not in the job stream)

Time restrictions (and possible offset) are calculated starting from the *Start Of Day* and the resulting date and time indicate the start of processing.

### Examples

Table 10. Scenario 1. No time restriction in the run cycle group

Run cycle group	Scheduled date	Earliest Start
Run cycle group	10/24	10/24
Run cycle group with offset (+ 3 days)	10/27 (Saturday)	10/27/ (Saturday)
Run cycle group with free day rule	10/29/ (Monday)	0/29/ (Monday)
<b>Run cycle in the job stream with time restrictions</b>		
Run cycle in the job stream with + 4 working days shift	11/02 (Friday)	11/02 (Friday)
Run cycle in the job stream with free day rule	11/02 (Friday)	11/02 (Friday)
Run cycle in the job stream with earliest start +1 1pm	11/02 (Friday)	11/03 (Saturday) 1pm
<b>Run cycle in the job stream without time restrictions</b>		

Table 10. Scenario 1. No time restriction in the run cycle group (continued)

Run cycle group	Scheduled date	Earliest Start
Run cycle in the job stream with + 4 working days shift	11/02 (Friday)	11/02 (Friday) Start of Day
Run cycle in the job stream with free day rule	11/02 (Friday)	11/02 (Friday) Start of Day

Table 11. Scenario 2. Time restriction in the run cycle group without offset

Run cycle group	Scheduled date	Earliest Start
Run cycle group	10/24	10/24
Run cycle group with calendar offset (+ 3 days)	10/27/ (Saturday)	10/27/ (Saturday)
Run cycle group with free day rule	10/29/ (Monday)	0/29/ (Monday)
<b>Run cycle in the job stream with time restrictions</b>		
Run cycle in the job stream with + 4 working days shift	11/02 (Friday)	11/02 (Friday)
Run cycle in the job stream with free day rule	11/02 (Friday)	11/02 (Friday)
Run cycle in the job stream with earliest start +1 1pm	11/02 (Friday)	11/03 (Saturday) 1pm
<b>Run cycle in the job stream without time restrictions</b>		
Run cycle in the job stream with + 4 working days shift	11/02 (Friday)	11/02 (Friday) Start of Day
Run cycle in the job stream with free day rule	11/02 (Friday)	11/02 (Friday) Start of Day

Table 12. Scenario 3. Time restriction in the run cycle group with offset (+1 12:00)

Run cycle group	Scheduled date	Earliest Start
Run cycle group	10/24	10/24
Run cycle group with calendar offset (+ 3 days)	10/27/ (Saturday)	10/27/ (Saturday)
Run cycle group with free day rule	10/29/ (Monday)	10/29/ (Monday)
Run cycle group with offset +1 12:00	10/29/ (Monday)	10/30 12:00 (Tuesday)
<b>Run cycle in the job stream with time restrictions</b>		
Run cycle in the job stream with + 4 working days shift	11/02 (Friday)	11/02 (Friday)
Run cycle in the job stream with free day rule	11/02 (Friday)	11/02 (Friday)
Run cycle in the job stream with earliest start +1 1pm	11/02 (Friday)	11/03 (Saturday) 1pm

Table 12. Scenario 3. Time restriction in the run cycle group with offset (+1 12:00) (continued)

Run cycle group	Scheduled date	Earliest Start
<b>Run cycle in the job stream without time restrictions</b>		
Run cycle in the job stream with + 4 working days shift	11/02 (Friday)	11/03 12:00 (Saturday)
Run cycle in the job stream with free day rule	11/02 (Friday)	11/03 12:00 (Saturday)

**z/OS Availability of the GENDAYS command at run cycle group level** Using GENDAYS, you can check the result of the combination of all the run cycles in the group.

When you create a run cycle within a run cycle group, you must include it in a subset, identified by a subset ID.

Managing subsets of run cycles provides a lot of flexibility in job stream scheduling.

For example, you create run cycle group that contains three run cycles, two inclusive and one exclusive, in **OR** relationship:

**RC1** Inclusive: run every Thursday of the month.

**RC2** Inclusive: run every Friday of the month.

**RC3** Exclusive: do not run the first week of each month.

In this case the result would be: the job stream runs every Thursday and Friday of the month except for those occurring in the first week of the month.

But if you want that the job stream also runs the first Thursday of the month, you could accomplish your goal by organizing your run cycles in subsets:

**RC1** Inclusive: run every Thursday of the month.

**RCSUBSET**

**RC2** Inclusive: run every Friday of the month.

**RC3** Exclusive: do not run the first week of each month.

In this way the result would be: the job stream runs every Thursday of the month and every Friday of the month, except for the first Friday.

From the Workload Designer, you can run the following actions on run cycle groups:

- Create
- Create like
- Delete
- Edit
- View

To open the Workload Designer, do the following:

1. Log in to the Dashboard Application Services Hub.

2. From the navigation toolbar, click **Administration >Workload Design>Manage Workload Definitions**

In the displayed window, you are required to select an engine to connect with.

3. Enter the name of an engine and click **Go**.

The Workload Designer opens.

To create a run cycle group:

1. Click **New** in the Working List pane of the Workload designer window.
2. Select **Run Cycle group** in the resulting list of objects.

A Properties - Run Cycle group pane is opened on the bottom-right section of the window.

3. Enter the properties of the new run cycle group as requested. You can proceed to define the run cycles that are part of the group or leave this task for later.
4. To save your data, click the box next to the run cycle group name listed in the Working list pane and select the **Save selected** icon in the menu bar.

To exit the Properties - Run Cycle group pane without saving your data, click the box next to the run cycle group name listed in the Working list pane and select the **Delete selected** icon in the menu bar.

You can also create a run cycle group starting from an existing one. To do so, list the existing run cycle group and click the **Create Like** icon.

To run any of the other actions on already defined run cycle groups, you must first list the run cycle groups upon which you want to act. You can do this in one of the following ways:

- Click **Search** in the Working List pane:

1. Select **Run Cycle group** in the resulting list of objects.

The Search - Run Cycle group window is displayed.

2. Click **Search** to display a list of all the run cycle groups defined on the engine. Before doing so, you can narrow your search by entering names or partial names in the text box.

The found run cycle group definitions are listed.

3. Select the run cycle groups you want to act upon and click **Edit**, **View**, or **Delete**.

If you clicked **Edit** or **View**, the selected groups, inclusive of their run cycles, are listed in the Working List pane, with the properties of the top one displayed on the right pane.

If you clicked **Delete**, you are asked to confirm the deletion from a pop-up window.

- Click the **Run Cycle group** icon in the Quick Open pane:

1. Click **Search** to display a list of all the run cycle groups defined on the engine. Before doing so, you can narrow your search by entering names or partial names in the text box.

The found run cycle group definitions are listed in the Quick Open pane.

2. Select the run cycle groups you want to act upon and click **Edit** or **View**. You cannot delete from this pane.

The selected groups, inclusive of their run cycles, are listed in the Working List pane, with the properties of the top one displayed on the right pane.

To add run cycles to the group you are creating you must first include them in a subset, to do it perform the following steps:

1. From the Details view, right-click the run cycle group in the Details view and select **Add Subset**.
2. Right-click the subset and select **Add Run Cycle**.
3. Specify the run cycle attributes in the Run Cycle properties pane displayed at the bottom.

You can toggle between the panels displaying the properties of the run cycle group and of the included run cycles by selecting the entries listed in the **Type** column

To view, edit, or create another run cycle of a run cycle group, just click the corresponding icon in the Working List pane or in the Details pane.

When you create a group of run cycles, you can choose whether the run cycles must be in **AND** or in **OR** relationship. However, the result of the run cycles combined within the group must be a set of dates; the group cannot produce an exclusive result.

**Related concepts:**

“Run cycle” on page 59

“Run cycle group” on page 61

**Related information:**

“Run Cycle Preview” on page 281

This view applies only to job streams and shows the run cycles defined for the selected job stream.

## Creating Workload Broker objects

Creating Workload Broker workstations and jobs.

### About this task

You can manage Workload Broker jobs in a IBM Workload Scheduler environment by creating special workstations and job definitions.

Using the Dynamic Workload Console you can:

- Create the Workload Broker workstation in the IBM Workload Scheduler database.
- Create Workload Broker job definitions that map Workload Broker jobs.
- Monitor Workload Broker workstations in the plan.
- Submit jobs to the Workload Broker workstation.
- Monitor Workload Broker jobs and browse the corresponding job logs.

For more information about Workload Broker, see IBM Workload Scheduler Scheduling Workload Dynamically.

### Procedure

To create a Workload Broker workstation, perform the following steps:

1. Click **Administration > Workload Environment Design > Create Workstations**.
2. Select a distributed engine from the list and click **Create Workstations**.
3. In the Workstations Properties panel, specify the following fields. The values you specify here must match the values specified during the installation of the

Workload Broker component. You can retrieve them from the `BrokerWorkstation.properties` configuration file.

**Name** It is the value specified in the **TWS Agent name** field.

**Workstation type**

Select **Workload Broker** from the available workstation types.

**Node Name**

The host name of the computer where the IBM Workload Scheduler master is installed.

**TCP/IP port**

The port number you specified when installing the IBM Workload Scheduler master. It is the value specified in the **TWS Agent Port** field.

Leave all other fields with their default values.

4. Click **Save** to add the workstation to the database.

You can create IBM Workload Scheduler job definitions that map to Workload Broker jobs, and submit and monitor the job status. To create a new Workload Broker job definition, perform the following steps:

1. From the navigation toolbar, click **Administration>Workload Design>Manage Workload Definitions**
2. In the Workload Designer, from the Working List pane click **New > Job Definition > Cloud > Workload Broker** .
3. In the Workspace pane, specify the properties for the job using the General, Task, Affinity, and Recovery Options tabs.
4. Click **Save** to add the Workload Broker job definition.

**Related concepts:**

“Workstation” on page 47

Using workstations for scheduling jobs and job streams.

“Workload Broker job definition” on page 81

## Creating an event rule

How you can create an event rule.

### About this task


Use an event rule to specify a predefined set of actions in response to events that occur on the nodes where IBM Workload Scheduler runs. When one or more defined events occurs, you can specify which actions must be performed.

To create an event rule definition, perform the following steps:

### Procedure

1. Make sure you have the required authorizations granted as Dashboard Application Services Hub user, and in the IBM Workload Scheduler security file. For more information about security settings, see “Event management configuration” on page 7.
2. From the navigation toolbar, click **Administration >Workload Design> Create Event Rules**.
3. In the **Engine** field, specify the engine (this must be either the master domain manager or a node installed as backup master domain manager but not necessarily belonging to the master domain) where you want to run the event rule and click **Go**. Only after you have selected an engine connection, is the



remainder of the panel displayed. If you have only one engine defined, it is displayed by default and the whole panel is displayed. Each time you create or modify an event rule, the corresponding object in the database is automatically locked. To release an object when you close the panel, click **Close** or the close button . You can unlock an event rule that you own by using the **Unlock** command. After closing the current rule, click **New** if you want to create a new rule without exiting the panel.

**Note:** When you change the engine connection, the available events and actions are also changed and the list of actions and events you had previously selected is reset. When you save your changes or select a different tab, a warning message is issued to inform you of the reset.

The Event Rule Editor panel displays the following main sections relating to:

- **General Information**
- **Events**
- **Actions**

Click the header bar of each section to minimize or expand it.

4. In the **General Information** section, enter the required information. All mandatory fields have a yellow background and are marked by an asterisk.

**Note:** Every time you modify and save any of these settings, the event rule (if not in **Draft** status) is newly deployed, and all possible events that were collected before the new deployment are ignored.

#### **Rule name**

Enter a name for the rule definition. It is a mandatory field with a maximum length of 40 characters. Blanks and special characters are not supported, except for minus (-) and underscore (\_) characters. If you enter invalid characters, the field becomes red and the rule saving fails with an error.

#### **Description**

A generic descriptive text for the rule, with a maximum length of 120 characters.

**Draft** When an event rule is in **Draft** status, it is neither deployed nor activated. When the event rule is not in **Draft** status, it is eligible to be deployed (automatically or manually, according to your deployment policy) and activated. As a result, actions are started whenever all the defined events take place, within the specified validity period. When you change a rule status into **Draft** or **Not Draft**, the rule goes respectively into Deactivation Pending or Activation Pending internal status.

Use the following options to specify time settings for the rule. The rule is active in the specified time zone, within the specified validity period during the days and hours defined.

#### **Time zone**

Select a time zone from the list. It is the time zone according to which the rule is active (regardless of the engine time zone). If no time zone is specified, the engine time zone is used by default.

#### **Valid from...Valid to**

Enter the time period during which the rule is valid. If the conditions specified in the rule are satisfied within this time period, the defined

actions are run. You can also specify only one value, leaving the other field blank. Blank fields are considered as infinite.

#### Daily start/Daily end

It indicates the hours during which the rule is active, every day during the validity period specified. You can specify only one value, leaving the other field blank. The value of a blank field is considered midnight. You can also enter time values that cross midnight. For example, you can specify: a start time of 7 pm and an end time of 6 am. In this case the rule is active 24 hours a day, except from 7 pm to 6 am everyday, for all the validity period.

5. In the **Events** section, select the events you want to monitor:
  - a. Each item of the list displayed on the left pane represents a category of events. Click an event category to view all the events belonging to it.
  - b. Click an event to automatically add it as a new box in the event section on the right pane. Within each of the boxes representing an event, click:



To open a new window listing the event properties and details.



To remove the event from the list.



The left or the right arrow at the bottom of the box to change the order in which the events occur. This is important when you define, within the event rule, a sequence of events.

- c. In the **Properties** section, specify the event properties.

The following list describes all the categories of events and their properties.

**Note:** The topics listed below are .html files referenced by the PDF. Ensure you are connected to the Internet before clicking on the links.

#### IBM Workload Scheduler object related events

All the events relating to scheduling objects such as jobs, job streams, workstations, and prompts. This type of event is described in more detail in IBM Workload Scheduler Object Monitor.

**Note:** Any change performed on a workstation referenced in a rule is not reported in the rule. For example if you modify, update, or delete a workstation that is referenced in a rule, the rule ignores the change and continues to consider the workstation as it was when it was included in the rule.

#### File monitoring events

Events relating to changes to files and logs.

File monitoring events are not supported on IBM i systems.

This type of event is described in more detail in File Monitor.

#### Application monitoring events

Events relating to IBM Workload Scheduler processes, file system, and message box. Application monitoring events are not supported on IBM i systems.

This type of event is described in more detail in Application Monitor.

### SAP related events

These events are available only if you have installed IBM Workload Scheduler for Applications and they are generated by external SAP systems. This type of event is described in more detail in SAP Monitor.

### Data set monitoring

These events are available only if you are using the agent for z/OS on IBM Workload Scheduler. This type of event is described in more detail in Data set Monitor.

### Generic events

Events used to manage custom events sent by external applications. You can write an XML file to define a custom event. A schema is provided to validate your XML, as well as a basic event template that you can use as a starting point. For more information, see the schemas for generic events. Events of this category are:

- Changes in a resource of the operating system, such as processes and memory
- Email received

/  
/  
/  
/

You can also decide to have the IBM environment loaded when you run this plug-in. To enable the environment loading, set the **er load** option in the `localopts` file to **yes**. For more information, see the section about `localopts` details in *Administration Guide*.

- d. In the Events toolbar, choose an icon to specify the relationship between the events. The corresponding response actions are started only when the events take place according to this relationship. Click:



To specify one *single* event. Select this icon if you want a response action to start whenever the specified event occurs within the defined time period.



To specify a *set* of events, regardless of the sequence in which they occur. Select this icon if you want a response action to start if *all* the specified events occur, regardless of the order, within the defined time period.



To specify various events in *sequence*. Select this icon if you want a response action to start if *all* the specified events occur in sequence, within the defined time period.

- e. Optionally, in the event toolbar, you can specify a **Timeout period**. This is a further condition that can be set for the rule, only if you selected a *set* or *sequence* of two or more events. When you set the timeout option, the specified period is calculated starting from the first event that occurs; if all the remaining events occur *within* the specified timeout, the *response actions* are started. If the timeout period expires before all the specified events have taken place, the defined *timeout actions* start.
- f. Optionally, in the **Correlate events on:** section, you can select some common properties.

These properties are common to the events selected. You can use them to create a correlation to further identify the events to monitor. The properties common to the selected events are automatically detected and listed in the right hand part of the event section. Select the properties you want to use for event correlation.

For example, if you want to receive an email every time a workstation remains unlinked for more than 10 minutes, you can correlate the following settings:

**Event 1**

Whatever workstation is unlinked.

**Event 2**

Whatever workstation is linked.

**Event correlation**

Start the action only if the property *workstation\_name* is the same in Event 1 and Event 2.

**Timeout**

The two events must take place within 10 minutes of each other.

**Action**

Send an email to the administrator.

6. In the **Actions** section:
  - a. Select the **Actions** tab. The number displayed in this tab, if any, represents the actions that have already been defined.
  - b. In the left pane of this section, select the actions you want to start. Click an action to automatically add it to the action section on the right. Within each of the boxes representing an action click:



In the new panel that lists the action properties. To see an explanation about the action and its properties, hover with the cursor over the fields.



To remove the action from the list.

- c. In the **Properties** section, specify the action properties. The following list describes all the actions and their properties:

**Operational actions**

Actions that cause a change in the status of one or more IBM Workload Scheduler objects. Actions in this category include:

- Submitting jobs or job streams
- Submitting ad hoc jobs
- Replying to a prompt

This type of action is described in more detail in IBM Workload Scheduler actions.

- Adding an application occurrence (job stream) to the current plan on IBM Workload Scheduler for z/OS in IBM Workload Scheduler-IBM Workload Scheduler for z/OS end-to-end scheduling configurations.

This type of action is described in more detail in IBM Workload Scheduler for z/OS actions.

**Notification actions**

Actions such as:

- Sending email's or SMS. For details, see Mail sender plug-in.
- Forwarding IBM Enterprise Console events. For details, see Message logger.
- Writing messages in a logging repository. For details, see IBM Enterprise Console event forwarder.

- Forwarding events to a IBM Business Services Manager server. For details, see IBM Business Services Manager Console event forwarder.
- Opening a ticket to a SmartCloud Control Desk. For details, see Smart Cloud Control Desk.
- Opening an incident in ServiceNow incident management. For details see Service Now.

### Generic actions

Actions performed by running a command. This type of action is described in more detail in Generic Action plug-in.

When defining the action properties, you can:

- Click **Variable** to associate the property to one or more variable values. At run time these values are displayed as properties associated to the selected action.
  - You can click **Lookup** to select jobs, job streams, and workstations defined in the database only for IBM Workload Scheduler and IBM Workload Scheduler for z/OS Actions,
- d. Optionally, select **Timeout actions** to define a further set of actions to start if the timeout period expires before all the specified events are performed. The number displayed in this tab, if any, represents the actions that have already been defined.

## Results

After you have defined events and actions, you can clear the **Draft** check box at the top of the panel and save the rule. The rule definition is then ready to be deployed and remains active according to its validity period, or until you disable it by marking it as **Draft**.

### Related concepts:

“Event management” on page 88

What the event management feature is and how to use it.

“Event management configuration” on page 7

Authorizations needed to use event management.

“Event rule” on page 292

## Editing event rules

Editing event rules in the IBM Workload Scheduler database.

### About this task

You can manage event rules in the database.

To modify an event rule definition in the database, perform the following steps.

### Procedure

1. From the navigation toolbar, click **Administration > Workload Design > Manage Event Rules** .
2. In the displayed panel, create a new task or run an existing task to retrieve a list of event rule definitions.
3. If required, specify the engine connections to run the task.

4. A table displays the list of event rule definitions available on the selected engine. Click a rule definition to view its properties or select it and click **Edit** to modify it. Alternatively, choose another action from the buttons and menu available.
5. In the displayed panel you can modify the current rule or create a new one.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

6. Click **Save**.

## Results

The event rule definition is now modified to the database.

## Listing object definitions in the database

### About this task

The following sections describe how you list the object definitions available in the database.

### Listing workload objects

#### About this task

To list all the workload definitions except for event rules, open the Workload Designer as follows:

1. From the navigation toolbar, click **>Workload Design>Manage Workload Definitions**.
2. In the displayed panel, specify the engine connection you want to use. Only the categories of objects supported by the engine you selected are available.

You can open multiple occurrences of the Workload Designer, but only the following scenarios are supported:

- Same user connected to multiple engines
- Multiple users connected to the same engine.

### Procedure

From the Workload Designer you can use the Working List view to list objects: Perform the following steps:

1. Specify the object name in **Search** field and select the object you want to view or modify. A toolbar is displayed with the icons of the objects you can search for. You can also click on **Advanced** to specify advanced search criteria.
2. From the displayed list, select one or multiple objects and click one of the following action buttons:




#### Create like

To create a new object with the same properties of the selected object.



#### Edit

To modify the properties of the selected objects. When an object is open in edit mode the edit icon  is displayed on the right of the object.



### Unlock

To unlock the selected objects for further actions. When an object is unlocked, it is displayed in read-only mode.



### Delete

To delete the selected objects from the database.



### Create New menu

To create a new object.



### Close selected

To close the currently open object.

All the selected objects are listed in the Working List view. When you select an object from this list, its properties are displayed in the right pane, where you can view or edit them, if you have the required authorization defined in the IBM Workload Scheduler security file.

By hovering with the cursor over the icons located on the toolbar, you can see all the actions you can perform on the selected objects.

#### Related concepts:

“Prompt” on page 68

Information about prompts, which are textual messages presented to the operator to pause the job or job stream processing.

“File” on page 70

“Resource” on page 69

Information about resources.

“Calendar” on page 59

“User” on page 80

“Workstation class” on page 80

“Variable table” on page 81

## Listing jobs and job streams

**Distributed**

### About this task

To view a list of jobs and job streams available in the database, perform the following steps:

#### Procedure

1. In the navigation bar at the top of the page, click **Administration > Workload Design > Manage Workload Definitions**
2. In the displayed panel, specify your engine connection and the filtering criteria for your query. With distributed engine connections, from the **Object type** drop-down menu, select the object you want to list.
3. In the **Columns** section, select the column you want to display in the list of results.
4. Click **Display** to launch the query.

#### Related concepts:

“Job” on page 55

Information about jobs, which are scheduling objects used to define and run activities in the scheduling environment.

“Job stream” on page 56

## Listing event rules

**Distributed**

### About this task

To view a list of event rules available in the database, perform the following steps:

### Procedure

1. From the navigation toolbar, click **Administration > Workload Design > Manage Event Rules**. Or In the navigation bar, click **System Status and Health > All Configured Tasks > New**.
2. In the Select Task Type section, select **Event Monitoring Task > List Event Rule Definitions** and click **Next**.
3. In the Enter Task Information panel, specify the task name and select the engine connection where you want to run the task. You can run this type of query only for IBM Workload Scheduler and IBM Workload Scheduler for z/OS Actions. You can click **Lookup** to select jobs, job streams, and workstations defined in the database on either the master domain manager or on a node installed as a backup master domain manager, but not necessarily belonging to the master domain. You can also specify whether to share the task with others, to allow them to see and run the task, but not to modify it.
4. Click **Next** to proceed with task creation or click **Finish** to complete the creation using the default values and exit without proceeding to the following steps. If you are editing an existing task, properties are organized in tabs.
5. In the Filter Criteria panel, specify some broad filtering criteria to limit the results retrieved by your query. Here you start refining the scope of your query by also considering the amount of information you want to retrieve. You can search for event rule definitions based on their status, validity intervals, or types of events and associated actions.
6. In the Columns Definition panel, select the information you want to display in the table containing the query results. According to the columns you choose here, the corresponding information is displayed in the task results table. For example, for each of the event rule definitions resulting from your query, you might want to see the status, type, or timeframe during which it is valid. You can then drill down into this information displayed in the table and navigate it. In the Columns Definition panel, not only can you select the columns for this task results, but you can also specify the columns for *secondary* queries on event rule instances. The information to be retrieved with these secondary queries is specified in this panel.
7. In the All Configured Tasks panel, you can see the main details about the task that you have just created. You can also choose to run the task immediately. The task is now in the list of your tasks where you can open and modify it. You can find it in the task lists displayed by clicking the following options: **All Configured Tasks** or **Administration > Workload Design > Manage Event Rules**.
8. After running the task, a table is displayed showing a list of event rule definitions, on which you can take several actions, such as setting them as complete or as draft depending whether you want to make them available for deployment.



## Listing workstations

### About this task

To view a list of workstations available in the database, perform the following steps:

#### Procedure

1. From the portfolio, click **Administration > Workload Environment Design > List Workstations**.
2. In the displayed panel, specify your engine connection and the filtering criteria for your query.
3. In the **Columns** section, select the column you want to display in the list of results.
4. Click **Display** to launch the query.

---

## Creating a workload application template

How to define a workload application template using the Dynamic Workload Console.

### Before you begin

To ensure the workload automation solution can be easily reproduced in another environment, there are some best practices to consider when creating the workload application template:

#### Job definitions

Jobs that refer to elements that are dependent on the environment or topology in which they reside, such as web service jobs, file transfer jobs, and database jobs to name a few, should make use of variables when specifying these elements such as credentials, paths, and port numbers. Variables can be managed in the mapping file so that the correct values can be assigned to the variable.

#### Workstation names

When jobs and job streams are extracted from the workload application during the export process, the names of the workstations are extracted as they are found in the source environment. Meaningful names or a standardized naming convention can simplify the mapping process.

**Users** Users are also extracted as they are found in the source environment. If the same user is not present in both source and target environment, then variables should be used to specify the user.

#### Mapping file

The mapping file should be maintained after performing the import process. It can be useful in the case where you want to replace a workload application or update it making the necessary changes to the mapping file.

#### Job stream variable table

All of the variables used to generically represent objects in the workload application should be added to a specific variable table related to the job stream in the workload application. This enables the customization of the job stream to reflect the target environment through the mapping file. Avoid associating the default variable table to a job stream. The default variable table is extracted like any other table and will need to be renamed,

otherwise, the import process fails because a table with the same name already exists. The target environment already has a default variable table, MAIN\_TABLE, defined.

### Run cycle variable table

All of the variables used to generically represent objects in the workload application should be added to a specific variable table related to the run cycle in the workload application. This enables the customization of the run cycle to reflect the target environment through the mapping file. Avoid associating the default variable table to a run cycle. The default variable table is extracted like any other table and will need to be renamed, otherwise, the import process fails because a table with the same name already exists. The target environment already has a default variable table, MAIN\_TABLE, defined.

## About this task

From the Workload Designer, you can create the template of a workload that can then be imported and run in another environment. You can create a workload application template containing one or more job streams with all the related jobs and internal or external dependencies (such as files, resources, prompts) so as to have a self-contained workflow. You can then export the workload application template to deploy and run it in another environment. To create a workload application template, perform the following procedure:

### Procedure

1. From the navigation toolbar, click **Administration > Workload Design > Manage Workload Definitions**
2. Specify the name of a distributed engine. The Workload Designer opens.
3. In the Working List pane, select **New > Workload Application Template**. The workload application template is created in the Details view and its properties page is displayed.
4. In the properties pane, specify the attributes for the workload application template that you are creating:

**Name** Mandatory field that contains the name of the workload application template. The maximum length is 80 characters.

#### Description

Optional descriptive text to help workload application users understand the purpose and characteristics of the workload application. The maximum length is 120 characters.

#### Provider

Optional field that specifies the creator of the workload application template. It can be useful to let workload application users know who created and provided it. The maximum length is 120 characters.

5. From the Details view, right-click the workload application template and click **Add Job Stream** to add job streams to it.
6. From the lookup dialog, select the job streams that you want to add. Together with the job streams, the corresponding dependencies are automatically also added to the workload application template.
7. Click **Save** to save the workload application template in the database.

- | 8. Right-click the workload application template and click **Export** to produce a  
| compressed file, named *workload application template name.zip*, containing all  
| the files and information required to allow the workload to run also in another  
| environment.

## | **Results**

| The compressed file contains:

### | *workload application template name*\_Definitions.UTF8.xml

| XML file that contains the definitions of all the exported objects. These  
| definitions will be deployed in the target environment to populate the  
| target database with the same objects existing in the source environment.  
| The objects in the definition file can remain as they are or you can choose  
| to rename them. If an object does not have a definition in the definition  
| file, for example, a workstation, then at import time, a corresponding  
| object will not be created in the target environment. The expectation is that  
| such object is already present in the target environment, therefore, for these  
| types of objects, you must map them in the mapping file.

### | *workload application template name*\_Mapping.UTF8.properties

| Mapping file that is used to replace the names of the objects in the source  
| environment with the names that these objects have in the target  
| environment. The objects that will be created in the target environment can  
| be created with the same names as those in the source environment or you  
| can specify a different name in this file.

= When the import process is performed from the **wappman** command line,  
= you can optionally request that the mapping file is automatically modified  
= according to rules defined using regular expressions and specified in one  
= of the following ad-hoc files:

- = • *workload application template name*\_BasicRegExpMapping.UTF8.rules
- = • *workload application template name*\_AdvancedRegExpMapping.UTF8.rules

= These files are produced by the export process and, if used, must be  
= properly customized.

### | *workload application template name*\_SourceEnv\_reference.txt

| Reference information containing the definitions of the workstations used  
| in the workload application template and other information that can be  
| useful to correctly map the source environment into the target environment  
| so as to allow the workload application to run.

### = *workload application template name*\_BasicRegExpMapping.UTF8.rules

= A file containing rules, defined using basic regular expressions, to modify  
= the mapping file. Optionally customize the file according to the names that  
= the objects will have in the target environment. The import process  
= performed from the **wappman** command line then applies the defined  
= rules to modify the mapping file.

### = *workload application template name*\_AdvancedRegExpMapping.UTF8.rules

= A file containing rules, defined using advanced regular expressions, to  
= modify the mapping file. Optionally customize the file according to the  
= names that the objects will have in the target environment. The import  
= process performed from the **wappman** command line then applies the  
= defined rules to modify the mapping file.

You can import the compressed package from the Dynamic Workload Console with an intuitive guided procedure, as described in the section about importing a workload application template in the *Dynamic Workload Console User's Guide*.

You can also use the **wappman** command line to manually import the compressed package into the target environment where the workload application will be deployed, thus creating all the required objects in the target environment. In the target environment, the *workload application name*\_Mapping.UTF8.properties file must be modified, manually or using regular expression mapping files, by specifying the names of the objects as they are defined in the target environment (for example, the names of the workstations on which the job streams run). For more details, see *User's Guide and References* sections about workload applications and the wappman command.

---

## Importing a workload application template

How to import a workload application template using the Dynamic Workload Console.

### Before you begin

Ensure you have created a workload application template as described in “Creating a workload application template” on page 149 or “Exporting a job stream definition as a workload application template” on page 128.

### About this task

You can import a workload application template that represents an efficient workload process or a standardized solution into a target environment to replicate all of the required objects to run the workload in the new environment.

You can also decide whether or not to maintain a tie to the workload application which binds the objects to the workload application, or to import the objects eliminating any ties to the workload application. Eliminating ties to the workload application allows you to manage objects with more flexibility.

To import a workload application template, perform the following procedure:

### Procedure

1. From the navigation toolbar, click **Administration > Workload Design > Import Workload Application**
2. Specify the name of a distributed engine
3. Browse to the workload application template.
4. Click **Upload**.
5. In the section **Import Options**, select **Import only the contents of the workload application template**, if you want to import only the objects contained in the template, without any ties to the workload application. This allows you to work freely with the objects contained in the template. (This import is supported only when connected to an engine with version 9.4.0.4 or later)
6. You now need to edit the names of the objects as they are defined in the target environment (for example, the names of the workstations on which the job streams run). In the left column, under the **Original Workload** heading, you

can find the original objects, such as workstations, jobs, and job streams. In the fields in the right column, you can enter the names to be assigned to the objects in the target environment.

7. Click **Import**.

## Results

The workload application template is now imported and ready for use in your target environment.

---

## Import Cron and Windows Task Scheduler

How to import a Cron or Windows Task Scheduler job by using the Dynamic Workload Console.

### Before you begin

You can use this procedure to import Cron or Windows Task Scheduler jobs into an IBM Workload Scheduler distributed environment that has a dynamic agent, by using the Dynamic Workload Console. Before starting to import, ensure that you have generated your Cron or Windows Task Scheduler files. Run the command *crontab -l*, on the machine where you created your Cron definitions, to display and save them in a file. Export your Windows Task Scheduler definitions from the Windows Task Scheduler panel and save it as an xml file. Use a zip file to import more than one xml file. You can now import your Cron or Windows Task Scheduler files into IBM Workload Scheduler.

### About this task

Import a Cron or Windows Task Scheduler job to take advantage of the powerful scheduling capabilities of IBM Workload Scheduler. You can use the Dynamic Workload Console to read crontab files or Windows Task Scheduler jobs and convert them into IBM Workload Scheduler objects. The jobs are added to your workload with the same specifications as the original jobs. The job streams reflect the time definition of the cron or Windows Task Scheduler commands. You can then modify, schedule, and monitor them together with all your other objects.

To manage your Cron or Windows Task Scheduler jobs in your IBM Workload Scheduler environment, complete the following steps:

### Procedure

1. From the navigation toolbar, click **Administration >Import Definitions**
2. Select the engine on which you want the job to run.
3. Browse for and select your Cron or Windows Task Scheduler file and click **Upload**.
4. IBM Workload Scheduler identifies the file type and the wizard changes accordingly:

#### Cron files

Select the user to run the command specified in the cron file. You can choose between:

#### Defined in the file

The user that runs the command is defined in the cron file, before the command definition in the rule. This is the default value.

**User name**

Select to specify the user that runs the command.

One job is created for each command in the file. Each job is scheduled to run independently of the other jobs, as defined in the cron file. A default editable name is given to the job stream and job that will be created.

**Windows Task Scheduler files**

Specify the agent where you want the process to run. A single job stream is created for all commands in the xml file, which are inserted in the job stream as jobs. To import multiple Windows Task Scheduler files, compress them in a zip file and import it.

**Previously exported IBM Workload Scheduler job stream**

Specify the agent where you want the process to run.

5. Optionally, specify the prefix to apply to the imported object.
6. Optionally, check the box to not import a specific definition.
7. Click **Import**. Your scheduler files are now imported and available for use in the Dynamic Workload Console.

**Results**

Click **Open job streams** to open the job stream in the Workload Designer. You can now manage, schedule, and monitor your Cron or Windows Task Scheduler job like any other job in the Dynamic Workload Console.

The following example shows a Windows Task Scheduler input definition file:

```
<?xml version="1.0" encoding="UTF-16"?>
<Task version="1.2" xmlns="http://schemas.microsoft.com/windows/2004/02/mit/task">
  <RegistrationInfo>
    <Date>2016-12-27T16:09:03.2293491</Date>
    <Author>NX051050\Administrator</Author>
  </RegistrationInfo>
  <Triggers>
    <TimeTrigger>
      <StartBoundary>2016-12-27T16:08:33.47795</StartBoundary>
      <Enabled>true</Enabled>
    </TimeTrigger>
  </Triggers>
  <Principals>
    <Principal id="Author">
      <UserId>NC051050\Administrator</UserId>
      <LogonType>InteractiveToken</LogonType>
      <RunLevel>LeastPrivilege</RunLevel>
    </Principal>
  </Principals>
  <Settings>
    <MultipleInstancesPolicy>IgnoreNew</MultipleInstancesPolicy>
    <DisallowStartIfOnBatteries>true</DisallowStartIfOnBatteries>
    <StopIfGoingOnBatteries>true</StopIfGoingOnBatteries>
    <AllowHardTerminate>true</AllowHardTerminate>
    <StartWhenAvailable>false</StartWhenAvailable>
    <RunOnlyIfNetworkAvailable>false</RunOnlyIfNetworkAvailable>
    <IdleSettings>
      <StopOnIdleEnd>true</StopOnIdleEnd>
      <RestartOnIdle>false</RestartOnIdle>
    </IdleSettings>
    <AllowStartOnDemand>true</AllowStartOnDemand>
    <Enabled>true</Enabled>
    <Hidden>false</Hidden>
    <RunOnlyIfIdle>false</RunOnlyIfIdle>
  </Settings>
</Task>
```

```

    <WakeToRun>false</WakeToRun>
    <ExecutionTimeLimit>P3D</ExecutionTimeLimit>
    <Priority>7</Priority>
  </Settings>
  <Actions Context="Author">
    <Exec>
      <Command>C:\Users\Administrator\Desktop\wts.bat</Command>
    </Exec>
  </Actions>
</Task>

```

The following example shows a Cron input definition file:

```
* / 10 13 26 10 * echo hello world
```

## Limitations

### About this task

There are some limitations that do not permit the import of a Cron or Windows Task Scheduler job:

#### Cron

- You can use commas only for the second, third, and fifth fields, indicating the hour and the day of the month, respectively. In all other fields, you must use the dash (-) to indicate a range. For example, a range from one to five must be specified as follows: 1-5. Consider the following example, in which you specify that the job must run on the 30th day of each month once a minute, from 12;30 AM to 12;35 AM and from 12;30 PM to 12;35 PM:  
30-35 0,12 30 \* \*
- The range-type syntax is not supported in the month field (penultimate) of the rule.
- In the last field of the rule, you can use a value between zero or seven and six only if in both the third and fourth field the value provided is \*. In all other cases, the value of the last field must be \*. The zero and seven values both indicate **Sunday** and can be used interchangeably.

#### Windows Task Scheduler

- Operating-system dependent options are not supported.
- Triggers are supported only if based on a schedule. The related advanced settings are not supported.
- Only the **Start a program** action is supported.
- Conditions are not supported.
- Hidden rules are not supported.
- Rules configured for specific operating systems are not supported.
- Choosing the user account with which you run the task is supported.
- Specifying how often the task should run is not supported.
- Settings are supported only for the rule applied if the task already running. The option "Stop the existing instance" is not supported.

---

## Managing Workload Security

Managing security settings in your environment by using Dynamic Workload Console.

If you work with the role-based security model, you can manage security settings in your environment by using Dynamic Workload Console.

From the navigation toolbar -> Administration -> Workload Environment Design, select Manage Workload Security. Here you can create and manage security objects in the database, according to a role-based security model.

You can work with the following security objects:

#### **Security roles**

Each role represents a certain level of authorization that defines the set of actions that users or groups can perform on a set of object types.

#### **Security domains**

Each domain represents the set of scheduling objects that users or groups can manage.

#### **Access control lists**

Each access control list assigns security roles to users or groups, in a certain security domain.

If you want to specify different security attributes for some or all of your users, you can create additional security domains based on specific matching criteria. For example, you can define a domain that contains all objects named with a prefix 'AA' and specify the actions that each role can do on that domain. You can then associate the roles to users or group by defining an access control list.

To create or modify security objects with Dynamic Workload Console, you must have permission for the **modify** action on the object type **file** with attribute **name=security**.

When working with the role-based security from Dynamic Workload Console, be aware that access to security objects is controlled by an "optimistic locking" policy. When a security object is accessed by user "A", it is not actually locked. The security object is locked only when the object update is saved by user "A", and then it is unlocked immediately afterwards. If in the meantime, the object is accessed also by user "B", he receives a warning message saying that the object has just been updated by user "A", and asking him if he wants to override the changes made by user "A", or refresh the object and make his changes to the updated object.

For more information about enabling a role-based security model for your installation, see the section about getting started with security in *Administration Guide*.

## **Managing access control list**

### **About this task**

Create an access control list by assigning security roles to users or groups, in a certain security domain .

You can:

- Give access to user or group.
- View access for user or group.
- View access for Security Domain .
- Manage accesses.



## Give access to user or group

### About this task

To give access to users or groups complete the following procedure:

#### Procedure

1. From the navigation toolbar, click **Administration**.
2. In the **Workload Environment Design**, select **Manage Workload Security**. The Manage Workload Security panel opens.
3. From the drop-down list, select the IBM Workload Scheduler engine on which you want to manage security settings.
4. In the Access Control List section, click **Give access to user or group**. The Create Access Control List panel opens.
5. Enter the user name or the group name, the assigned roles, and the security domain.
6. Click **Save** to save the access definition in the database.
7. Click **Save and Create New** to save the access definition in the database and proceed to create a new access definition.
8. Click **Save and Exit** to save the access definition in the database and return to the Manage Workload Security panel.

#### Results

The access definition has now been added to the database. If the **optman** `enRoleBasedSecurityFileCreation` global option is set to *yes*, the access definition is activated in your security file.

## View access for user or group

### About this task

From Manage Workload Security, you can also view the access for users or groups.

#### Procedure

1. In the Access Control List section of the Manage Workload Security panel, click **View access for user or group**. The input field for the user or group name is displayed.
2. Enter the user or group name and click **View**. The user or group access, with the assigned roles, to the related security domains is displayed.

## View access for Security Domain

### About this task

From Manage Workload Security, you can also view the access to a certain security domain.

#### Procedure

1. In the Access Control section of the Manage Workload Security panel, click **View access for Security Domain**. The input field for the security domain name is displayed.
2. Enter the security domain name and click **View**. The list of users or groups, with the assigned roles, that have access to the specified security domain is displayed.

## Manage accesses

### About this task

From Manage Workload Security, you can also **remove** and **edit** existing access control lists.

### Procedure

1. In the Access Control List section of the Manage Workload Security panel, click **Manage Accesses**. The list of users or groups, with the assigned roles, that have access to the different security domains is displayed.
2. Select the access control list that you want to manage.
3. Select the action that you want to run on the selected access control list.

If you select the **edit** action, you can change only the roles associated with the access control list. You cannot change the associated domain. If you want to change the domain, you must **remove** the access control list and redefine the access control list with a new domain.

## Managing security domains

### About this task

A security domain represents the set of objects that users or groups can manage. For example, you can define a domain that contains all objects named with a prefix 'AA'. If you want to specify different security attributes for some or all of your users, you can create additional security domains based on specific matching criteria.

You can filter objects by specifying one or more attributes for each security object type. You can include or exclude each attribute from the selection. For example, you can restrict access to a set of objects having the same name or being defined on the same workstation, or both.

For the attributes that you can specify for each security object type, see Attributes for object types.

For the values that you can specify for each object attribute, see Specifying object attribute values.

You can create new security domains or manage existing security domains.

### Create new security domain

#### About this task

To create a new security domain from the Dynamic Workload Console, complete the following procedure:

#### Procedure

1. From the navigation toolbar, click **Administration**.
2. In the **Workload Environment Design**, select **Manage Workload Security** . The Manage Workload Security panel opens.
3. From the drop-down list, select the IBM Workload Scheduler engine on which you want to manage security settings.
4. In the Security Domains section, click **Create new Security Domain**. The security domain creation panel opens.

5. Enter the name of the security domain that you are creating and, optionally, the domain description.
6. Select the type of security domain that you want to define:

#### **Simple**

To define a filtering rule that applies to all object types.

#### **Complex**

To define different filtering rules for different object types.

7. Use object filtering to select the set of security objects that users or groups can manage in the security domains that you are defining. You can use the wildcard character (\*) when defining object attributes.
8. Click **View** to see the mapping between the set of security objects that you are assigning to the domain and the corresponding set of security objects in the classic security model.
9. Click **Save** to save the security domain definition in the database.
10. Click **Save and Exit** to save the security domain definition in the database and then exit.

### **Results**

The security domain has now been added to the database. If the `optmanenRoleBasedSecurityFileCreation` global option is set to *yes*, the security domain is activated in your security file.

## **Manage security domain**

### **About this task**

From Manage Workload Security, you can also **remove**, **edit**, and **duplicate** existing security domains.

### **Procedure**

1. In the Security Domains section of the Manage Workload Security panel, click **Manage Security Domain**. The list of the available security domains is displayed.
2. Select the security domains that you want to manage.
3. Select the action that you want to run on the selected security domains.

## **Managing security roles**

### **About this task**

A security role represents a certain level of authorization and includes the set of actions that users or groups can perform on a set of object types.

For the list of actions that users or groups can perform on the different objects, for each IBM Workload Scheduler task, see “Actions on security objects” on page 161.

A set of predefined security roles is available in the master domain manager database after the product has been installed:

- A full access definition for the user who installed the product, `TWS_user`.
- An access definition for the system administrator, `root` on UNIX or `Administrator` on Windows.
- The following access definitions for the Dynamic Workload Console:
  - Analyst

- Administrator
- Configurator
- Operator
- Developer

You can create new security roles or manage existing security roles.

## Create new role

### About this task

To create a new security role from the Dynamic Workload Console, complete the following procedure:

### Procedure

1. From the navigation toolbar, click **Administration**.
2. In the **Workload Environment Design**, select **Manage Workload Security**. The Manage Workload Security panel opens.
3. From the drop-down list, select the IBM Workload Scheduler engine on which you want to manage security settings.
4. In the Roles section, click **Create new role**. The Create Role panel opens.
5. Enter the name of the security role that you are creating and, optionally, the role description.
6. For each of the IBM Workload Scheduler task, assign to the security role the level of access for performing certain actions on specific object types. You can assign a predefined or a custom level of access.
7. Click **Show Details** to see the permissions associated to a predefined level of access, or to define your custom level of access. Tooltips are available to explain what a certain permission means for a particular object type.
8. Click **View** to see the mapping between the set of permissions that you are assigning and the corresponding set of permissions in the classic security model.
9. Click **Save** to save the security role definition in the database.
10. Click **Save and Exit** to save the security role definition in the database and return to the Manage Workload Security panel.

### Results

The security role has now been added to the database. If the **optman** `enRoleBasedSecurityFileCreation` global option is set to *yes*, the security role is activated in your security file.

## Manage roles

### About this task

From Manage Workload Security, you can also **remove**, **edit**, and **duplicate** existing roles.

### Procedure

1. In the Roles section of the Manage Workload Security panel, click **Manage roles**. The list of the available security roles is displayed.
2. Select the security roles that you want to manage.
3. Select the action that you want to run on the selected roles.

## Actions on security objects

The following tables show the actions that users or groups can perform on the different object types, for each IBM Workload Scheduler task. See in parenthesis the corresponding *actions* and *objects* values that you must use when defining role-based security with **composer** command line interface.

Table 13. Actions that users or groups can perform when designing and monitoring the workload

Design and Monitor Workload	
Actions that users or groups can perform	Security object types
List (list)	Jobs (job)
Display (display)	Job Streams (schedule)
Create (add)	User Objects (userobj)
Delete (delete)	Prompts (prompt)
Modify (modify)	Resources (resource)
Use (use)	Calendars (calendar)
Unlock (unlock)	Run Cycle Groups (runcygrp)
Actions on remote workstations while modeling jobs (cpu-run)	Variable Tables (vartable)
	Workload Application (wkldappl)
<b>Note:</b> See in parenthesis the corresponding <i>actions</i> and <i>objects</i> values that you must use when defining role-based security with <b>composer</b> command line interface.	Parameters (parameter)

Table 14. Actions that users or groups can perform when modifying current plan

Modify current plan
Actions that users or groups can perform on the current plan
Add job stream dependency (schedule - adddep)
Add job dependency (job - adddep)
Remove job dependency (job - deldep)
Remove job stream dependency (schedule - deldep)
Change job priority (job - altpri)
Change job stream priority (schedule - altpri)
Cancel job (job - cancel)
Cancel job stream (schedule - cancel)
Rerun job (job - rerun)
Confirm job (job - confirm)
Release job (job - release)
Release job stream (schedule - release)
Kill jobs (job - kill)
Reply to prompts (prompt - reply)
Reply to job prompts (job - reply)
Reply to job stream prompts (schedule - reply)
Alter user password (userobj - altpass)
Change jobs limit (schedule - limit)
Actions on job remote system (job - run)
Change resource quantity (resource - resource)
<b>Note:</b> See in parenthesis the corresponding <i>actions</i> and <i>objects</i> values that you must use when defining role-based security with <b>composer</b> command line interface.

Table 15. Actions that users or groups can perform when submitting workload

Submit Workload
Workload definitions that can be added to the current plan
Only existing job definitions (job - submitdb)
Existing jobs definitions and ad hoc jobs (job - submit)
Existing job stream definitions (schedule - submit)
<b>Note:</b> See in parenthesis the corresponding <i>actions</i> and <i>objects</i> values that you must use when defining role-based security with <b>composer</b> command line interface.

Table 16. Actions that users or groups can perform when managing workload environment

Manage Workload Environment
<b>Actions that users or groups can perform on workstations, domains, and workstation classes</b>
List workstations (cpu - list)
Display workstation details (cpu - display)
Create workstations (cpu - add)
Delete workstations (cpu - delete)
Modify workstations (cpu - modify)
Use workstations (cpu - use)
Unlock workstations (cpu - unlock)
Start a workstation (cpu - start)
Stop a workstation (cpu - stop)
Change limit (cpu - limit)
Change fence (cpu - fence)
Shutdown (cpu - shutdown)
Reset FTA (cpu - resetfta)
Link (cpu - link)
Unlink (cpu - unlink)
Use 'console' command from conman (cpu - console)
Upgrade workstation (cpu - manage)
<b>Note:</b> See in parenthesis the corresponding <i>actions</i> and <i>objects</i> values that you must use when defining role-based security with <b>composer</b> command line interface.

Table 17. Actions that users or groups can perform when managing event rules

Manage Event Rules
Actions that users or groups can perform on event rules
List event rules (eventrule - list)
Display event rules details (eventrule - display)
Create event rules (eventrule - add)
Delete event rules (eventrule - delete)
Modify event rules (eventrule - modify)
Use event rules (eventrule - use)
Unlock event rules (eventrule - unlock)
Display actions in the event rules (action - display)
Monitor triggered actions (action - list)
Use action types in the event rules (action - use)
Submit action (action - submit)
Use events in the event rules (event - use)
Use a File Monitor event on the workstation where the file resides. (event - display)
<b>Note:</b> See in parenthesis the corresponding <i>actions</i> and <i>objects</i> values that you must use when defining role-based security with <b>composer</b> command line interface.

Table 18. Administrative tasks that users or groups can perform

Administrative Tasks
Administrative tasks that users or groups can perform
View configuration ( dump security and global options) (file - display)
Change configuration (makesec, optman add) (file - modify)
Delete objects definitions (file - delete)
Unlock objects definitions (file - unlock)
Allow planman deploy, prodsked and stageman (file - build)
<b>Note:</b> See in parenthesis the corresponding <i>actions</i> and <i>objects</i> values that you must use when defining role-based security with <b>composer</b> command line interface.



Table 19. Actions that users or groups can perform on workload reports

Workload Reports	
Actions that users or groups can perform on workload reports	
Generate workload reports (display report)	<p><b>Reports in Dynamic Workload Console</b></p> <p><b>RUNHIST</b> Job Run History</p> <p><b>RUNSTATS</b> Job Run Statistics</p> <p><b>WWS</b> Workstation Workload Summary</p> <p><b>WWR</b> Workstation Workload Runtimes</p> <p><b>SQL</b> Custom SQL</p> <p><b>ACTPROD</b> Actual production details (for current and archived plans)</p> <p><b>PLAPROD</b> Planned production details (for trial and forecast plans)</p>
<p><b>Note:</b> See in parenthesis the corresponding <i>actions</i> and <i>objects</i> values that you must use when defining role-based security with <b>composer</b> command line interface.</p>	

Table 20. Actions that users or groups can perform on Application Lab

Application Lab
Actions that users or groups can perform on Application Lab
Access Application Lab (use lob)
<p><b>Note:</b> See in parenthesis the corresponding <i>actions</i> and <i>objects</i> values that you must use when defining role-based security with <b>composer</b> command line interface.</p>

## Attributes for security object types

Table 21 shows the attributes that you can specify for each security object type (see in parenthesis the corresponding object type and object attribute that you must use when defining security objects with the **composer** command line interface).

Table 21. Attributes for security object types

Attribute	Name (name)	Workstation (cpu)	Custom (custom)	JCL (jcl)	JCLtype (jcltype)	Logon (logon)	Provider (provider)	Type (type)	Host (host)	Port (port)
Actions (action)							✓	✓	✓	✓
Calendars (calendar)	✓									
Workstations (cpu)								✓		
Events (event)			✓				✓	✓		
Event rules (event)	✓									
Files (file)	✓									
Jobs (job)	✓	✓		✓	✓	✓				
Application Lab (lob)	✓									
Parameters (parameter)	✓	✓								
Prompts (prompt)	✓									
Reports (report)	✓									
Resource (resource)	✓	✓								
RunCycle groups (runcygrp)	✓									
Job streams (schedule)	✓	✓								

Table 21. Attributes for security object types (continued)

Attribute	Name (name)	Workstation (cpu)	Custom (custom)	JCL (jcl)	JCLtype (jcltype)	Logon (logon)	Provider (provider)	Type (type)	Host (host)	Port (port)
Security object type										
User objects (userobj)		✓				✓				
Variable tables (vartable)	✓									
Workload applications (wkldappl)	✓									

For the values that are allowed for each object attribute, see “Specifying object attribute values.”

## Specifying object attribute values

The following values are allowed for each object attribute (see in parenthesis the corresponding object type and object attribute for the **composer** command line interface):

### Name (name)

Specifies one or more names for the object type.

- For the **Files (file)** object type, the following values apply:

#### **globalopts**

Allows the user to set global options with the **optman** command.

The following access types are allowed:

- Display access for **optman ls** and **optman show**
- Modify access for **optman chg**

#### **prodsked**

Allows the user to create, extend, or reset the production plan.

#### **security**

Allows the user to manage the security file.

#### **Symphony**

Allows the user to run **stageman** and **JnextPlan**.

#### **trialsked**

Allows the user to create trial and forecast plans or to extend trial plans.

**Note:** Users who have restricted access to files should be given at least the following privilege to be able to display other object types that is, Calendars (calendar) and Workstations (cpu):

```
file name=globalopts action=display
```

- For the **Variable Tables (vartable)** object type, you can use the \$DEFAULT value for the **Name (name)** attribute to indicate the default variable table. This selects the table that is defined with the **isdefault** attribute.

### Workstation (cpu)

Specifies one or more workstation, domain, or workstation class name. If this attribute is not specified, all defined workstations and domains can be accessed. Workstation variables can be used:

#### **\$MASTER**

The IBM Workload Scheduler master domain manager.

#### **\$SLAVES**

Any fault-tolerant agent.

#### **\$REMOTES**

Any standard agent.

### **\$THISCPU**

The workstation on which the user is running the IBM Workload Scheduler command or program.

If you use **composer** command line to define security domains, the following syntax applies:

**cpu=workstation[,workstation]...**

### **Custom (custom)**

Use this attribute to assign access rights to events defined in event plug-ins. The precise syntax of the value depends on the plug-in. For example:

- Specify different rights for different users based on SAP R/3 event names when defining event rules for SAP R/3 events.
- Define your own security attribute for your custom-made event providers.
- Specify the type of event that is to be monitored. Every event can refer to an event provider.

If you use **composer** command line to define security domains, the following syntax applies:

**custom=value[,value]...**

### **JCL (jcl)**

Specifies the command or the path name of a job object's executable file. If omitted, all defined job files and commands qualify.

You can also specify a string that is contained in the task string of a JSDL definition to be used for pattern matching.

If you use **composer** command line to define security domains, the following syntax applies:

**jcl="path" | "command" | "jSDL"**

### **JCL Type (jcltype)**

Specifies that the user is allowed to act on the definitions of jobs that run only scripts (if set to **scriptname**) or commands (if set to **docommand**). Use this optional attribute to restrict user authorization to actions on the definitions of jobs of one type only. Actions are granted for both scripts and commands when **JCL Type (jcltype)** is missing.

A user who is not granted authorization to work on job definitions that run either a command or a script is returned a security error message when attempting to run an action on them.

If you use **composer** command line to define security domains, the following syntax applies:

**jcltype=[scriptname | docommand]**

### **Logon (logon)**

Specifies the user IDs. If omitted, all user IDs qualify.

You can use the following values for the **Logon (logon)** attribute to indicate default logon:

#### **\$USER**

Streamlogon is the conman/composer user.

#### **\$OWNER**

Streamlogon is the job creator.

### **\$JCLOWNER**

Streamlogon is the OS owner of the file.

### **\$JCLGROUP**

Streamlogon is the OS group of the file.

If you use **composer** command line to define security domains, the following syntax applies:

**logon=username[,username]...**

### **Provider (provider)**

For **Actions (action)** object types, specifies the name of the action provider.

For **Events (event)** object types, specifies the name of the event provider.

If **Provider (provider)** is not specified, no defined objects can be accessed.

If you use **composer** command line to define security domains, the following syntax applies:

**provider=provider\_name[,provider\_name]...**

### **Type (type)**

For **Actions (action)** object types, is the `actionType`.

For **Events (event)** object types, is the `eventType`.

For **Workstations (cpu)** object types, the permitted values are those used in **composer** or the Dynamic Workload Console when defining workstations, such as `manager`, `broker`, `fta`, `agent`, `s-agent`, `x-agent`, `rem-eng`, `pool`, and `d-pool`.

**Note:** The value `master`, used in **conman** is mapped against the manager security attributes.

If **Type (type)** is not specified, all defined objects are accessed for the specified providers (this is always the case after installation or upgrade, as the type attribute is not supplied by default).

If you use **composer** command line to define security domains, the following syntax applies:

**type=type[,type]...**

### **Host (host)**

For **Actions (action)** object types, specifies the TEC or SNMP host name (used for some types of actions, such as sending TEC events, or sending SNMP). If it does not apply, this field must be empty.

If you use **composer** command line to define security domains, the following syntax applies:

**host=host\_name**

### **Port (port)**

For **Actions (action)** object types, specifies the TEC or SNMP port number (used for some types of actions, such as sending TEC events, or sending SNMP). If it does not apply, this field must be empty.

If you use **composer** command line to define security domains, the following syntax applies:

**port=port\_number**

---

## Chapter 10. Changing user password in the plan

How you change the user password in the plan.

### About this task

A User is the user name used as the login value for several operating system job definitions. Users are defined in the database and are associated to a password.

Users need to access the workstation where IBM Workload Scheduler launches jobs. If you need to change the user password after having already generated the plan, you can change the password in the plan. However, the changed password is only relevant to the current plan; Jnextplan restores the user password the next time it is run.

To change a user password in the plan, perform the following steps:

### Procedure

1. From the navigation toolbar, click **Administration > Workload Environment Design > Alter User Password in Plan**.
2. Select the engine.
3. Enter the following information in the Alter User Password in Plan panel:

#### Workstation

The name of the IBM Workload Scheduler workstation where the user can launch jobs.

#### User name

The user name. A user needs access to the workstation where IBM Workload Scheduler launches jobs, and have the right to **Log on as batch**.

The following formats are supported when specifying the value of the user name:

#### username

The Windows user. For example user1.

#### domain\username

The user belongs to a Windows domain. Specify the Windows domain name to which the user belongs. For example MYDOMAIN\user1.

#### username@internet\_domain

The user belongs to an internet domain. The user name is in User Principal Name (UPN) format. UPN format is the name of a system user in an email address format. The user name is followed by the "at sign" followed by the name of the Internet domain with which the user is associated. For example administrator@bvt.com.

When a name is not unique it is considered to be a local user, a domain user, or a trusted domain user, in that order. If you schedule a job on a pool or a dynamic pool, the job runs with the user defined on the pool

or dynamic pool. However, the user must exist on all workstations in the pool or dynamic pool where you plan to run the job.

Maximum length is 47 characters.

**Password**

The user password as defined on the computer. Maximum length is 31 characters.

**Confirm password**

The user password again for confirmation.

**Versions**

Use this section to view the history of object changes and work with the different versions.

You can run the following actions:

**Compare**

Select two different versions and compare them.

**Restore...**

Select a previous version and start the restore process.

4. Modify the values as required and click **Save** to save the modified task.

---

## Chapter 11. Monitoring your Objects in the Plan

To monitor your scheduling environment and workload objects in the plan, read the following sections.

---

### Monitoring the progress of your plan

Request a graphical view of the progress of the current plan.

You can request a graphical view that shows the progress of the current plan on the engines for which you have configured a connection and specified the option to show the engine in the dashboard.

The IBM Workload Scheduler engine must be version 9.1 or later.

An enhanced graphical view of the plan is also available in the Plan View and Job Stream View, see “Graphical views in the plan” on page 269.

**Tip:** You can also request a graphical view of jobs and workstations from a mobile device. Refer to the *Mobile Applications User's Guide*.

To request this graphical view, in the navigation bar at the top, click **System Status and Health > Workload Dashboard**. The panel opens showing a number of widgets which return the results for the most widely-used queries. The Workload Dashboard provides a single, consolidated view for monitoring the workload status. You can also drill down through the widgets to the query results to discover more detailed information and fix errors.

To customize the dashboard refresh time interval for all the engines, click **System Configuration > Workload Scheduling Settings > Set User Preferences**. In the lower part of this panel you can find a section to customize this interval.

### Workload Dashboard

In the Workload Dashboard you can view the whole status of your workload at a glance for one or more of the engines you have configured. You can check the status of workstations, jobs, critical jobs, prompts, and other relevant information.



By clicking on selected widgets, you open the table listing the information in the widget in tabular format. The following widgets support the link to the table of results:

### Job status

This pane shows the status of the jobs.

### Job in error

This widget shows how many jobs have completed in error status for the selected engine. By double clicking on the widget the **Monitor Jobs** view is displayed with detailed information about jobs in error status.

### Late jobs

This widget shows how many jobs have completed in late status for the selected engine. By double clicking on the widget the **Monitor Jobs** view is displayed with detailed information about jobs in late status.

This widget is available for distributed engines only.

### Min duration

This widget shows the number of jobs that have not reached the minimum duration for the selected engine. By double clicking on the widget the **Monitor Jobs** view is displayed with detailed information about jobs that have not reached the minimum duration.

This widget is available for distributed engines only.

### Max duration

This widget shows the number of jobs that have exceeded the maximum duration for the selected engine. By double clicking on the widget the **Monitor Jobs** view is displayed with detailed information about jobs that have exceeded the maximum duration.



This widget is available for distributed engines only.

#### **Available workstations**

This widget shows the number of available workstations for the selected engine. By double clicking on the widget the **Monitor Jobs** view is displayed with detailed information about available workstations.

#### **Unavailable workstations**

This widget shows the number of unavailable workstations for the selected engine. By double clicking on the widget the **Monitor Jobs** view is displayed with detailed information about unavailable workstations.

#### **Prompts**

This panel shows prompts for the selected engine.

This widget is available for distributed engines only.

#### **Critical status**

This widget shows in tabular format the number of jobs in high, potential, and no risk status for the selected engine. By double clicking on the widget the **Monitor Jobs** view is displayed with detailed information about jobs in critical status.

#### **Log messages**

This widget shows in tabular format the status, timestamp and contents of the message logged for the selected engine.

This widget is available for distributed engines only.

#### **Related concepts:**

Chapter 4, “Running IBM Workload Scheduler from a mobile device,” on page 11  
Use your mobile device to easily and quickly interact with your IBM Workload Scheduler environment.

“Plans” on page 83

Different types of plans you can access to manage the objects and the activities they contain.

---

## **Monitor tasks**

Information about the monitor tasks and how to create them.

Create and run *monitor tasks* to obtain a list of objects on which you can perform monitoring and control actions. Creating and running a monitor task means creating a filter and running a search on it. This search returns a list of objects whose attributes satisfy the criteria that are defined in the task. From this list, you can click an item to view its properties or to run actions against it. In this way you can easily change some settings and the processing of the plan.

You can use the Dynamic Workload Console to create a monitor task, setting your filter criteria by entering a query in a query line or by selecting the filtering options from the user interface.

If you have administrator's rights, you can configure a global setting so as to limit the number of results retrieved by monitor tasks. You can specify the maximum number of items that must be retrieved by the queries, and this configuration will apply to *all* monitor tasks run by current Dynamic Workload Console, except for Monitor Critical jobs. For more information, see “Limit the number of objects retrieved by queries” on page 38.

#### **Related concepts:**

## Creating a monitoring task query

Define a task to monitor objects in the plan by specifying a query in a query line. The objects for which you can create a monitoring task query are: jobs, critical jobs, job streams, workstations, files, resources, domains, and prompts.

### About this task

To create a monitoring task query, perform the following steps.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

### Procedure

1. In the navigation bar, click **System Status and Health > Workload Monitoring > Monitor Workload**.
2. From the **Engine** drop-down list, select the check box related to the engine where the task must run.  
You can specify more than one engine only if the type of object you want to monitor is job or job stream.
3. From the **Object Type** drop-down list, select the type of object you want to monitor. The available object types correspond to the type of engine and number of engines you selected.

For a distributed engine, you can create a monitoring task query for: **Job, Critical Job, Job Stream, Workstation, File, Resource, Domain, and Prompt**.

For a z/OS engine, you can create a monitoring task query only for: **Job, Critical Job, Job Stream, Workstation, and Resource**.

4. From the **List Plans** drop-down list, you can select the current plan or an archived plan related to the selected engine. Plans are only stored for the distributed engines, you cannot select the field for critical jobs.
5. In the **Query** text box, type the query that specifies the filter criteria to apply to the object type you selected. If you are familiar with the **conman** syntax, the query syntax is quite similar; for example, the syntax for filtering jobs is similar to **conman showjobs**. If you are not familiar with **conman**, click **Edit** to create your query by selecting the options from the filter criteria that are displayed (for details, see step 7 on page 175).

In general, the following rules apply to the query syntax:

- The plus symbol (+) is used to separate filter parameters.
- The hash key symbol (#) is used to separate the workstation name from the job stream name, for a distributed engine.
- The exclamation mark (!) is used to separate the workstation from the job stream name, for a z/OS engine.
- The ampersand symbol (@) replaces one or more alphanumeric characters (wild card).
- The period (.) separates the workstation name, job stream name from the job name.

For example, to display the status of all jobs in the acctg job stream on workstation site3 for a distributed engine, type the following string in the **Query** text box:

```
site3#acctg.@
```

or:

```
site3#acctg
```

For more example about queries and syntax, see Example.

6. Click **Run** to run the task immediately. The results are displayed in table format in a new page. From this page you can continue to edit the query in the query line or click **Edit** to make changes to the user interface selections. The list of results are updated with the changes you make.
7. Alternatively, click **Edit** to select the filter criteria from a list of options rather than specifying them in the **Query** text box. The **Query** text field is automatically populated with the appropriate syntax.

For details about the filter criteria that apply to the object type you selected, refer to the following sections:

- “Creating a task to Monitor Jobs” on page 180
- “Creating a task to Monitor Jobs on Multiple Engines” on page 185
- “Creating a task to Monitor Job Streams” on page 187
- “Creating a task to Monitor Job Streams on Multiple Engines” on page 189
- “Creating a task to Monitor Workstations” on page 177
- “Creating a task to Monitor Files” on page 190
- “Creating a task to Monitor Resources” on page 191
- “Creating a task to Monitor Domains” on page 178
- “Creating a task to Monitor Prompts” on page 193

8. Type a name for the monitoring task in the **Task Name** text box.
9. Click **Save** to save the task. Each task you create and save is included under the **All Configured Tasks** menu, as well as in the **Query** drop-down list. You can reuse or modify each saved task, as required.
10. Select a task from the **Query** drop-down list and click **Edit. Duplicate** to create a new task exactly like the one you selected. This is useful if you want to work with a task that is not your own, but is shared with you.
11. Select one or more tasks from the **Query** drop-down list and click **Edit. Click Delete** to delete them. You cannot delete tasks that are not your own.
12. Click **Run** to run the task. A list of results is displayed in table format in a new page. Alternatively you can view the output of the selected task in a report format in a separate HTML file. Click **View as Report** to view the output.

## Results

You have created your task that, when run, creates a list of results satisfying your filtering criteria and showing, for each object in the list, the information contained in the columns you selected to view.

## Example

The following examples show the syntax used to create some specific queries:

### Job query in a distributed environment

To query for all jobs, in all job streams and on all workstations on a specific distributed engine, with the following characteristics:

- Having a dependency on a workstation with a name beginning with FTA\_1
- Beginning with Job\_A in a job stream beginning with JS\_A
- Scheduled to run at 10 a.m. on October 31, 2015
- Currently in Waiting state with a priority in the range of 1 - 50

specify the following query in the query line:

```
@#0.0+follows=FTA_1#JS_A@(1000 10/31/2015).JOB_A@+state=#Waiting,  
#Ready+priority=1,50
```

### Job query in a z/OS environment

To query for all jobs in a job stream ending in 001, on all workstations beginning with HR in a z/OS environment, with the following characteristics:

- Having an internal status of Interrupted and Error
- Having a priority of 1

specify the following query in the query line:

```
HR@!@001.0+jsfrom=1000 10/10/2015+state=E,I+priority=1
```

---

## Monitoring your Scheduling Environment

Tasks to monitor the workstations and domains of your environment.

To monitor workstations and domains in your environment, you create and run *monitor tasks*.

**Note:** You must create a connection to a remote IBM Workload Scheduler engine, before you can run tasks on it to obtain data.

When you create a task, you are actually defining a query where you specify multiple criteria to search for items and to display the search results. You can then save, reuse, and share this task with other users, and modify it at any time. When you run the task, you are actually running the query on the plan to retrieve the information according to the filters and level of detail you specified when you created the task.

**Note:** To add a task to your favorite bookmarks, from the panel displaying your

task results, click the user icon  and select **Favorites**.

To create a task, perform the following steps.

1. In the navigation bar, click **System Status and Health > All Configured Tasks > New**.
2. In the Select Task Type panel, select the task you want to create, and click **Next**. You must select a task type to make the corresponding list active.
3. Follow the procedure relating to the specific task you are creating.

Alternatively, you can also create and run your task by specifying a query, as described in Creating a monitoring task query.

Each task you create and save is included under the **All Configured Tasks** menu.

**Related concepts:**

“Monitoring your Workload” on page 179

Controlling and managing scheduling activities and objects on plans with *tasks*.

## Creating a task to Monitor Workstations

How you can create a Monitor Workstations task.

### About this task

To create a Monitor Workstations task, perform the following steps.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

### Procedure

1. In the navigation bar, click **System Status and Health > Workload Monitoring > Monitor Workload** and follow the steps described in “Creating a monitoring task query” on page 174.

If you are familiar with **conman**, in the **Query** text box specify a query based on the **conman showcpus** syntax. Alternatively, click **Edit** to select the filter criteria from the list of options that is displayed.

2. In the General Filter section, specify some broad filtering criteria to limit the results retrieved by your query. Here you start refining the scope of your query by also considering the amount of information you want to retrieve. Optionally, in some of the results tables in the Periodic Refresh Options section, you can customize how often to refresh the information by specifying the refresh interval in seconds in hh:mm:ss format, with a minimum of 30 seconds and a maximum of 7200 seconds. For example, 00:01:10 means 70 seconds. If the value specified is not valid, the last valid value is automatically used. If the periodic refresh is enabled for a task, when the task runs, the refresh time control options are shown in the results table. You can also set or change the periodic refresh interval directly in the results table when the timer is in stop status. In this case, the value specified at task creation time is temporarily overwritten.

**Distributed** You can filter the task results based on the workstation and domain names, or part of names (using wildcard characters).

**z/OS** You can filter the task results based on the workstation types and reporting attributes.

3. In the Columns Definition section, select the information you want to display in the table containing the query results. According to the columns you choose here, the corresponding information is displayed in the task results table. For example, for all the objects resulting from your query, you might want to see their link statuses, domains, and type, or you might want to see their statuses and the number of jobs successful or running on them. You can then drill down into this information displayed in the table and navigate it.

In the Columns Definition section, not only can you select the columns for this task results, but you can also specify the columns for *secondary* queries on:

**Distributed** jobs, job streams domains, files, and resources. For example, you are creating a task to search for all the workstations of a domain. From the resulting list of workstations, you can navigate to see (secondary query) a list of all the jobs running on each of them.

**z/OS** jobs. For example, you are creating a task to search for all the virtual workstations that are also fault-tolerant. From the resulting list of workstations, you can navigate to see (secondary query) a list of all the jobs running on each of them.

## Results

After specifying all the required criteria, you can save your task or immediately run it to create a list of workstations that satisfies your filtering settings. For details, see “Creating a monitoring task query” on page 174.

### Related concepts:

“Workstation” on page 47

Using workstations for scheduling jobs and job streams.

### Related reference:

“Workstation types” on page 264

The following are the main workstation types and their attributes.

## Creating a task to Monitor Domains

### Distributed

Why and how you can create a Monitor Domains task.

### About this task

To create a Monitor Domains task, perform the following steps.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

### Procedure

1. In the navigation bar, click **System Status and Health > Workload Monitoring > Monitor Workload** and follow the steps described in “Creating a monitoring task query” on page 174.

If you are familiar with **conman**, in the **Query** text box specify a query based on the **conman showdomains** syntax. Alternatively, click **Edit** to select the filter criteria from the list of options that is displayed.

2. In the General Filter section, specify some broad filtering criteria to limit the results retrieved by your query. Here you start refining the scope of your query by also considering the amount of information you want to retrieve. Optionally, in some of the results tables in the Periodic Refresh Options section, you can customize how often to refresh the information by specifying the refresh interval in seconds in hh:mm:ss format, with a minimum of 30 seconds and a maximum of 7200 seconds. For example, 00:01:10 means 70 seconds. If the value specified is not valid, the last valid value is automatically used. If the periodic refresh is enabled for a task, when the task runs, the refresh time control options are shown in the results table. You can also set or change the periodic refresh interval directly in the results table when the timer is in stop status. In this case, the value specified at task creation time is temporarily overwritten. You can filter the task results based on the domain name, or part of name (using wildcard characters). You can also configure the automatic refresh of the task results in the table.

3. In the Columns Definition section, select the information you want to display in the table containing the query results. According to the columns you choose here, the corresponding information is displayed in the task results table. You can then drill down into this information displayed in the table and navigate it. In the Columns Definition panel, not only can you select the columns for this task results, but you can also specify the columns for *secondary* queries on workstations. Starting from the Monitor Domains task table of result, you can start further queries on the workstations associated to one of the domains in the table; the information to be retrieved with these secondary queries is specified in this panel.

## Results

After specifying all the required criteria, you can save your task or immediately run it to create a list of domains that satisfies your filtering settings. For details, see “Creating a monitoring task query” on page 174.

### Related concepts:

“Domain” on page 51  
The domain.

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## Monitoring your Workload

Controlling and managing scheduling activities and objects on plans with *tasks*.

To control and manage scheduling activities and objects in plans, you create and run *tasks*.

**Note:** You must create a connection to a remote IBM Workload Scheduler engine, before you can run tasks on it to obtain data.

You can create the following types of task:

### Monitor Task

When you create a Monitor task, you define a query where you specify multiple criteria to search for items and to display the search results. You can then save, reuse, and share this task with other users, and modify it at any time.

Task sharing is enabled only if your role is authorized to share tasks. If you are not, contact the administrator or see: “Limit task and engine sharing” on page 40.

When you run the task, you launch the query, according to the filtering criteria, on all the objects associated to the IBM Workload Scheduler connection you specified. A list of the objects that satisfy the search criteria is displayed when you run the task. You can view the objects resulting from your query, and their properties, and take actions on some of them.

### Event Monitoring Task

When you create an Event Monitoring Task you define a query where you specify multiple criteria to search for specific monitoring objects stored on the database and to display the search results. Available monitoring objects are event rules, triggered actions, and operator messages. You can then save, reuse, and share this task with other users, and modify it at any time.

When you run the task, you launch the query, according to the filtering criteria, on all the objects associated to the IBM Workload Scheduler connection you specified. A list of the objects that satisfy the search criteria

is displayed when you run the task. You can view the objects resulting from your query, and their properties, and take actions on some of them.

### Report Task

For information about this type of task, see Chapter 15, “Reporting,” on page 229.


To create a task, you perform the following steps:

1. In the navigation bar, click **System Status and Health > All Configured Tasks > New**.
2. In the Select Task Type panel, select the task you want to create, and click **Next**. You must select a task type to make the corresponding list active.
3. Follow the procedure relating to the specific task you are creating.

### Note:

To create a monitoring task, you can also define a monitoring task query by clicking **System Status and Health > Workload Monitoring > Monitor Workload**. For details about the complete procedure, see “Creating a monitoring task query” on page 174.

You can also save your tasks as one of your favorite bookmarks in your browser.

To do this, from the panel displaying your task results, click the add link icon  to launch your task directly from the browser, in the same way you do when accessing any other website.

Each task you create and save is included under the **All Configured Tasks** menu. Saved tasks are also listed under:

#### **System Status and Health > Workload Monitoring > Monitor Workload.**

For tasks to monitor jobs, critical jobs, job streams, workstation, files, resources, domains, prompts, and **Show plan view**.

#### **System Status and Health > Event Monitoring > Workload Events**

For tasks to monitor event rules, operator messages, and triggered actions.

#### **Related concepts:**

“Scheduling objects” on page 54

Scheduling objects that you can view and manage using the Dynamic Workload Console.

“Monitoring your Scheduling Environment” on page 176

Tasks to monitor the workstations and domains of your environment.

## Creating a task to Monitor Jobs

How you can create a Monitor Jobs task.

### About this task

Create a Monitor Jobs task to retrieve all the jobs that satisfy a number of filter criteria. For example, you might want to retrieve all the jobs with a specific status, a specific priority, and by actual start or end time.

From the list of jobs satisfying your filter criteria that are displayed, you can also retrieve a list of predecessors that are causing a delay of a selected job. Jobs in the predecessors list are in such states such as error, late, fence (for distributed systems only), suppressed (for distributed systems only) or long duration. If these jobs do



not complete successfully on time, they prevent the selected job from completing on time. In this view, you can quickly see on which jobs you need to take appropriate recovery actions (for example, by releasing dependencies or answering prompts).

To create a Monitor Jobs task, perform the following steps.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

## Procedure

1. In the navigation bar, click **System Status and Health > Workload Monitoring > Monitor Workload** and follow the steps described in “Creating a monitoring task query” on page 174.

If you are familiar with **conman**, in the **Query** text box specify a query based on the **conman showjobs** syntax. Alternatively, click **Edit** to select the filter criteria from the list of options that is displayed.

2. In the General Filter section, specify some broad filtering criteria to limit the results retrieved by your query. Here you start refining the scope of your query by also considering the amount of information you want to retrieve. Optionally, in some of the results tables in the Periodic Refresh Options section, you can customize how often to refresh the information by specifying the refresh interval in seconds in hh:mm:ss format, with a minimum of 30 seconds and a maximum of 7200 seconds. For example, 00:01:10 means 70 seconds. If the value specified is not valid, the last valid value is automatically used. If the periodic refresh is enabled for a task, when the task runs, the refresh time control options are shown in the results table. You can also set or change the periodic refresh interval directly in the results table when the timer is in stop status. In this case, the value specified at task creation time is temporarily overwritten. You can search for jobs based on their status, on the workstation where they run, or the job streams to which they belong. For example, you can look for all the jobs that did not complete successfully on the specified workstations, or you can look for all the jobs with the same owner and that have a specific priority level and an immediate restart option set.
3. In the Time Data Filter section, specify a time range to limit your search to jobs or job streams that ran within a specific time period.

**Note:** If no date and time is specified then the jobs and job streams are not filtered based on their processing time.

4. **Distributed** In the Dependencies Filter section, you can filter your results based on the dependencies they have. Only jobs that have the dependencies you specify in this panel are included in the query results. Dependencies can be jobs, job streams, resources, files, or prompts.
5. In the Columns Definition section, select the information you want to display in the table containing the query results. According to the columns you choose here, the corresponding information is displayed in the task results table. For example, for all the objects resulting from your query, you might want to see their statuses, the workstations where they ran, when they ran, and when they were scheduled to run. You can then drill down into this information displayed in the table and navigate it. In the Columns Definition section, not only can you select the columns for this task results, but you can also specify the columns for *secondary* queries on job streams, jobs on critical network, and workstations. Starting from the Monitor Jobs task table of results, you can start

further queries on the secondary objects associated to one of the jobs in the table; the information to be retrieved with these secondary queries is specified in this panel.

## Results

After specifying all the required criteria, you can save your task or immediately run it to create a list of jobs that satisfies your filtering settings. For details, see “Creating a monitoring task query” on page 174.

### Related concepts:

“Job” on page 55

Information about jobs, which are scheduling objects used to define and run activities in the scheduling environment.

### Related reference:

“Status description and mapping for distributed jobs” on page 256

The job status as described in Dynamic Workload Console and how it is defined in IBM Workload Scheduler.

“Status description and mapping for z/OS jobs” on page 259

z/OS job status displayed by Dynamic Workload Console and how it is defined in IBM Workload Scheduler for z/OS.

“Limit the number of objects retrieved by queries” on page 38

## Creating a task to Monitor Critical Jobs

Why and how you can create a Monitor Critical Jobs task.

### About this task

You can use this task to retrieve all the jobs that were marked as **Critical** during their job stream creation. If it is critical that a job must be completed before a specific time, you can flag it as critical when you add it to a job stream using the Workload Designer. Jobs can also be flagged as critical by including the **critical** keyword to the job statement when you create or modify a job stream using the **composer** command line.

For more information about this, see the *IBM Workload Scheduler User's Guide and Reference*.

You can then use this list of critical jobs to control them, ensuring that nothing prevents them from completing on time.

For each critical job listed, you are also provided with information about the confidence factor and the related estimated end time of the critical job. The confidence factor is expressed as a percentage and indicates the confidence with which a critical job will finish running within its deadline. The confidence factor is calculated as the normal cumulative density function using a Gaussian function, where the estimated end time is the mean and the estimated end variance is the standard deviation. When a job completes, the confidence factor is set to 0% when the job exceeded its deadlines, and is set to 100% when the deadline was not exceeded.

**Note:** **Distributed** This task can only be run against the current plan and only on a master workstation.

Starting from the list of critical jobs, you can drill down and take actions on their predecessors (internal and external), which might be located faraway in the whole critical job network.

You can retrieve the following lists of predecessors to act on them (for example, by releasing dependencies or answering prompts) if they compromise the critical job success:

### **Critical Path**

Critical job predecessors with the least slack time (delay allowed to let the critical job complete on time).

### **Hot List**

The hot list contains a subset of critical predecessors that can cause a delay of the critical job because they are in such states as error, late, fence (for distributed systems only), suppressed (for distributed systems only) or long duration. If these jobs do not complete successfully on time, they prevent the critical job from completing on time. In the hot list view, you can quickly see which jobs need you to take appropriate recovery actions. Jobs included in the Hot List are not necessarily included in the Critical Path.

To create a Monitor Critical Jobs task, perform the following steps.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

### **Procedure**

1. In the navigation bar, click **System Status and Health > All Configured Tasks > New**.
2. In the Create Task panel, under **Monitor Task**, select **Monitor Critical Jobs** and click **Next**.
3. In the Enter Task Information panel, define the type of scheduler engine here you want to run the task. You can select an engine at a later time. Remember that the engine name must be specified before running the task. Depending on the engine type you choose, the filtering criteria and the results you can display are different. You can also specify whether to share the task with others, to allow them to see and run the task, but not to modify it. Task and engine sharing can be disabled by the TWSWEBUIAdministrator in the global settings customizable file.
4. Click **Next** to proceed with task creation or click **Finish** to complete the creation using the default values and exit without proceeding to the following steps. If you are editing an existing task, properties are organized in tabs.
5. In the General Filter section, specify some broad filtering criteria to limit the results retrieved by your query. Here you start refining the scope of your query by also considering the amount of information you want to retrieve. Optionally, in some of the results tables in the Periodic Refresh Options section, you can customize how often to refresh the information by specifying the refresh interval in seconds in hh:mm:ss format, with a minimum of 30 seconds and a maximum of 7200 seconds. For example, 00:01:10 means 70 seconds. If the value specified is not valid, the last valid value is automatically used. If the periodic refresh is enabled for a task, when the task runs, the refresh time control options are shown in the results table. You can also set or change the periodic refresh interval directly in the results table when the timer is in stop status. In this case, the value specified at task creation time is temporarily

overwritten. You can search for jobs based on their status, on the workstation where they run, or on the job streams they belong to. For example, you can look for all the jobs that have a specific priority level and a high risk of missing their deadlines.

**Note:** The Monitor Critical Jobs task searches only for jobs that have been marked as *critical*.

Depending on what you choose as **Risk Level**, one or more of the following alert levels is shown in the list of critical jobs:



Critical jobs at high risk. This icon means that the critical job estimated end is beyond the job deadline. If nothing changes, the critical job is going to miss its deadline. The critical job estimated end is dynamically recalculated.



Critical jobs at potential risk. This icon means that the critical job estimated end has not yet passed the job deadline. However, the critical job has some predecessors in late, long duration, or error state. For distributed systems, the late condition can also be due to priority, limit, or fence values that are preventing jobs from running. If nothing changes, there is the possibility that the critical job will miss its deadline.



Critical job is on track. If nothing changes, it will meet its deadline.

6. In the Time Data Filter panel, specify a time range to limit your search to jobs or job streams that ran within a specific time period. If no date and time are specified, the jobs and job streams are not filtered based on their processing time.
7. In the Columns Definition section, select the information you want to display in the table containing the query results. According to the columns you choose here, the corresponding information is displayed in the task results table. For example, for all the objects resulting from your query, you might want to see their statuses, the workstations where they ran, when they ran, and when they were scheduled to run. You can then drill down into this information displayed in the table and navigate it. In the Columns Definition section, not only can you select the columns for this task results, but you can also specify the columns for *secondary* queries on jobs, job streams, jobs in critical network, and workstations. Starting from the Monitor Critical Jobs results, you can launch further queries on secondary objects associated to the jobs in the table. The information you can retrieve with these queries is specified in this panel. One of these secondary queries retrieves the list of **jobs in the critical network**, which includes *all* the critical job predecessors. The critical path is part of the critical network. The columns set for the list of **jobs in the critical network** are displayed as details of all the critical jobs Predecessors, and in the **Hot List** and **Critical Path** views. All these views can be launched by using the corresponding buttons from the Monitor Critical Jobs table of results.
8. In the All Configured Tasks panel, you can see the main details about the task that you have just created. You can also choose to run the task immediately. The task is now in the list of your tasks where you can open and modify it. You can find it in the task lists displayed by clicking the following options: **System Status and Health > All Configured Tasks** or **Workload Monitoring > Monitor Critical Jobs**.

## Results

You have created your task that, when run, creates a list of jobs satisfying your filtering criteria and showing, for each job in the list, the information contained in the columns you selected to view.

You can find a workload service assurance scenario in the IBM Workload Scheduler User's Guide and Reference about using this feature to monitor critical jobs.

From the list of results, you can display a timeline, by clicking **Expand Timeline**, that shows the placement of critical jobs along a horizontal time axis and highlights jobs with high risk level. Only critical jobs that have not completed are displayed in the timeline. It also allows you to modify the plan deadline and quickly see how it would affect jobs. If you see a job that is late or in high risk state, right-click the job in the list of results and select **What-if** from the table toolbar to open the What-if Analysis and view them in a Gantt chart for further investigation.

**Note:** The timeline is not supported on Internet Explorer, version 9.

### **Related concepts:**

"Job" on page 55

Information about jobs, which are scheduling objects used to define and run activities in the scheduling environment.

"Workload service assurance" on page 93

Basic concepts about critical jobs and the critical path, which are fundamental to take advantage of this feature.

### **Related reference:**

"Status description and mapping for distributed jobs" on page 256

The job status as described in Dynamic Workload Console and how it is defined in IBM Workload Scheduler.

"Status description and mapping for z/OS jobs" on page 259

z/OS job status displayed by Dynamic Workload Console and how it is defined in IBM Workload Scheduler for z/OS.

"Limit the number of objects retrieved by queries" on page 38

### **Related information:**

"Using workload service assurance to monitor z/OS critical jobs" on page 243

How to monitor jobs that are critical for the customer business and that must complete by their deadline.

## Creating a task to Monitor Jobs on Multiple Engines

Why and how you create a Monitor Jobs task to run on multiple engines.

### **About this task**

If you need to combine queries about jobs running on multiple distributed and z/OS engines, you can use Monitor Jobs on Multiple Engines. For example, it might be useful to run a query to find all the jobs in error in your environment by running a single task.

To create this task, perform the following steps.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

## Procedure


1. In the navigation bar, click **System Status and Health > All Configured Tasks > New**.

**Note:** Alternatively, you can create a monitoring task query to be run on multiple engines. For details, see “Creating a monitoring task query” on page 174.

2. In the Create Task panel, select **Monitor Jobs on Multiple Engines > Monitor Jobs** and click **Next**.
3. In the Enter Task Information panel, specify a name for the task you are creating (a default name is provided) and define the IBM Workload Scheduler engines where you want to run the task. The task is run following the specified engine sequence. In this panel, you can also specify whether to share the task with others, to allow them to see and run the task, but not to modify it.
4. Click **Next** to proceed with task creation or click **Finish** to complete the creation using the default values and exit without proceeding to the following steps. If you are editing an existing task, properties are organized in tabs.
5. In the General Filter section, specify some broad filtering criteria to limit the results retrieved by your query. Here you start refining the scope of your query by also considering the amount of information you want to retrieve. Optionally, in some of the results tables in the Periodic Refresh Options section, you can customize how often to refresh the information by specifying the refresh interval in seconds in hh:mm:ss format, with a minimum of 30 seconds and a maximum of 7200 seconds. For example, 00:01:10 means 70 seconds. If the value specified is not valid, the last valid value is automatically used. If the periodic refresh is enabled for a task, when the task runs, the refresh time control options are shown in the results table. You can also set or change the periodic refresh interval directly in the results table when the timer is in stop status. In this case, the value specified at task creation time is temporarily overwritten. You can search for jobs based on their identifier, on the job streams they belong to, or on their status, scheduled time, and priority. For example, you can look for all the jobs that did not complete successfully and were scheduled to run within a specific time period.
6. In the Columns Definition panel, select the information you want to display in the table containing the query results. According to the columns you choose here, the corresponding information is displayed in the task results table. For example, for all the objects resulting from your query, you might want to see their statuses, the job streams they belong to, when they were scheduled to run, and the engines on which they ran. You can then drill down into this information displayed in the table and navigate it.
7. In the All Configured Tasks panel, you can see the main details about the task that you have just created. You can also choose to run the task immediately. The task is now in the list of your tasks where you can open and modify it. You can find it in the task lists displayed by clicking the following options: **System Status and Health > All Configured Tasks** or **Workload Monitoring > Monitor Jobs**.

## Results

You have created your task that, when run, creates a list of jobs satisfying your filtering criteria and showing, for each job in the list, the information contained in the columns you selected to view.

To view connection status information and statistical information about the engines against which the task was run, click the statistical icon  on the table toolbar.

A pie chart showing the number of query results and job status is displayed for each engine on which the task ran successfully. Click the pie sections to see further details. If the task did not run successfully on one or more engines, you see a message containing details about the errors.

### Related concepts:

“Job” on page 55

Information about jobs, which are scheduling objects used to define and run activities in the scheduling environment.

“Monitoring jobs running on multiple engines” on page 245

Using the Dynamic Workload Console to create a task to simultaneously monitor jobs that run on multiple engines.

### Related reference:

“Status description and mapping for distributed jobs” on page 256

The job status as described in Dynamic Workload Console and how it is defined in IBM Workload Scheduler.

“Status description and mapping for z/OS jobs” on page 259

z/OS job status displayed by Dynamic Workload Console and how it is defined in IBM Workload Scheduler for z/OS.

“Limit the number of objects retrieved by queries” on page 38

## Creating a task to Monitor Job Streams

How you can create a Monitor Job Streams task.

### About this task

Create a Monitor Job Streams task to retrieve all job streams satisfying a number of filter criteria. For example, you might want to retrieve all job streams with a specific status, a specific priority, and by actual start or end time.

From the list of job streams displayed that satisfy your filter criteria, you can also retrieve a list of predecessors that are causing a delay of a selected job stream. Jobs in the predecessors list are in such states such as error, late, fence (for distributed systems only), suppressed (for distributed systems only) or long duration. If these jobs do not complete successfully on time, they prevent the selected job stream from completing on time. In this view, you can quickly see on which jobs you need to take appropriate recovery actions (for example, by releasing dependencies or answering prompts).

To create a Monitor Job Streams task, perform the following steps.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

## Procedure

1. In the navigation bar, click **System Status and Health > Workload Monitoring > Monitor Workload** and follow the steps described in “Creating a monitoring task query” on page 174.

If you are familiar with **conman**, in the **Query** text box specify a query based on the **conman showschedules** syntax. Alternatively, click **Edit** to select the filter criteria from the list of options that is displayed.

2. In the General Filter section, specify some broad filtering criteria to limit the results retrieved by your query. Here you start refining the scope of your query by also considering the amount of information you want to retrieve. Optionally, in some of the results tables in the Periodic Refresh Options section, you can customize how often to refresh the information by specifying the refresh interval in seconds in hh:mm:ss format, with a minimum of 30 seconds and a maximum of 7200 seconds. For example, 00:01:10 means 70 seconds. If the value specified is not valid, the last valid value is automatically used. If the periodic refresh is enabled for a task, when the task runs, the refresh time control options are shown in the results table. You can also set or change the periodic refresh interval directly in the results table when the timer is in stop status. In this case, the value specified at task creation time is temporarily overwritten. You can search for job streams based on their scheduled run time, status, or the workstation where they run. For example, you can look for all the job streams with a given priority level that remained in waiting state on a set of workstations, or you can look for all the job streams with a specific group, a given priority level, and whose most critical job has a specified duration.
3. In the Time Data Filter panel, specify a time range to limit your search to jobs or job streams that ran within a specific time period.

**Note:** If no date and time is specified, then the jobs and job streams are not filtered based on their processing time.

4. **Distributed** In the Dependencies Filter section, you can filter your results based on the dependencies they have. Only job streams that have the dependencies you specify in this panel are included in the query results. Dependencies can be jobs, job streams, resources, files, or prompts.
5. In the Columns Definition section, select the information you want to display in the table containing the query results. According to the columns you choose here, the corresponding information is displayed in the task results table. For example, for all the objects resulting from your query, you might want to see their statuses, the workstations where they ran, when they ran, and when they were scheduled to run. You can then drill down into this information displayed in the table and navigate it. In the Columns Definition section, not only can you select the columns for this task results, but you can also specify the columns for *secondary* queries on jobs and workstations (for distributed job streams only). Starting from the Monitor Job Streams task table of result, you can start further queries on jobs and workstations associated to one of the job streams in the table; the information to be retrieved with these secondary queries is specified in this panel.

## Results

After specifying all the required criteria, you can save your task or immediately run it to create a list of job streams that satisfies your filtering settings. For details, see “Creating a monitoring task query” on page 174.



## Example

### Related concepts:

“Job stream” on page 56

### Related reference:

“Status description and mapping for distributed job streams” on page 261

The job stream status in Dynamic Workload Console and how it is defined in IBM Workload Scheduler.

“Status description and mapping for z/OS job streams” on page 263

The z/OS job stream status in Dynamic Workload Console and how it is defined in IBM Workload Scheduler for z/OS.

“Limit the number of objects retrieved by queries” on page 38

## Creating a task to Monitor Job Streams on Multiple Engines

Why and how you create a Monitor Job Streams task to run on multiple engines.

### About this task

If you need to combine queries about job streams running on multiple distributed and z/OS engines, you can use Monitor Jobs on Multiple Engines. For example, it might be useful to run a query to find all the job streams running in your environment by running a single task.

To create this task, perform the following steps.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

### Procedure

1. In the navigation bar, click **System Status and Health > All Configured Tasks > New**.

**Note:** Alternatively, you can create a monitoring task query to be run on multiple engines. For details, see “Creating a monitoring task query” on page 174.


2. In the Create Task panel, click **Monitor Jobs on Multiple Engines > Monitor Job Streams** and click **Next**.
3. In the Enter Task Information panel, specify a name for the task you are creating (a default name is provided) and define the IBM Workload Scheduler engines where you want to run the task. The task is run following the specified engine sequence. In this panel, you can also specify whether to share the task with others, to allow them to see and run the task, but not to modify it.
4. Click **Next** to proceed with task creation or click **Finish** to complete the creation using the default values and exit without proceeding to the following steps. If you are editing an existing task, properties are organized in tabs.
5. In the General Filter section, specify some broad filtering criteria to limit the results retrieved by your query. Here you start refining the scope of your query by also considering the amount of information you want to retrieve. Optionally, in some of the results tables in the Periodic Refresh Options section, you can customize how often to refresh the information by specifying the refresh interval in seconds in hh:mm:ss format, with a minimum of 30 seconds and a maximum of 7200 seconds. For example, 00:01:10 means 70 seconds. If the value specified is not valid, the last valid value is automatically used. If the

periodic refresh is enabled for a task, when the task runs, the refresh time control options are shown in the results table. You can also set or change the periodic refresh interval directly in the results table when the timer is in stop status. In this case, the value specified at task creation time is temporarily overwritten. You can search for job streams based on their identifier, status, scheduled time, and priority. For example, you can look for all the job streams that are currently running and were scheduled to run within a specific time period.

6. In the Columns Definition panel, select the information you want to display in the table containing the query results. According to the columns you choose here, the corresponding information is displayed in the task results table. For example, for all the objects resulting from your query, you might want to see their statuses, when they were scheduled to run, and the engines on which they ran. You can then drill down into this information displayed in the table and navigate it.
7. In the All Configured Tasks panel, you can see the main details about the task that you have just created. You can also choose to run the task immediately. The task is now in the list of your tasks where you can open and modify it. You can find it in the task lists displayed by clicking the following options: **System Status and Health > All Configured Tasks** or **Workload Monitoring > Monitor Job Streams**.

## Results

You have created your task that, when run, creates a list of job streams satisfying your filtering criteria and showing, for each job stream in the list, the information contained in the columns you selected to view.

To view connection status information and statistical information about the engines against which the task was run, click the  statistical icon on the table toolbar.

A pie chart showing the number of query results and job stream status is displayed for each engine on which the task ran successfully. Click the pie sections to see further details. If the task did not run successfully on one or more engines, you see a message containing details about the errors.

### Related concepts:

“Job stream” on page 56

### Related reference:

“Status description and mapping for distributed job streams” on page 261

The job stream status in Dynamic Workload Console and how it is defined in IBM Workload Scheduler.

“Status description and mapping for z/OS job streams” on page 263

The z/OS job stream status in Dynamic Workload Console and how it is defined in IBM Workload Scheduler for z/OS.

“Limit the number of objects retrieved by queries” on page 38

## Creating a task to Monitor Files

Why and how you can create a Monitor Files task to Monitor Files.

### About this task

To create a Monitor Files task, perform the following steps.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

## Procedure

1. In the navigation bar, click **System Status and Health > Workload Monitoring > Monitor Workload** and follow the steps described in “Creating a monitoring task query” on page 174.  
If you are familiar with **conman**, in the **Query** text box specify a query based on the **conman showfiles** syntax. Alternatively, click **Edit** to select the filter criteria from the list of options that is displayed.
2. In the General Filter section, specify some broad filtering criteria to limit the results retrieved by your query. Here you start refining the scope of your query by also considering the amount of information you want to retrieve. Optionally, in some of the results tables in the Periodic Refresh Options section, you can customize how often to refresh the information by specifying the refresh interval in seconds in hh:mm:ss format, with a minimum of 30 seconds and a maximum of 7200 seconds. For example, 00:01:10 means 70 seconds. If the value specified is not valid, the last valid value is automatically used. If the periodic refresh is enabled for a task, when the task runs, the refresh time control options are shown in the results table. You can also set or change the periodic refresh interval directly in the results table when the timer is in stop status. In this case, the value specified at task creation time is temporarily overwritten. You can filter the task results based on the file and workstation names, or part of names (using wildcard characters). You can also configure the automatic refresh of the task results in the table.
3. In the Columns Definition section, select the information you want to display in the table containing the query results. According to the columns you choose here, the corresponding information is displayed in the task result. For example, for all the files resulting from your query, you might want to know their status and associated workstations. You can then drill down into this information displayed in the table and navigate it. In the Columns Definition panel, not only can you select the columns for this task results, but you can also specify the columns for *secondary* queries on jobs, job streams, and workstations. For example, you are creating a task to search for all the files whose names start with the same characters. From the resulting list of files, you can launch a secondary query to view a list of all the jobs associated to each of these files. Starting from the Monitor Files task results table, you can start further queries on secondary objects associated to one of the files in the table; the information to be retrieved with these secondary queries is specified in this panel.

## Results

After specifying all the required criteria, you can save your task or immediately run it to create a list of files that satisfies your filtering settings. For details, see “Creating a monitoring task query” on page 174.

### Related concepts:

“File” on page 70

## Creating a task to Monitor Resources

How you can create a Monitor Resources task.

## About this task

To create a Monitor Resources task, perform the following steps.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

## Procedure

1. In the navigation bar, click **System Status and Health > Workload Monitoring > Monitor Workload** and follow the steps described in “Creating a monitoring task query” on page 174.

If you are familiar with **conman**, in the **Query** text box specify a query based on the **conman showresources** syntax. Alternatively, click **Edit** to select the filter criteria from the list of options that is displayed.

2. In the General Filter section, specify some broad filtering criteria to limit the results retrieved by your query. Here you start refining the scope of your query by also considering the amount of information you want to retrieve. Optionally, in some of the results tables in the Periodic Refresh Options section, you can customize how often to refresh the information by specifying the refresh interval in seconds in hh:mm:ss format, with a minimum of 30 seconds and a maximum of 7200 seconds. For example, 00:01:10 means 70 seconds. If the value specified is not valid, the last valid value is automatically used. If the periodic refresh is enabled for a task, when the task runs, the refresh time control options are shown in the results table. You can also set or change the periodic refresh interval directly in the results table when the timer is in stop status. In this case, the value specified at task creation time is temporarily overwritten. You can filter the task results based on the resource and workstation names, or part of names (using wildcard characters). You can also configure the automatic refresh of the task results in the table.
3. In the Columns Definition section, select the information you want to display in the table containing the query results. According to the columns you choose here, the corresponding information is displayed in the task results table. For example, for all the resources resulting from your query, you might want to know if they are in use and the associated workstations. You can then drill down into this information displayed in the table and navigate it. In the Columns Definition panel, not only can you select the columns for this task results, but you can also specify the columns for *secondary* queries on jobs, job streams, and workstations. For example, you are creating a task to search for all the resources whose names start with the same characters. From the resulting list of resources, you can navigate to see (secondary query) a list of all the jobs that use each of them. Starting from the Monitor Resources task results table, you can start further queries on secondary objects associated to one of the resources in the table; the information to be retrieved with these secondary queries is specified in this panel.

## Results

After specifying all the required criteria, you can save your task or immediately run it to create a list of resources that satisfies your filtering settings. For details, see “Creating a monitoring task query” on page 174.

### Related concepts:

“Resource” on page 69  
Information about resources.

## Creating a task to Monitor Prompts

Why and how you can create a Monitor Prompts task.

### About this task

To create a Monitor Prompts task, perform the following steps.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

### Procedure

1. In the navigation bar, click **System Status and Health > Workload Monitoring > Monitor Workload** and follow the steps described in “Creating a monitoring task query” on page 174.  
If you are familiar with **conman**, in the **Query** text box specify a query based on the **conman showprompts** syntax. Alternatively, click **Edit** to select the filter criteria from the list of options that is displayed.
2. In the General Filter section, specify some broad filtering criteria to limit the results retrieved by your query. Here you start refining the scope of your query by also considering the amount of information you want to retrieve. Optionally, in some of the results tables in the Periodic Refresh Options section, you can customize how often to refresh the information by specifying the refresh interval in seconds in hh:mm:ss format, with a minimum of 30 seconds and a maximum of 7200 seconds. For example, 00:01:10 means 70 seconds. If the value specified is not valid, the last valid value is automatically used. If the periodic refresh is enabled for a task, when the task runs, the refresh time control options are shown in the results table. You can also set or change the periodic refresh interval directly in the results table when the timer is in stop status. In this case, the value specified at task creation time is temporarily overwritten. You can filter the task results based on the prompt name or status. You can also configure the automatic refresh of the task results in the table.
3. In the Columns Definition section, select the information you want to display in the table containing the query results. According to the columns you choose here, the corresponding information is displayed in the task results table. For example, for all the prompts resulting from your query, you might want to know their type and text. You can then drill down into this information displayed in the table and navigate it. In the Columns Definition panel, not only can you select the columns for this task results, but you can also specify the columns for *secondary* queries on jobs, and job streams. From the resulting list of prompts, you can launch a secondary query to view a list of all the jobs associated to each of them. Starting from the Monitor Prompts task results table, you can start further queries on secondary objects associated to one of the prompts in the table; the information to be retrieved with these secondary queries is specified in this panel.

### Results

After specifying all the required criteria, you can save your task or immediately run it to create a list of domains that satisfies your filtering settings. For details, see “Creating a monitoring task query” on page 174.

#### Related concepts:

“Prompt” on page 68

Information about prompts, which are textual messages presented to the operator

to pause the job or job stream processing.

## Event monitoring tasks

Information about event monitoring tasks and how to create them.

You create and run an event monitoring task by specifying a filter and running a search to get information about event monitoring related objects.

The information retrieved when running event tasks is stored in the IBM Workload Scheduler databases, therefore, to run event tasks you must be connected to a IBM Workload Scheduler engine and must be authorized in the IBM Workload Scheduler security file to access those objects in the database.

You can create event monitoring tasks to query for:

### Event rule definitions

The template that defines an event rule consists of:

- One or more events, defined with its properties.
- The relationship between the specified events (they can be randomly grouped or listed in chronological order).
- The actions that must be performed when all the event conditions are satisfied.

### Event rules

The instance of a rule definition in the plan.

### Triggered action

The actual occurrence of an action defined in the event rule and triggered when the event conditions have been satisfied.

### Operator messages

The instance of the **MessageLogger** action specified in the event rule definition. It provides information about the result of an event rule instance on a repository stored in the IBM Workload Scheduler relational database.

### Related tasks:

“Creating a task to Monitor Event Rules”

Why and how you can create a Monitor Event Rule Instances task.

“Creating a task to Monitor Triggered Actions” on page 196

Why and how you can create a Monitor Triggered Actions task.

“Creating a task to Monitor Operator Messages” on page 197

Why and how you can create a Monitor Operator Messages task.

## Creating a task to Monitor Event Rules

Why and how you can create a Monitor Event Rule Instances task.

### About this task

To create a Monitor Event Rules task, perform the following steps.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

## Procedure

1. In the navigation bar, click **System Status and Health > All Configured Tasks > New**.
2. In the Create Task panel, under **Event Monitoring Task**, select **Monitor Event Rules** and click **Next**.
3. In the Enter Task Information panel, specify the task name and select the engine connection where you want to run the task. You can run this type of query only in a IBM Workload Scheduler distributed environment on either the master domain manager or on a node installed as a backup master domain manager, but not necessarily belonging to the master domain. Here you also specify whether to share the task with others, to allow them to see and run the task, but not to modify it.
4. Click **Next** to proceed with task creation or click **Finish** to complete the creation using the default values and exit without proceeding to the following steps. If you are editing an existing task, properties are organized in tabs.
5. In the General Filter section, specify some broad filtering criteria to limit the results retrieved by your query. Here you start refining the scope of your query by also considering the amount of information you want to retrieve. Optionally, in some of the results tables in the Periodic Refresh Options section, you can customize how often to refresh the information by specifying the refresh interval in seconds in hh:mm:ss format, with a minimum of 30 seconds and a maximum of 7200 seconds. For example, 00:01:10 means 70 seconds. If the value specified is not valid, the last valid value is automatically used. If the periodic refresh is enabled for a task, when the task runs, the refresh time control options are shown in the results table. You can also set or change the periodic refresh interval directly in the results table when the timer is in stop status. In this case, the value specified at task creation time is temporarily overwritten. You can search for rule instances based on their status, type, or trigger timestamps.
6. In the Columns Definition panel, select the information you want to display in the table containing the query results. According to the columns you choose here, the corresponding information is displayed in the task results table. For example, for all the objects resulting from your query, you might want to see their statuses, and the kind of rule that generated them. You can then drill down into this information displayed in the table and navigate it. In the Columns Definition panel, not only can you select the columns for this task results, but you can also specify the columns for *secondary* queries on event rules (the event rule definition stored in the database). The information to be retrieved with these secondary queries is specified in this panel.
7. In the All Configured Tasks panel, you can see the main details about the task that you have just created. You can also choose to run the task immediately. The task is now in the list of your tasks where you can open and modify it. You can find it in the task lists displayed by clicking the following options: In the All Configured Tasks panel, you can see the main details about the task that you have just created. You can also choose to run the task immediately. The task is now in the list of your tasks where you can open and modify it. You can find it in the task lists displayed by clicking the following options: **System Status and Health > All Configured Tasks** or **Event Monitoring > Monitor Event Rules**.

## Results

You have created your query that, when run, lists the event rule instances satisfying your filtering criteria and shows, for each event rule in the list, the information you selected to view.

### Related concepts:

“Event monitoring tasks” on page 194

Information about event monitoring tasks and how to create them.

“Event management configuration” on page 7

Authorizations needed to use event management.

## Creating a task to Monitor Triggered Actions

Why and how you can create a Monitor Triggered Actions task.

### About this task

To create a Monitor Triggered Actions task, perform the following steps.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

### Procedure

1. In the navigation bar, click **System Status and Health > All Configured Tasks > New**.
2. In the Create Task panel, select **Event Monitoring Task > Monitor Triggered Actions** and click **Next**.
3. In the Enter Task Information panel, specify the task name and select the engine connection where you want to run the task. You can run this type of query only in a IBM Workload Scheduler distributed environment on either the master domain manager or on a node installed as a backup master domain manager, but not necessarily belonging to the master domain. You can also specify whether to share the task with others, to allow them to see and run the task, but not to modify it.
4. Click **Next** to proceed with task creation or click **Finish** to complete the creation using the default values and exit without proceeding to the following steps. If you are editing an existing task, properties are organized in tabs.
5. In the General Filter section, specify some broad filtering criteria to limit the results retrieved by your query. Here you start refining the scope of your query by also considering the amount of information you want to retrieve. Optionally, in some of the results tables in the Periodic Refresh Options section, you can customize how often to refresh the information by specifying the refresh interval in seconds in hh:mm:ss format, with a minimum of 30 seconds and a maximum of 7200 seconds. For example, 00:01:10 means 70 seconds. If the value specified is not valid, the last valid value is automatically used. If the periodic refresh is enabled for a task, when the task runs, the refresh time control options are shown in the results table. You can also set or change the periodic refresh interval directly in the results table when the timer is in stop status. In this case, the value specified at task creation time is temporarily overwritten. You can search for triggered actions based on the type of rule instance that triggers them or on their scope. The scope of an action (or an event) is the set of properties that most characterize it.



6. In the Columns Definition panel, select the information you want to display in the table containing the query results. According to the columns you choose here, the corresponding information is displayed in the task results table. For example, for each of the actions resulting from your query, you might want to see the status, type, or associated message. You can then drill down into this information displayed in the table and navigate it. In the Columns Definition panel, not only can you select the columns for this task results, but you can also specify the columns for *secondary* queries on event rule instances. The information to be retrieved with these secondary queries is specified in this panel.
7. In the All Configured Tasks panel, you can see the main details about the task that you have just created. You can also choose to run the task immediately. The task is now in the list of your tasks where you can open and modify it. You can find it in the task lists displayed by clicking the following options: **System Status and Health > All Configured Tasks** or **Event Monitoring > Monitor Triggered Actions**.

## Results

You have created your query that, when run, lists the event rule instances satisfying your filtering criteria and shows, for each event rule in the list, the information you selected to view.

### Related concepts:

“Event monitoring tasks” on page 194

Information about event monitoring tasks and how to create them.

“Event management configuration” on page 7

Authorizations needed to use event management.

## Creating a task to Monitor Operator Messages

Why and how you can create a Monitor Operator Messages task.

### About this task

To create a Monitor Operator Messages task, perform the following steps.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

### Procedure

1. In the navigation bar, click **System Status and Health > All Configured Tasks > New**.
2. In the Create Task panel, select **Event Monitoring Task > Monitor Operator Messages** and click **Next**.
3. In the Enter Task Information panel, specify the task name and select the engine connection where you want to run the task. You can run this type of query only in a IBM Workload Scheduler distributed environment on either the master domain manager or on a node installed as a backup master domain manager, but not necessarily belonging to the master domain. You also specify whether to share the task with others, to allow them to see and run the task, but not to modify it.

4. Click **Next** to proceed with task creation or click **Finish** to complete the creation using the default values and exit without proceeding to the following steps. If you are editing an existing task, properties are organized in tabs.
5. In the General Filter section, specify some broad filtering criteria to limit the results retrieved by your query. Here you start refining the scope of your query by also considering the amount of information you want to retrieve. Optionally, in some of the results tables in the Periodic Refresh Options section, you can customize how often to refresh the information by specifying the refresh interval in seconds in hh:mm:ss format, with a minimum of 30 seconds and a maximum of 7200 seconds. For example, 00:01:10 means 70 seconds. If the value specified is not valid, the last valid value is automatically used. If the periodic refresh is enabled for a task, when the task runs, the refresh time control options are shown in the results table. You can also set or change the periodic refresh interval directly in the results table when the timer is in stop status. In this case, the value specified at task creation time is temporarily overwritten. You can search for operator messages based on their severity, time stamp, or scope. The scope of an operator message is the set of properties that most characterize it.
6. In the Columns Definition panel, select the information you want to display in the table containing the query results. According to the columns you choose here, the corresponding information is displayed in the task results table. For example, for each of the operator messages resulting from your query, you might want to see the severity, the type of associated event, or the group in whose queue the message is. You can then drill down into this information displayed in the table and navigate it.
7. In the All Configured Tasks panel, you can see the main details about the task that you have just created. You can also choose to run the task immediately. The task is now in the list of your tasks where you can open and modify it. You can find it in the task lists displayed by clicking the following options: **System Status and Health > All Configured Tasks** or **Event Monitoring > Monitor Operator Messages**.

## Results

You have created your query that, when run, lists the event rule instances satisfying your filtering criteria and shows, for each event rule in the list, the information you selected to view.

### Related concepts:

“Event monitoring tasks” on page 194

Information about event monitoring tasks and how to create them.

“Event management configuration” on page 7

Authorizations needed to use event management.

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## Creating a dashboard for monitoring

Customize your console by creating pages with personalized dashboards to use for monitoring.

### About this task

For monitoring purposes, you can create customized dashboards by arranging one or more widgets (predefined or custom) that are required to perform the task. Only users that have been assigned the role of *iscadmins* can create dashboards.

The IBM Workload Scheduler engine must be version 9.1 or later.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

Perform the following steps.

## Procedure



1. In the navigation bar, click **Console Settings > Pages > New Page**.
2. From the **Page Settings** panel, enter a descriptive **Page name** and a **Page location** to indicate where you want the dashboard to be displayed in the navigation bar.
3. By default, the **Page layout** is set to Proportional. It is recommended to change this value to Freeform or Fluid if a very large number of widgets is used.
4. Click **OK** to start creating your dashboard.
5. Click **Dashboard Widgets** to show the widgets available for you to use.  
According to the data set you want to monitor, use the appropriate widgets, as described in Table 22:

Table 22. Data sets and corresponding dashboard widgets

Data set	Dashboard widgets
Engine data set	List, Table
Job data set	List, Table
Job History data set	List, Table
Job Stream data set	List, Table
Job Risk Level data set	Analog Gauge, Value Status Gauge, Table, Bar Chart <b>Note:</b> If you plan to use the <b>All status values</b> filter, you can only use the Bar Chart widget.
Job Status data set	Table
Jobs Count data set (Not available on z/OS)	Value Status Gauge, Bar Chart
Log Messages data set	List, Table
Plan Progress data set <b>Note:</b> To obtain an accurate progress bar, the value for the progress indicator must be between 0 and 100.	Volume Bar
Prompt asked data set	Value Status Gauge
Prompt data set	List, Table
Workstation data set	List, Table

Table 22. Data sets and corresponding dashboard widgets (continued)

Data set	Dashboard widgets
Workstations Status data set	Value Status Gauge, Bar Chart <b>Note:</b> <ul style="list-style-type: none"> <li>• If you plan to use the <b>All status values</b> filter, you can only use the Bar Chart widget.</li> <li>• When you select the <b>Available</b> filter, the results include both linked workstations and workstations on which jobman is running.</li> <li>• When you select the <b>Not available</b> filter, the results include both unlinked workstations and workstations on which jobman is not running.</li> </ul>

6. Drag the widget you choose to the lower part of the page and position it to meet your requirements.


**Note:** For the Gauge widget, click the down arrow in the upper-right corner of the widget and select Events. Clear the NodeClickedOn event for the subscribed events to avoid unnecessary reloading of the widgets.

7. Click the down arrow in the upper-right corner of the widget and select **Edit**.
8. Select the data set you want to use for retrieving information to display in the widget. You can choose among all data sets provided by IBM Workload Scheduler. If you select the most widely used data sets, you can also use wires to create in the widget a direct link to the table listing the data set results. This feature is available for the following data sets:
  - Job Status
  - Jobs Count (Available for distributed engines only)
  - Workstations Status
  - Job Risk Level
  - Prompt Asked (Available for distributed engines only)

**Note:** If you disable plan data replication in the database, the retrieved data might be inconsistent or wrong.

For more information about replicating plan data in the database, see section about the **Planman** command line in the IBM Workload Scheduler User's Guide and Reference

To create a direct link to the table listing the data set results, perform the following steps:

- a. Click  **Show Wires** in the upper right corner of the dashboard. The **Summary of wires** page is displayed.
  - b. Click **New wire**.
  - c. Open the arrow next to the widget name and select **NodeClickedOn**. Click **OK**.
  - d. In the **Select Target For New Wire** dialog, select **DashDrillDown**.
  - e. Select **Load the selected target page** and **Switch to the selected target page**. Click **OK**.
  - f. In the **Transformation** dialog, select **None**. Click **OK**. You have now linked the widget to the table listing the results of the data set of your choice.
9. When you are satisfied with your settings, click **Save and exit**.

## Results

You have created your dashboard to suit your monitoring needs. For more details about working with dashboards or pages, creating wires, and editing dashboard content and layout, see *Jazz for Service Management: Integration Guide*.

## What to do next

You can also set your dashboard as either a Startup page or as your welcome page so that it is displayed each time you log into the console.

More in-depth information about dashboard widgets to help you quickly build integrated dashboards can be found in the IBM Dashboard Application Services Hub documentation: [https://www.ibm.com/support/knowledgecenter/SSEKCU\\_1.1.3.0/com.ibm.psc.doc/tip\\_original/dash\\_c\\_twl\\_dashboard\\_widgets.html](https://www.ibm.com/support/knowledgecenter/SSEKCU_1.1.3.0/com.ibm.psc.doc/tip_original/dash_c_twl_dashboard_widgets.html).

See this helpful tutorial about creating your own customized dashboard: <http://twsuser.org/customized-dashboard/>.

Helpful videos on designing dashboards on the DASH Wiki page.

### Related concepts:

“Monitoring your Workload” on page 179

Controlling and managing scheduling activities and objects on plans with *tasks*.

“Monitoring your Scheduling Environment” on page 176

Tasks to monitor the workstations and domains of your environment.

Chapter 1, “Navigating the Dynamic Workload Console,” on page 1

An overview to the Dynamic Workload Console.

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## Controlling job and job stream processing

How you can control job and job stream processing.

In the Dynamic Workload Console, you can control job and job stream processing by specifying dependencies, setting properties, and running actions against the job or job stream.

## Using dependencies to control job and job stream processing

A *dependency* is a prerequisite that must be satisfied before processing can proceed. You can define dependencies for both jobs and job streams to ensure the correct order of processing. You can use these types of dependencies: **Distributed**

### On completion of jobs and job streams

A job or a job stream must not begin processing until other jobs and job streams have completed. May be defined to require success or just completion.

### On satisfaction of specific conditions by jobs and job streams

A job or a job stream, named *successor*, must not begin processing until other jobs and job streams, named *predecessor*, have met one, all, or a subset of specific conditions that can be related to the status of the job or job stream, the return code, output variables, or job log content. When the conditions are not met by the predecessor, then any successor jobs with a

conditional dependency associated to them are put in **suppress** state. Successor jobs with a standard dependency or no dependency at all defined run normally.

**Resource**

A job or a job stream needs one or more resources available before it can begin to run.

**File** A job or a job stream needs to have one or more files meet the specified criteria before it can begin to run.

**Prompt**

A job or a job stream needs to wait for an affirmative response to a prompt before it can begin to run.

= You can define up to 40 dependencies for a job or job stream. If you need to define  
= more than 40 dependencies, you can group them in a join dependency. In this case,  
= the join is used simply as a container of standard dependencies and therefore any  
= standard dependencies in it that are not met are processed as usual and do not  
= cause the join dependency to be considered as suppressed. For more information  
= about join dependencies, see the section about joining or combining conditional  
= dependencies and the **join** keyword in the *User's Guide and Reference*. In a IBM  
Workload Scheduler network, dependencies can cross workstation and network  
boundaries. z/OS

/ **On completion of jobs and job streams**

/ A job or a job stream must not begin processing until other jobs and job  
/ streams have completed. May be defined to require success or just  
/ completion.

**Resource**

A job or a job stream needs one or more resources available before it can begin to run.

In addition to this, each job needs the workstation where it is scheduled to run to be available.

To add a dependency to a job or to a job stream from the Workload Designer, see "Adding and removing dependencies" on page 129.

You can also add a dependency from the panel displayed as result of your monitor task related to jobs or job streams by performing the following steps:

1. In the query result panel select a job or a job stream and click **Dependencies**.
2. In the Dependencies panel expand the section related to the dependency type you want to add and click **Add**.
3. Enter the required information and click **OK**.

For all the details about options and fields displayed in the panel, see the online help by clicking the question mark located at the top-right corner of the panel.

## Using time restrictions to control job and job stream processing

*Time restrictions* can be specified for both jobs and job streams.

For a specific job or job stream you can specify the time that processing begins, **earliest start**, or the time after which processing can no longer be started, **latest**

**start.** By specifying both, you define a time interval within which a job or job stream runs. You can use them as time dependencies.

You can also specify a **deadline** to specify the time within which a job or a job stream must complete. Jobs or job streams that have not yet started or that are still running when the deadline time is reached, are considered late in the plan. The deadline does not prevent jobs or job streams from starting.

You can also specify a **maximum duration** or a **minimum duration** for a job defined within a job stream. If a job is running and the maximum duration time has been exceeded, then the job can either be killed or can continue to run. If a job does not run long enough to reach the minimum duration time, then the job can be set to Abend status, to Confirm status awaiting user confirmation, or it can continue running.

For jobs you can also specify a **repeat range**; for example, you can have IBM Workload Scheduler launch the same job every 30 minutes between 8:30 a.m. and 1:30 p.m.

To specify time restrictions for a job or a job stream, perform the following steps:

1. From the navigation toolbar, click **Administration > Workload Design > Manage Workload Definitions**.
2. In the Workload Designer, edit the job stream you want to modify. For information about editing an object, see “Editing objects from the Working List View” on page 108.
3. Select the job or the job stream in the Details view and click the **Time restrictions** tab in the Properties section.
4. Enter the time restriction properties and save the job stream.

For all the details about options and fields displayed in the panel, see the online help by clicking the question mark located at the top-right corner of the panel.

## Using job priority and workstation fence to control distributed job processing

### Distributed

IBM Workload Scheduler has its own queuing system, consisting of levels of *priority*. Assigning a priority to jobs gives you added control over their precedence and order of running.

The *fence* provides another type of control over job processing on a workstation. When it is set to a priority level, it only allows jobs whose priority exceeds the fence value to run on that workstation. Setting the fence to 40, for example, prevents jobs with priorities of 40 or less from being launched.

To specify job priority for a job, perform the following steps:

1. From the navigation toolbar, click **Administration > Workload Design > Manage Workload Definitions**.
2. In the Workload Designer, edit the job stream you want to modify. For information about editing an object see “Editing objects from the Working List View” on page 108.
3. Select the job in the Details view and click the **Scheduling options** tab in the Properties section.

4. Enter the job priority and save the job stream.  
For all the details about options and fields displayed in the panel, see the online help by clicking the question mark located at the top-right corner of the panel.

You can also add a job priority from the panel displayed as result of your monitor task related to jobs by performing the following steps:

1. In the query result panel select a job and click **More Actions > Priority**.
2. In the Set Priority panel specify a priority value and click **OK**.

To set a workstation fence perform the following steps:

1. In the panel displayed as results of your monitor workstation task, select the workstation and click **More Actions > Fence**.
2. In the Set Fence panel specify a fence value and click **OK**.

## Using limits to control job and job stream processing

The *limit* provides a means of setting the highest number of jobs that IBM Workload Scheduler is allowed to launch. You can set a limit:

- In the job stream definition
- In the workstation definition

Setting the limit on a workstation to 25, for example, allows IBM Workload Scheduler to have no more than 25 jobs running concurrently on that workstation.

To specify a limit for a job stream, perform the following steps:

1. From the navigation toolbar, click **Administration > Workload Design > Manage Workload Definitions**.
2. In the Workload Designer, edit the job stream you want to modify. For information about editing an object see “Editing objects from the Working List View” on page 108.
3. Select the job stream in the Details view and click the **Scheduling options** tab in the Properties section.
4. Enter the limit value and save the job stream.

For all the details about options and fields displayed in the panel, see the online help by clicking the question mark located at the top-right corner of the panel.

You can also add a limit from the panel displayed as result of your monitor job stream task by performing the following steps:

1. In the query result panel select a job stream and click **More Actions > Limit**.
2. In the Set Limit panel specify a new limit value and click **OK**.

To set a workstation limit perform the following steps:

1. In the panel displayed as result of your monitor workstation task, select the workstation and click **More Actions > Limit**.
2. In the Set Limit panel specify a new limit value and click **OK**.

## Using job confirmation to control job processing

There might be scenarios where the completion status of a job cannot be determined until you have performed some tasks. You might want to check the results printed in a report, for example. In this case, you can set in the job



definition that the job *requires confirmation*, and IBM Workload Scheduler waits for your response before marking the job as successful or failed.

To specify that a job requires confirmation, perform the following steps:

1. From the navigation toolbar, click **Administration > Workload Design > Manage Workload Definitions**.
2. In the Workload Designer, edit the job stream you want to modify. For information about editing an object see “Editing objects from the Working List View” on page 108.
3. Select the job in the Details view and click the **Scheduling options** tab in the Properties section.
4. Check **Requires confirmation** and save the job stream.  
For all the details about options and fields displayed in the panel, see the online help by clicking the question mark located at the top-right corner of the panel.

## Using job recovery actions to control job processing

When you create a job definition, you can specify the type of recovery you want performed by IBM Workload Scheduler if the job fails. The predefined recovery options are:

- Continue with the next job. You can also continue with the next job after a prompt is issued which requires a response from the operator.
- Stop and do not start the next job. You can also continue with the next job after a prompt is issued which requires a response from the operator.
- Run the failed job again. You can specify also how often you want IBM Workload Scheduler to rerun the failed job and the maximum number of rerun attempts to be performed. If any rerun in the sequence completes successfully, the remaining rerun sequence is ignored and any job dependencies are released. You can optionally decide to also rerun the successors of the parent job, either all successors in the same job stream, or all successors, both in the same job stream and in other job streams, if any. In the Dynamic Workload Console, you can easily view the list of all job successors before rerunning them from the **Monitor Workload** view, by selecting the job and clicking **More Actions> Rerun with successors**.

In addition, you can specify other actions to be taken in terms of recovery jobs and recovery prompts. For example, if a job fails, you can have IBM Workload Scheduler automatically run a recovery job, issue a recovery prompt that requires an affirmative response, and then run the failed job again. For more information about recovery actions, the section about defining job rerun and recovery actions in *User’s Guide and Reference*

To specify the job recovery actions, perform the following steps:

1. From the navigation toolbar, click **Administration > Workload Design > Manage Workload Definitions**.
2. In the Workload Designer, edit the job you want to modify. For information about editing an object see “Editing objects from the Working List View” on page 108.
3. Click the **Recovery options** tab in the Properties section.
4. Enter the recovery **Action** and the remaining information, as necessary. Then save the job.

= For all the details about options and fields displayed in the panel, see the  
= online help by clicking the question mark located at the top-right corner of the  
= panel.

## \* **Modifying job instances in the plan to control job processing**

\* Even after your jobs have been submitted into the current plan, you still have  
\* opportunities to modify them without having to go back to the original job  
\* definition in the database. When modifying a job instance, you can change the  
\* definition if the job has not yet started to run, or you can change the definition of  
\* a job that has already run and rerun it with the new definition. For example, you  
\* can update a command or script, rerun a job with a different logon name or  
\* priority, or edit connection server details. Whatever the change, this is a quick and  
\* easy way to react and recover.

\* To modify the job definition of a job instance that has not yet run, perform the  
\* following steps:

- \* 1. From **Monitor Workload**, run a query on your jobs.
- \* 2. From the resulting list of jobs, select a job that has not yet run and click **More Actions > Edit Job**.
- \* 3. Modify the job definition then click **OK** to save the changes. To restore original definition, click **Reload**.

\* To rerun a job with a different definition, perform the following steps:

- \* 1. From **Monitor Workload**, run a query on your jobs.
- \* 2. From the resulting list of jobs, select a job that has already run and then click **Rerun**.
- \* 3. From the Rerun Job dialog, select **Edit Job** and then click **Edit Job**.
- \* 4. Modify the job definition then click **OK** to save the changes. To restore original definition, click **Reload**.
- \* 5. Click **Rerun** to rerun the job with the modified definition.

---

## | **Using advanced statistics to forecast the estimated duration of a job**

| A powerful statistical tool for the prediction of estimated job durations - in  
| addition to the one provided by the logman command - is available by installing a  
| subset of IBM SPSS Statistics software packaged with IBM Workload Scheduler.  
| This tool does not employ specific time series to calculate the estimated job  
| durations, as logman does. On the contrary, it uses a very sophisticated algorithm  
| on all the history of the previous ninety days to forecast the estimated durations  
| for the next five days.

| Whereas logman is tailored to provide accurate estimates when the workload is  
| subject to periodical shifts, the advanced statistical tool is ideal in case of more  
| complex patterns. For example, the tool can be particularly useful to see beyond  
| the accepted impacts of already known cyclic events, and understand what  
| apparently hidden conflicts can affect the duration of a job. It can be effective to  
| measure and forecast the durations of jobs along a critical path that occasionally  
| does not meet its deadline.

### | **Deploying the advanced statistical tool**

| To use the SPSS-based statistical tool on selected jobs to have a 5-day forecast of  
| their estimated duration, follow these steps:

1. Install the SPSS subset packaged with IBM Workload Scheduler on an agent of your choice
2. Flag the jobs that you want to be processed by the advanced statistical tool
3. Configure and import as a job stream the ELAB\_JOB\_STAT workload application template
4. Run the ELAB\_JOB\_STAT\_JS job stream after the plan has completed to calculate the estimated job durations

## Installing the SPSS statistics subset

### About this task

Install the SPSS statistics subset on an agent of your IBM Workload Scheduler network. Follow these steps to install the SPSS statistics subset:

### Procedure

1. Download or copy the .zip file IBMWorkload Scheduler Advanced Statistics Tool onto the agent from the IBM Workload Scheduler eImage according to the operating system running on the agent.
2. Unzip the file.
3. Run:
  - `./iws_spss_install.sh -inst_dir installation path` (UNIX)
  - `drive\iws_spss_install.bat -inst_dir installation path` (Windows)

where *installation path* is an installation path that you specify on the agent. You will later have to specify this installation path in one of the jobs that make up the ELAB\_JOB\_STAT\_JS job stream. If you run `iws_spss_install` with no arguments, you get the usage in return.

### Results

The installation is complete. On the AIX platform, an additional step is required to complete the installation.

### What to do next

**Attention:** For AIX platforms only. This additional configuration step is required to complete the installation.

If you are installing on an AIX platform, you must modify the JobManager.ini file as follows to complete the installation:

1. Locate the JobManager.ini file on the local agent instance where the SPSS job will run. The file is located in the *TWA\_home/TWS/ITA/cpa/config* directory on the agent.
2. In the [ITA Env] section of the file, modify the value of the LIBPATH keyword by appending the following text displayed in bold typeface. The entire value must be entered in a single continuous row. This example assumes that SPSS was installed in the /opt/IBM/SPSS folder:

```
[ITA Env]
SHLIB_PATH = $SHLIB_PATH:..
LIBPATH = $LIBPATH:/home/spss_075/TWS/JavaExt
/jre/jre/bin/j9vm:/home/spss_075/
TWS/JavaExt/jre/jre/bin/j9vm/../../lib/ppc64
:/opt/IBM/SPSS:/opt/IBM/SPSS/ext/
```

```

bin/pasw.adp:/opt/IBM/SPSS/ext/bin/pasw.aedata:
/opt/IBM/SPSS/ext/bin/pasw.alm:/
opt/IBM/SPSS/ext/bin/pasw.bagging:/opt/IBM/SPSS
/ext/bin/pasw.boosting:/opt/IBM/
SPSS/ext/bin/pasw.cognos:/opt/IBM/SPSS/ext/bin
/pasw.common:/opt/IBM/SPSS/ext/
bin/pasw.externalrule:/opt/IBM/SPSS/ext/bin
/pasw.glm:/opt/IBM/SPSS/ext/bin/
pasw.me:/opt/IBM/SPSS/ext/bin/pasw.netezzaindb:
/opt/IBM/SPSS/ext/bin/
pasw.neuralnet:/opt/IBM/SPSS/ext/bin/pasw.outerpartition:
/opt/IBM/SPSS/ext/
bin/pasw.pmm1merge:/opt/IBM/SPSS/ext/bin/pasw.psm:
/opt/IBM/SPSS/ext/bin/
pasw.scoring:/opt/IBM/SPSS/ext/bin/pasw.simulation:
/opt/IBM/SPSS/ext/bin/
pasw.split:/opt/IBM/SPSS/ext/bin/pasw.stb:/opt/IBM
/SPSS/ext/bin/pasw.tm1:/
opt/IBM/SPSS/ext/bin/pasw.transformation:/opt/IBM
/SPSS/ext/bin/pasw.tree:/opt/
IBM/SPSS/ext/bin/pasw.xmldata:/opt/IBM/SPSS/ext
/bin/spss.C5:/opt/IBM/SPSS/ext/
bin/spss.bayesiannetwork:/opt/IBM/SPSS/ext/bin
/spss.binning:/opt/IBM/SPSS/ext/
bin/spss.cplex:/opt/IBM/SPSS/ext/bin/spss.dataview:
/opt/IBM/SPSS/ext/bin/
spss.inlinesp:/opt/IBM/SPSS/ext/bin/spss.knn:
/opt/IBM/SPSS/ext/bin/
spss.modelaccreditation:/opt/IBM/SPSS/ext/bin/
spss.modelevaluation:/opt/IBM/SPSS/
ext/bin/spss.optimization:/opt/IBM/SPSS/ext/bin
/spss.predictoreffectiveness:/opt/
IBM/SPSS/ext/bin/spss.predictorstat:/opt/IBM/SPSS
/ext/bin/spss.propensitymodelling:/
opt/IBM/SPSS/ext/bin/spss.selflearning:/opt/IBM
/SPSS/ext/bin/spss.svm:/opt/IBM/SPSS/
ext/bin/spss.xd:/opt/IBM/SPSS/jre/bin/classic:
/opt/IBM/SPSS/jre/lib/ppc64:/opt/IBM/
SPSS/jre/lib/ppc64/j9vm:/opt/IBM/SPSS/jre/bin
LD_LIBRARY_PATH = $LD_LIBRARY_PATH:.

```

3. Save the changes to the file.

## Selecting the jobs to be measured by the advanced statistical tool

To select the jobs for which the estimated duration is to be forecasted by the SPSS\_based tool, you can use either the composer command line or the Dynamic Workload Console. In either case you update the definition of the job within the job stream definition.

### In composer:

1. Open the job stream definition that includes the jobs that you want to flag.
2. Flag the jobs by adding the statisticstype custom keyword in their definition.

### In the Dynamic Workload Console:

1. In Manage Workload Definitions, edit the job stream definition that includes the jobs that you want to flag.
2. In the job stream definition, select every job you want to flag to open its definition.
3. In the Properties panel of the job, select the Duration forecast tab.

4. In Duration forecast, select the Use Advanced analytics checkbox.

You can change your selection anytime around your workload. The jobs that are not flagged for advanced statistics have their estimated duration calculated by logman (see IBM Workload Scheduler User's Guide and Reference for details).

While you do not have to take additional steps to have estimated job durations calculated by logman, to have them calculated by the advanced statistical tool you must also create and customize the ELAB\_JOB\_STAT\_JS job stream as described next.

The estimated durations of the flagged jobs are, however, calculated by the SPSS-based advanced statistical tool only when you run the ELAB\_JOB\_STAT\_JS job stream after running the plan (JNextPlan).

## Importing and configuring the ELAB\_JOB\_STAT\_JS job stream

The ELAB\_JOB\_STAT workload application template (WAT) is provided as a zip file together with the installation code of the SPSS software subset. You must unpack the workload application template from the zip file and import it to the master domain manager of your network as a job stream. The ELAB\_JOB\_STAT\_JS job stream is made up of three jobs that you must configure before you can run it once the plan has completed.

ELAB\_JOB\_STAT\_JS must be launched after the plan has run. Its function is to:

1. Search the plan for all the flagged jobs, get their past duration histories (of up to 90 days), and copy them into the exportjobstat.zip file.
2. Export exportjobstat.zip to the SPSS-based statistical tool (which calculates the estimated durations of the flagged jobs for the next 5 days and copies them in the importjobstat.zip file).
3. Import importjobstat.zip and make the estimated durations (and their confidence intervals) available in conman and in the Dynamic Workload Console.

To create and customize the ELAB\_JOB\_STAT\_JS job stream, follow these steps:

1. To create the ELAB\_JOB\_STAT\_JS job stream:
  - a. Find the custom\_stats\_wat.zip file in the same medium from where you extracted the installation file of the SPSS software subset.
  - b. Download this file, unpack it, and find the ELAB\_JOB\_STAT\_WAT\_Mapping.UTF8.properties file.
  - c. Edit ELAB\_JOB\_STAT\_WAT\_Mapping.UTF8.properties to replace the value of the WORKSTATION\_ELAB\_JOB\_STAT\_WS key with the name of the agent workstation that is to run the ELAB\_JOB\_STAT job stream.
  - d. Use the following command to import the modified WAT file in to the master domain manager:

```
wappman -import ELAB_JOB_STAT_WAT_Definitions.UTF8.xml ELAB_JOB_STAT_WAT_Mapping.UTF8.properties
```

See IBM Workload Scheduler User's Guide and Reference for reference on workload application templates.

The ELAB\_JOB\_STAT\_JS job stream is thus created. It includes the following jobs that you need to customize:

- EXPORT\_JOB\_STAT

- ELAB\_JOB\_STAT
- IMPORT\_JOB\_STAT

The name of the workstation that is to run the job stream is the one you provided when you edited the properties file of the workload application template.

2. To customize the ELAB\_JOB\_STAT\_JS job stream:

- Open EXPORT\_JOB\_STAT and IMPORT\_JOB\_STAT for editing. These jobs are RESTful Web Services jobs. In composer edit the JSDL definition. In the Dynamic Workload Console right click the jobs in the job stream definition and select Open Job Definition:
  - In Authentication, enter the login user name and password
  - In Actions, enter the host name and port of the master domain manager in the Service URI field
- Open ELAB\_JOB\_STAT for editing. The type of this job is SPSS Job Duration Prediction. In composer edit the JSDL definition. In the Dynamic Workload Console right click the jobs in the job stream definition and select Open Job Definition:
  - In SPSS Job Duration Prediction, enter the installation path of the SPSS software subset in the Installation directory field
  - In SPSS Job Duration Prediction, specify the path names to the exportjobstat.zip and importjobstat.zip files. The directories must already exist before the job stream is run.

## Running the ELAB\_JOB\_STAT\_JS job stream and viewing results

Submit the ELAB\_JOB\_STAT\_JS job stream after JNextPlan has run. Optionally, schedule the job stream to run regularly after JNextPlan (after the FINAL job, if it exists).

The estimated durations and the related confidence intervals can be viewed, as it happens with the values calculated by the logman command, in the following ways:

### Conman command line

As the output of:

```
showjobs job_name;props
```

### Dynamic Workload Console

In one of the following views:

- Monitor jobs
- Job properties
- Critical path
- Gantt

---

## Chapter 12. Working with Plans

The main tasks that involve plans.

This section contains the main tasks that involve plans. You can find information about selecting the working plan, creating trial and forecast plans, monitoring the progress of a plan, and generating a graphical plan view or a preproduction plan view.

---

### Selecting the working plan

How to select the plan against which tasks are run.

When you monitor the processing of your scheduling activities, you can choose the plan you want to work with. This plan is called the active plan.

There are several ways of defining the active plan. By default, the active plan is the default plan, which is associated to the engine connection. However, you can select a different plan and define it as active in the following ways:

#### “Associating a plan to the task”

Every time the task is run, it is run using the specified plan. Usually this setting is useful if you want to run multiple queries at the same time against different plans. To run the task on a different plan, you must either change this selection or use a temporary plan selection that lasts only until the current session expires. This plan selection takes precedence over all other selections and is the first to be used. It is made during the task creation when specifying the engine connection in the Enter Task Information panel.

#### “Dynamically defining a temporary plan” on page 212

You can set a temporary plan selection. This plan is used as the active plan for the current session only. All tasks and engines that have been set to use the active plan will use the currently defined plan. This plan selection is valid unless a different plan is defined as the active plan in the Enter Task Information panel.

#### “Associating a plan to an engine” on page 212

If none of the above settings are specified, tasks are run against the plan associated to the engine. By default, this plan and the active plan are the same.

### Associating a plan to the task

To associate a plan to a task, perform the following steps:

1. In the navigation bar, click **System Status and Health > All Configured Tasks > New**.
2. In the All Configured Tasks panel, select the type of task you want to create and click **Next**.
3. In the Enter Task Information panel, select a distributed engine as the scheduler engine where you want to run the task. If you select **Ask when needed**, you cannot perform the next steps.
4. Click **Select** to specify the plan that you want to associate to this task. Unless you change this selection, this task is always run against this plan.

Alternatively, click **Use Active Plan**, if you want this task to run using the plan that is set as the active plan in the plan list panel.

5. In the Select Plan panel, select the plan that you want to associate to this task and click **OK** to return to the Enter Task Information panel.

If you do not select any plan, the task uses the plan set as active. You can change the active plan by following the procedure described in “Dynamically defining a temporary plan.”

## Dynamically defining a temporary plan

From the **Manage Available Plans** entry in the navigation toolbar, you can specify some filtering criteria to retrieve a list of plans.

Regardless of whether you are the owner of the engine connection or if it is only shared with you, you can select a plan from the list to define it as the active plan for the current session.

Follow these steps to define a filter and run a query to create a list of available plans:

1. From the navigation toolbar, click **Planning > Workload Forecast > Manage Available Plans**.
2. In the Manage Available Plans panel:
  - a. Under **Select an Engine**, select the engine where you want to list the plans.
  - b. Under **Select Plan Type**, click the corresponding check box to select the type of plan you want to list. Selections are mutually exclusive. By default, all available plans are listed.
  - c. Under **Select Plan Name**, specify the name of the file containing the plan you want to search. You can use wildcard characters.
  - d. Click **Display Plans List** to generate a list of plans.
3. From the displayed list, select a plan and click **Set as active** to set it as a temporary plan that remains valid until the current session expires or you set another active plan.

Only for the current session, the plan selection made in this panel overrides the plan selection specified in the engine connection properties panel. However, it does not override the plan selection specified during the task definition.

## Associating a plan to an engine

To associate a plan to an engine, perform the following steps:

1. From the navigation bar, click **System Configuration > Manage Engines**.
2. In the Manage Engines panel, select an engine and click **Connection Properties**.
3. Under the Plans section, click **Select** to view a list of the available plans.
4. Choose a plan from the list and click **OK**. This setting is overridden by the plan selection made in the Enter Task Information panel or, if not available, by the selection made in the List Available Plans panel.

### Related concepts:

“Plans” on page 83

Different types of plans you can access to manage the objects and the activities they contain.



---

## Generating Trial and Forecast Plans

How you create either a new trial or forecast plan.

### About this task

To create a new plan, perform the following steps:

### Procedure

1. From the navigation toolbar, click **Planning > Workload Forecast**

#### Create Trial Plan

To create a trial plan. The Create Trial Plan panel is displayed.

#### Create Forecast Plan

To create a new forecast plan. The Create Forecast Plan panel is displayed.

2. Under the **Plan Information** section, enter the required information:

#### Engine Name

In the drop-down menu, select the engine where you want to create the plan. Only the engine connections that you created are available in the menu.

#### Plan Filename

Assign a name to the file that contains the plan. This is a mandatory field.

3. Under the **Plan Start** section, assign the date and time when the plan starts. Because the trial plan is mainly an extension of an existing and processing current plan, if you selected to create a new trial plan and a current plan is available on the engine, these fields are grayed out and their values are the same as the current plan end date. If you selected to create a new trial plan and a current plan is not available on the engine, or if you selected to create a new forecast plan, you can enter a date and time for the plan to start.
4. Under the **Plan End** section, assign one of the following values:
  - A date and time when the plan ends.
  - The number of days and hours the plan lasts.

By default the plan covers a one-day time interval.

5. Under the **Plan Time Zone** section, choose the time zone used in the plan.
6. Click **OK** to create the plan.

#### Related concepts:

"Plans" on page 83

Different types of plans you can access to manage the objects and the activities they contain.

---

## Display a graphical plan view

Specify filter criteria and display a graphical representation of the plan in the Plan View.

### About this task

To display a graphical representation of the plan, you can specify multiple filter criteria to match objects in the plan and display them in the plan view.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

To display a Show Plan View, perform the following steps:

## Procedure

1. In the navigation bar, click **System Status and Health > Workload Monitoring > Show Plan View**
2. Specify the engine on which you want to search for the scheduling objects to display in the view.
3. Use the fields in the Filter Criteria section to limit the number of job streams displayed in the result. You can filter based on the names of job streams and workstations (distributed systems only),
4. You can also filter on the starting times of the job streams and decide if you want to include predecessors and successors in the Plan View.
5. Select **Auto refresh view on a timer** to refresh the Plan View at regular intervals. By default, the view is refreshed every 300 seconds (5 minutes). You can control the auto refresh through timer controls on the toolbar to pause, stop, and resume the auto refresh. You configure the default auto refresh interval by setting the **DefaultTime** property in the **PlanViewAutorefresh** section of the `TdwcGlobalSettings.xml` configuration file. See “Plan View auto refresh interval” on page 33.
6. Click **Go** when you are ready to see the results displayed in the graphical plan view.

## Results

The Plan View is a graphical representation of a filtered set of the job streams that make up the plan. Using the Plan View toolbar, you can perform several actions on the objects displayed. You can also modify the original filter criteria to update the display. For more information about the objects in the view, see “Graphical views in the plan” on page 269.

## What to do next

There are several actions you can perform on the objects displayed in the Plan View:

- Use the actions available from the toolbar that include modifying the original filter criteria that was set to change the objects displayed.
- Right-clicking a job stream reveals a number of actions that you can perform on the job stream:
  - Perform an action such as Cancel, Hold, Release, and add or remove a dependency.
  - Launch and display the job stream in the What-if analysis Gantt chart.
  - View the jobs in the job stream by launching the in-context link to the Job Stream View.
  - Open the job stream definition within the Workload Designer
  - Perform actions on the workstation such as Link, Unlink, Start, and Stop.
  - View workstation properties.

=  
=  
=

- Single-click a job stream to reveal an info-rich tooltip. The tooltip also includes a color-coded status bar that indicates the status of jobs such as, the number of failed jobs, successful jobs, jobs in abend, or jobs in waiting.

**Related concepts:**

“Plans” on page 83

Different types of plans you can access to manage the objects and the activities they contain.

**Related information:**

“Graphical views in the plan” on page 269

Views to monitor the progress of your job streams in the plan in a graphical map.

---

## Display a graphical preproduction plan

How to view a graphical representation of a preproduction plan from the Dynamic Workload Console.

### About this task

The preproduction plan is used to identify in advance the job stream instances and the job stream dependencies involved in a specified time period.

This improves performance when generating the production plan by preparing in advance a high-level schedule of the predicted production workload.

The preproduction plan contains:

- The job stream instances to be run during the time interval covered by the plan.
- The external dependencies that exist between the job streams and jobs included in different job streams.

From the Dynamic Workload Console you can view the preproduction plan graphically. You can open the preproduction plan in view mode only; you cannot extend it from this panel.

All users are allowed to view the preproduction plan. However, the preproduction plan content depends on the permissions you have on job streams. You can see only the job streams that you are allowed to see.

To open the preproduction plan view, perform the following procedure:

### Procedure

1. From the navigation toolbar, click **Planning > View Preproduction Plan**.
2. In the displayed panel, select the distributed engine whose preproduction plan you want to view.
3. Optionally, specify a filter to reduce the number of job streams shown in the view. Only the job streams matching the string you entered as a filter are displayed in the preproduction plan view. By default, all job streams are shown. You can change your filtering criteria directly from the preproduction plan graphical view panel.
4. Specify the start and end dates to view only a portion of your preproduction plan. If you do not specify any date, the whole plan is shown. Optionally, you can organize the view by grouping the job streams by scheduled date.

## Results

The graphical view of the preproduction plan is displayed. In this view, you can view the job streams included in the plan together with their job stream dependencies. Each box represents a job stream, whose color indicates the status. By default, it shows a maximum number of 1,000 job streams.

If you want to change this setting, modify the property **preProdPlanViewMaxJobstreams** in the “Override graphical view limits” on page 32 file.

There are several actions you can perform on the objects displayed in the Preproduction Plan View:

- Right-click a job stream, to open the job stream definition within Workload Designer. You can modify a job stream from the Workload Designer and then reload the updated preproduction plan view.
- Use the actions available from the toolbar:
  - Zoom in and zoom out to better view segments of the plan.
  - Print the plan or export it to either .svg (Scalable Vector Graphics) or .png (Portable Network Graphics) format.
  - Highlight the dependencies in the view.
  - Modify the original filter criteria that was set to change the objects displayed.

### Related concepts:

“Preproduction plan” on page 85

---

## Analyzing the impact of changes on your environment

How to apply changes to your plan and see the related impact displayed in a Gantt chart.

The What-if Analysis visualizes the current plan in real time, displaying the current status of jobs and job streams, the planned start and end times, deadline, and the risk level associated to each job or job stream. The analysis is launched from any job or job stream in a distributed environment, or from any critical job or job that is part of a critical network in a z/OS environment. This feature is supported on version 9.3 engines or later. The current plan is visually represented in a Gantt chart. A Gantt chart is a time and activity bar chart that is used for planning and controlling projects or programs that have a distinct beginning or end. In a Gantt chart, each main activity that is involved in the completion of the overall project or program is represented by a horizontal bar. The ends of the bar represent the start and end of the activity. In IBM Workload Scheduler, each activity represents a job or job stream.

Use the What-if Analysis to simulate and evaluate the impact of changes on the current plan. For example, if you know that a required file will be made available later than expected, you can evaluate the effects on the whole plan of the delay in the delivery of the file and see in detail which jobs and job streams risk missing their deadlines. For example, if you know that a specific workstation is scheduled to undergo a programmed maintenance operation, you can simulate the impact of the missing workstation on the overall plan.

Drag and drop each job or job stream along the horizontal time axis to see how this changes the job or job stream status with respect to its planned deadline. For example, if you move a job too close to its planned deadline, its status changes to

indicate a potential problem. When you move a job or job stream, its dependencies are maintained and automatically recalculated. You can also add and remove successors and predecessors for each job or job stream.

If you need to enlarge the scope of your analysis, you can add more job streams and jobs to the Gantt view using the **Show Jobs** and **Show Job Streams** (distributed only) buttons. This operation performs a search on the current plan and adds the selected jobs or job streams with the related predecessors and successors.

You can also highlight the critical path for a selected job or job stream along with its successors and predecessors. Modify the job duration, start time, and end time, add or delete successors and predecessors and see how this affects the whole critical path.

Under **More Actions** tab of the context menu you can find the **Workstation Unavailability Intervals** page where you can select intervals of time when the workstation will be unavailable. Use **Simulate Job Stream Submit** (distributed only) to simulate the impact of submitting a job stream. The predecessors and successors will not be matched automatically.

If you want to view the current plan again, click **More Actions > Reset** to revert the What-if Analysis to the current plan status.

Running the What-if Analysis before carrying out the actual plan shows your predicted results at a glance, and, by seeing the results beforehand, you can plan for any potential problems before you start.

Any changes that you make in What-if Analysis are applied for simulation purposes until you use the option **Apply changes** to the actual plan with exception to a z/OS environment where changes are made for simulation purposes only.

You can disable the What-if Analysis in your environment by setting the **optman enWhatIf | wi** global option to *no* (default value is *yes* ). If you change this global option value, run "JnextPlan" to make the change effective. For additional information about **optman** global options , see the Administration Guide.

The **enWhatIf | wi** global option interacts with the **enWorkloadServiceAssurance | wa** global option, which enables or disables privileged processing of mission-critical jobs and their predecessors. For details about the interaction between the What-if Analysis and the Workload service assurance, see the Administration Guide.

If you want to extend the What-if Analysis to plans other than the current plan, consider that the maximum number of plans that you can analyze simultaneously is 5.

If you want to use the What-if Analysis on the backup master domain manager, ensure that on the backup master you have the same user definition as on the master domain manager.

If the administrator has enforced the related policy, when you apply the changes to the actual plan, a panel is displayed, where you enter the reason why the change was implemented, the ticket number, if any, and the category of the change. For more information about the justification policy, see Chapter 14, "Keeping track of changes to scheduling objects," on page 223.

**Related tasks:**

“Creating a task to Monitor Critical Jobs” on page 182  
Why and how you can create a Monitor Critical Jobs task.

---

## Chapter 13. Submitting Workload on Request in Production

How you can insert jobs or job streams into your workflow at any time.

### About this task

In addition to the jobs and job streams that are scheduled to run in production, you can also submit at any time other jobs and job streams. However, these jobs and job streams are not considered when identifying predecessors for jobs and job stream dependencies.

In production you can:

#### **Distributed** Submit Ad Hoc Jobs

This is a job that is:

- Not defined in the database.
- Used to run a command or a script in production.

#### **Distributed** Submit Predefined Jobs

This is a job that is:

- Defined in the database.

#### Submit Predefined Job Streams

This is a job stream that is:

- Defined in the database.

See the following sections for instructions about inserting each of these types.

---

## Submitting ad hoc jobs

### **Distributed**

How to add an ad hoc job to the current plan.

### About this task

To add an ad hoc job to the current plan, perform the following steps:

#### Procedure

1. From the navigation toolbar, click **Administration > Workload Submission > Submit Ad Hoc Jobs**.
2. In the displayed panel, select, from the drop-down list, the engine where you want to run the job, and click **Go**.
3. Enter all the required information about the job that you want to add. For more details about the information to enter in this panel, see the screen help, which you can open by clicking the question mark located at the top-right corner of the panel.
4. Click **OK** to save your changes, exit the panel and submit the job.

---

## Submitting predefined jobs

**Distributed**

How to insert a predefined job into the production plan.

### About this task

To add a predefined job to the current plan, perform the following steps:

### Procedure

1. From the navigation toolbar, click **Administration > Workload Submission > Submit Predefined Jobs**.
2. In the displayed panel, select, from the drop-down list, the engine where you want to run the job, and click **Go**.
3. Enter all the required information about the job that you want to add. For more details about the information to enter in this panel, see the screen help, which you can open by clicking the question mark located at the top-right corner of the panel.
4. Click **OK** to save your changes, exit the panel and submit the job.

---

## Submitting predefined job streams

How to insert a predefined job stream into the current plan.

### About this task

To add a predefined job stream to the current plan, perform the following steps:

### Procedure

1. From the navigation toolbar, click **Administration > Workload Submission > Submit Predefined Job Streams**.
2. In the displayed panel, select, from the drop-down list, the engine where you want to run the job.
3. Enter all the required information about the job stream that you want to add. For more details about the information to enter in this panel, see the screen help, which you can open by clicking the question mark located at the top-right corner of the panel. To find the job stream that you want to submit, you can launch searches based on part of the job stream name, workstation name, alias or variable table associated to it.
4. Optionally, specify a scheduled time to submit the job stream.
5. After completing the panel, click **Submit** to submit your job stream in the plan. Close the tab to exit discarding your changes.

---

## Setting properties for ad hoc jobs and predefined jobs and job streams

This topic describes how to specify all the settings and properties required to add jobs or job streams to the current plan.



## About this task

To set the properties required to add jobs or job streams to the current plan, perform the following steps.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

### Procedure

1. Enter the required information in the **General** section.
2. For predefined and ad hoc jobs only: under the **Task** tab, enter the task properties for the job in the displayed panel.
3. Select the **Time Restrictions** tab, and enter the required information in the displayed panel to set time restrictions for the job or job stream.
4. Select the **Resources** tab to set resource dependencies.
  - To create a new resource, click **New** and enter the required information in the Info panel.
  - To delete an existing resource, select it from the list and click **Delete**.
  - To modify a resource listed in the table, double-click its name and edit its properties in the Info panel.
5. Select the **Prompts** tab to set prompts as dependencies for the job or job stream.
  - To create a new prompt, click **New** and enter the required information in the Info panel.
  - To delete an existing prompt, select it from the list and click **Delete**.
  - To modify a prompt listed in the table, double-click its name and edit its properties in the Info panel.
6. Select the **Files** tab to set file dependencies for the job or job stream.
  - To create a new file, click **New** and enter the required information in the Info panel.
  - To delete an existing file, select it from the list and click **Delete**.
  - To modify the file properties, double-click the file and edit the settings in the displayed table.
7. Select the **Internetwork Predecessors** tab to add predecessor dependencies from a remote IBM Workload Scheduler network. The displayed panel shows existing internetwork predecessor properties.
  - To create a new internetwork predecessor, click **New** and enter the required information in the Info panel. Click the ... (Browse) button to search for and select the name of the network agent. Internetwork dependencies require that a network agent is configured to communicate with the external scheduler network.
  - To delete an existing internetwork predecessor, select it from the list and click **Delete**.
  - To modify an existing internetwork predecessor properties, double-click it, and edit its settings.
8. Select the **Predecessors** tab to set predecessor dependencies for the job or job stream. The displayed panel shows existing predecessor properties. Select **Conditional Dependencies** option to specify the type of the conditional dependency.
  - To create a new predecessor, click **New** and enter the required information in the displayed panel.

- To delete an existing predecessor, select it from the list and click **Delete**.
- To modify an existing predecessor properties, double-click it, and edit its settings in the displayed table.

---

## Chapter 14. Keeping track of changes to scheduling objects

How to keep track of changes in your environment

From the Dynamic Workload Console, IBM Workload Scheduler administrators, operators, and schedulers can review all changes to scheduling objects, both in the database and in the plan, discover which user performed a specific change, and the time and date when the change was performed.

Schedulers can review the history of all changes made on a specific object at any time and check previous versions of the object in scheduling language.

Historical information is available for each scheduling object in the Workload Designer in the **Versions** tab and in the results of the **Monitor Workload** query.

### Auditing justification and reporting

Administrators can maintain an audit trail, consisting of detailed information about the user who performed the change, the time and date when the change was performed, the reason why the change was implemented, and the details of the change for every modified item.

Administrators can optionally enforce a policy by which each user making a change to an object must provide a justification for the change.

They can produce a report containing information on all changed objects or on a subset of such objects.

You can audit both information available in the plan and in the database. By default, auditing is enabled. To disable auditing, use the following global options:

#### **enDbAudit**

Enables auditing of the information available in the database.

#### **enPlanAudit**

Enables auditing of the information available in the plan.

You can store auditing information in a file, in the IBM Workload Scheduler database, or in both. To define in which type of store to log the audit records, use the **auditStore** global option. For more information about global options, see the related section in the *Administration Guide*.

To enforce a policy by which each user making a change to an object from the Dynamic Workload Console must provide a justification for the change, see “Auditing justification and reporting” on page 224.

To enforce the policy when making changes from the command-line programs see:

- The **composer** command-line program in the *User's Guide and Reference* .
- The **conman** command-line program in the *User's Guide and Reference*.
- The **optman** command-line program in the *Administration Guide*.
- The **wappman** command-line program in the *User's Guide and Reference*.

All audited information is available in a Tivoli Common Reporting report. For more information about Tivoli Common Reporting reports, see “Tivoli Common Reporting reports” on page 236 .

## Versioning

Application developers and schedulers can compare and restore previous versions of each changed object because IBM Workload Scheduler Workload Automation on Cloud maintains all previous versions for the whole set of objects.

Schedulers can also view the differences between versions using a comparison viewer, compare the differences, and rollback to a previous version.

Previous versions of changed objects are available in scheduling language.

## Release management

Application developers and schedulers can promote the job workflow from development to test or production environments. An enhanced versioning capability keeps track of differences between different versions in the test and production environments to avoid conflicts.

They can also promote changes from production to pre-production or development environments to apply in the preproduction environments last-minute changes implemented into the active plan.

To move their workflows they can create and export a workload application template, a compressed file containing one or more job streams with all the related jobs and internal or external dependencies (such as files, resources, prompts). A workload application template is a self-contained workflow that you can import into a target environment.

Any mismatches in the versions of objects between development and production environments are seamlessly managed and resolved. For more information about creating and importing workload application templates, see “Creating a workload application template” on page 149.

---

## Auditing justification and reporting

### Distributed

Enforcing justification policies and maintaining auditing reports

### About this task

From the Dynamic Workload Console, administrators can enforce a policy by which each user making a change to an object must provide a justification for the change. From the Dynamic Workload Console, administrators perform the following steps:

1. From the navigation toolbar, click **Administration**.
2. In the **Workload Design** section, select **Auditing Preferences**.
3. For each displayed engine, you can enable the justification policy. After enabling the justification policy, decide which fields (Category, Ticket, and Description) are required.

4. Optionally create a new category to be added to the default ones in the lower section of the panel.

5. Optionally click on **Ticket required** to specify the address of the ticketing server and the specific syntax supported on the server, for example:  
`https://ticket.server.com/tickets/{ticketnumber}`, where:

`https://ticket.server.com/tickets/`

is the ticketing server sample address

`{ticketnumber}`

is the ticket number to be provided by the user

After the justification policy is enabled, the justification panel is displayed each time a user performs a change in the Workload Designer. The related changes are stored for auditing purposes in the IBM Workload Scheduler database, in a file or in both, depending on the value you set in the **auditStore** global option.

For more information about global options, see the *IBM Workload Scheduler: Administration Guide*.

For more information about enabling the storage of auditing information from the command line, see the following commands:

- The **composer** command-line program in the *User's Guide and Reference*.
- The **conman** command-line program in the *User's Guide and Reference*.
- The **optman** command-line program in the *Administration Guide*.
- The **wappman** command-line program in the *User's Guide and Reference*.

---

## Checking version information

**Distributed**

Work with previous versions of your scheduling and security objects.

### About this task

IBM Workload Scheduler maintains all previous versions, both for scheduling and security objects. From the Dynamic Workload Console you can view and edit object definitions and check the related version information.

Depending on your object type, select the **Versions** tab or the **Show versions** button. For each object, you can view the history of changes, discover which user performed a specific change, the time stamp, and the reason for the change. You can also display previous versions in scheduling language.

For the object in the database, you can compare different versions in a comparison viewer. Perform the following steps:

- Open the object in edit mode and, depending on your object type, select the **Versions** tab or the **Show versions** button.
- Select the two versions that you want to compare.
- Click on **Compare**.
- A comparison viewer opens that highlights the differences between the two versions.

For the object in the Workload Designer, you can also restore a previous version. Perform the following steps:

- From the Workload Designer, open the object in edit mode and select the **Versions** tab.
- Select the version that you want to revert to.
- Click on **Restore...** to start the restore process.
- The selected version is opened in edit mode. Review the object definition and save it.

---

## Auditing justification and reporting- a business scenario

Keep your scheduling environment under control

Jason and Tim both work for S&L, a primary brokering company. Tim is a IBM Workload Scheduler administrator and he must be in control of every aspect of the scheduling process. Just when he is getting ready to leave, his boss calls him with an urgent request: he needs a complete audit report of last year's activities for the Toronto branch. Tim is in a hurry and it is getting late.

However, with IBM Workload Scheduler, he can easily trace all changes and quickly find out who did what and why.

In the Dynamic Workload Console, Tim requires that justification information be provided for each change to an object by setting the **Auditing Preferences**. The requirement applies to all objects on the specified engines. Each time a user performs a change on an object, they have to specify a reason for making the change. Based on this information, Tim can produce a report containing all information about who, when, why, and what has changed for each modification on each scheduling object.

Tim's colleague, Jason, is an IBM Workload Scheduler operator and he needs to make sure that his workflows run smoothly. However, this is not always the case: an error has occurred and Jason must understand what happened. The PAYROLL job stream has failed unexpectedly. In the Workload Designer, Jason can see that some jobs were modified yesterday and why. He then applies the same correction to the one remaining job and restarts the job stream. With the correction applied, the job stream now runs correctly.

You can find more information and the detailed business scenario in the Stay in control of your workload video.

---

## Streamline release management - a business scenario

Deploy new products, features, and fixes faster.

If you can reduce the amount of time it takes to push a code change into production, then you also reduce costs and maximize productivity, efficiency, and reliability. Code changes are usually triggered by a new feature or release, a minor enhancement stemming from a change request, or an emergency situation where a hot fix needs to be implemented.

Code changes also need to be continuously tested, integrated and built, and they often need to undergo an approval process before they can be promoted. To deliver business value, your release management process cannot suffer lag time from manual, error-prone processes that would slow down the development team's productivity.

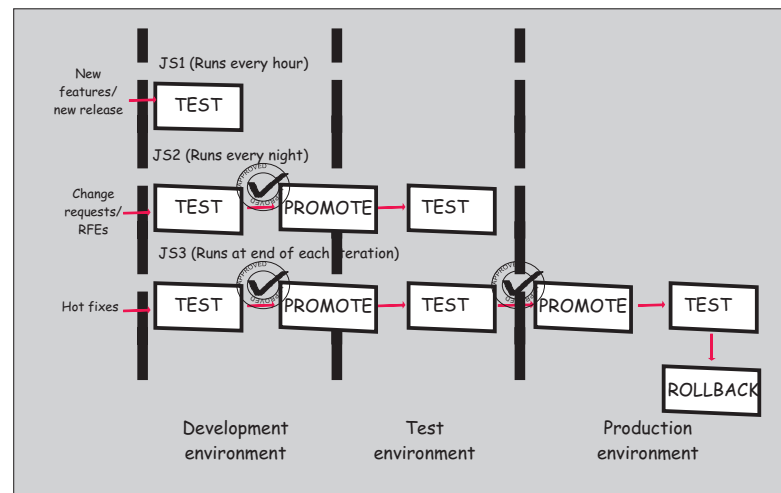
IBM Workload Scheduler can automate and control the entire process from the introduction of the code change to the promotion into production. With IBM Workload Scheduler workload application templates, you can easily replicate a job flow from one environment to another through a quick and easy import and export operation.

## Business scenario

Rob is an application developer for an insurance company. He writes code for new releases, new features and enhancements, and hot fixes. His company applies agile methodology to their business development model. Agile is both iterative and incremental, with continuous improvement, that means that at the end of each abbreviated, repetitive cycle, a shippable deliverable is produced and can be deployed. This also means that in a short, abbreviated time slot, the development team is developing and testing and then promoting into production. The teams need an up-to-date environment with the latest code changes running at all times. Running a process like this manually is time consuming and error prone. Here's where Rob's colleague Marnie can help. Marnie is a scheduler. She suggests that rather than implement and run the release management system manually, that they could automate and schedule the development, test, and promotion into production of the process.

Rob maps the process to jobs, job streams, dependencies, prompts and any other scheduling objects needed to replicate the process. Here's what his workload includes:

- A job stream, JS1, is created to run a job every hour that runs an automation test suite that tests the code change.
- A job stream, JS2, that runs every night that contains jobs that, through a script, export the environment to a workload application template and then imports the template to deploy the environment into the test environment. Approval is obtained through a prompt. Another job is triggered to run a new automation test suite in the test environment.
- A third job stream, JS3, that runs at the end of each iteration and automatically tests and promotes after approval into the test environment and then again in the production environment. Finally, a job that performs a rollback if the test job fails.



Standardizing and automating your business processes ensures your deliverable is consistent every time guarantees a high level of quality, frees up human resources,

saves money, and guarantees faster time to market.

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## Version control - a business scenario

Gain full control of changes in your scheduling environment.

Version control is most often used to track and control changes to software source code. However, to meet change management and auditing requirements, version control must also be applied to the scheduling objects, like jobs and job streams, associated to a certain application.

IBM Workload Scheduler is a modern, advanced workload automation solution supporting Version Control. IBM Workload Scheduler maintains all versions of your scheduling objects in the database, and you can easily access them from the Dynamic Workload Console. For each scheduling object, you can view the history of changes, discover which user made a specific change, the time stamp of the change, and the reason for the change. Then, you can compare two different versions in a comparison viewer and restore a previous version.

### Business scenario

Rob works as an application developer in a large healthcare company. Marnie works as a scheduler in the same company. Rob is working on the new release of an application for smart diagnostics. He prepares the full set of scheduling objects, jobs and job streams, associated to the application, and validates them in the test environment. The deadline has arrived, Rob is confident that the new release can be deployed in the production environment. He just makes a last minute change to the input file path for a java class in the DefineDiagnostics job. Time is running out and Rob leaves the office without verifying his last change.

The day after, Marnie, the scheduler, opens the Monitor Workload view and checks the job results for the daily plan. She is surprised to find out that the healthcare application job stream is blocked. The DefineDiagnostics job that has always completed successfully, today has ended abnormally. From the Workload Designer user interface, Marnie opens the failing job definition in edit mode. On the Versions page, she looks at the history of changes and realizes that Rob made a last minute change the day before.

Marnie can compare the failing job definition with the previous one, with no manual effort. By opening the comparison viewer and by looking at the differences between the two versions, she can determine the error introduced by Rob: a wrong file path. Marnie decides to restore the previous version of the job definition. From the Monitor Workload page, she reruns the failing job. This time, the healthcare application job stream completes successfully.

By using the version control feature, Marnie can quickly and easily solve a problem that otherwise would have compromised the release of the application into production. Version control enables audit readiness, reporting, collaboration, and change management within your company: all challenges that you must overcome in today's business world.



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## Chapter 15. Reporting

You can use IBM Workload Scheduler reports to retrieve data from the IBM Workload Scheduler database. You can then view, print, and save the results in different kinds of output. You can also save, reuse, and share the reports with other users and modify them at any time.

To generate your reports, you can use either Business Intelligent Report Tool (BIRT) or Tivoli Common Reporting.

BIRT provides a historical and statistical overview of your jobs, workstations, and plans, while Tivoli Common Reporting provides sample reports which you can customize to suit your needs and analytical reports which analyze errors in the job duration estimate and variances in job duration.

The analytical reports help you identify the jobs that have a high estimated error rate and the jobs whose duration varies significantly, thus indicating a potential problem. This insight information allows you to intervene beforehand on those jobs and prevent potential problems.

After you analyze the results of the reports, you can plan and assess changes and adjustments to your workload with the What-if Analysis. The What-if Analysis simulates and evaluates the impact of any changes to the current plan. For more information on What-if Analysis, see “Analyzing the impact of changes on your environment” on page 216.

**Related concepts:**

“Reports” on page 90

How to customize and generate IBM Workload Scheduler reports.

**Related reference:**

“Regular expressions and SQL reports” on page 285

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### BIRT Reports

This topic lists the reports you can generate using BIRT.

To create a report you must create and run *report tasks*.

Before you can run a report to retrieve data from an IBM Workload Scheduler engine, you must complete the following steps:

1. Create a connection to an IBM Workload Scheduler engine.
2. Configure the Dynamic Workload Console to view reports, as described in the section about reports in the IBM Workload Scheduler Administration Guide.

You can generate the following reports from the Dynamic Workload Console using Business Intelligent Report Tool (BIRT).

#### **Creating a task to generate a Job Run Statistics report**

How to generate and run a Job Run Statistics report task.

## About this task

To create a task to run a Job Run Statistics Report, perform the following steps:

### Procedure

1. From the navigation toolbar, click **Reporting > Create Historical Reports**, and click **New**.
2. In the Create Task panel, click **Report Definition > Job Run Statistics Report > Next**.
3. In the Enter Task Information panel, define the type of scheduler engine here you want to run the task. You can select an engine at a later time. Remember that the engine name must be specified before running the task. Depending on the engine type you choose, the filtering criteria and the results you can display are different. You can also specify whether to share the task with others, to allow them to see and run the task, but not to modify it. Task and engine sharing can be disabled by the TWSWEBUIAdministrator in the global settings customizable file.
4. In the Report Header panel, choose the name and the format of the output of the report, and click **Next** to proceed, or click **Finish** to complete the task creation using all the default values. If you are editing an existing task properties, click **Save** to keep your changes and open the next panel, if needed.
5. In the Filter Criteria panel, define a filter to select the jobs you want to include in the report. All the information about fields and options is available in the panel help. Click **Next** to proceed or click **Finish** to complete the task creation using all the default values.
6. In the Report Output Content panel, select the layout of your report. You can view the information either as a chart or as a table. The chart view displays the statistics for each job run in pie charts. You can select the report format. If you select HTML format, you can also limit the size of the report. You can also select the job details and the statistics you want to include in your report. After you made your selection, click **Next** to proceed or click **Finish** to complete the task creation using all the default values.
7. In the Create New Task panel:
  - Select **Run this Task Now** and click **Finish** if you want to run the report task. If you have not yet specified an engine connection, you are prompted to do so now.
  - Click **Cancel** to exit without saving your changes.
  - Click **Finish** to save the task, without starting it immediately.

### Results

You have created your task that, when run, creates a report of jobs satisfying your filtering criteria and showing, for each job in the list, the information you selected to view.

#### Related concepts:

“Reports” on page 90

How to customize and generate IBM Workload Scheduler reports.

#### Related reference:

“Samples of report output” on page 290

Samples of report output.

## Creating a task to generate a Job Run History report

How to generate and run a Job Run History report task.

### About this task

To create a task to run a Job Run History report, perform the following steps:

### Procedure

1. From the navigation toolbar, click **Reporting > Create Historical Reports**, and click **New**.
2. In the Create Task panel, click **Report Definition > Job Run History Report > Next**.
3. In the Enter Task Information panel, define the type of scheduler engine here you want to run the task. You can select an engine at a later time. Remember that the engine name must be specified before running the task. Depending on the engine type you choose, the filtering criteria and the results you can display are different. You can also specify whether to share the task with others, to allow them to see and run the task, but not to modify it. Task and engine sharing can be disabled by the TWSWEBUIAdministrator in the global settings customizable file.
4. In the Report Header panel, choose the name and the format of the output of the report, and click **Next** to proceed, or click **Finish** to complete the task creation using all the default values. If you are editing an existing task properties, click **Save** to keep your changes and open the next panel, if needed.
5. In the Filter Criteria panel, define a filter to select the jobs you want to include in the report. All the information about fields and options is available in the panel help. Click **Next** to proceed or click **Finish** to complete the task creation using all the default values.
6. In the Report Output Content panel, select the layout of your report. You can view the information only as a table, but you can format it as an HTML or CSV file. If you select HTML format, you can also limit the size of the report. You can also select the job details you want to include in your report. After you make your selection, click **Next** to proceed or click **Finish** to complete the task creation using all the default values.
7. In the Create New Task panel:
  - Select **Run this Task Now** and click **Finish** if you want to run the report task. If you have not yet specified an engine connection, you are prompted to do so now.
  - Click **Cancel** to exit without saving your changes.
  - Click **Finish** to save the task, without starting it immediately.

### Results

You have created your task that, when run, creates a report of jobs satisfying your filtering criteria and showing, for each job in the list, the information you selected to view.

#### Related concepts:

“Reports” on page 90

How to customize and generate IBM Workload Scheduler reports.

#### Related reference:

“Samples of report output” on page 290

Samples of report output.

## Creating a task to generate a Workstation Workload Summary report

How to create and run a Workstation Workload Summary report.

### About this task

To create a task to run a Workstation Workload Summary report, perform the following steps:

### Procedure

1. From the navigation toolbar, click **Reporting** > **Create Historical Reports**, and click **New**.
2. In the Create Task panel, select **Report Definition, Workstation Workload Summary Report**, and click **Next**.
3. In the Enter Task Information panel, define the type of scheduler engine here you want to run the task. You can select an engine at a later time. Remember that the engine name must be specified before running the task. Depending on the engine type you choose, the filtering criteria and the results you can display are different. You can also specify whether to share the task with others, to allow them to see and run the task, but not to modify it. Task and engine sharing can be disabled by the TWSWEBUIAdministrator in the global settings customizable file.
4. In the Report Header panel, choose the name and the format of the output of the report, and click **Next** to proceed, or click **Finish** to complete the task creation using all the default values. If you are editing an existing task properties, click **Save** to keep your changes and open the next panel, if needed.
5. In the Filter Criteria panel, define a filter to select the jobs you want to include in the report. All the information about fields and options is available in the panel help. Click **Next** to proceed or click **Finish** to complete the task creation using all the default values.
6. In the Report Output Content panel, select the layout of your report. You can view the information either as a chart or as a table. The chart view shows the workload of all the specified workstations, aggregated by time. You can also choose to view the workloads of all the specified workstations in a single line chart. Aggregating all the information, you have a comparative view of the workstation workloads. You can select the report format. If you select HTML format, you can also limit the size of the report. You can also select the granularity with which to extract the data (by day or hour) and to order the report. After you make your selection, click **Next** to proceed or **Finish** to complete the task creation using all the default values.
7. In the Create New Task panel:
  - Select **Run this Task Now** and click **Finish** if you want to run the report task. If you have not yet specified an engine connection, you are prompted to do so now.
  - Click **Cancel** to exit without saving your changes.
  - Click **Finish** to save the task, without starting it immediately.

### Results

You have created your task that, when run, creates a report of jobs satisfying your filtering criteria and showing, for each job in the list, the information you selected to view.

| **Related concepts:**

| "Reports" on page 90  
| How to customize and generate IBM Workload Scheduler reports.

| **Related reference:**

| "Samples of report output" on page 290  
| Samples of report output.

## | **Creating a task to generate a Workstation Workload Runtimes report**

| How to create and run a Workstation Workload Runtimes report.

### | **About this task**

| To create a task to run a Workstation Workload Runtimes report, perform the following steps:

#### | **Procedure**

- | 1. From the navigation toolbar, click **Reporting** > **Create Historical Reports**, and click **New**.
- | 2. In the Create Task panel, select **Report Definition, Workstation Workload Runtimes Report**, and click **Next**.
- | 3. In the Enter Task Information panel, define the type of scheduler engine here you want to run the task. You can select an engine at a later time. Remember that the engine name must be specified before running the task. Depending on the engine type you choose, the filtering criteria and the results you can display are different. You can also specify whether to share the task with others, to allow them to see and run the task, but not to modify it. Task and engine sharing can be disabled by the TWSWEBUIAdministrator in the global settings customizable file.
- | 4. In the Report Header panel, choose the name and the format of the output of the report, and click **Next** to proceed, or click **Finish** to complete the task creation using all the default values. If you are editing an existing task properties, click **Save** to keep your changes and open the next panel, if needed.
- | 5. In the Filter Criteria panel, define a filter to select the jobs you want to include in the report. All the information about fields and options is available in the panel help. Click **Next** to proceed or click **Finish** to complete the task creation using all the default values.
- | 6. In the Report Output Content panel, select the layout of your report. You can view the information either as a chart or as a table. The chart view shows in a bar chart the number of jobs that are running on the workstations. Selecting the chart view, you can also specify how many jobs to display in each chart. You can specify the format of your report. If you select HTML format, you can also limit the size of the report. You can also select the information you want to include in the report and how you want it ordered. After you make your selection, click **Next** to proceed or **Finish** to complete the task creation using all the default values.
- | 7. In the Create New Task panel:
  - | • Select **Run this Task Now** and click **Finish** if you want to run the report task. If you have not yet specified an engine connection, you are prompted to do so now.
  - | • Click **Cancel** to exit without saving your changes.
  - | • Click **Finish** to save the task, without starting it immediately.

## Results

You have created your task that, when run, creates a report of jobs satisfying your filtering criteria and showing, for each job in the list, the information you selected to view.

### Related concepts:

“Reports” on page 90

How to customize and generate IBM Workload Scheduler reports.

### Related reference:

“Samples of report output” on page 290

Samples of report output.

## Creating a task to Create Plan Reports

How to generate a Plan Report task.

### About this task

Perform the following steps to create one of the following reports:

#### Actual Production Details Report

A report based on the information stored either in the current or in an archived plan. The information contained in these plans is retrieved from the Symphony files. Actual Production Details Report can be run on distributed engines (master domain manager, backup domain manager, domain manager with connector, and fault-tolerant agent with connector).

#### Planned Production Details Report

A report based on the information stored either in a trial or in a forecast plan. The information contained in these plans is retrieved from the IBM Workload Scheduler database. A Planned Production Details Report can be run on distributed engines (master domain manager and backup domain manager). A real production report extracted from a fault-tolerant agent might contain different information with respect to a plan extracted from a master domain manager. For example, the number of jobs and job streams is the same, but their status can change, because a job successful on the master can be in hold or ready on the agent. The update status rate is the same only on the full status agent that runs on the domain master.

### Procedure

1. From the navigation toolbar, click **Reporting > Create Plan Reports**, and click **New**.
2. In the Create Task panel, choose the type of report that you want to create, and click **Next**.
3. In the Enter Task Information panel, define the type of scheduler engine here you want to run the task. You can select an engine at a later time. Remember that the engine name must be specified before running the task. Depending on the engine type you choose, the filtering criteria and the results you can display are different. You can also specify whether to share the task with others, to allow them to see and run the task, but not to modify it. Task and engine sharing can be disabled by the TWSWEBUIAdministrator in the global settings customizable file.
4. In the Report Header panel, choose the name and the format of the output of the report and click **Next** to proceed or click **Finish** to complete the task creation using all the default values.

5. In the Filter Criteria panel, define a filter to select the jobs that you want to include in the report. All the information about fields and options is available in the panel help. Click **Next** to proceed or click **Finish** to complete the task creation using all the default values.
6. In the Report Output Content panel, select the job information that you want to display in the report output. After you make your selection, click **Next** to proceed or **Finish** to complete the task creation using all the default values.
7. In the Create New Task panel:
  - Select **Run this Task Now** and click **Finish** if you want to run the report task. If you have not yet specified an engine connection, you are prompted to do so now.
  - Click **Cancel** to exit without saving your changes.
  - Click **Finish** to save the task, without starting it immediately.

## Results

You have created your task that, when run, creates a report of job and job streams processing details satisfying your filtering criteria.

### Related concepts:

“Reports” on page 90

How to customize and generate IBM Workload Scheduler reports.

### Related reference:

“Samples of report output” on page 290

Samples of report output.

## Creating a task to Create Custom SQL Reports

How to create an SQL query report task to run on a distributed IBM Workload Scheduler environment.

### About this task

Use this task to define your own reports by writing or importing SQL queries for extracting data in HTML or CSV format. To create an SQL report task, perform the following steps:

### Procedure

1. From the navigation toolbar, click **Reporting > Create Custom SQL Reports**, and click **New**.
2. In the Create Task panel, select **Report Definition > Custom SQL Report Task > Next**.
3. In the Enter Task Information panel, define the type of scheduler engine here you want to run the task. You can select an engine at a later time. Remember that the engine name must be specified before running the task. Depending on the engine type you choose, the filtering criteria and the results you can display are different. You can also specify whether to share the task with others, to allow them to see and run the task, but not to modify it. Task and engine sharing can be disabled by the TWSWEBUIAdministrator in the global settings customizable file.
4. In the Report Header panel, choose the name and the format of the output of the report and click **Next** to proceed or **Finish** to complete the task creation using all the default values. The **Custom SQL Report** supports only the **Tables View** in either HTML or CSV format.

5. In the Filter Criteria panel, enter the SQL statement on which you want to base your report. You can write the query in the text pane or load an existing query from a file by browsing to the required file and clicking **Load**. Click **Next** to proceed or **Finish** to complete the task creation using all the default values.
6. In the Report Output Content panel, select the job information that you want to display in the report output. After you make your selection click **Next** to proceed or **Finish** to complete the task creation using all the default values.
7. In the Create New Task panel:
  - Select **Run this Task Now** and click **Finish** if you want to run the report task. If you have not yet specified an engine connection, you are prompted to do so now.
  - Click **Cancel** to exit without saving your changes.
  - Click **Finish** to save the task, without starting it immediately.

## Results

You have created your task that, when run, creates a report satisfying your filtering criteria and showing the information you selected to view.

### Related concepts:

“Reports” on page 90

How to customize and generate IBM Workload Scheduler reports.

### Related reference:

“Samples of report output” on page 290

Samples of report output.

### Related information:

“SQL report examples” on page 290

Examples of queries that can be run using the SQL custom reports.

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## Tivoli Common Reporting reports

This topic provides an overview of Tivoli Common Reporting, as available within the Dynamic Workload Console.

Tivoli Common Reporting is an optional integration service of Jazz for Service Management, which is installed with WebSphere Application Server. Tivoli Common Reporting provides a web user interface functioning as a portal for IBM Cognos and allows you to administer, run, customize, and create IBM Workload Scheduler reports on IBM DB2, Microsoft SQL Server and Oracle databases in a distributed environment, and on IBM DB2 databases in a z/OS environment. It provides web-based, launch-in-context report administration and editing.

IBM Workload Scheduler provides some packages to get you started with Tivoli Common Reporting. You can use the sample reports as starting points for creating your own custom reports and optionally tailoring them to your environment. For example, you can define dynamic parameters to make your reports more flexible. You can use the historical reports as they are provided to extract information from the database.

Before you can generate reports with Tivoli Common Reporting, you need to perform the following steps:

1. “Configuring Tivoli Common Reporting” on page 237
2. “Importing IBM Workload Scheduler reports” on page 238



# Configuring Tivoli Common Reporting

Configure Tivoli Common Reporting.

## About this task

Tivoli Common Reporting provides a portal for IBM Cognos. After you have installed and configured Tivoli Common Reporting, you can launch and operate on IBM Cognos from the Dynamic Workload Console.

For more information about installing Tivoli Common Reporting, see the section about the Dynamic Workload Console prerequisites in the *Planning and Installation Guide*.

To configure Tivoli Common Reporting, perform the following steps:

## Procedure

1. Ensure you have installed Jazz for Service Management and Tivoli Common Reporting.
2. From the navigation toolbar, click **Reporting > Common Reporting**. The IBM Cognos Connection interface is displayed.
3. Click **Launch > Administration**.
4. Select the **Configuration** tab.
5. Click the **New Data Source** icon. The **New Data Source** wizard is displayed.
6. Specify the name of the alias of the IBM Workload Scheduler database. The name of the database alias is as follows:

### On distributed environments

TWS

### On z/OS environments

TWS\_ZOS

7. In the **Type** list, select either **IBM DB2**, **Oracle**, or the appropriate **Microsoft SQL Server** selection. Do not modify the other default values on this wizard page and click **Next**.
8. Specify the database name. This is the name of the database where your data is stored.
9. In the **Signon** section, select the **Password** checkbox and specify the user ID and password of the IBM Workload Scheduler database. Click **Next**.
10. In the **Server name** field, specify the server name or IP address of the database, the port number, the JDBC connection properties, and the database name. Click **Test Connection**, if successful, click **Finish**. If the connection test is not successful, correct the information and retry.

## Results

You have defined the connection to the IBM Workload Scheduler database. You can now use IBM Cognos to create and customize reports on the IBM Workload Scheduler database. For more information, see the IBM Cognos documentation.

To import the reports provided with IBM Workload Scheduler, follow the import procedure, as described in “Importing IBM Workload Scheduler reports” on page 238.

## Importing IBM Workload Scheduler reports

This topic describes the Tivoli Common Reporting sample, historical and analytical reports available with IBM Workload Scheduler

### About this task

IBM Workload Scheduler installation media provide the following packages in the **reports** folder:

The following packages are available for the **distributed environment**:

#### Historical\_Report.zip

This package contains the following analytical reports:

- Analysis Job Duration Estimation Error
- Analysis Job Duration Standard Deviation

#### IWSReportsSamples\_for\_TCR.zip

This compressed file contains packages for each supported database, with the following sample reports:

- Job Run History
- Job Run Statistics Chart
- Job Run Statistics Table

#### Auditing\_Report.zip

This compressed file contains packages for each supported database, with the following report:

- Audit Reporting

The following packages are available for the **z/OS environment**:

#### Historical\_Report\_for\_zOS.zip

This package contains the following analytical reports:

- Analysis Job Duration Estimation Error
- Analysis Job Duration Standard Deviation

#### TWSReportsSamples\_for\_TCR\_for\_zOS.zip

This package contains the following report:

- Job Run History

To import IBM Workload Scheduler packages in Tivoli Common Reporting, perform the following steps:

### Procedure

1. Copy the packages from the installation media to the following path:

#### On Windows operating systems:

<JAZZSM\_INSTALL\_DIR>\reporting\cognos\deployment

#### On UNIX and Linux operating systems:

<JAZZSM\_INSTALL\_DIR>/reporting/cognos/deployment

2. From the navigation toolbar, click **Reporting > Common Reporting**. The IBM Cognos Connection interface is displayed.
3. Click **Launch > Administration**.
4. Select the **Configuration** tab.
5. Click **Content Administration** in the left-side pane.

6. Click the **New Import** icon and select one or more packages depending on which reports you want to import and the installed database type.
7. You can optionally select the reports to be imported for each package.
8. Maintain all the default values and follow the wizard.
9. Click **Run** to run the imported reports immediately.

## Results

The following sample reports are available:

*Table 23. Sample report types*

Report Name	Description	Supported environment	Available in package
Job Run History	A report collecting the historical job run data during a specified time interval. It is useful to detect which jobs ended in error or were late, as well as critical and promoted jobs and the latest time within which the job can start without causing the critical job miss its deadline. It also shows which jobs missed their deadline, long duration jobs, and rerun indicators for reruns.	Distributed and z/OS	<ul style="list-style-type: none"> <li>• IWSReportsSamples_for_TCR.zip</li> <li>• TWSReportsSamples_for_TCR_for_zOS.zip</li> </ul>
Job Run Statistics Chart	A report collecting the job run statistics, which returns output in chart format. It is useful to detect success, error rates; minimum, maximum, and average duration; late and long duration statistics; however, it might take some time to generate.	Distributed	IWSReportsSamples_for_TCR.zip
Job Run Statistics Table	A report collecting the job run statistics, which returns output in table format. It is useful to detect success, error rates; minimum, maximum, and average duration; late and long duration statistics.	Distributed	IWSReportsSamples_for_TCR.zip

The following analytical reports are available:

*Table 24. Analytical report types*

Report Name	Description	Supported environment	Available in package
Analysis Job Duration Estimation Error	<p>A report that shows the average estimation error. It is useful to detect whether a job ends in frequent errors, ends in error, or if the jobs have unsatisfactory accuracy rates. You can then drill down to display all the jobs that are in that threshold and finally you can visualize charts that will help you to identify the jobs that have a high estimated error rate allowing you to intervene beforehand on those jobs.</p> <p><b>Note:</b> When specifying the filter criteria for the Thresholds of this report, consider that the "Correct interval" threshold cannot be higher than the "Wrong interval".</p>	Distributed and z/OS	<ul style="list-style-type: none"> <li>• Historical_Report.zip</li> <li>• Historical_Report_for_zOS.zip</li> </ul>
Analysis Job Duration Standard Deviation	A report showing variances in job duration. The variance is calculated as a percentage and according to which variance level the jobs are they will be presented as follows: <b>High variability</b> , <b>Medium variability</b> or a <b>Low variability</b> . You can drill down to display all the jobs that are in that threshold which then returns output in a chart format. This report is useful to identify the run that had a greater duration.	Distributed and z/OS	<ul style="list-style-type: none"> <li>• Historical_Report.zip</li> <li>• Historical_Report_for_zOS.zip</li> </ul>

**Note:** To be included in the analytical report, jobs must have a planned duration higher than 0 and have ran successfully

The following auditing report is available:

*Table 25. Auditing report types*

Report Name	Description	Supported environment	Available in package
Audit Reporting	A report that provides an audit trail, consisting of detailed information about the user who performed the change, the time and date when the change was performed, the reason why the change was implemented, and the details of the change for every modified item.	Distributed	Auditing_Report.zip

| You can now use IBM Cognos to create and customize reports on the IBM  
| Workload Scheduler database. For more information, see the IBM Cognos  
| documentation.

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## Chapter 16. Scenarios

Scenarios demonstrating practical application of IBM Workload Scheduler in a business environment.

View these scenarios to help you get familiar with IBM Workload Scheduler and learn how to use the product to achieve your business goals.

You can find additional scenarios at the following links:

- The Workload Automation YouTube channel, which is continuously updated with video demos that show new features and capabilities for both IBM Workload Scheduler and Workload Automation on Cloud.
- The IBM Workload Scheduler Wiki Media Gallery, which contains demos (only available in English) about how to use IBM Workload Scheduler.
- A workload service assurance scenario in the IBM Workload Scheduler User's Guide and Reference, which describes how to monitor critical jobs.

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### Customizing your job stream

Using the Dynamic Workload Console to create and customize a job stream.

This scenario describes how you can use the Dynamic Workload Console to create a job stream, schedule it to run at specified times, and change its behavior based on the day when it is scheduled to run.

#### Overview

A sales department manager needs to collect data on sales reports both at business unit level and at corporation level. For this reason the department manager needs reports both on a weekly and on a monthly basis. Report data is stored in two different directories, as follows:

- Data for weekly reports is stored in a set of files located in the directory `/reports/weekly`.
- Data for monthly reports is stored in a set of files located in the directory `/reports2/monthly`.

The job stream used for generating the reports has a dependency on the presence of these files. To collect the required data, the IBM Workload Scheduler administrator creates one job stream with two different run cycles, one scheduled to run on a weekly basis and one scheduled to run on a monthly basis.

Each run cycle references two different variable tables, which contain the variable and the related value used to define the path where the correct input files are located.

#### Creating the job stream and the related objects

To create all the database objects required to reach the business goal, the IBM Workload Scheduler designer uses the Workload Designer on the Dynamic Workload Console.

1. He logs in to the Dynamic Workload Console and, from the navigation toolbar, he clicks **Administration > Workload Design > Manage Workload Definitions**. The Workload Designer opens.  
Using the **New** menu in the **Working List** section, the administrator can create all the necessary objects. He can also search for existing objects to edit and insert in the plan.
2. The administrator selects **New > Variable Table** to create the two variable tables required to provide the two different values for the input file paths.
  - a. He creates a variable table with name SC1\_WEEKLY\_DATA\_TABLE. This table is the default table. The path to the files required to generate the weekly reports is indicated by the REP\_PATH variable, to which he assigns the value "/reports/weekly".
  - b. He creates a variable table with name SC1\_MONTHLY\_DATA\_TABLE. The path to the files required to generate the monthly reports is indicated by the REP\_PATH variable, to which he assigns the value "/reports2/monthly".
3. The administrator selects **New > Job Definition > Windows Job Definition** to create the job definitions which generate the reports. All job definitions run a script each, which receives the value of the REP\_PATH variable as the input value. He creates the following job definitions:
  - a. The job definition named SC1\_PARSE\_DATA SCRIPTNAME runs on the relevant workstation logging in as root. It runs a script which contains the following statement: "/reportApp/parseData.sh ^REP\_PATH^".
  - b. The job definition named SC1\_PROCESS\_DATA SCRIPTNAME runs on the relevant workstation logging in as root. It runs a script which contains the following statement: "/reportApp/processData.sh ^REP\_PATH^".
  - c. The job definition named SC1\_CREATE\_REPORTS SCRIPTNAME runs on the relevant workstation logging in as root. It runs a script which contains the following statement: "/reportApp/createReports.sh ^REP\_PATH^".
4. The administrator selects **New > Job Stream** to create the job stream which contains the jobs. The job stream is named SC1\_RUN\_REPORTS and runs on the relevant workstation.
5. The administrator selects **Add to Selected > Run Cycle > Inclusive** to define two run cycles for the job stream, as follows:
  - a. The run cycle named SC1\_WEEKLY\_RCY uses the variable table SC1\_WEEKLY\_DATA\_TABLE, which contains the value for the file path to be used for generating the weekly report. The run cycle also specifies that the job stream is to run once per week on Friday.
  - b. The run cycle named SC1\_MONTHLY\_RCY uses the variable table SC1\_MONTHLY\_DATA\_TABLE, which contains the value for the file path to be used for generating the monthly report. The run cycle also specifies that the job stream is to run once per month on the 27th day.
6. The administrator selects **Add to Selected > Add Dependency > File** to specify a dependency from the files containing the data used for report generation. He uses the REP\_PATH variable to define the path to the required files.
7. The administrator searches for the job definitions he previously created (SC1\_PARSE\_DATA SCRIPTNAME, SC1\_PROCESS\_DATA SCRIPTNAME, SC1\_CREATE\_REPORTS SCRIPTNAME) and adds them to the job stream.
8. The administrator creates a plan lasting 30 days to generate multiple instances of the job stream.

As a result, the variable REP\_PATH is assigned different values depending on the run cycle that applies. The administrator defines two run cycles, each of which references a specific variable table.

In this way, the job stream instances have a dependency on a different set of files depending on the type of report they have to produce, either monthly or weekly, as follows:

- The job stream instances that generate the weekly report have a dependency on the files located in the /reports/weekly directory.
- The job stream instances that generate the monthly report have a dependency on the files located in the /reports2/monthly directory.

Furthermore, the name of the target directory is correctly replaced in the task string of the three jobs run by every job stream instance, as follows:

- The jobs run by job stream instances that generate the weekly report run shell scripts with the directory /reports/weekly as an input argument.
- The jobs run by job stream instances that generate the monthly report run shell scripts with the directory /reports2/monthly as an input argument.

The administrator can therefore define a single job stream with two different run cycles and ensure that the appropriate reports are generated on the correct dates without further user intervention.

**Related concepts:**

“Job stream” on page 56

“Job” on page 55

Information about jobs, which are scheduling objects used to define and run activities in the scheduling environment.

“Variable table” on page 81

“Run cycle” on page 59

“Dependencies” on page 66

Controlling processing using dependencies

**Related tasks:**

“Designing your Workload” on page 107

Create and editing workload definitions in the database.

“Creating job definitions” on page 111

How to define a new job definition using the Dynamic Workload Console.

“Prerequisite steps to create job types with advanced options” on page 122

How to define a new job definitions using the Dynamic Workload Console.

---

## Using workload service assurance to monitor z/OS critical jobs

z/OS

How to monitor jobs that are critical for the customer business and that must complete by their deadline.

This scenario shows how an operator can monitor the jobs that are critical for the customer business and that must complete by their deadline.

## Overview

The operator uses the Dynamic Workload Console to meet a Service Level Agreement (SLA) that requires a DB2 database to be up and running each day by 3 p.m., after its backup.

The operator must be informed whether critical jobs risk missing their deadline, to take the appropriate actions if needed. While the plan is running, the operator expects that the scheduler dynamically controls the network of submitted jobs, detecting when a critical job predecessor is late, long running, or ended with an error.

## Roles

The scheduling administrator and the operator are involved in this scenario:

### IBM Workload Scheduler for z/OS scheduling administrator

When planning the operations, the administrator defines:

- Scheduled time, duration, and deadline times.
- Critical jobs.

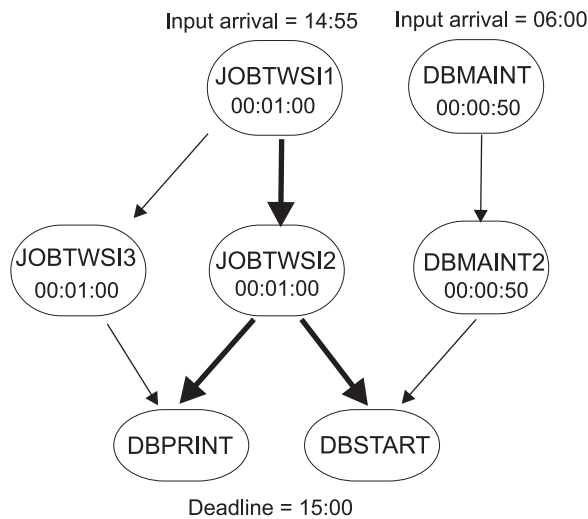
### IBM Workload Scheduler operator

Controls the submitted workload by using Critical Jobs and Hot List views.

## Setting up the environment

Complete the following tasks when planning your operations:

1. Mark your critical jobs in the z/OS database. Set DBSTART and DBPRINT as critical jobs, using a job network with the following structure:



Key:

- > Job dependency
- > Job dependency on a critical path

2. Run a daily planning job. The daily planning process calculates the critical paths in your job network, using the deadline, scheduled time arrival, and duration settings.



## Running the scenario

After you updated your current plan, you can monitor your critical workload by using **Critical Path** and **Hot List** views:

1. In the navigation bar, click **System Status and Health > Workload Monitoring > Monitor Workload** .
2. Under the **Engine** drop-down list, select the check-box related to the engine or engines where the task must run.
3. Under the **Object Type** drop-down list select **Critical job**.
4. Click **Edit**.
5. In the General Filter panel, specify DB\* as **Job Name** and set a **Risk Level** different from None as filter criteria, because you want to monitor the critical jobs that risk missing their deadlines.
6. Click **Save** to complete the task, leaving the default values in the remaining panels.
7. **Run** the task.
8. Select the DBSTART job and click **Critical Path** to view the path of the DBSTART predecessors with the least slack time. The **Critical Path** view does not show any cause for the delay, because no problems occurred for any of the DBSTART predecessors in the critical path. Return to the Monitor Workload task output.
9. Click **Hot List** or the **Potential Risk** hyperlink to get a list of any critical job predecessor that is late, has been running for too long, or has ended with an error. The returned **Hot List** shows DBMAINT as a late job. It is scheduled to run on the CPU2 workstation.
  - a. Click the CPU2 hyperlink.
  - b. After verifying that CPU2 is offline, activate the workstation. The DBMAINT job starts to run.
10. Refresh the **Monitor Workload** task output. It shows that the **Risk Level** for DBSTART job is now **No Risk**.

### Related concepts:

“Workload service assurance” on page 93

Basic concepts about critical jobs and the critical path, which are fundamental to take advantage of this feature.

### Related tasks:

“Creating a task to Monitor Critical Jobs” on page 182

Why and how you can create a Monitor Critical Jobs task.

### Related reference:

“Limit the number of objects retrieved by queries” on page 38

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## Monitoring jobs running on multiple engines

Using the Dynamic Workload Console to create a task to simultaneously monitor jobs that run on multiple engines.

This scenario describes how you use the Dynamic Workload Console to create a task to simultaneously monitor jobs that run on multiple engines, which can be in mixed distributed and z/OS environments.

## Overview

High efficiency batch processing relies on powerful monitoring capabilities. The need for a single operator to monitor systems is continuously increasing. Up until about 10 years ago, only a limited amount of workload was monitored, but this is increasing to the monitoring of an entire division, and even to an entire company.

Today operators frequently have to monitor multiple large divisions or multiple companies for service providers. These operators work in shifts in multiple geographical locations according to a "follow-the-sun" approach, in some cases. They must try to balance what must be monitored with the size of the monitored environment.

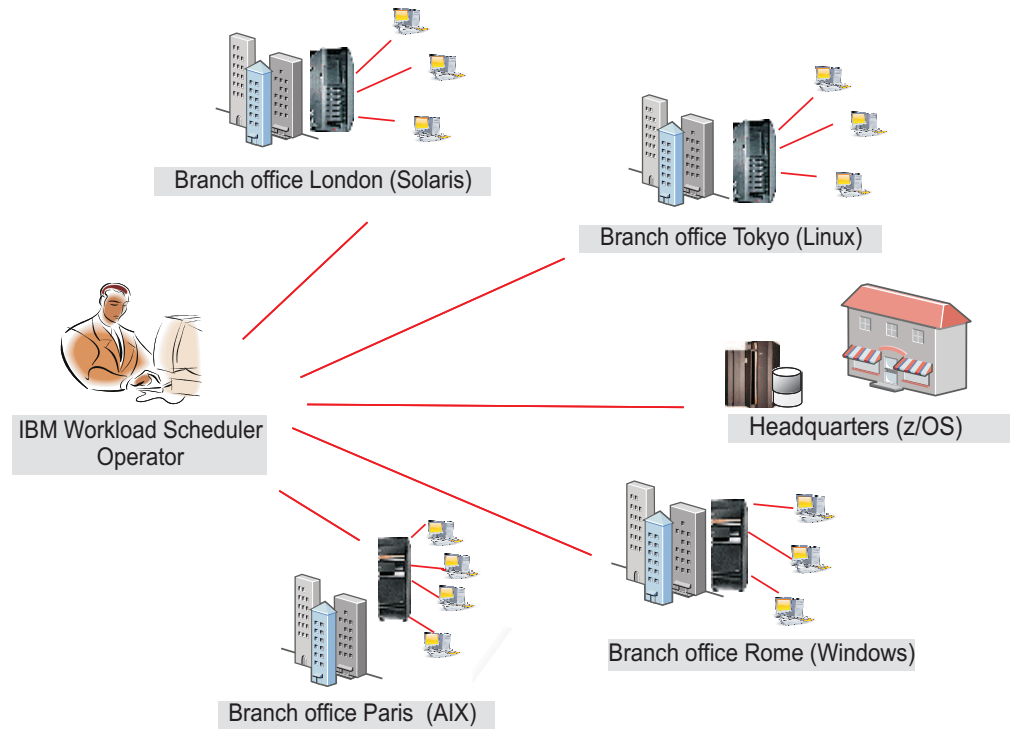
## Business scenario

In this scenario, an insurance company, named *Starbank*, consists of a headquarters where its central office accounting department is located, and multiple branch offices located all over the world, where several administrative departments perform accounting activities.

The central office is in charge of the company's entire accounting workload. Therefore, the IBM Workload Scheduler operator must verify that all the workload processing for the *Starbank* company proceeds smoothly and without errors and needs a comprehensive workload management solution.

To achieve this goal, the operator needs to create a task that he can run every day to monitor all the administrative jobs, detecting in real time any possible failures.

However, although the sales department of the company runs its jobs in a z/OS environment, the single business units run their jobs in distributed environments. The operator needs a single console panel, from which he can control all the jobs, both z/OS and distributed, at the same time.



The operator creates a task to monitor jobs that run on multiple engines, including both the environments. He does this by creating and running a task to Monitor Jobs on multiple engines.

### Creating a Monitor Jobs task for multiple engines

The operator logs in to the Dynamic Workload Console and, from the navigation bar, he clicks **System Status and Health > Workload Monitoring > Monitor Workload** .

|  
|

To create a task using Monitor Workload, see “Creating a monitoring task query” on page 174.

### Selecting the engines

In the Enter Task Information panel, the operator specifies a name for the task, for example *AccError*, and defines the scheduler engines on which to run the task.

According to a company naming convention policy, all the engine names have a prefix specifying to which department they belong. Therefore, the operator includes in the **Selected Engines** list all the engines named *acc\_\**. The operator then organizes the list by importance, placing the engines belonging to the most critical company departments (like *Finance* and *Sales*) at the beginning of the list, so as to have their results displayed as the first rows of the table. The task runs following the engine sequence, but the results are displayed altogether, only after the task has run on all the engines in the list.

### Defining the filter

In the General Filter panel, the IBM Workload Scheduler operator specifies some filtering criteria to limit the results retrieved by the query. Here he starts refining

the scope of the query by also considering the amount of information to retrieve. Defining a meaningful filter is very important to avoid unnecessary overhead, considering that the task runs on multiple engines. First, the operator sets the automatic refresh time to 600 so as to receive the updated monitoring results every 600 seconds (10 minutes). He then filters for jobs based on their job streams. According to a company policy, all administrative job streams begin with the company name followed by the department code. In our scenario, the operator looks for all the job streams whose identifier starts with *Starb\** that did not complete successfully.

## Selecting the columns

In the Columns Definition panel, the operator selects the information to display in the table containing the query results. According to the columns he chooses, the corresponding information is displayed in the task results table. In our scenario, for all the jobs resulting from the query, the operator wants to see their statuses, the job streams they belong to, when they were scheduled to run, and the engines on which they ran. Then, if more details are necessary, he can drill down into this information displayed in the table of results and navigate it.

## Results

In the All Configured Tasks panel, the operator can see the main details about the task that he has just created and launch the task immediately. The task is now in the list of saved tasks from where the operator can open and modify it any time. To find the task from the displayed task lists, he clicks the following options: **System Status and Health > Workload Monitoring > Monitor Workload.**

The operator has created a task that can be run every day to highlight possible critical failure in real time. If there is a failure in any of the administrative jobs run by the selected offices, the operator discovers it no later than 10 minutes after the error occurs.

## Running the Monitor Jobs task for multiple engines

To launch the task, the operator clicks **System Status and Health > Workload Monitoring > Monitor Workload.**

The operator clicks *AccError* task to launch it. Because some engine connections do not work correctly, the Checking engine connections panel reports some errors on two of the eight engines defined. The failing connections are the *Tokyo* and *Paris* offices. The operator could ignore the failed connections and proceed, running the task on the successful engines only. However, monitoring the entire workload running in all the branch offices is crucial to his activity, and he does not want to skip any engine connection. Therefore, by clicking **Fix it** next to each failing engine connection, the operator opens a dialog where he can enter the credentials required for that engine. After entering the correct credentials, also the remaining engine connections work successfully and the operator clicks **Proceed** to run the task against all the engines.

## Viewing results and taking corrective actions


Viewing the results of the *AccError* task, the operator realizes that there is a job in error, named *PayAcc1*. He right-clicks the job to open its job log, to better determine the cause and effects of this error.

From the job log, he finds out that only the last step of the job failed, which was a data backup process. This step can be done manually at a later time. The most important part of the job, consisting of the accounting processes related to payrolls, completed successfully.

Now the operator needs to determine the impact that this job in error has on the overall plan. To do this, he selects the *PayAcc1* job and clicks **Job Stream View**. From this view, he realizes that this job is a predecessor dependency of another job, named *Balance1*. The operator releases the failing job dependency so as to make it possible for the successor *Balance1* to start and the whole workload processing to complete.

A second job in error results from the *AccError* task. It is a z/OS job, named *Info*. The operator selects this job from the list and right-clicks it to open the **Operator Instructions** that give him important information about what to do. According to the instructions, this is an optional procedure, which can be skipped without consequence for the entire processing. Therefore, the operator right-clicks the job and cancels it.

The operator then refreshes the view to ensure that there are no other jobs in error.

To view connection status information and statistical information about the engines against which the task was run, the operator clicks the statistical icon  on the table toolbar.

A pie chart showing the number of query results and job status is displayed for each engine on which the task ran successfully. By clicking the pie sections, he can see further details. If the task did not run successfully on one or more engines, he sees a message containing details about the errors.

**Related tasks:**

“Creating a task to Monitor Jobs on Multiple Engines” on page 185  
Why and how you create a Monitor Jobs task to run on multiple engines.

**Related reference:**

“Limit the number of objects retrieved by queries” on page 38



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## Chapter 17. Troubleshooting the Dynamic Workload Console

Accessing troubleshooting information.

### **About this task**

You can find information about how to troubleshoot problems with the Dynamic Workload Console, related to connections, performance, user access, reports, and others at the following link: [IBM Workload Scheduler Troubleshooting](#), under the section about troubleshooting Dynamic Workload Console problems.

**Note:** If you print PDF publications on other than letter-sized paper, set the option in the File -> Print window that enables Adobe Reader to print letter-sized pages on your local paper.

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## **Internet Explorer version 10 compatibility mode no longer required**

Internet Explorer, version 10 is no longer required in compatibility mode for Dynamic Workload Console

### **About this task**

Internet Explorer, version 10 is no longer required to run in compatibility mode when working with the Dynamic Workload Console. On the contrary, compatibility mode might now cause some issues, such as plug-ins not loading correctly. To ensure you can work with the Dynamic Workload Console, disable the compatibility mode.





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## Chapter 18. Reference

Reference information to perform the main tasks and activities from the Dynamic Workload Console.

This section provides some reference information that can be useful to perform the main tasks and activities from the Dynamic Workload Console.

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### Accessing online product documentation

Accessing the products online publications in IBM Knowledge Center.

#### About this task

IBM posts publications for this and all other products, as they become available and whenever they are updated, to IBM Knowledge Center. You can access product documentation at the following links:

- IBM Workload Automation product information, to access all the online product documentation related to the IBM Workload Scheduler product.
- IBM Workload Scheduler for z/OS Publications in PDF format, to access publications in Adobe PDF format.
- Workload Automation YouTube channel, to access scenario-based and how-to videos about product features.
- IBM Workload Scheduler Wiki Media Gallery, to access demos about how to use the IBM Workload Scheduler product.
- IBM Workload Automation wiki, to access information about IBM Workload Scheduler such as best practices, product features, and new tools.

**Note:** If you print PDF publications on other than letter-sized paper, set the option in the File -> Print window that enables Adobe Reader to print letter-sized pages on your local paper.

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### Users and groups

How a system of users and groups allows different types of access to the Dynamic Workload Console.

The Dynamic Workload Console uses the Dashboard Application Services Hub capabilities for defining users and to authorize them to view and use items on the navigation menu. Users are granted access to resources based on the role to which they have been assigned. The groups in which users are defined or the role assigned to users determines the operations they can perform and which resources are visible to them. This means that depending on your user role designation, you might not see all of the items described in this help system. The groups or predefined roles available are:

#### TWSWEBUIAdministrator

Users in this group can see the entire portfolio and use all features of the Dynamic Workload Console.

Users in this group can also access and use all features of the Self-Service Catalog and the Self-Service Dashboards mobile applications. From the Self-Service Catalog mobile application, these users can create and edit

catalogs, create and edit services, add services to catalogs, submit services associated to job streams, and share catalogs and services with other users. From the Self-Service Dashboards mobile application, these users can create and edit dashboards to filter for jobs and workstations, display a dashboard of results, perform recovery actions on a single result.

#### **TWSWEBUIConfigurator**

Users in this group can manage Dynamic Workload Console scheduler connections, user preferences, and scheduling environment design.

#### **TWSWEBUIOperator**

Users in this group can see Dynamic Workload Console:

- All Monitor tasks
- Jobs and job streams to be submitted on request
- Set User Preferences

#### **TWSWEBUIDeveloper**

Users in this group can create, list, and edit workload definitions, workstations, and event rule definitions in the IBM Workload Scheduler database.

#### **TWSWEBUIAnalyst**

Users in this group can manage Dynamic Workload Console reports and user preferences.

Users in this group can also access the Self-Service Catalog and the Self-Service Dashboards mobile applications but the actions they can perform are limited to submitting service requests (job streams) from the Self-Service Catalog and, from the Self-Service Dashboards mobile application, displaying a dashboard of results and performing recovery actions on them.

#### **TWSWEBUIBusinessDeveloper**

Users in this group can access and use the Self-Service Catalog and the Self-Service Dashboards mobile applications. From the Self-Service Catalog mobile application, these users can create and edit catalogs, create and edit services, add services to catalogs, delete services and catalogs, and submit services associated to job streams. From the Self-Service Dashboards mobile application, these users can create and edit dashboards to filter for jobs and workstations, display and view a dashboard of results, delete dashboards, and perform recovery actions on a single result. To share catalogs, services, and dashboards with other users, the TWSWEBUIBusinessDeveloper can assign them to the custom roles that the TWSWEBUIBusinessDeveloper possesses but not to predefined roles. Users with these same custom roles can work with the catalogs, services, and dashboards. Users with all of the custom roles can submit services; view, edit, and delete services, catalogs, and dashboards; but users with only one or some of the custom roles can only submit services, and view services, catalogs, and dashboards.

If a user with the Administrator role, creates catalogs, services, and dashboards and does not assign any roles to them, then users with the TWSWEBUIBusinessDeveloper role cannot see or work with them.

**Note:** If a custom role is removed from a catalog, service, or dashboards, in addition to the TWSWEBUIBusinessDeveloper user, users with this same custom role can no longer see and work with them, even if they possess other custom roles that are currently assigned to the catalog or service. The Administrator must reassign the custom role to the catalog, service, or

dashboard to make it accessible again to the TWSWEBUIBusinessDeveloper user and other users with the same custom role.

The following table lists some entries of the navigation toolbar, and some activities you can perform from the Dynamic Workload Console. Beside each item, the table shows the groups whose users are authorized to access them.

*Table 26. Menu and Group Permissions*

<b>Menu Item</b>	<b>Groups with Permission</b>
Quick Start	TWSWEBUIAdministrator
All Configured Tasks	TWSWEBUIAdministrator TWSWEBUIOperator
Manage Workload Reports	TWSWEBUIAdministrator TWSWEBUIAnalyst
Administration -> Workload Design	TWSWEBUIAdministrator TWSWEBUIDeveloper
Administration -> Workload Forecast	TWSWEBUIAdministrator TWSWEBUIOperator
Administration -> Workload Submission	TWSWEBUIAdministrator TWSWEBUIOperator
Administration -> Monitor	TWSWEBUIAdministrator TWSWEBUIOperator
Administration -> Workload Design	TWSWEBUIAdministrator TWSWEBUIConfigurator
Administration -> Monitor	TWSWEBUIAdministrator TWSWEBUIOperator
Reporting	TWSWEBUIAdministrator TWSWEBUIAnalyst
System Configuration ->Manage Engines	TWSWEBUIAdministrator TWSWEBUIConfigurator
System Configuration -> Set User Preferences	TWSWEBUIAdministrator TWSWEBUIOperator TWSWEBUIConfigurator TWSWEBUIDeveloper TWSWEBUIAnalyst
System Configuration -> Manage Settings	TWSWEBUIAdministrator

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## **Type of communication based on SSL communication options**

How the SSL communication options for distributed workstations affect communication between workstations.

Based on the authentication types that you defined for the workstations in your network, communication between workstations is different. The following table summarizes the types of connection for the different authentication type settings.

*Table 27. Type of communication based on workstation SSL communication options*

<b>Fault-tolerant Agent (Domain Manager)</b>	<b>Domain Manager (Parent Domain Manager)</b>	<b>Connection Type</b>
Disabled	Disabled	TCP/IP

Table 27. Type of communication based on workstation SSL communication options (continued)

Fault-tolerant Agent (Domain Manager)	Domain Manager (Parent Domain Manager)	Connection Type
Allow Incoming	Disabled	TCP/IP
Upward Forced	Disabled	No connection
All Forced	Disabled	No connection
Disabled	Upward Forced	TCP/IP
Allow Incoming	Upward Forced	TCP/IP
Upward Forced	Upward Forced	SSL
All Forced	Upward Forced	SSL
Disabled	Allow Incoming	TCP/IP
Allow Incoming	Allow Incoming	TCP/IP
Upward Forced	Allow Incoming	SSL
All Forced	Allow Incoming	SSL
Disabled	All Forced	No connection
Allow Incoming	All Forced	SSL
Upward Forced	All Forced	SSL
All Forced	All Forced	SSL

For details about how to create SSL certificates and how to set local options for SSL communication, see *IBM Workload Scheduler: Administration Guide*.

**Related tasks:**

“Creating distributed workstations” on page 101

Creating distributed workstation definitions in the IBM Workload Scheduler database.

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## Status description and mapping for distributed jobs

**Distributed**

The job status as described in Dynamic Workload Console and how it is defined in IBM Workload Scheduler.

There are the following types of status for distributed jobs:

**“Job status” on page 257**

A subset of internal status that is common for both IBM Workload Scheduler for distributed and IBM Workload Scheduler for z/OS environments.

**“Job internal status” on page 257**

The IBM Workload Scheduler job status registered on the workstation where the job is running. The internal status uniquely identifies a job status in IBM Workload Scheduler.

## Job status

Table 28 lists the job statuses.

Table 28. Job status

This job status ...	Means that ...
Waiting	The job is waiting for its dependencies to be resolved.
Ready	The dependencies of the job have been resolved and the job is ready to run.
Running	The job is running.
Successful	The job completed successfully.
Error	The job stopped running with an error.
Canceled	The job was canceled.
Held	The job was put on hold.
Undecided	The job status is currently being checked.
Blocked	The job was blocked because of unfulfilled dependencies.
Suppressed by condition	The job is suppressed because the condition dependencies associated to its predecessors are not satisfied.

## Job internal status

Table 29 lists the job internal statuses.

**Note:** The + flag written beside the INTRO and EXEC statuses means that the job is managed by the local **batchman** process.

Table 29. Job internal status

This job status ...	Means that ...
ABEND	The job terminated with a nonzero exit code or with an exit code outside the defined RC mapping.
ABEND P	An ABEND confirmation was received, but the job is not completed.
ADD	The job is being submitted.
+AUTOGEN+	A monitoring job automatically created to monitor conditions in condition-based workload automation. For more information, see the section about condition-based workload automation in <i>User's Guide and Reference</i> .
BOUND	For shadow jobs, it means that the shadow job matched a remote job instance in the remote plan. For Workload Scheduler for z/OS Agent, it means that the job is on the JES queue.
CANCEL	The job was canceled.
CANCEL P	The job is pending cancellation. Cancellation is deferred until all of the dependencies, including <b>at</b> time dependencies, are resolved.
DONE	The job completed in an unknown status.
ERROR	For internetwork and cross dependencies only, an error occurred while checking for the remote status.
EXEC	The job is running.
EXTRN	For internetwork dependencies only, the status is unknown. An error occurred, a rerun action was just performed on the job in the <b>external</b> job stream, or the remote job or job stream does not exist.

Table 29. Job internal status (continued)

This job status ...	Means that ...
FAILED	Unable to launch the job.
FENCE	The job's priority is below the fence.
HOLD	The job is awaiting dependency resolution.
INTRO	The job is introduced for launching by the system.
PEND	The job completed, and is awaiting confirmation.
READY	The job is ready to launch, and all dependencies are resolved. If a job fails because the agent is not available, the job is automatically restarted and set to the READY status, waiting for the agent to connect again. As soon as the agent connects again, the job is submitted.
R JOB	The job is running.
SCHED	The job's <b>at</b> time has not arrived.
SUCC	The job completed with an exit code of zero.
SUCC P	A <b>SUCC</b> confirmation was received, but the job is not completed.
SUSP	The job was blocked because of unfulfilled dependencies. For IBM i jobs only, this status indicates that the IBM i job is waiting for a reply to a message.  For more information, see the section about scheduling jobs on IBM i systems in <i>User's Guide and Reference</i> .
USER STAT	The job was put on hold by the user.
WAIT	The job is waiting to fulfill its dependencies.
WAITD	The job is waiting to fulfill its dependencies.
SUPPRESS	The job is suppressed because the condition dependencies associated to its predecessors are not satisfied.

## Job status mapping

Table 30 describes how a job status is mapped to the corresponding job internal status.

Table 30. Job status mapping

This job status ...	Maps to this job internal status
Waiting	ADD, PEND, WAIT, WAITD, INTRO, HOLD
Ready	READY
Running	EXEC, SUCC P, ABEND P, R JOB, BOUND
Successful	SUCC
Error	ABEND, FAILED
Canceled	Status of the job when it was canceled. Canceled flag is set.
Held	Priority = 0, WAIT, READY, USER STAT
Undecided	ERROR, EXTRN
Blocked	SUSP
Suppressed by condition	SUPPR

**Related concepts:**

“Job” on page 55

Information about jobs, which are scheduling objects used to define and run activities in the scheduling environment.

**Related tasks:**

“Creating a task to Monitor Jobs” on page 180

How you can create a Monitor Jobs task.

“Creating a task to Monitor Critical Jobs” on page 182

Why and how you can create a Monitor Critical Jobs task.

“Creating a task to Monitor Jobs on Multiple Engines” on page 185

Why and how you create a Monitor Jobs task to run on multiple engines.

## Status description and mapping for z/OS jobs

z/OS

z/OS job status displayed by Dynamic Workload Console and how it is defined in IBM Workload Scheduler for z/OS.

There are the following types of status for z/OS jobs:

**“z/OS job status”**

A subset of internal statuses common for both IBM Workload Scheduler distributed and z/OS environments.

**“z/OS job internal status” on page 260**

The job status registered on the IBM Workload Scheduler controller. The internal status uniquely identifies the status of a z/OS job.

### z/OS job status

Table 31 shows the z/OS job statuses that are displayed by the Dynamic Workload Console.

*Table 31. z/OS job status*

This job status ...	Means that ...
Waiting	The job is waiting for its dependencies to be resolved.
Ready	The dependencies of the job have been resolved and the job is ready to run.
Running	The job is running.
Successful	The job completed successfully.
Error	The job has stopped running with an error.
Canceled	The job was canceled.
Held	The job was put in hold.
Undefined	The job status is currently being checked.
Suppressed by Condition	The job is suppressed because the condition dependencies associated to its predecessors are false.

## z/OS job internal status

Table 32 shows the z/OS job internal statuses that are displayed by the Dynamic Workload Console and how they map to the status displayed on the IBM Workload Scheduler for z/OS controller.

Table 32. z/OS job internal status

This job internal status ...	Means that ...	Maps to ...
Arriving	The job is ready for processing; no predecessors were defined.	A
Complete	The job has completed	C
Deleted	The job has been deleted from the plan	D
Error	The job has ended-in-error.	E
Interrupted	The job is interrupted.	I
Ready	The job is ready for processing; all predecessors are complete.	R
Started	The job has started	S
Undefined	The job status is being evaluated.	U
Waiting	The job is waiting for a predecessor to complete.	W
Ready - non-reporting workstation	Ready - At least one predecessor is defined on a <i>nonreporting</i> workstation; all predecessors are complete.	*
Suppressed by Condition	The condition dependencies associated to its predecessors are not satisfied.	X

## z/OS job status mapping

Table 33 describes how a z/OS job status is mapped to the corresponding job internal status.

Table 33. z/OS job status mapping

This job status ...	Maps to this job internal status
Waiting	W
Ready	A, R, *
Running	S
Successful	C
Error	E
Canceled	I, D
Held	A,R,* manually held
Undefined	U
Suppressed by Condition	X

**Related concepts:**



“Job” on page 55

Information about jobs, which are scheduling objects used to define and run activities in the scheduling environment.

**Related tasks:**

“Creating a task to Monitor Jobs” on page 180

How you can create a Monitor Jobs task.

“Creating a task to Monitor Critical Jobs” on page 182

Why and how you can create a Monitor Critical Jobs task.

“Creating a task to Monitor Jobs on Multiple Engines” on page 185

Why and how you create a Monitor Jobs task to run on multiple engines.

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## Status description and mapping for distributed job streams

### Distributed

The job stream status in Dynamic Workload Console and how it is defined in IBM Workload Scheduler.

There are the following types of status for job streams:

**“Job stream status”**

A subset of internal statuses that is common for both IBM Workload Scheduler for distributed and IBM Workload Scheduler for z/OS environments.

**“Job stream internal status” on page 262**

The IBM Workload Scheduler job stream status registered on the workstation where the job stream is running. The internal status uniquely identifies a job stream status in IBM Workload Scheduler.

### Job stream status

Table 34 lists the job stream statuses.

*Table 34. Job stream status*

This job stream status ...	Means that ...
Waiting	The job stream is waiting for its dependencies to be resolved.
Ready	The dependencies of the job stream have been resolved and the job stream is ready to run.
Running	The job stream is running.
Successful	The job stream completed successfully.
Error	The job stream has stopped running with an error.
Canceled	The job stream was canceled.
Held	The job stream was interrupted.
Undefined	The job stream status is currently being checked.
Blocked	The job stream was blocked because of unfulfilled dependencies.
Suppressed by condition	The job stream is suppressed because the condition dependencies associated to its predecessors are not satisfied.

## Job stream internal status

Table 35 lists the job stream internal statuses.

Table 35. Job stream internal status

This job stream status ...	Means that ...
ABEND	The job stream terminated with a nonzero exit code.
ADD	The job stream was added with operator intervention.
CANCEL	The job stream was canceled.
CANCEL P	The job stream is pending cancellation. Cancellation is deferred until all of the dependencies, including an at time, are resolved.
EXEC	The job stream is running.
EXTRN	The job stream is in a remote IBM Workload Scheduler network and its status is unknown. An error occurred, a Rerun action was performed on the <b>EXTERNAL</b> job stream, or the <b>INET</b> job or job stream does not exist.
HOLD	The job stream is awaiting dependency resolution.
READY	The dependencies for the job stream have been met but the time restrictions for the job stream have not.
STUCK	The job stream was interrupted. No jobs are launched without operator intervention.
SUCC	The job stream completed with an exit code of zero.
SUPPRESS	The job stream is suppressed because the condition dependencies associated to its predecessors are not satisfied.
Get Job Status Error	This is for internetwork job streams and specifies that an error occurred while checking for the remote status.

## Job stream status mapping

Table 36 describes how a job stream status is mapped to the corresponding job stream internal status.

Table 36. Job stream status mapping

This job stream status ...	Maps to this job stream internal status
Waiting	ADD, PEND, WAIT, WAITD, INTRO, HOLD
Ready	READY
Running	EXEC
Successful	SUCC
Error	ABEND, FAILED
Canceled	CANCEL, HOLD, CANCEL P
Held	HOLD
Undefined	ERROR, EXTRN
Blocked	STUCK
Suppressed by condition	SUPPR

### Related concepts:

“Job stream” on page 56

### Related tasks:

“Creating a task to Monitor Job Streams” on page 187

How you can create a Monitor Job Streams task.

“Creating a task to Monitor Job Streams on Multiple Engines” on page 189

Why and how you create a Monitor Job Streams task to run on multiple engines.

“Creating job stream definitions” on page 110

How to define a new job stream definitions using the Dynamic Workload Console.

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## Status description and mapping for z/OS job streams

z/OS

The z/OS job stream status in Dynamic Workload Console and how it is defined in IBM Workload Scheduler for z/OS.

There are the following types of status for z/OS job streams:

### “z/OS job stream statuses”

A subset of internal statuses that is common for both IBM Workload Scheduler for distributed and IBM Workload Scheduler for z/OS environments.

### “z/OS job stream internal statuses”

The IBM Workload Scheduler job stream statuses registered on the controller. The internal status uniquely identifies the status of a z/OS job stream in IBM Workload Scheduler.

## z/OS job stream statuses

Table 37 shows the z/OS job stream statuses that are displayed by the Dynamic Workload Console.

Table 37. z/OS job stream status

This job stream status ...	Means that ...
Waiting	No job in the job stream has started.
Running	The job stream is running.
Successful	The job stream completed successfully.
Error	The job stream has stopped running with an error.
Canceled	The job stream was canceled.

## z/OS job stream internal statuses

Table 38 shows the z/OS job stream internal statuses that are registered on the Dynamic Workload Console controller.

Table 38. z/OS job stream internal status

This job stream status ...	Means that ...
Waiting	No job in the job stream has started.
Started	The job stream is running.

Table 38. z/OS job stream internal status (continued)

This job stream status ...	Means that ...
Completed	The job stream completed successfully.
Error	The job stream has stopped running with an error.
Deleted	The job stream was deleted.
Undefined	The job stream status is not known.

## z/OS job stream status mapping

Table 39 describes how a z/OS job stream status is mapped to the corresponding job stream internal status.

Table 39. z/OS job stream status mapping

This job stream status ...	Maps to this job stream internal status
Waiting	Waiting
Running	Started
Successful	Completed
Error	Error
Canceled	Deleted

### Related concepts:

“Job stream” on page 56

### Related tasks:

“Creating a task to Monitor Job Streams” on page 187  
How you can create a Monitor Job Streams task.

“Creating a task to Monitor Job Streams on Multiple Engines” on page 189  
Why and how you create a Monitor Job Streams task to run on multiple engines.

“Creating job stream definitions” on page 110  
How to define a new job stream definitions using the Dynamic Workload Console.

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## Workstation types

The following are the main workstation types and their attributes.

Table 40. Attribute settings for management workstation types. this table shows the attribute settings for management workstation types

Attributes	Master domain manager	Domain manager	Backup domain manager
<b>cpuname</b>	The name of the workstation.		
<b>description</b>	A description for the workstation enclosed within double quotes. This attribute is optional.		
<b>vartable</b>	The name of a variable table associated with the workstation. Variables used with the workstation are defined in this table. This attribute is optional.		

Table 40. Attribute settings for management workstation types (continued). this table shows the attribute settings for management workstation types

Attributes	Master domain manager	Domain manager	Backup domain manager
<b>os</b>	The operating system installed on the system. Specify one of the following values: UNIX WNT OTHER IBM_i		
<b>node</b>	The system host name or IP address.		
<b>tcpaddr</b>	The value assigned to <i>nm port</i> in the <i>localopts</i> file. For multiple workstations on a system, enter an unused port number. The default value is 31111.		
<b>secureaddr</b>	The value assigned to <i>nm ssl port</i> in the <i>localopts</i> file. Specify it if <b>securitylevel</b> is set to on, force or enabled.		
<b>timezone   tz</b>	The time zone in which the system is located. It is recommended that the value matches the value set on the operating system.		
<b>domain</b>	MASTERDM	The name of the managed domain.	
<b>host</b>	Not applicable		
<b>access</b>	Not applicable		
<b>type</b>	manager		fta
<b>ignore</b>	Use this attribute if you do not want this workstation to appear in the next production plan.		
<b>autolink</b>	It indicates if a link between workstations is automatically opened at startup. Specify one of the following values:  ON OFF  This is an optional attribute. The default value is ON.		
<b>behindfirewall</b>	This setting is ignored.	It indicates if there is a firewall between the workstation and the master domain manager. Specify one of the following values:  ON OFF  The default value is OFF.	
<b>securitylevel</b>	The type of SSL authentication to use:  enabled on force		
<b>fullstatus</b>	ON		
<b>server</b>	Not applicable		This setting is ignored.
<b>protocol</b>	Not applicable		
<b>members</b>	Not applicable		
<b>requirements</b>	Not applicable		

Table 41 describes the values you set for each attribute for target workstation types. Following the table you find additional details about each attribute.

Table 41. Attribute settings for target workstation types. this table shows the attribute settings for target workstation types

Attribute	Fault-tolerant agent and standard agent	Workload broker workstation	Extended agent	Agent	Remote engine workstation	Pool	Dynamic pool
<b>cpuname</b>	The name of the workstation.						
<b>description</b>	A description for the workstation enclosed within double quotes. This attribute is optional.						
<b>variable</b>	The name of a variable table associated with the workstation. Variables used with the workstation are defined in this table. This attribute is optional.						
<b>os</b>	The operating system installed on the system. Specify one of the following values:  UNIX WNT OTHER IBM_i  Specify OTHER for IBM i systems running as limited fault-tolerant agents.	OTHER	The operating system installed on the machine. Specify one of the following values:  UNIX WNT OTHER IBM_i	This value setting is discovered on the system.	The operating system installed on the machine. Specify one of the following values:  UNIX WNT ZOS	The operating system installed on the machine. Specify one of the following values:  UNIX WNT OTHER IBM_i	
<b>node</b>	The system host name or IP address.		The system host name or IP address. Specify NULL when <b>host</b> is set to \$MASTER, or when defining an extended agent for PeopleSoft, MVS or Oracle.	Agent host name or IP address.	Remote engine host name or IP address.		Not applicable
<b>tcpaddr</b>	The value assigned to <i>nm port</i> in the <i>localopts</i> file. When defining multiple workstations on a system, enter an unused port number. The default value is 31111.	The value assigned to <i>nm port</i> in the <i>localopts</i> file. When defining multiple workstations on a system, enter an unused port number. The default value is 41114.	See the selected access method specifications.	The port number to communicate with the agent when the protocol is http.	The port number to communicate with the remote engine when the protocol is http.		Not applicable
<b>secureaddr</b>	The value assigned to <i>nm ssl port</i> in the <i>localopts</i> file. Specify it if <b>securitylevel</b> is set to on, force or enabled.	Not Applicable	Not Applicable	The port number to communicate with the agent when the protocol is https.	The port number to communicate with the remote engine when the protocol is https.		Not applicable

Table 41. Attribute settings for target workstation types (continued). this table shows the attribute settings for target workstation types

Attribute	Fault-tolerant agent and standard agent	Workload broker workstation	Extended agent	Agent	Remote engine workstation	Pool	Dynamic pool
<b>timezone   tz</b>	The time zone in which the system is located. It is recommended that the value matches the value set on the operating system.		The time zone set on the workstation specified in the <b>host</b> attribute.	The time zone set on the agent.	The time zone set on the remote engine.	The time zone set on the pool agents.	The time zone set on the dynamic pool agents.
<b>domain</b>	Specify an existing domain. The default value for fault-tolerant agents is MASTERDM. This setting is mandatory for standard agents.	Specify an existing domain. This setting is mandatory.	This setting is needed only if the value assigned to <b>host</b> is \$MANAGER.	Not applicable			
<b>host</b>	Not Applicable		The host workstation. It can be set to \$MASTER or \$MANAGER.	The broker workstation.			
<b>access</b>	Not Applicable			Select the appropriate access method file name.	Not Applicable		
<b>agentID</b>				The unique identifier of the dynamic agent			
<b>type</b>	fta s-agent  The default value is fta.  Specify fta for IBM i systems running as limited fault-tolerant agents.	broker	x-agent	agent	rem-eng	pool	d-pool
<b>ignore</b>	Use this attribute if you do not want this workstation to appear in the next production plan.						
<b>autolink</b>	It indicates if a link between workstations is automatically opened at startup. Specify one of the following values:  ON OFF  This is an optional attribute. The default value is ON.		OFF	Not applicable			
<b>behindfirewall</b>	It indicates if there is a firewall between the workstation and the master domain manager. Specify one of the following values:  ON OFF  The default value is OFF.		OFF	Not applicable			

Table 41. Attribute settings for target workstation types (continued). this table shows the attribute settings for target workstation types

Attribute	Fault-tolerant agent and standard agent	Workload broker workstation	Extended agent	Agent	Remote engine workstation	Pool	Dynamic pool
<b>securitylevel</b>	The type of SSL authentication to use:  enabled on force  Not applicable for IBM i systems running as limited fault-tolerant agents.	Not Applicable					
<b>fullstatus</b>	It indicates if the workstation is updated about job processing status in its domain and subdomains. Specify one of the following values:  ON OFF  Specify OFF for standard agents.	OFF	Not applicable				
<b>server</b>	0-9, A-Z. When specified, it requires the creation of a dedicated mailman processes on the parent workstation.	Not Applicable					
<b>protocol</b>	Not applicable			Specify one of the following values:  http https  This attribute is optional. When not specified, it is automatically determined from the settings specified for <b>tcpaddr</b> and <b>secureaddr</b> .	Not applicable		
<b>members</b>	Not applicable					Required value	Not applicable
<b>requirements</b>	Not applicable					Required value	

**Related concepts:**

“Workstation” on page 47

Using workstations for scheduling jobs and job streams.

**Related tasks:**

“Creating distributed workstations” on page 101

Creating distributed workstation definitions in the IBM Workload Scheduler database.

“Creating z/OS workstations” on page 102

Creating z/OS workstation definitions in the IBM Workload Scheduler database.



“Creating z/OS virtual workstations” on page 103

This topic describes how to create z/OS virtual workstation definitions in the IBM Workload Scheduler database.

“Creating a task to Monitor Workstations” on page 177

How you can create a Monitor Workstations task.

---

## = Graphical views in the plan

= Views to monitor the progress of your job streams in the plan in a graphical map.

= You can use these views to monitor the progress of your job streams in the plan  
= from a graphical map.

= You can also take several actions on the objects displayed in the view. Almost all of  
= the actions and information available in the traditional views resulting from  
= Monitor queries are also graphically available from these views.

= All of the views provide a toolbar that you can use to act upon the views and the  
= objects displayed. For more information about the actions available from the  
= toolbar, see the specific panel help.

= You can also export the displayed graphic to either a Scalable Vector Graphics  
= (SVG) file or a Portable Network Graphics (PNG) file . In these formats,  
= vector-based images can be scaled indefinitely without degrading the quality of the  
= image.

= The graphical views contain a combination of textual (tooltips, labels) and visual  
= elements (icons, colors, shapes, progress bar). See the following representations of  
= the graphical elements in the views and what each represents:

= *Table 42. Graphical representation of scheduling objects*



Object	Shape	Icon
Job		In the Workload Designer, the job is represented by this icon:  . In the plan, this icon is replaced with the icon representing the status of the job, see Table 43 on page 270. If the job has a deadline set, then the deadline is visible in the lower-left corner of the job shape. An icon in the lower-left corner indicates if a job is time-dependent.

Table 42. Graphical representation of scheduling objects (continued)


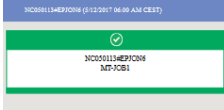









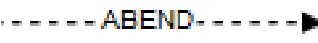
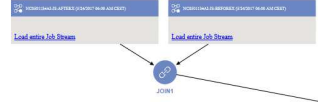

Object	Shape	Icon
Job stream	<p><b>Workload Designer Graphical View</b></p>  <p><b>Job Stream View</b></p>  <p><b>Plan View</b></p> 	<p>In the Workload Designer, the job stream is represented by this icon: . In the plan, the job stream is represented as a container containing jobs.</p>
Prompt		
Resource		
File		
Internetwork dependency		
Dependency		-
Conditional dependency		-
Join dependency		

Table 43. Graphical representation of statuses












Status	Icon	Color
Blocked		Red
Error		
Running		Blue


Table 43. Graphical representation of statuses (continued)

Status	Icon	Color
Successful		Green
Canceled		Grey
Suppressed		
Held		Light grey
Undecided		
Waiting		
Ready		

Table 44. Quick actions on scheduling objects

Icon	Description
	Remove the selected object from the view. Use it, for example, to remove a job from a job stream or a dependency from a job. The removal becomes effective only when you save the object.
	Duplicate object. Available in the Workload Designer graphical view only.
	Create a dependency. Click the icon, click an object, and then draw a line to the job stream or to the job that represents the depending object. The lines are drawn from the dependency to the depending object.
	Remove all the dependencies of the object. Available in the Workload Designer graphical view only.
	View the job log. Not available in the Workload Designer graphical view.
	Rerun job. Not available in the Workload Designer graphical view.
	View the properties. Not available in the Workload Designer graphical view.
	Load successors. Not available in the Workload Designer graphical view.
	Release dependency. Not available in the Workload Designer graphical view.

= Table 44. Quick actions on scheduling objects (continued)

Icon	Description
	Open the actions menu which can also be accessed by right-clicking an object. Not available in the Workload Designer graphical view.

The following graphical views are currently available in the plan:

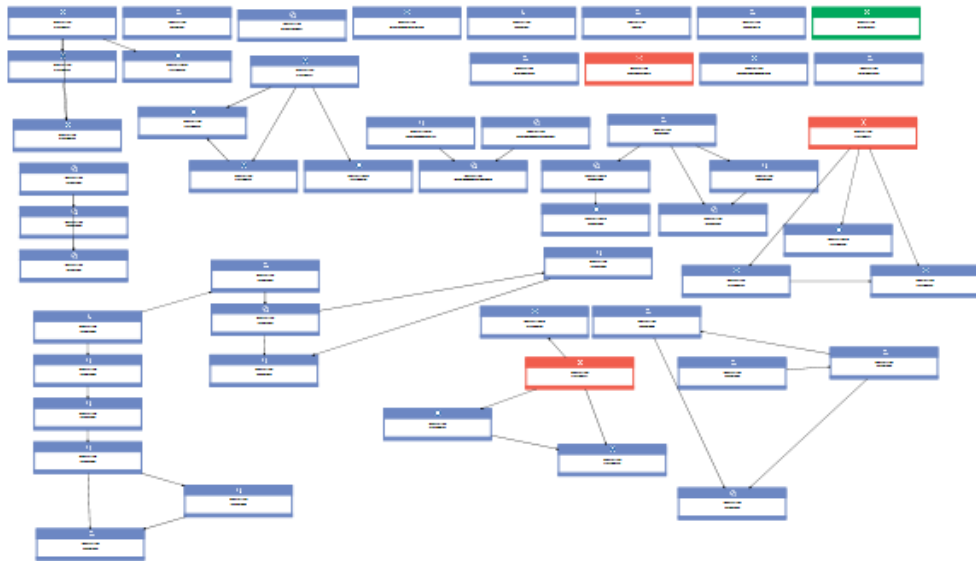
- “Plan View”
- “Job Stream View” on page 273

### Plan View

Use this view to get an overall picture of your plan.

This view shows a collapsed plan; it shows only the job streams, hiding any jobs and internal dependencies. External dependencies, both at job and job stream levels, are shown as arrows between job streams. If a job stream has multiple dependencies on another job stream, these are shown as one single arrow.

The following is an example of the view:



Because potentially a plan can contain a large number of job streams, by default the Plan View displays a limited number of objects. You can determine which job streams to display by specifying filtering criteria in the **Show Plan View** page before launching the view or from the toolbar within the view itself.

The maximum number of job streams displayed by the Plan View is 1000. You can modify the default maximum number of job streams to display in the Plan View by modifying the **planViewMaxJobstreams** property in the `TdwcGlobalSettings.xml` global settings file for the Dynamic Workload Console.

To launch the Plan View:

1. From the portfolio, click: **System Status and Health > Workload Monitoring > Show Plan View.**

= 2. Specify any filter criteria and then click **Go**.

= You can take multiple actions on the job streams in the view by right-clicking them  
= and choosing an option from the context menu such as the following:

- = • Perform an action such as Cancel, Hold, Release, and add or remove a  
= dependency.
- = • Launch and display a job stream in the What-if analysis Gantt chart.
- = • View the jobs in the job stream by launching the in context link to the Job  
= Stream View.

## = **Job Stream View**

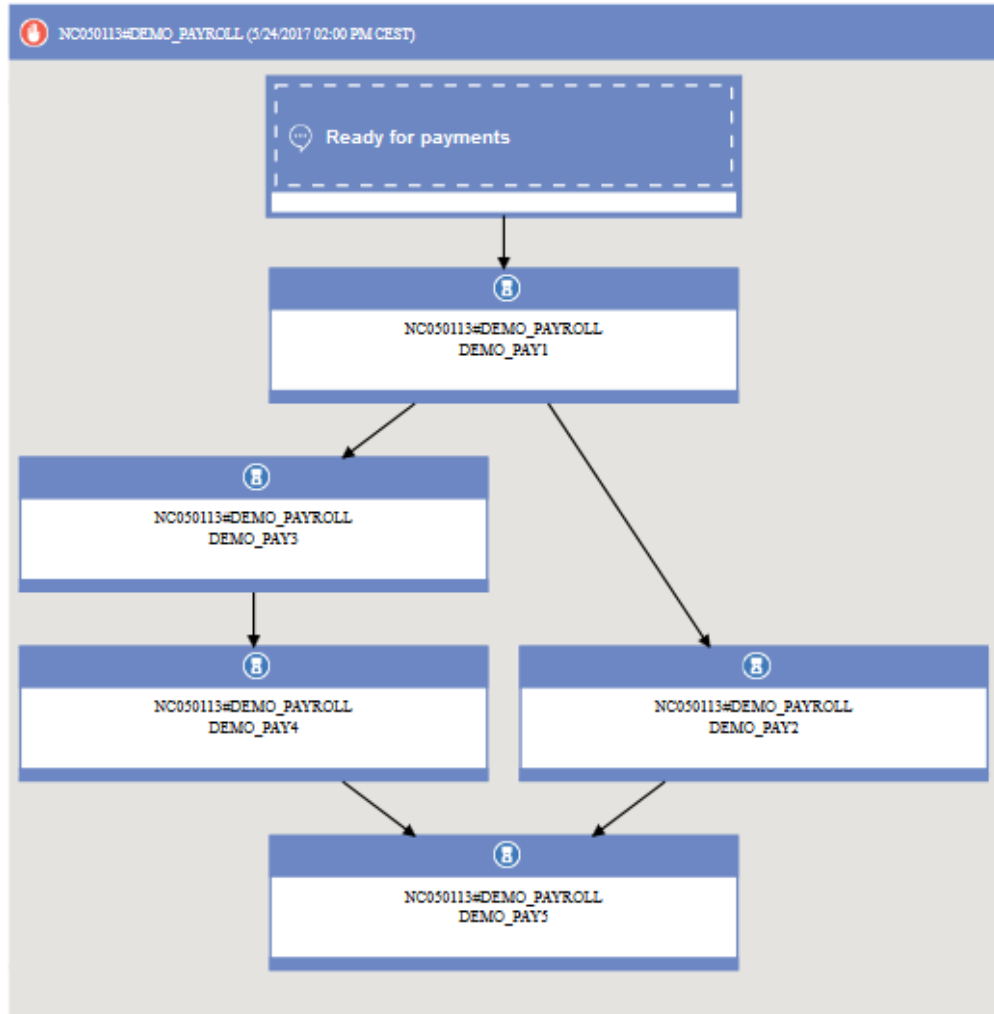
= This view displays a picture of the job stream with all its jobs and related  
= dependencies. You can navigate through the displayed jobs and job streams,  
= choosing the level of predecessors and successors to display. By default, this view  
= displays all the objects in the job stream and the first-level of external predecessors.

= You can open this view in the following ways:

- = • From the table of results of a Monitor Jobs or Monitor Job Streams task, select an  
= item and select **Job Stream View** from the toolbar.
- = • From the Plan View, right-click a job stream and select **Open > Job Stream  
= View**.

\* Use the **Rename** icon to change the name of the view. The **Rename** icon is  
\* displayed when you hover over the Job Stream View string.

= The following is an example of a Job Stream View:



The main elements in the Job Stream View are:

- **Jobs**



The status of the job is indicated by the color and the small icon in the header. See Table 43 on page 270 for the various icons representing the status. Additional information available about the job include:

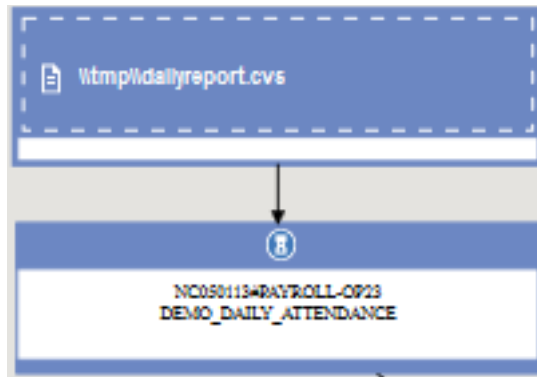
- The deadline written in the lower-left of the rectangle representing the job.
- An icon is displayed in the lower-left indicating if the job is time dependent.
- The tooltip for the job indicates if the job is a critical job or a shadow job. Shadow jobs are jobs running locally that are used to map jobs running on the remote engine.

Further details are available in the tooltip displayed when you click on the job.

You can take multiple actions on the job by right-clicking it and choosing options from the context menu. The actions available depend on the selected engine and on the type of job. From this menu, you can view and print the job

= log and the job properties, or act on the job and its dependencies. You can also  
= take actions on the job workstation or open the job and job stream definitions in  
= the database to modify them.

=  
= • **Dependencies**



=  
= They are shown as boxes different from those used to represent jobs, connected  
= to the depending objects by arrows that represent the dependency relationships.  
= A joined conditional dependency instead is represented by the circle icon  
= connected to the dependency arrows. To take actions on dependencies, you can  
= right-click either the box or the arrow and choose an option from the context  
= menu. Icons displayed in the box to the left describe the dependency type.  
= Further details are available in the tooltip displayed when you click on the  
= dependency. If dependencies within a job stream form a loop, this is highlighted  
= in the view and a message appears, so that you can take the appropriate actions  
= to resolve it.

=  
= **Related concepts:**

= "Plans" on page 83

= Different types of plans you can access to manage the objects and the activities  
= they contain.

= **Related tasks:**

= "Display a graphical plan view" on page 213

= Specify filter criteria and display a graphical representation of the plan in the Plan  
= View.

---

## Workload Designer

Reference information about the Workload Designer.

This section provides some reference information about the Workload Designer.

### Working List

Use this pane to view all the objects that you are working on, to create new objects and to search for existing ones.

Use this pane to view all the objects you are working on, to create new objects, and to search for existing ones in the database.

The objects you see in this list are those you have currently open and you can switch between them to act on them in the workspace on the right.

In this pane you can use the following toolbars:



Use the toolbar to work with the objects displayed in this pane.



Use the toolbar to select or clear all the objects displayed in the list or to collapse and expand the list.

The object highlighted in the list is open in the workspace on the right, where you can edit it.

The object open in the workspace on the right is displayed in bold in this list.

The objects in the list can be marked by the following icons: The objects in the list can be marked by the following icons:



The object is open in edit mode.



The object has pending changes that must still be saved. Click the Save icon to commit the changes to the database.



The object is incorrect or incomplete and cannot be saved until all errors are fixed.



The object is currently being loaded. It cannot be edited until the loading completes.

If you close an object, it is removed from the working list. If it was locked, by closing it you also unlock it.

**Related tasks:**

“Designing your Workload” on page 107

Create and editing workload definitions in the database.

“Editing objects from the Working List View” on page 108

## Details view

Details view displays the structure of the job streams, associated dependencies, and run cycles in a tree table.

Use this view to create, display, and modify job streams, and to add jobs, run cycles, and dependencies to them. It shows the job stream with all the jobs it contains, associated dependencies, and run cycles.

This view displays the structure of the objects in a tree table. It applies to

**Distributed** job streams

**z/OS** job streams and resources.

**z/OS**

It also shows the resource availability intervals. Use the view also to create, display, and modify resources, and to add availability intervals to them.

In this view you can use the following toolbar, icons, and buttons:



All the actions available using the icons of the toolbar act on the root object of the tree table.





Use this button to print the contents of the tree in text format for job streams. Click the button to open a new page containing the information in the tree table for the job stream you are viewing. The output is organized in columns. For all job streams, the object properties shown are Name, Type, and Workstation.

**z/OS**

For z/OS job streams, also Task Type and Owner are shown.



This icon is located at the end of each row and in the objects pop-up menu. Click it to remove the corresponding object from the tree table. Use it, for example, to remove a job from a job stream or a dependency from a job. The removal becomes effective only when you save the object.

Select an Action ▼

Use this button to act on objects located at inner levels. Select the object in the tree table and open the menu, or use the pop-up menu by right-clicking the object. This button is enabled only if the operation is available for the selected object.

Some of the actions available from the action menus are:

#### **Add Objects Selected in Working List**

Add all the objects currently selected in the **Working List**. The objects are added as part of the flow or as dependencies. For example, adding a job definition to a job stream adds it to the job stream flow, while adding a prompt adds it as a dependency.

#### **Add object**

Add any specific object listed in the option.

#### **Open Job Definition**

Open the definition of the job to display its properties as they are defined in the database.

#### **Copy**

Copy the object and keep it in memory until you either copy another object or close the Workload Designer window. You can only copy a job stream if it already exists in the database (that is, it must have been saved at least once). You can also copy dependencies, except for internal job dependencies.

#### **Paste as Dependency**

Paste the object previously copied as a dependency of the selected one. The copied object can be a job, a job stream, or any kind of dependency. You can only paste source objects that already exist in the database.

You can paste a job stream as:

- External job stream dependency of the same or of another job stream
- External job stream dependency of a job in the same or in another job stream

You can paste a job as:

- External job dependency of itself or of the job stream it belongs to
- Internal job dependency of another job in the same job stream

- External job dependency of another job stream or job in another job stream

The object selected in the tree table is highlighted in light blue and is displayed in bold in the **Working List**. When you select an object in the tree table, its properties are displayed in the lower pane, where you can view and edit them, if you are authorized to do so.

**Related tasks:**

- “Designing your Workload” on page 107
- Create and editing workload definitions in the database.
- “Editing objects from the Details View” on page 109

## Graphical View - modelling

Use this panel to graphically view the selected job or job stream with its dependencies in the Workload Designer.

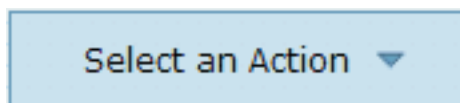
This view shows the jobs contained in a job stream and their associated dependencies or the job stream dependencies. When you select an object in the graphical view, the object properties are displayed at the bottom of the properties pane. In distributed environments, the flexibility of the layout in this view enables you to reposition objects in whichever way is most useful or meaningful for you. If you save changes to the layout, the changes are maintained the next time you open the same job stream in the Graphical View, and also if you open the same job stream in the Job Stream View. In a z/OS environment, and in the case of a connection to a previous version of the engine, any changes made in the layout persist for the current browser session only. Changes to the layout cannot be saved to the database in a z/OS environment or when the engine connection is an engine of a release previous to 9.4.

For a description of the shapes and icons available in this view, as well as in the Job Stream View and Plan View, see “Graphical views in the plan” on page 269.

The same information and actions available from the **Details** pane are also available from the **Graphical View**.

You can select or open objects in the Welcome page and work on them in these panes to edit your definitions as required.

In this view, you can use the following toolbar, icons, and buttons:



Use this button to perform multiple actions. Select the object in the graphic and open the menu, or use the pop-up menu by right-clicking the object. This button is enabled only if this operation is available for the selected object.



Use this toolbar to rapidly manage the view.



=  
=

Use these icons or the slider bar to zoom in or out from the view. The percentage of the view is displayed.



Use this icon to adjust the zoom level of the view so that all the objects are shown at the maximum resolution.



Use this icon to adjust the view to full screen size.



Use this icon to dynamically calculate the best size and position of all the objects in your view.



Click this icon to highlight all the dependencies of the selected object.



Click this icon to display or hide the job stream and job external dependencies in the graphical view. It can be useful to customize the picture granularity, especially in complex and large job streams.



Click this icon to show or hide the job stream dependencies.



Click this icon to open the graphic in a Scalable Vector Graphics (SVG) file. With this type of file, vector-based images can be scaled indefinitely without losing any quality. A vector graphic program uses these mathematical formulas to construct the screen image, building the best quality image possible, for the given screen resolution.



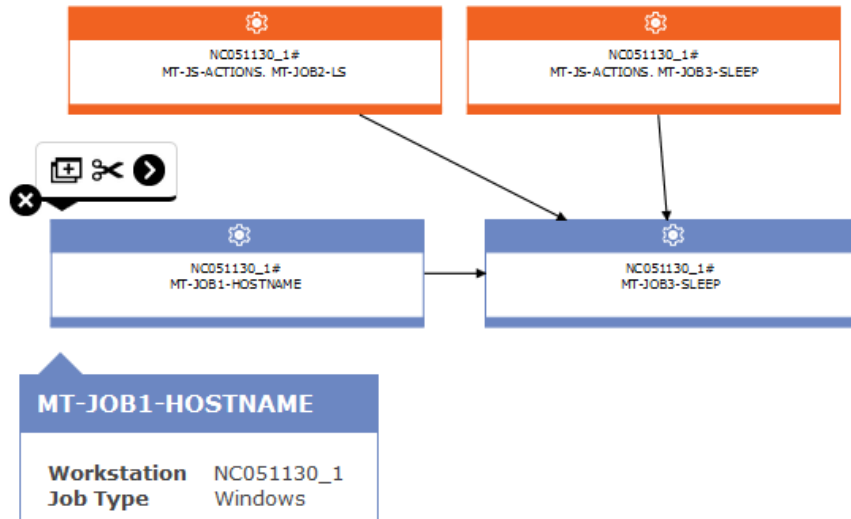
Click this icon to open the graphic in a Portable Network Graphics (PNG) file. A PNG file is compressed in lossless fashion, which means that all image information is restored when the file is decompressed during viewing.





Use this icon to print the view.


Click an object to display a tooltip containing more object information.

You can select an object with a single click to view a quick actions menu above the selected object from where you can perform further actions using the following icons:




 Click this icon to remove the selected object from the view. Use it, for example, to remove a job from a job stream or a dependency from a job. The removal becomes effective only when you save the object.

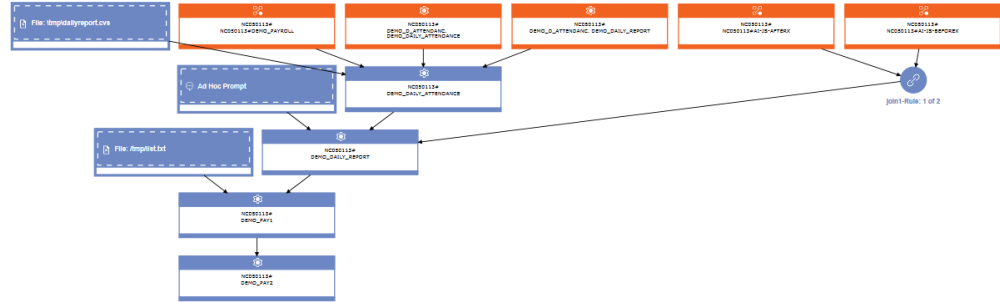
 Use this icon to duplicate the selected object.

 Use this icon to create dependencies. Click the icon, click an object, and then draw a line to the job stream or to the job that represents the depending object. You can use this icon only to create dependencies from objects displayed in the view and by drawing lines in the correct direction (from the dependency to the depending object).

Use this icon to also create a conditional dependency on jobs internal to the job stream. However, in this case, the job stream cannot be saved until you have manually updated the conditional dependency table, by specifying all the required information about the condition.

 Use this icon to remove all the dependencies of the object.

The following graphic is an example of a graphical representation of a job stream.



## Dependencies

When you click a job stream or job dependency, you select its dependency relationship and you can remove it. If this object is a dependency for multiple items, click it again to select the next dependency relationship. If dependencies within a job stream form a loop, this is highlighted in a light yellow color in the view so that you can take the appropriate actions to resolve it. If you delete the dependency causing the loop, the highlighting disappears.

The arrows represent the dependency relationships; where the arrow goes from the dependency to the object that depends on it.

Dependencies can also be conditional. In the graphical view, this type of dependency is represented by a dash arrow.

### Related tasks:

“Designing your Workload” on page 107

Create and editing workload definitions in the database.

“Editing objects from the Graphical View” on page 110

## Object properties

You can use the Properties pane to modify the properties of the selected object.

The properties pane is divided into tabs, which contain options and properties relating to the object currently open.

If you have more than one object open in the **Working List**, the properties displayed in this pane are relating to the object currently selected in the **Details** or **Graphical** view above.

**Note:** For all the details about options and fields displayed in the panels, see the online help by clicking the question mark located at the top-right corner of each panel.

## Run Cycle Preview

This view applies only to job streams and shows the run cycles defined for the selected job stream.

It shows the days on which the job stream runs and the days on which it is explicitly excluded from running. You can see this view as a Month or full Year view, and use the navigation toolbar to go to the next or previous Month or Year.

When you modify a run cycle, the view is automatically updated.

Color coding and symbols are used to indicate included and excluded days in the run cycle rule.

**Selecting a run cycle, the colors have the following meanings:**



The run cycle includes that day.



The run cycle excludes that day.

**Selecting a job stream, the colors have the following meanings:**



The job stream runs only once on that day.



The job stream runs more than once on that day.



The job stream runs, but some runs have been excluded.



The job stream runs more than once, but some runs have been excluded.



The job stream does not run, because it is excluded by a rule.



Non-working day.

Click any highlighted day to view details about the run cycles occurring on the selected day.

**Related concepts:**

“Run cycle” on page 59

“Run cycle group” on page 61

“Creating and managing run cycle groups and their run cycles” on page 132

**Related tasks:**

“Designing your Workload” on page 107

Create and editing workload definitions in the database.

## Message History

Use this panel to view all the messages related to the active session.

When you open this section, by default all warning and error messages of the current session are displayed.

Click the error, warning or information icon to filter for the corresponding messages. No message is displayed until you click an icon.



Click this icon to view error messages.



Click this icon to view warning messages.



Click this icon to view informational messages.



Click this icon to clear only the messages currently displayed.

**Find** Type the string you want to find in the messages. Typing in the text fields

automatically triggers the search, you do not have to click any further button. To reset the search criteria, clear the **Find** text field.



**Main view**

Click this button to go back to the main view, hiding the Message History view.

**Related tasks:**

“Designing your Workload” on page 107

Create and editing workload definitions in the database.

## Using recovery options in job definitions

Possible combinations of recovery options and actions.

The recovery options indicate the actions to be taken if a job fails.

The following table summarizes possible combinations of recovery options and actions. The table is based on the following criteria from a job stream called **sked1**:

- Job stream **sked1** has two jobs, **job1** and **job2**.
- If selected for **job1**, the recovery job is **jobr**.
- **Job2** is dependent on **job1** and will not start until **job1** is complete.

*Table 45. Recovery option table*

Prompt/Job	Stop	Continue	Rerun
<b>Recovery prompt:</b> No <b>Recovery job:</b> No	Intervention is required.	Run job2 regardless of job1 completion status.	<ul style="list-style-type: none"> <li>• Rerun job1.               <ul style="list-style-type: none"> <li>– If job1 ends in error, issue scheduler prompt.</li> <li>– If reply is yes, repeat the above steps.</li> </ul> </li> <li>• If job1 is successful, run job2.</li> </ul>
<b>Recovery prompt:</b> Yes <b>Recovery job:</b> No	Issue recovery prompt. Intervention is required.	<ul style="list-style-type: none"> <li>• Issue recovery prompt.</li> <li>• If reply is yes, run job2 regardless of job1 completion status.</li> </ul>	<ul style="list-style-type: none"> <li>• Issue recovery prompt.               <ul style="list-style-type: none"> <li>– If reply is yes, rerun job1.</li> <li>– If job1 ends in error, repeat the above steps.</li> </ul> </li> <li>• If job1 is successful, run job2.</li> </ul>

Table 45. Recovery option table (continued)

Prompt/Job	Stop	Continue	Rerun
<b>Recovery prompt:</b> No <b>Recovery job:</b> Yes	<ul style="list-style-type: none"> <li>• Run jobr.</li> <li>– If jobr ends in error, intervention is required.</li> <li>– If jobr is successful, run job2.</li> </ul>	<ul style="list-style-type: none"> <li>• Run jobr.</li> <li>• Run job2 regardless of job1 completion status.</li> </ul>	<ul style="list-style-type: none"> <li>• Run jobr.</li> <li>– If jobr ends in error, intervention is required.</li> <li>– If jobr is successful, rerun job1.</li> <li>• If job1 ends in error, issue scheduler prompt.</li> <li>– If reply is yes, repeat the above steps.</li> <li>– If job1 is successful, run job2.</li> </ul>
<b>Recovery prompt:</b> Yes <b>Recovery job:</b> Yes	<ul style="list-style-type: none"> <li>• Issue recovery prompt.</li> <li>– If reply is yes, run jobr.</li> <li>– If jobr ends in error, intervention is required.</li> <li>– If jobr is successful, run job2.</li> </ul>	<ul style="list-style-type: none"> <li>• Issue recovery prompt.</li> <li>– If reply is yes, run jobr.</li> <li>• Run job2 regardless of job1 completion status.</li> </ul>	<ul style="list-style-type: none"> <li>• Issue recovery prompt.</li> <li>– If reply is yes, run jobr.</li> <li>– If jobr ends in error, intervention is required.</li> <li>– If jobr is successful, rerun job1.</li> <li>• If job1 ends in error, repeat the above steps.</li> <li>• If job1 is successful, run job2.</li> </ul>

**Note:**

- *Intervention is required* means that job2 is not released from its dependency on job1, and therefore must be released by the operator. You can also manually rerun job1 or cancel it.
- The **continue** recovery option overrides the abend state, which might cause the schedule containing the job ended in error to be marked as successful. This prevents the schedule from being carried forward to the next day.
- If you select the **Rerun** option without supplying a recovery prompt, when the job is unsuccessful IBM Workload Scheduler creates a prompt that asks if you want to proceed.
- To reference a recovery job in **conman**, you must use the name of the original job (job1 in the scenario above, not jobr). Recovery jobs are run only one per abend.

Not all jobs are eligible to have recovery jobs run on a different workstation. Follow these guidelines:



- If either workstation is an extended agent, it must be hosted by a domain manager or a fault-tolerant agent that runs in **Full Status** mode.
- The recovery job workstation must be in the same domain as the parent job workstation.
- If the recovery job workstation is a fault-tolerant agent, it must run in **Full Status** mode.

---

## Regular expressions and SQL reports

This section contains examples of regular expressions and SQL reports. Some samples of report output are also shown.

### Related concepts:

“Reports” on page 90

How to customize and generate IBM Workload Scheduler reports.

### Related reference:

Chapter 15, “Reporting,” on page 229

## Regular Expressions

Examples of useful regular expressions supported by IBM Workload Scheduler.

This section gives some examples of useful regular expressions, together with a table that defines the expressions supported by IBM Workload Scheduler. Further information about regular expressions is also widely available in the Internet.

### Useful regular expressions

The following table shows some useful regular expressions for use with the plan extractor, both for filtering jobs and job streams, and for configuring business unit names.

*Table 46. Useful regular expressions*

Requirement	Regular expression	Example
To obtain the same effect as using the "@" character in the Tivoli Workload Scheduler command line	.*	-JScpu .*  Used as a parameter to the plan extractor, filters for all job stream workstations.
To join different criteria in an "OR" relationship		(XYZ.*)   (. *ABC.*)  Filters for all items that begin with the string "XYZ" or that contain the string "ABC" (regular expressions are case-sensitive).
To select objects that begin with one of several characters	[<the characters to be included>]	[ABC].*  Filters for all items that begin with either "A", "B", or "C".
To select objects that do not begin with one of several characters	[^<the characters to be excluded>]	[^ABC].*  Filters for all items that do not begin with either "A", "B", or "C".

Table 46. Useful regular expressions (continued)

Requirement	Regular expression	Example
To select objects in which certain characters appear a certain number of times	<the character to be counted>{<the character count>}	A{3}.* Filters for all items that begin with the string "AAA".
To select objects in which certain characters appear at least a certain number of times	<the character to be counted>{<the character count>}	A{3,}.* Filters for all items that begin with the string "AAA", "AAAA", "AAAAA", and so on.
To select objects in which certain characters appear at least a certain number of times, but not more than a certain number of times	<the character to be counted>{<the lower character count>,<the upper character count>}	A{3,4}.* Filters for all items that begin with the string "AAA", or "AAAA"; a string that began with "AAAAA" would not be selected.

## Complex expressions

These individual regular expressions can be combined to make a complex expression, as shown in the following table.

Table 47. Complex expressions

Example requirement	Regular expression
Select all strings that begin with "AA", "AB", "AC", "BA", "BB", "BC", "CA", "CB", or "CC", and also those that do not end in "X", "Y", or "Z".	([ABC]{2}.*) (.*(^[XYZ]))
Select all strings that begin with "AA" followed by either one or more numbers or one or more letters, and then by the character "_". It can finish with any characters.  This would, for example, select the string AA11_XYZ76 and the string AAFGH_43KKK, but not the string AA8H_3232IHSDG, because this latter has both numbers and letters between the "AA" and the "_".	A{2}([0-9]+ [A-Z]+)_.*

## Regular expressions supported by the plan extractor

The following tables provide full details of the regular expressions supported by the plan extractor.

Table 48. Regular expressions supported by the plan extractor: character

Syntax	Filters for?
x	The character x (regular expressions are case-sensitive)
\\	The backslash character
\0n	The character with octal value 0n (0 <= n <= 7)
\0nn	The character with octal value \0nn (0 <= n <= 7)

Table 48. Regular expressions supported by the plan extractor: character (continued)

Syntax	Filters for?
\0mnn	The character with octal value \0mnn(0 <= m <= 3, 0 <= n <= 7)
\0xhh	The character with hexadecimal value 0xhh
\uhhhh	The character with hexadecimal value 0xhhhh
\t	The tab character ('\u0009')
\n	The newline (line feed) character ('\u000A')
\r	The carriage-return character ('\u000D')
\f	The form-feed character ('\u000C')
\a	The alert (bell) character ('\u0007')
\e	The escape character ('\u001B')
\cx	The control character corresponding to x

Table 49. Regular expressions supported by the plan extractor: character classes

Syntax	Filters for?
[abc]	a, b, or c (simple class)
[^abc]	Any character except a, b, or c (negation)
[a-zA-Z]	a through z or A through Z, inclusive (range)
[a-d[m-p]]	a through d, or m through p: [a-dm-p] (union)
[a-z&&[def]]	d, e, or f (intersection)
[a-z&&[^bc]]	a through z, except for b and c: [ad-z] (subtraction)
[a-z&&[^m-p]]	a through z, and not m through p: [a-lq-z] (subtraction)

Table 50. Regular expressions supported by the plan extractor: predefined character classes

Syntax	Filters for?
.	Any character (might or might not match line terminators)
\d	A digit: [0-9]
\D	A non-digit: [^0-9]
\s	A whitespace character: [ \t\n\x0B\f\r]
\S	A non-whitespace character: [^\s]
\w	A word character: [a-zA-Z_0-9]
\W	A non-word character: [^\w]

Table 51. Regular expressions supported by the plan extractor: POSIX character classes (US-ASCII only)

Syntax	Filters for?
\p{Lower}	A lowercase alphabetic character: [a-z]
\p{Upper}	An uppercase alphabetic character: [A-Z]
\p{ASCII}	All ASCII: [\x00-\x7F]
\p{Alpha}	An alphabetic character: [\p{Lower}\p{Upper}]
\p{Digit}	A decimal digit: [0-9]
\p{Alnum}	An alphanumeric character: [\p{Alpha}\p{Digit}]

Table 51. Regular expressions supported by the plan extractor: POSIX character classes (US-ASCII only) (continued)

Syntax	Filters for?
\p{Punct}	Punctuation: One of !"#\$%&'()*+,-./:;<=>?@[\\]^_`{ }~
\p{Graph}	A visible character: [\p{Alnum}\p{Punct}]
\p{Print}	A printable character: [\p{Graph}]
\p{Blank}	A space or a tab: [ \t]
\p{Cntrl}	A control character: [\x00-\x1F\x7F]
\p{XDigit}	A hexadecimal digit: [0-9a-fA-F]
\p{Space}	A whitespace character: [ \t\n\x0B\f\r]

Table 52. Regular expressions supported by the plan extractor: classes for Unicode blocks and categories

Syntax	Filters for?
\p{InGreek}	A character in the Greek block (simple block)
\p{Lu}	An uppercase letter (simple category)
\\p{Sc}	A currency symbol
\P{InGreek}	Any character except one in the Greek block (negation)
[\p{L}&&[^\p{Lu}]]	Any letter except an uppercase letter (subtraction)

Table 53. Regular expressions supported by the plan extractor: boundary matchers

Syntax	Filters for?
^	The beginning of a line
\$	The end of a line
\b	A word boundary
\B	A non-word boundary
\A	The beginning of the input
\G	The end of the previous match
\Z	The end of the input but for the final terminator, if any
\z	The end of the input

Table 54. Regular expressions supported by the plan extractor: greedy quantifiers

Syntax	Filters for?
X?	X, once or not at all
X*	X, zero or more times
X+	X, one or more times
X{n}	X, exactly n times
X{n,}	X, at least n times
X{n,m}	X, at least n but not more than m times

Table 55. Regular expressions supported by the plan extractor: reluctant quantifiers

Syntax	Filters for?
X??	X, once or not at all

Table 55. Regular expressions supported by the plan extractor: reluctant quantifiers (continued)

Syntax	Filters for?
$X^*?$	$X$ , zero or more times
$X^+?$	$X$ , one or more times
$X\{n\}?$	$X$ , exactly $n$ times
$X\{n, \}?$	$X$ , at least $n$ times
$X\{n, m\}?$	$X$ , at least $n$ but not more than $m$ times

Table 56. Regular expressions supported by the plan extractor: possessive quantifiers

Syntax	Filters for?
$X^?+$	$X$ , once or not at all
$X^{*+}$	$X$ , zero or more times
$X^{++}$	$X$ , one or more times
$X\{n\}^+$	$X$ , exactly $n$ times
$X\{n, \}^+$	$X$ , at least $n$ times
$X\{n, m\}^+$	$X$ , at least $n$ but not more than $m$ times

Table 57. Regular expressions supported by the plan extractor: logical operators

Syntax	Filters for?
$XY$	$X$ followed by $Y$
$X Y$	Either $X$ or $Y$
$(X)$	$X$ , as a capturing group

Table 58. Regular expressions supported by the plan extractor: back references

Syntax	Filters for?
$\backslash n$	Whatever the $n$ th capturing group matched

Table 59. Regular expressions supported by the plan extractor: quotation

Syntax	Filters for?
$\backslash$	Nothing, but quotes the following character
$\backslash Q$	Nothing, but quotes all characters until $\backslash E$
$\backslash E$	Nothing, but quotes all characters until $\backslash Q$

Table 60. Regular expressions supported by the plan extractor: special constructs (non-capturing)

Syntax	Filters for?
$(?:X)$	$X$ , as a non-capturing group
$(?idmsux-idmsux)$	Nothing, but turns match flags on - off
$(?idmsux-idmsux:X)$	$X$ , as a non-capturing group with the given flags on - off
$(?=X)$	$X$ , via zero-width positive lookahead
$(?!X)$	$X$ , via zero-width negative lookahead
$(?<=X)$	$X$ , via zero-width positive lookbehind

Table 60. Regular expressions supported by the plan extractor: special constructs (non-capturing) (continued)

Syntax	Filters for?
(?<!X)	X, via zero-width positive lookbehind
(?>X)	X, as an independent, non-capturing group

## Samples of report output

Samples of report output.

This section lists some samples of report output:

- **Distributed** Job Run History Report Distributed
- **z/OS** Job Run History Report z/OS
- **Distributed** Job Run Statistics Distributed
- **z/OS** Job Run Statistics Report z/OS
- Workstation Workload Summary Report
- **Distributed** Workstation Workload run times Report Distributed
- **z/OS** Workstation Workload run times Report z/OS
- **Distributed** Custom SQL Report Distributed
- **z/OS** Custom SQL Report z/OS

## SQL report examples

Examples of queries that can be run using the SQL custom reports.

This section provides some examples of queries that can be run using the SQL custom reports.

### Jobs grouped by return codes

For each return code, this query returns the number of jobs that ended with the corresponding return code:

```
SELECT DISTINCT return_code AS RC count(job_name) AS ,#JOB
FROM mdl.job_history_v
GROUP BY return_code
```

Table 61. Example of query outcome

RC	#JOB
0	1670
5	11
6	1
50	2
127	352

## Job statistics grouped on job status

For each job status, this query returns the number of jobs that ended with the corresponding job status and also the planned duration time, the total elapsed time, and total CPU time:

```
SELECT job_status, count(job_name) AS job count, floor(sum(planned_duration/
1000)) AS
planned duration, floor(sum(total_elapsed_time/1000)) AS total elapsed,
floor(sum(total_cpu_time/1000)) AS total cpu
FROM mdl.job_history_v GROUP BY job_status
FROM mdl.job_history_v
GROUP BY return_code
```

Table 62. Example of query outcome

JOB_STATUS	JOB COUNT	PLANNED DURATION	TOTAL ELAPSED	TOTAL CPU
A	366	0	21960	0
S	1670	1413360	1423500	183

## Jobs in a range of return code

This query returns the number of job in a range of return codes

```
SELECT *
FROM (select DISTINCT return_code, count(job_name) AS #JOB
FROM mdl.job_history_v
GROUP BY return_code) AS temp
WHERE return_code > 0 AND return_code < 6
```

Table 63. Example of query outcome

RETURN_CODE	#JOB
5	11

## Jobs that ran within a time range and finished with a specific job status

```
SELECT WORKSTATION_NAME, JOB_NAME, JOB_RUN_DATE_TIME
FROM MDL.JOB_HISTORY_V
WHERE JOB_RUN_DATE_TIME BETWEEN '2008-05-19 10:00:00.0' AND '2008-05-19
21:00:00.0' AND JOB_STATUS <> 'S'
```

ORDER BY JOB\_RUN\_DATE\_TIME

Table 64. Example of query outcome

WORKSTATION_NAME	JOB_NAME	JOB_RUN_DATE_TIME
NC122072	PEAK_A_06	2008-08-03 23:23:00.0
NC122072	JOB_RER_A	2008-08-03 23:23:00.0
NC122072	PEAK_A_13	2008-08-03 23:23:00.0
NC122072	PEAK_A_20	2008-08-03 23:23:00.0
NC122072	PEAK_A_27	2008-08-03 23:23:00.0
NC122072	PEAK_A_43	2008-08-03 23:23:00.0
NC122072	PEAK_B_19	2008-08-03 23:24:00.0

**Related tasks:**

“Creating a task to Create Custom SQL Reports” on page 235

How to create an SQL query report task to run on a distributed IBM Workload Scheduler environment.

---

## Event rule

An *event rule* defines a set of actions that run when specific event conditions occur. An event rule definition correlates events and trigger actions.

For information about how to define event rules, see the topic about defining event rules in the *User’s Guide and Reference* .

**Related concepts:**

“Event management” on page 88

What the event management feature is and how to use it.

“Event management configuration” on page 7

Authorizations needed to use event management.

**Related tasks:**

“Creating an event rule” on page 140

How you can create an event rule.

## Action properties


How to specify and use action properties.

When you select an action, its properties are displayed at the bottom of the panel, where you can edit them. Mandatory property values are displayed by default, marked by asterisks and with a yellow background. If you try to add an action without specifying one or more mandatory values, the action turns red and the rule cannot be saved.

You can add further properties by selecting them from the drop-down list. When you add new properties, they become mandatory, therefore you cannot leave them blank, but you can delete them by clicking the close icon.

You can also add the same property multiple times assigning different values to it. In this case all these properties are logically correlated by the conjunction *and*, creating a cumulative filter.



For examples, when you define your event filter, if you want to exclude some files from it, you can define as event properties all the filenames that *match* /tmp/tool/oldfiles, and all the filenames that *do not match* /tmp/tools/newfiles. Additionally, you can also remove the non-required properties, by clicking the close icon  next to them. You cannot remove mandatory properties.

## Using variable information into action properties

To better qualify your action, you can use some event properties as variable information that can be added to the action properties.

For example, you can include the job name in the mail body, if you have mail notification as a response action to a job-related event. You can include this variable information together with normal text in action properties that require a string value. For those properties that require a numeric value, you can enter either the variable information or a number.

The event properties that can be used as variable information for the actions can be selected from the list that is displayed if you click the button **Variable**. Select **Machine-readable format** check box when you want to use the variable as input to a command or a script. Alternatively, you can recall this information within the action property by copying the *event alias* (displayed in the first row of the event box) and pasting it into the action property field, complying with the following syntax:

`%{event_alias.property_name}`

Use it to include normal text information. This can be useful if you want to see this text in a message or an email.

`${event_alias.property_name}`

Use it to include machine-readable information. This can be useful if you want to use the action as input to a command or a script.

## Event properties

How to use event properties.


When you select an event, its properties are displayed at the bottom of the panel, where you can edit them. A tooltip over the event box shows all the event properties available as variables that you can use to define the action properties.


When you choose the event properties, you define a *filter* for all the events that you want to monitor and manage. The most meaningful properties you choose are logically correlated and represent the *event scope*, which is displayed in the event box.


You can add further properties by selecting them from the drop-down list. When you add new properties, they become mandatory, therefore you cannot leave them blank but you can delete them by clicking the close icon.


Mandatory property values are displayed by default, marked by asterisks and with a yellow background. If you try to add an event without specifying one or more mandatory values, the event turns red, the invalid fields are highlighted, and the rule cannot be saved.

You can also add the same property multiple times assigning different values to it. In this case all these properties are logically correlated by the conjunction *and*, creating a cumulative filter.

For example, when you define your event filter, if you want to exclude some files from it, you can define as event properties all the filenames that *match* /tmp/tool/oldfiles, and all the filenames that *do not match* /tmp/tools/newfiles. You can also remove the non-required properties, by clicking the close icon  next to them. You cannot remove mandatory properties.

When completing this section, consider that wildcard characters are supported, depending on the event type. When wildcard characters are supported, the wildcard icon  is enabled.

Event properties that do not support wildcard characters are identified by the wildcards not supported icon .

Some event properties allow you to specify multiple values separated by semicolon (;). These properties are identified by the multiple filter icon . When you specify multiple values, these values are logically correlated by the conjunction *or*.

For example, if you create a **Job Status Changed** event specifying the **Job name** property as "A;B;C", an action is triggered each time either of the specified jobs changes its status.

Event properties that do not support multiple values are identified by this icon



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## Chapter 19. Glossary

### A

#### **access method**

An executable file used by extended agents to connect to and control jobs on other operating systems (for example, z/OS) and applications (for example, Oracle Applications, PeopleSoft, and SAP R/3). The access method is specified in the workstation definition for the extended agent. This term applies only to IBM Workload Scheduler distributed environments. See also "extended agent".

#### **actual start**

The time that a job or job stream, planned to run during current production, actually starts. See also:

- "earliest start"
- "latest start"
- "planned start"
- "scheduled time"

#### **ad hoc job**

A job used to run a command or a script file that is inserted into the current plan. These jobs are not saved in the IBM Workload Scheduler database. See also:

- "database"
- "plan"

#### **ad hoc prompt dependency**

A prompt dependency that is defined within the properties of a job or job stream and is unique to that job or job stream. This term applies only to IBM Workload Scheduler distributed environments. See also "prompt dependency".

#### **availability**

The degree to which a system or resource is ready when needed to process data.

### B

#### **batchman**

A process running on IBM Workload Scheduler workstations. This process accesses the copy of the Symphony file distributed to workstations at the beginning of the production period and updates it, resolving dependencies. It is the only process that can update the Symphony file. This term applies only to IBM Workload Scheduler distributed environments. See also:

- "processes"
- "production period"
- "symphony file"

#### **backup domain manager**

A full status fault-tolerant agent in a distributed network that can assume the responsibilities of its domain manager. This term applies only to IBM Workload Scheduler distributed environments. See also:

- "fault-tolerant agent"

- "full status"
- "domain manager"

**backup master domain manager**

A full status fault-tolerant agent in a distributed network that can assume the responsibilities of the master domain manager. This term applies only to IBM Workload Scheduler distributed environments. See also:

- "fault-tolerant agent"
- "full status"
- "master domain manager"

**C**

**calendar**

A list of scheduling dates used either to identify the dates when job streams or jobs can be run (when used with inclusive run cycles), or when they cannot be run (when used with exclusive run cycles). See also:

**carry forward**

A property of a job stream that, if not completed before the end of the current production period, is carried forward to the next and then to subsequent periods, until the latest start time is reached or the job stream completes. See also "latest start".

**computer workstation**

In the IBM Workload Scheduler for z/OS, either:

- A workstation that performs z/OS processing of jobs and started-task jobs, and that usually reports status to Dynamic Workload Console for z/OS automatically.

or:

- A processor used as a workstation. It can refer to single processors or multiprocessor complexes serving a single job queue, for example JES2 or JES3 systems.

**connector**

An installed component that provides the interface between the Dynamic Workload Console and the engine. This term applies only to IBM Workload Scheduler distributed environments. See also:

- "engine"

**controller**

In the IBM Workload Scheduler for z/OS, the component that runs on the management hub, and that contains the tasks that manage the plans and the database.

**cpu time**

The processor time used by a job when running. See also "duration".

**current plan**

In the IBM Workload Scheduler for z/OS the detail plan of activity that covers a period of at least 1 minute, and not more than 21 days. A current plan typically covers 1 or 2 days.

**D**

**database**

In IBM Workload Scheduler for distributed environments it consists of a set of tables defined in relational database, such as DB2 or Oracle,

containing the definitions for all scheduling objects (jobs, job streams, resources, workstations, domains, parameters, prompts and files), job and job stream statistics, user data, and the last time an object was modified.

In the IBM Workload Scheduler for z/OS it consists of collection of the following data: calendar, period, workstation description, JCL variable table, application description, and operation instruction.

**deadline**

The time by which a job or job stream is set to complete. When a job or job stream passes the deadline, notifications are sent to users and integrated applications, but the job or job stream is not prevented from running if all time restrictions and dependencies are satisfied. Jobs or job streams that have not yet started or that are still running after the deadline time has expired are marked as "late" in the plan. See also "plan".

**dependency**

A prerequisite condition that must be satisfied before a job or job stream can start or continue to run. See also:

- "external dependency"
- "file dependency"
- "follows dependency"
- "prompt dependency"
- "resource dependency"

**distributed network**

A connected group of workstations defined using IBM Workload Scheduler for distributed environments. See also:

- "engine"
- "workstation"

**distributed workstation**

A workstation in the IBM Workload Scheduler distributed environment on which jobs and job streams are run. See also:

- "engine"
- "workstation"

**domain**

A named group of workstations in a IBM Workload Scheduler distributed network, consisting of one or more agents and a domain manager acting as the management hub. All domains have a parent domain except for the master domain. This term applies only to IBM Workload Scheduler distributed environments. See also:

- "domain manager"
- "master domain manager"

**domain manager**

An installed component in a IBM Workload Scheduler distributed network that is the management hub in a domain. All communication to and from the agents in the domain is routed through the domain manager. This term applies only to IBM Workload Scheduler distributed environments. See also "workstation"

**duration**

The elapsed time that a job is expected to take to complete (estimated duration) and actually takes (actual duration). See also:

- "cpu time"

- "time restriction"

## E

### **earliest start**

The time before which a job or job stream cannot start. The job or job stream can start after the earliest start time provided that all other time restrictions and dependencies are satisfied. See also:

- "actual start"
- "latest start time"
- "planned start"
- "scheduled time"

### **engine**

The core software for the scheduling environment. The engine can be either a z/OS engine (installed as part of the product "Tivoli Workload Scheduler for z/OS"), or a distributed engine (installed as part of the product "Tivoli Workload Scheduler").

### **extended agent**

An agent used to integrate Tivoli® Workload Scheduler job control features with other entities such as operating systems (for example, z/OS) and applications (for example, Oracle Applications, PeopleSoft, and SAP R/3). Extended agents must be hosted by a master domain manager, domain manager, or an agent (not another extended agent), and use access methods to communicate with the other entities. This term applies only to IBM Workload Scheduler distributed environments. See also "access method".

### **external dependency**

A dependency defined in one job or job stream that refers to another job stream or to a job in another job stream.

### **external job**

A job referred to in an external dependency. See also "external dependency".

## F

### **fault-tolerant agent**

A installed agent component in a distributed network capable of resolving local dependencies and launching its jobs. This term applies only to IBM Workload Scheduler distributed environments.

**fence** An attribute on a workstation that regulates whether a job can be run on a workstation. The job fence is a priority level that the priority of a job must exceed before it can run. This term applies only to IBM Workload Scheduler distributed environments.

### **file dependency**

A dependency where a job or job stream cannot start until it finds a specific file is present in a specific path on a specific workstation. Sometimes called an opens file dependency. This term applies only to IBM Workload Scheduler distributed environments. See also "dependency".

### **follows dependency**

A dependency where a job or job stream cannot start until other jobs or job streams have completed successfully. See also "dependency".

**forecast plan**

A projection over a selected time interval based on the job streams and dependencies defined in the database. This term applies only to IBM Workload Scheduler distributed environments. See also

- "database"
- "plan"

**FTA** See "fault-tolerant agent"

**full status**

An attribute of an agent that enables it to be updated with the status of jobs and job streams running on all other workstations in its domain and in subordinate domains, but not on peer or parent domains. A backup domain manager or master domain manager must be full status. See also:

- "backup domain manager"
- "domain"
- "master domain manager"

**G****general workstation**

In the IBM Workload Scheduler for z/OS this is a workstation where activities other than printing, and processing are carried out. A general workstation is usually manual, but it can also be automatic. Manual activities can include data entry and job setup.

**H**

**host** A workstation required by extended agents. It can be any IBM Workload Scheduler workstation except another extended agent. This term applies only to IBM Workload Scheduler distributed environments.

**I****internal status**

The current status of jobs and job streams in the IBM Workload Scheduler engine. The internal status is unique to IBM Workload Scheduler. See also "status".

**internetwork dependencies**

A dependency between jobs or job streams in separate IBM Workload Scheduler networks. This term applies only to IBM Workload Scheduler distributed environments. See also "network agent".

**internetwork job or job stream**

A job or job stream in a remote IBM Workload Scheduler network that is referenced by an internetwork dependency defined for a job or job stream in the local network. This term applies only to IBM Workload Scheduler distributed environments. See also "network agent".

**J**

**job** A unit of work scheduled for a specific run date in the plan that is processed at a workstation. In IBM Workload Scheduler for z/OS, a job is an operation performed at a computer workstation.

**job limit**

See "limit"

**job status**

See "status".

**job stream**

A list of jobs that scheduled to run as a unit in the plan (such as a weekly backup application), along with run cycles, times, priorities, and other dependencies that determine the exact order in which the jobs run.

**jobman**

A process running on IBM Workload Scheduler workstations. This process controls the launching of jobs under the direction of **batchman** and reports job status back to **mailman**. This term applies only to IBM Workload Scheduler distributed environments. See also:

- "batchman"
- "jobmon"
- "mailman"

**jobmon**

An additional process running on IBM Workload Scheduler Windows workstations. It manages and monitors job processing. A separate jobmon process is created to launch and monitor each job. This term applies only to IBM Workload Scheduler distributed environments. It reports job status back to **jobman**. See also:

- "jobman"
- "processes"

**L****latest start**

The time before which the job or job stream must start. The job or job stream can start before the latest start time provided that all other dependencies are satisfied. See also:

- "actual start"
- "earliest start time"
- "planned start"
- "scheduled time"

**limit**

A means of allocating a specific number of job slots into which IBM Workload Scheduler is allowed to launch jobs. A job limit can be set for each job stream, and for each workstation. For example, setting the workstation job limit to 25 permits IBM Workload Scheduler to have no more than 25 jobs running concurrently on the workstation.

**list**

A means of filtering plan and objects and presenting them in a table. Lists on Dynamic Workload Console are the result of running tasks.

**M****mailman**

The mail management process running on IBM Workload Scheduler workstations. It routes messages about jobs processing status to local and remote workstations. This term applies only to IBM Workload Scheduler distributed environments. See also "processes".

**master domain manager**

The management hub of the top-level domain in the IBM Workload Scheduler distributed network. It maintains the database of all scheduling objects in the domain and the central configuration files. The master



domain manager generates and distributes the current plan through the network as a program control file named Symphony file. In addition, logs and reports for the network are maintained on the master domain manager. See also:

- "backup master domain manager"
- "database"
- "domain"
- "plan"

**MDM** See "master domain manager".

## N

### **netman**

The network management process that is started first when the IBM Workload Scheduler workstations starts up. It processes **start**, **stop**, **link** or **unlink** commands or requests to run actions impacting the job processing on that workstation. The **netman** process examines each request received and either implements the request itself or create a local IBM Workload Scheduler process to do so. This term applies only to IBM Workload Scheduler distributed environments. See also "processes".

### **network agent**

A logical extended agent used to create dependencies between jobs and job streams on separate IBM Workload Scheduler networks. This term applies only to IBM Workload Scheduler distributed environments. See also "internetwork dependencies".

## O

### **opens file dependency**

See "file dependency".

### **open interval**

The time interval during which a workstation is active and can process work.

### **owner ID**

In IBM Workload Scheduler for z/OS, the identifier that represents the job stream owner.

## P

### **parameter**

An entity that enables job instance-specific values to be substituted in job and job stream scripts, either from values set in the database or at run time. Parameters cannot be used when scripting extended agent jobs. This term applies only to IBM Workload Scheduler distributed environments.

**plan** The means of scheduling jobs. See also:

- "database"
- "current plan"
- "trial plan"

### **planned start**

The time that IBM Workload Scheduler estimates a job instance will start. This estimate is based on start times of previous instances of the job. See also:

- "actual start"
- "earliest start "
- "latest start "
- "scheduled time"

**portlet**

A pluggable user interface components that are managed and displayed in a web portal.

**predecessor**

A job or job stream that must complete successfully before successor jobs or job streams can be started. See also "successor".

**predefined prompt dependency**

A prompt dependency that is defined in the database and can be associated to any job or job stream. This term applies only to IBM Workload Scheduler distributed environments. See also "prompt dependency".

**printer workstation**

In IBM Workload Scheduler for z/OS, a workstation that prints output and usually reports status automatically.

**priority**

A way of determining the order in which jobs and job streams start. Priorities for each job and job stream range from 0 to 101. A job or job stream with a priority of 0 does not run.

**production period**

The time interval covered by the current plan. See also "current plan".

**current plan**

Contains all job scheduling activity planned for a production period. The plan is stored in the Symphony file, and consists of all the jobs, job streams, and dependency objects that are scheduled to run for that period, including any jobs or job streams carried forward from the previous plan. See also:

- "carry forward"
- "plan"

**processes**

IBM Workload Scheduler workstation processes that control the scheduling environment and network traffic. This term applies only to IBM Workload Scheduler distributed environments. See also:

- "batchman"
- "jobman"
- "jobmon"
- "mailman"
- "netman"

**prompt dependency**

A dependency where an operator must respond affirmatively to a prompt so that the dependent job or job stream can run. See also:

- "ad hoc prompt dependency"
- "predefined prompt dependency"

**R**

**resource**

Either physical or logical system resources. Resources are used as dependencies for jobs and job streams. See also "resource dependency".

**resource dependency**

A dependency where a job or job stream cannot start until the required quantity of the defined resource is available. See also "resource".

**restart and cleanup**

A recovery function that ensures the restart of a job and the related cleanup actions, for example, deleting temporary files or dataset created in a job run.

**rule-based run cycle**

A run cycle that uses rules based on lists of ordinal numbers, types of days, and common calendar intervals (or period names in IBM Workload Scheduler for z/OS). For example, the last Thursday of every month. Rule-based run cycles are based on conventional periods, such as calendar months, weeks of the year, and days of the week. In IBM Workload Scheduler for z/OS, run cycles can also be based on periods that you define, such as a semester. This term is only used as such in IBM Workload Scheduler for z/OS, but the concept applies also to the distributed product. See also:

- "run cycle"

**run cycle**

Specifies the days that a job stream is scheduled to run. The specification can be in the form of a rule or as a combination of period and offset. See also:

- "calendar"

**S****schedule**

See "job stream".

**scheduled time**

The time when a job or job stream is scheduled to run. See also:

- "actual start"
- "earliest start"
- "latest start"
- "planned start"

**slack time**

In a critical job predecessor path, the slack time is the amount of time the predecessor processing can be delayed without exceeding the critical job deadline. It is the spare time calculated using the deadline, input arrival, and duration settings of predecessors jobs

**special resource**

In IBM Workload Scheduler for z/OS, a resource that is not associated with a particular workstation, such as a data set.

**standard agent**

An installed agent component in a distributed network that runs jobs, but requires a domain manager to resolve local dependencies and launch the jobs.

**started-task operation**

In IBM Workload Scheduler for z/OS, an operation that starts or stops started tasks. This operations are run at a computer workstation with the STC option specified.

**status** The current job or job stream status within the Dynamic Workload Console. The Dynamic Workload Console status is common to IBM Workload Scheduler and IBM Workload Scheduler for z/OS. See also "internal status".

**successor**

A job that cannot start until all of the predecessor jobs or job streams on which it is dependent are completed successfully. See also: "predecessor".

**Symphony file**

A file containing the scheduling information needed by the production control process (**batchman**) to run the plan. The file is built and loaded when the current plan is created or extended on the master domain manager. During the production phase, this file is continually updated to indicate the current status of production processing: work completed, work in progress, and work to be done. The tasks run from the Dynamic Workload Console display the contents of the Symphony file (plan) and are run against it. See also:

- "batchman"
- "plan"

**T**

**task** A filter that returns, when run, a list of scheduling objects of the same type whose attributes satisfy the criteria set in the task definition.

**time restriction**

Determines the times before which, after which, or both, that a job or job stream cannot be run. Specifying both defines a time interval within which a job or job stream runs. Jobs can also have a repetition rate. For example, IBM Workload Scheduler can launch the same job every 30 minutes between the hours of 8:30 a.m. and 1:30 p.m.

**tracker**

In IBM Workload Scheduler for z/OS, a component that runs on every system in your complex. It acts as the communication link between the z/OS system that it runs on and the controller.

**trial plan**

A projection of the current plan for a different period, using the same start date. It is used to determine the effect of different plan decisions. This term applies only to IBM Workload Scheduler distributed environments. See also "plan".

**V****virtual workstation**

It is a computer workstation where you define a pool of destinations for the workload submission. When the scheduler processes the operations submitted to a virtual workstation, it distributes the workload according a balanced turn criteria. To obtain the job submission, at least one of the destinations in the pool must be available.

**W**

**workstation**

A definition of an individual computer or computer partition on which jobs and job streams are run. Types of workstation vary depending on the type of engine. See also:

- "distributed workstation"
- "z/OS workstation"

**workstation resource**

In IBM Workload Scheduler for z/OS, a physical resource, such as a tape driver, that must be allocated among jobs. When you define a workstation, you can specify the quantity of each of the two resources (R1 and R2) that are available to jobs. When defining jobs to that workstation, you can specify the number of these resources that must be available for the operation to start on that workstation.

**write-to-operator workstation**

In IBM Workload Scheduler for z/OS, a general workstation that lets you use scheduling facilities to issue a write-to-operator (WTO) message at a specific operator console defined by the workstation destination.

**WTO operation**

In IBM Workload Scheduler for z/OS, jobs that consists of and operator instruction that is passed to IBM Tivoli NetView. These operations are run at a general workstation with the WTO option specified.

**X****x-agent**

See "extended agent".

**Z****z/OS network**

A connected group of workstations that use the z/OS engine to perform workload scheduling. See also:

- "engine"
- "workstation"

**z/OS workstation**

A representation of system configuration elements in the IBM Workload Scheduler for z/OS network. For the IBM Workload Scheduler for z/OS engine, workstations can be:

- Computer
- General
- Printer

IBM Workload Scheduler for z/OS requires that you define for every workstation: the type of work it does, the quantity of work it can handle at any particular time, and the time it is active. See also "workstation".



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