IBM Workload Automation

Scheduling Applications with IBM Workload Automation

Version 9 Release 4

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Note
Before using this information and the product it supports, read the information in "Notices" on page 363.

This edition applies to version 9, release 4, modification level 0 of IBM Workload Scheduler (program number 5698-WSH) and to all subsequent releases and modifications until otherwise indicated in new editions.

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About this Publication

This guide provides information about how to set up and use IBM Workload Scheduler. It contains the following information:

- Job plug-ins or adaptors for the following applications:
  - Amazon EC2
  - Apache Oozie
  - Apache Spark
  - IBM BigInsights
  - IBM Cognos
  - IBM Cloudant
  - IBM InfoSphere DataStage
  - IBM Sterling Connect:Direct
  - IBM WebSphere MQ
  - IBM SoftLayer
  - Hadoop Distributed File System
  - Hadoop Map Reduce
  - Informatica PowerCenter
  - Microsoft Azure
  - Oracle E-Business Suite
  - Salesforce
  - SAP BusinessObjects BI
  - SAP PI Channel
- Access methods that run and control jobs of the following applications:
  - PeopleSoft
  - SAP R/3
  - z/OS
- Integration with SAP:
  - SAP R/3 access method
  - Job plug-in for SAP BusinessObjects BI
  - Job plug-in for SAP PI Channel
  - Integration with SAP Solution Manager

What is new in this release

Learn 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, see the IBM Workload Scheduler Release Notes at http://www-01.ibm.com/support/docview.wss?rs=672&uid=swg27048863 and the Dynamic Workload Console Release Notes at http://www-01.ibm.com/support/docview.wss?rs=672&uid=swg27048864.

= New or changed content is marked with revision bars. For the PDF format, new or
= changed V9.4 content is marked in the left margin with a pipe (|) character and
= new or changed V9.4FP1 content is marked with an equal sign (=).

Who should read this publication

Learn who should read this publication.

This publication is intended for job schedulers who want to run and control application jobs by using IBM Workload Scheduler. Readers of this publication should have some knowledge of:

- IBM Workload Scheduler
- Dynamic Workload Console
- The specific application environment.

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*.

Technical training

Cloud & Smarter Infrastructure provides technical training.

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

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:

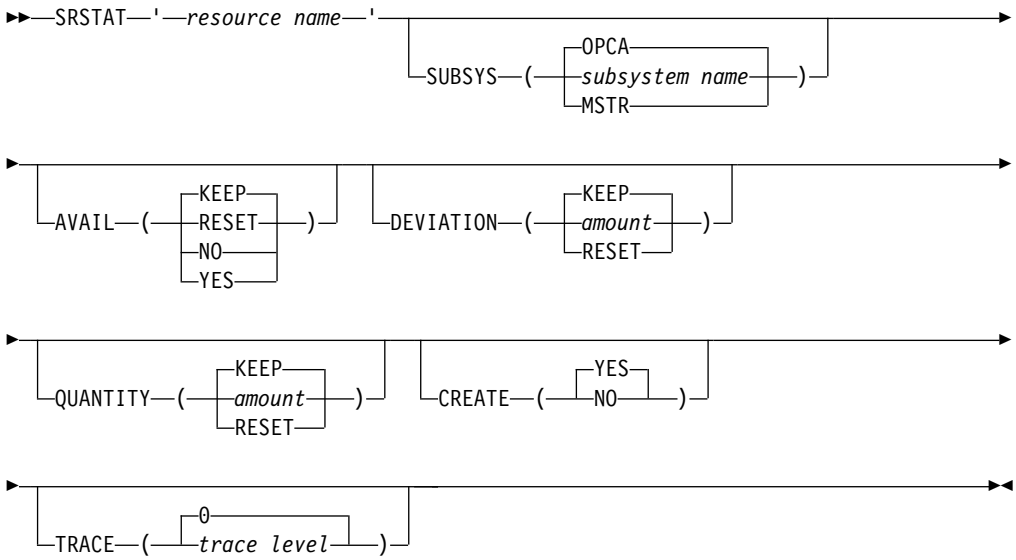
- Searching knowledge bases: You can search across a large collection of known problems and workarounds, Technotes, and other information.
- Obtaining fixes: You can locate the latest fixes that are already available for your product.
- Contacting IBM Software Support: If you still cannot solve your 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*.

How to read syntax diagrams

Syntax diagrams help to show syntax in a graphical way.

Throughout this publication, syntax is described in diagrams like the one shown here, which describes the SRSTAT TSO command:



The symbols have these meanings:

The statement begins here.

The statement is continued on the next line.

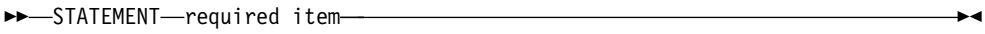
The statement is continued from a previous line.

The statement ends here.

Read the syntax diagrams from left to right and from top to bottom, following the path of the line.

These are the conventions used in the diagrams:

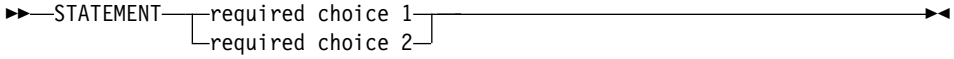
- Required items appear on the horizontal line (main path):



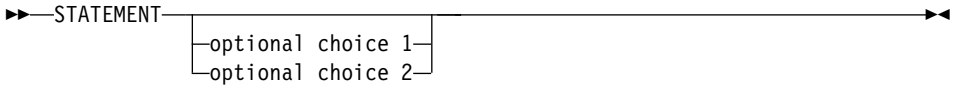
- Optional items appear below the main path:

- An arrow returning to the left above the item indicates an item that you can repeat. If a separator is required between items, it is shown on the repeat arrow.

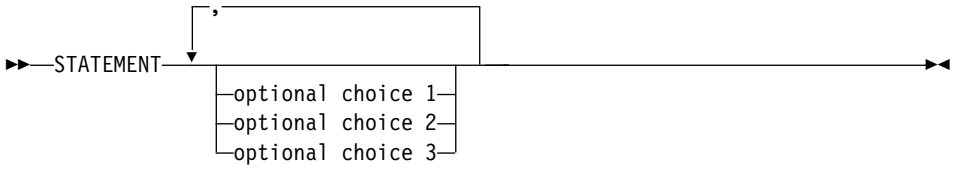
- If you can choose from two or more items, they appear vertically in a stack.
  - If you must choose one of the items, one item of the stack appears on the main path:

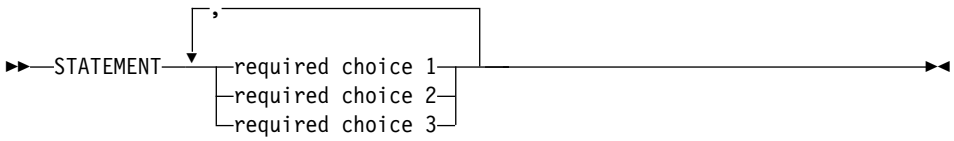


  - If choosing one of the items is optional, the entire stack appears below the main path:

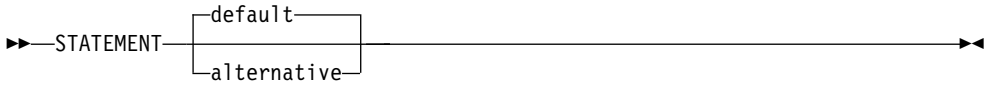


  - A repeat arrow above a stack indicates that you can make more than one choice from the stacked items:

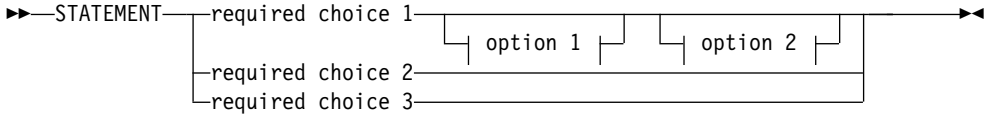




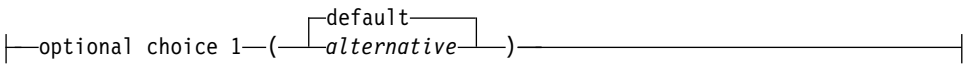
- Parameters that are above the main line are default parameters:



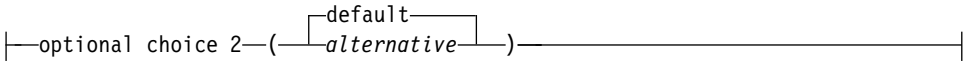
- Keywords appear in uppercase (for example, STATEMENT).
- Parentheses and commas must be entered as part of the command syntax, as shown.
- For complex commands, the item attributes might not fit on one horizontal line. If that line cannot be split, the attributes appear at the bottom of the syntax diagram:



option 1



option 2



Part 1. Overview

Learn about plug-ins and access methods and how you can use them to extend IBM Workload Scheduler scheduling capabilities to external applications and systems.

Important: The plug-ins and access methods listed are included with IBM Workload Scheduler, but to be entitled to use them, you must purchase a separate chargeable component in addition to IBM Workload Scheduler or purchase the IBM Workload Scheduler for z/OS Agent, which includes the plug-ins and access methods. See the IBM Workload Scheduler Download document for details: http://www-01.ibm.com/support/docview.wss?rs=672&uid=swg24042843. For information about the supported versions of the plug-ins and access methods, run the Data Integration report and select the **Supported Software** tab.

You can extend job scheduling capabilities with IBM Workload Scheduler plug-ins to external applications to take advantage of all the IBM Workload Scheduler functions to manage the operations and tasks performed by the external applications.

The plug-ins are:

Table 1. Job plug-ins

Job Plug-in	**More information**
Amazon EC2	Chapter 16, “Amazon EC2 jobs,” on page 85
Apache Oozie	Chapter 14, “Apache Oozie jobs,” on page 77
Apache Spark	Chapter 15, “Apache Spark jobs,” on page 81
IBM BigInsights	Chapter 6, “IBM BigInsights jobs,” on page 15
IBM Cloudant	Chapter 7, “IBM Cloudant jobs,” on page 19
IBM Cognos	Chapter 8, “IBM Cognos jobs,” on page 23
IBM InfoSphere DataStage	Chapter 9, “IBM InfoSphere DataStage jobs,” on page 41
IBM Sterling Connect:Direct	Chapter 10, “IBM Sterling Connect:Direct jobs,” on page 53
IBM WebSphere MQ	Chapter 11, “IBM WebSphere MQ jobs,” on page 63
IBM SoftLayer	Chapter 17, “IBM SoftLayer jobs,” on page 89
Hadoop Distributed File System	Chapter 12, “Hadoop Distributed File System jobs,” on page 69
Hadoop Map Reduce	Chapter 13, “Hadoop Map Reduce jobs,” on page 73
Informatica PowerCenter	Chapter 19, “Informatica PowerCenter jobs,” on page 97
Microsoft Azure	Chapter 18, “Microsoft Azure jobs,” on page 93

Table 1. Job plug-ins (continued)

Job Plug-in	More information
Oracle E-Business Suite	Chapter 20, "Oracle E-Business Suite jobs," on page 111
Salesforce	Chapter 21, "Salesforce jobs," on page 119
SAP BusinessObjects BI	"SAP BusinessObjects BI jobs" on page 344
SAP PI Channel	"SAP Process Integration (PI) Channel jobs" on page 339

You can use access methods to extend the job scheduling capabilities of IBM Workload Scheduler to other systems and applications. Access methods run on:

- Extended agents to extend static scheduling capability.
- Dynamic agents and IBM Workload Scheduler for z/OS Agents to extend dynamic scheduling capability.

For more details about which workstations can run the access methods, see Chapter 1, "Supported agent workstations," on page 3.

An access method interacts with the external system through either its command line or the Dynamic Workload Console. IBM Workload Scheduler includes the following access methods:

Table 2. Access methods

Access Method	More information
SAP R/3 (r3batch)	"Configuring the SAP R/3 environment" on page 196
PeopleSoft (psagent)	Chapter 23, "Access method for PeopleSoft," on page 143
z/OS® (mvsjes and mvsopc)	Chapter 24, "Access method for z/OS," on page 155

Chapter 1. Supported agent workstations

You can extend IBM Workload Scheduler scheduling capabilities to external applications by using plug-ins and access methods.

To extend scheduling capabilities to external applications by using IBM Workload Scheduler job plug-ins, you must install either a dynamic agent or an IBM Workload Scheduler for z/OS Agent (z-centric), or both.

To extend scheduling capabilities to external applications, such as PeopleSoft, SAP R/3, and z/OS JES2 or JES3 by using IBM Workload Scheduler access methods, you must have at least one, or a combination of, the following types of agent workstations: dynamic agent, extended agent, and IBM Workload Scheduler for z/OS Agent (z-centric).

These agent workstations are described as follows:

Dynamic agents and IBM Workload Scheduler for z/OS agents

Dynamic agents and IBM Workload Scheduler for z/OS agents can manage a wide variety of job types. They are used to extend the dynamic scheduling capabilities of IBM Workload Scheduler to your external applications through appropriate job plug-ins.

Dynamic agents and IBM Workload Scheduler for z/OS agents also extend the dynamic scheduling capabilities to external applications through access methods. To run access methods on external applications using dynamic agents, you define a job of type **Access Method**. The access method communicates with the external system to launch the job and returns the status of the job. The method uses the corresponding file named *optionsfile_accessmethod*`.opts` (where *optionsfile* is the configuration file that depends on the selected access method). The dynamic agent and the IBM Workload Scheduler for z/OS agent can have more than one associated `.opts` file to determine which external environment instance it connects to. The access method can launch jobs on that instance and monitor them through completion, writing job progress and status information in the standard list file of the job.

Dynamic agents in particular, can be grouped in pools and dynamic pools. Pools group a set of dynamic agents with similar hardware or software characteristics together. When jobs are submitted to a pool, IBM Workload Scheduler balances the jobs among the dynamic agents within the pool. Dynamic pools are dynamically defined based on the resource requirements specified. A pool is dynamically updated whenever a new suitable dynamic agent becomes available. Jobs run on the first workstation in the dynamic pool that matches all the requirements of the job.

Extended agents

Extended agents extend the static scheduling capability. They are logical workstations related to an access method hosted by a physical IBM Workload Scheduler workstation (a fault-tolerant agent). More than one extended agent workstation can be hosted by the same IBM Workload Scheduler fault-tolerant agent and rely on the same access method. The extended agent is defined in a standard IBM Workload Scheduler workstation definition, which gives the extended agent a name and

identifies the access method. An access method is a program that is run by the hosting workstation whenever IBM Workload Scheduler submits a job to an external system.

Jobs are defined for an extended agent in the same manner as for other IBM Workload Scheduler workstations, except for any job attributes that depend on the external system or application.

To launch and monitor a job on an extended agent, the host runs the access method, passing to it job details as command line options. The access method communicates with the external system to launch the job and returns the status of the job. To launch a job in an external environment, IBM Workload Scheduler runs the extended agent access method providing it with the extended agent workstation name and information about the job. The method looks at the corresponding file named *XANAME_accessmethod*.opts (where *XANAME* is the name of the extended agent workstation) to determine which external environment instance it connects to. The access method can then launch jobs on that instance and monitor them through completion, writing job progress and status information in the standard list file of the job.

Extended agents can also be used to run jobs in an end-to-end environment, where job scheduling and monitoring is managed from an IBM Workload Scheduler for z/OS controller.

Part 2. Job plug-ins to extend workload scheduling capabilities

A wide variety of out-of-the-box adaptors or plug-ins are provided to integrate your business processes. The job plug-ins allow you to orchestrate Enterprise Resource Planning and Business Intelligence solutions (PeopleSoft, Oracle E-Business, Informatica PowerCenter, Salesforce) and other business related systems. New applications are added to your organization all the time. By integrating them into your existing IBM Workload Scheduler environment you save time in getting skilled on new applications because you can administer them just like any of your existing jobs.

By extending the concept of jobs and workload scheduling to other applications you can continue to define jobs for your business process, add them to job streams, submit them to run according to schedule, and then monitor any exceptions all from a single entry point. The job plug-ins require an IBM Workload Scheduler dynamic agent, IBM Workload Scheduler for z/OS Agent (z-centric), or both. For more information, see Chapter 1, “Supported agent workstations,” on page 3.

The following sections provide an overview of creating job definitions and job streams, submitting them to run, monitoring them, and then analyzing the job log and job output. These procedures can be applied to any of the supported job plug-ins.

For information about the supported versions of the job plug-ins, generate a dynamic Data Integration report from the IBM® Software Product Compatibility Reports web site, and select the **Supported Software** tab: Data Integration.

Tip: Many of the IBM Workload Scheduler job plug-ins are illustrated in helpful, how-to demonstrations videos available on the Workload Automation YouTube channel.

Chapter 2. Defining a job

Define IBM Workload Scheduler jobs to run business tasks and processes defined in an external application.

Define an IBM Workload Scheduler job to run tasks or processes you have defined in external applications. Using the IBM Workload Scheduler job plug-in for your external application, you can define, schedule and run jobs to automate your business.

Distributed In distributed environment, define a job by using the Dynamic Workload Console connected to a distributed engine, by using Application Lab, or by using the **composer** command line.

z/OS In a z/OS environment, define a job by using the Dynamic Workload Console connected to a z/OS engine.

How to define a job using the Dynamic Workload Console
For details about defining jobs from the Dynamic Workload Console, see the section about creating job definitions in *Dynamic Workload Console User's Guide*.

How to define a step (job) inside a process (job stream) using Application Lab
For details about defining a step (job) inside a process (job stream) using Application Lab see the section about creating a process in *Application Lab User's Guide*.

How to define a job using the `composer` command line
The composer command line supports the following syntax when defining a job:

$jobs
[*workstation#*]*jobname*
{**scriptname** *filename* **streamlogon** *username* |
docommand "*command*" **streamlogon** *username* |
task *job_definition* }
[**description** "*description*"]
[**tasktype** *tasktype*]
[**interactive**]

[**succoutputcond** *Condition_Name* "*Condition_Value*"]
[**outputcond** *Condition_Name* "*Condition_Value*"]

[**recovery**
{**stop**
[**after** [*workstation#*]*jobname*]
[**abendprompt** "*text*"]]
|**continue**
[**after** [*workstation#*]*jobname*]
= [**abendprompt** "*text*"]] |**rerun** [**same_workstation**]
= [[**repeatevery** *hhmm*] [**for** *number* **attempts**]]
[**after** [*workstation#*]*jobname*]
|[**after** [*workstation#*]*jobname*]
[**abendprompt** "*text*"]}

Use the **task** argument, specifying the XML syntax for the specific job plug-in. See the section for each job plug-in for the specific XML syntax.

For a detailed description of the XML syntax, see the section about job definition in *User's Guide and Reference*.

For some jobs a properties file can be generated and used to provide the values for some of the properties defined in the job definition.

The properties file is automatically generated either when you perform a "Test Connection" from the Dynamic Workload Console in the job definition panels, or when you submit the job to run the first time. Once the file has been created, you can customize it. This is especially useful when you need to schedule several jobs of the same type. You can specify the values in the properties file and avoid having to provide information such as credentials and other information, for each job. You can override the values in the properties files by defining different values at job definition time.

Chapter 3. Scheduling and submitting jobs and job streams

You schedule IBM Workload Scheduler jobs by defining them in job streams.

Distributed For distributed environments, use the Dynamic Workload Console, Application Lab or the **conman** command line.

After you define an IBM Workload Scheduler job, add it to a job stream with all the necessary scheduling arguments and submit it to run. After submission, when the job is running (**EXEC** status), you can kill the IBM Workload Scheduler job if necessary. For some job plug-ins, this action is converted into corresponding action in the plug-in application. Refer to the specific plug-in section for details about what effect the kill action has in the application.

z/OS For z/OS environments, use the Dynamic Workload Console or the ISPF application.

How to submit a job stream using the Dynamic Workload Console
To submit a job or job stream to run according to the schedule defined, see the section about submitting workload on request in production in *Dynamic Workload Console User's Guide*. For distributed environments only, see also the section about quick submit of jobs and job streams in *Dynamic Workload Console User's Guide*.

How to submit a process (job stream) using Application Lab
To submit a process to run according to the schedule defined for it, see the section about running a process in *Application Lab User's Guide*.

How to submit a job stream from the conman command line
To submit a job stream for processing, see the **submit sched** command. To submit a job to be launched, see the **submit job** command. For more information about these commands see the *IBM Workload Scheduler: User's Guide and Reference*.

How to submit your workload using the ISPF application
The workload is defined by creating one or more calendars, defining applications, creating a long-term plan, and creating a current plan. The current plan is a detailed plan, typically for one day, that lists the applications that run and the operations in each application. See the section about creating the plans for the first time in *Managing the Workload* for more information about creating plans.

Chapter 4. Monitoring IBM Workload Scheduler jobs

Monitor IBM Workload Scheduler jobs by using the Dynamic Workload Console, the command line, Application Lab, or the ISPF application.

Distributed You monitor distributed jobs by using the Dynamic Workload Console connected to a distributed engine, by using the **conman** command line, or from Application Lab.

z/OS You monitor z/OS jobs by using the Dynamic Workload Console connected to a z/OS engine or the ISPF application.

How to monitor jobs by using the Dynamic Workload Console
See the online help or the section about creating a task to monitor jobs in the *Dynamic Workload Console User's Guide*.

How to monitor jobs by using conman
See the section about managing objects in the plan - conman in *User's Guide and Reference*.

How to monitor jobs by using Application Lab
See the section about monitoring your process in *Application Lab User's Guide*.

How to monitor jobs by using the ISPF application
See the section about monitoring the workload in *IBM Workload Scheduler for z/OS Managing the Workload*.

Chapter 5. Analyzing the job log

When a job runs IBM Workload Scheduler creates a job log that you can analyze to verify the job status.

About this task

Distributed For distributed jobs, you analyze the job log by using the Dynamic Workload Console, Application Lab or the **conman** command line.

z/OS For z/OS jobs, you analyze the job log by using the Dynamic Workload Console or the ISPF application.

While the job is running, you can track the status of the job and analyze the properties of the job. In particular, in the Extra Information section, if the job contains variables, you can verify the value passed to the variable from the remote system. Some job streams use the variable passing feature, for example, the value of a variable specified in job 1, contained in job stream A, is required by job 2 in order to run in the same job stream.

For more information about passing variables between jobs, see the related section in the IBM Workload Scheduler on-premises online product documentation in IBM Knowledge Center.

How to analyze the job log using the Dynamic Workload Console
Before you can access the job log for an individual job, you need to run a query and list the jobs for which you want to analyze the job log. See the online help or the section about creating a task to monitor jobs in *Dynamic Workload Console User's Guide*. From the list of jobs resulting from the query, you can either download the job log, or view the job log in the job properties view. Select the job for which you want to analyze the job log and click **More Actions** > **Download Job Log** or **More Actions** > **Properties** from the toolbar.

How to analyze the job log using Application Lab
In Application Lab, a process is the equivalent of a job stream. From the list of processes displayed for the selected process library, select a process and then click the **History** tab. A run history for the process is displayed. Select a run instance and click **Details**. A list of steps defined in the process is displayed. Each step is the equivalent of a job. To view the log for a step or download the log, select a step and click **View Log** or **Download Log**, as needed.

For more information about Application Lab, see *Application Lab User's Guide*.

How to analyze the job log using conman
See the section about the **showjobs** command in *User's Guide and Reference*.

How to analyze the job log using the ISPF application
See the section about monitoring the workload in *Managing the Workload*.

Chapter 6. IBM BigInsights jobs

An IBM BigInsights job defines, schedules, monitors, and manages IBM BigInsights Workbook data sheets or applications.

Prerequisite

You manage IBM BigInsights Workbook data sheets or applications in both a distributed and z/OS environment.

IBM Workload Scheduler integrates with IBM BigInsights for Hadoop to bring the power of Apache Hadoop to the enterprise. With the IBM Workload Scheduler plug-in for BigInsights for Hadoop you can:

- Monitor and control workflows containing IBM BigInsights workbooks and applications that help enterprise find insights into new and emerging types of data.
- Fully automate IBM BigInsights process execution with calendar and event-based scheduling, and a single point of control to handle exceptions, and automate recovery processes.

Before you can define IBM BigInsights jobs, you must create a connection between the IBM Workload Scheduler agent and the IBM BigInsights server.

For information about the supported versions of the job plug-ins, generate a dynamic Data Integration report from the IBM Software Product Compatibility Reports web site, and select the **Supported Software** tab: Data Integration.

IBM BigInsights job definition

A description of the job properties and valid values are detailed in the context-sensitive help in the Dynamic Workload Console by clicking the question mark (?) icon in the top-right corner of the properties pane.

For more information about creating jobs using the various supported product interfaces, see Chapter 2, “Defining a job,” on page 7.

The following table lists the required and optional attributes for IBM BigInsights jobs:

Table 3. Required and optional attributes for the definition of an IBM BigInsights job

Attribute	Description and value	Required
Connection properties - IBM BigInsights server section		
Hostname	The hostname of the IBM BigInsights server.	✓
Port	The port of the IBM BigInsights server.	✓
Protocol	The protocol for connecting to the IBM BigInsights server. Supported values are **http** and **https**.	
User	The user to be used for accessing the IBM BigInsights server.	
Password	The password to be used for accessing the IBM BigInsights server.	

Table 3. Required and optional attributes for the definition of an IBM BigInsights job (continued)

Attribute	Description and value	Required
Connection properties - Retry options section		
Number of retries	The number of times the program retries performing the operation.	
Retry interval (seconds)	The number of seconds the program waits before retrying the operation. The default value is 30 seconds.	
Action properties - Workbook section		
Workbook	The name and path to an IBM BigInsights workbook. Use this option to run a user-specified workbook.	✓
Action properties - Application section		
Application Identifier	The application identifier. Use this option to run an Application.	✓
Execution Name	The user-defined identifier for a specific run of the application	

Scheduling and stopping the job in IBM Workload Scheduler

You schedule IBM Workload Scheduler IBM BigInsights jobs by defining them in job streams. Add the job to a job stream with all the necessary scheduling arguments and submit the job stream.

You can submit jobs by using the Dynamic Workload Console, Application Lab or the **conman** command line. See Chapter 3, "Scheduling and submitting jobs and job streams," on page 9 for information about how to schedule and submit jobs and job streams using the various interfaces.

After submission, when the job is running and is reported in **EXEC** status in IBM Workload Scheduler, you can stop it if necessary, by using the **kill** command. However, this action is effective only for the **Wait for a file** action. If you have defined different actions in your job, the **kill** command is ignored.

Monitoring the job

If the IBM Workload Scheduler agent stops when you submit the IBM Workload Scheduler IBM BigInsights job or while the job is running, as soon as the agent becomes available again IBM Workload Scheduler begins monitoring the job from where it stopped.

For information about how to monitor jobs using the different product interfaces available, see Chapter 4, "Monitoring IBM Workload Scheduler jobs," on page 11.

Job properties

While the job is running, you can track the status of the job and analyze the properties of the job. In particular, in the Extra Information section, if the job contains variables, you can verify the value passed to the variable from the remote system. Some job streams use the variable passing feature, for example, the value of a variable specified in job 1, contained in job stream A, is required by job 2 in order to run in the same job stream.

For information about how to display the job properties from the various supported interfaces, see Chapter 5, "Analyzing the job log," on page 13.

For example, from the **conman** command line, you can see the job properties by running:

```
conman sj <job_name>;props
```

where *<job_name>* is the IBM BigInsights job name.

The properties are listed in the `Extra Information` section of the output command.

For more information about passing variables between jobs, see the related sections in *User's Guide and Reference*.

Job log content

For information about how to display the job log from the various supported interfaces, see Chapter 5, "Analyzing the job log," on page 13.

For example, you can see the job log content by running `conman sj <job_name>;stdlist`, where *<job_name>* is the IBM BigInsights job name.

See also

From the Dynamic Workload Console you can perform the same task as described in

the *Dynamic Workload Console User's Guide*, section about Creating job definitions.

For more information about how to create and edit scheduling objects, see

the *Dynamic Workload Console User's Guide*, section about Designing your Workload.

Chapter 7. IBM Cloudant jobs

An IBM Cloudant job defines, schedules, monitors, and controls the execution of actions on IBM Cloudant NoSQL database, on its documents, or attachments.

Prerequisites

For information about the supported versions of the job plug-ins, generate a dynamic Data Integration report from the IBM Software Product Compatibility Reports web site, and select the **Supported Software** tab: Data Integration.

Before you can define IBM Cloudant jobs, you must sign up on IBM Cloudant and create an account.

IBM Cloudant job definition

A description of the job properties and valid values are detailed in the context-sensitive help in the Dynamic Workload Console by clicking the question mark (?) icon in the top-right corner of the properties pane.

For more information about creating jobs using the various supported product interfaces, see Chapter 2, “Defining a job,” on page 7.

The following table lists the required and optional attributes for IBM Cloudant jobs:

Table 4. Required and optional attributes for the definition of an IBM Cloudant job

Attribute	Description and value	Required
Connection		
Username	The name of the user authorized to access the Cloudant database.	If you do not specify this attribute, then the attribute is read from the properties file.
Password	The password that is associated with the user authorized to access the Cloudant database.	If you do not specify this attribute, then the attribute is read from the properties file.
AccountText	The account that was created when you signed up on Cloudant database.	If you do not specify this attribute, then the attribute is read from the properties file.
DatabaseText	The Cloudant database that you want to work with.	If you do not specify this attribute, then the attribute is read from the properties file.
Action		
Database Action		

Table 4. Required and optional attributes for the definition of an IBM Cloudant job (continued)

Attribute	Description and value	Required
DatabaseOperation	The action that you want to run on the Cloudant database: • Create • Read • Delete	✔
Database Replication Action		
TargetDb	The target Cloudant database that you want to synchronize with your source Cloudant database. If the target database does not exist, it is created automatically, unless you specify **create_target=false** in the list of Operation Parameters.	✔
Document Action		
DocumentOperation	The action that you want to run on the Cloudant database document: • Create • Read • Update • Delete	✔
IdDocument	The document identifier.	✔
RevDocument	The document revision number. For the delete action, it must be equal to the latest revision number.	This attribute is required for the update and delete actions.
Attachment Action		
AttachmentOperation	The action that you want to run on the document attachment: • Create • Read • Update • Delete	✔
IdDocument2	The identifier of the document to which the attachment refers to.	✔
RevDocument2	The revision number of the document to which the attachment refers to. For the delete action, it must be equal to the latest revision number.	This attribute is required for the update and delete actions.
NameAttach	The name by which the attachment is associated with the document. For the update action, if the attachment does not exist, it is created automatically. For the create action, if the attachment already exists, it is updated automatically.	✔
ContentTypeAttach	The attachment content type header.	✔
DestinationAttach	For the read action, the name of the file where you want to receive the attachment.	
Operation Parameters		
OperationParameters	The list of additional parameters that you can add for the read document and the database replication actions. No check is performed at job definition time on the extra parameters . For details about operation parameters, see the *IBM Cloudant* documentation.	
Body		
InputFileName	The path and name of the file containing the document or attachment content.	
InputDocument	The document content. This attribute does not apply to attachments. To create or update a document with an empty content, specify *{}*.	

Scheduling and stopping a job in IBM Workload Scheduler

You schedule IBM Workload Scheduler IBM Cloudant jobs by defining them in job streams. Add the job to a job stream with all the necessary scheduling arguments and submit the job stream.

You can submit jobs by using the Dynamic Workload Console, Application Lab or the **conman** command line. See Chapter 3, “Scheduling and submitting jobs and job streams,” on page 9 for information about how to schedule and submit jobs and job streams using the various interfaces.

After submission, when the job is running and is reported in **EXEC** status in IBM Workload Scheduler, you can stop it if necessary, by using the **kill** command. This action stops also the program execution on the IBM Cloudant database.

Monitoring a job

If the IBM Workload Scheduler agent stops when you submit the IBM Cloudant job, or while the job is running, the job restarts automatically as soon as the agent restarts.

For information about how to monitor jobs using the different product interfaces available, see Chapter 4, “Monitoring IBM Workload Scheduler jobs,” on page 11.

CloudantJobExecutor.properties file

The properties file is automatically generated either when you perform a "Test Connection" from the Dynamic Workload Console in the job definition panels, or when you submit the job to run the first time. Once the file has been created, you can customize it. This is especially useful when you need to schedule several jobs of the same type. You can specify the values in the properties file and avoid having to provide information such as credentials and other information, for each job. You can override the values in the properties files by defining different values at job definition time.

The *TWS_INST_DIR*\TWS\JavaExt\cfg\CloudantJobExecutor.properties file contains the following properties:

```
#Cloudant properties
Username=
Password=
AccountText=
DatabaseText=
```

For a description of each property, see the corresponding job attribute description in Table 4 on page 19.

Job properties

While the job is running, you can track the status of the job and analyze the properties of the job. In particular, in the Extra Information section, if the job contains variables, you can verify the value passed to the variable from the remote system. Some job streams use the variable passing feature, for example, the value of a variable specified in job 1, contained in job stream A, is required by job 2 in order to run in the same job stream.

For information about how to display the job properties from the various supported interfaces, see Chapter 5, “Analyzing the job log,” on page 13. For example, from the **conman** command line, you can see the job properties by running:

```
conman sj <job_name>;props
```

where <*job_name*> is the IBM Cloudant job name.

The properties are listed in the `Extra Information` section of the output command.

For information about passing job properties, see the topic about passing job properties from one job to another in the same job stream instance in the *User's Guide and Reference*.

The following example shows the job definition for an IBM Cloudant job that deletes a document:

```
<?xml version="1.0" encoding="UTF-8"?>
<jsdl:jobDefinition xmlns:jsdl="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdl"
  xmlns:jsdlcloudant="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdlcloudant" name="CLOUDANT">
  <jsdl:application name="cloudant">
  <jsdlcloudant:cloudant>
  <jsdlcloudant:cloudantParameters>
      <jsdlcloudant:Connection>
      <jsdlcloudant:UsernameText>cfalcxx</jsdlcloudant:UsernameText>
      <jsdlcloudant:PasswordText>xxxxxx00</jsdlcloudant:PasswordText>
      <jsdlcloudant:AccountText>54fdc307-1b24-4323-9a91-adc817ac45xx-bluemix
                </jsdlcloudant:AccountText>
      <jsdlcloudant:DatabaseText>mydb</jsdlcloudant:DatabaseText>
      </jsdlcloudant:Connection>
      <jsdlcloudant:Action>
      <jsdlcloudant:ActionButtonGroup>
         <jsdlcloudant:DocumentRadioButton>
         <jsdlcloudant:DocumentOperation>DELETE</jsdlcloudant:DocumentOperation>
         <jsdlcloudant:IdDocument>claudio</jsdlcloudant:IdDocument>
         <jsdlcloudant:RevDocument/>
         </jsdlcloudant:DocumentRadioButton>
      </jsdlcloudant:ActionButtonGroup>
      </jsdlcloudant:Action>
      <jsdlcloudant:Body>
      <jsdlcloudant:DocumentInputGroup>
         <jsdlcloudant:InputDocumentButton>
         <jsdlcloudant:InputDocument/>
         </jsdlcloudant:InputDocumentButton>
      </jsdlcloudant:DocumentInputGroup>
      </jsdlcloudant:Body>
  </jsdlcloudant:cloudantParameters>
  </jsdlcloudant:cloudant>
  </jsdl:application>
 </jsdl:jobDefinition>
```

Job log content

For information about how to display the job log from the various supported interfaces, see Chapter 5, "Analyzing the job log," on page 13.

For example, you can see the job log content by running `conman sj <job_name>;stdlist`, where *<job_name>* is the IBM Cloudant job name.

See also

From the Dynamic Workload Console you can perform the same task as described in

the *Dynamic Workload Console User's Guide*, section about Creating job definitions.

For more information about how to create and edit scheduling objects, see

the *Dynamic Workload Console User's Guide*, section about Designing your Workload.

Chapter 8. IBM Cognos jobs

Use the IBM Workload Scheduler plug-in for IBM Cognos to run IBM Cognos reports, interactive reports, query, and report views, using IBM Workload Scheduler.

Take advantage of all the IBM Workload Scheduler scheduling capabilities to manage these reports.

You manage these reports both in a distributed and in a z/OS environment, by selecting the appropriate engine.

Any reference in the documentation to reports is intended to mean reports, interactive reports, query, and report views, unless otherwise specified.

For information about the supported versions of the job plug-ins, generate a dynamic Data Integration report from the IBM Software Product Compatibility Reports web site, and select the **Supported Software** tab: Data Integration.

Business scenario

A retail company has many shops around the world. Each shop has its own local database, which stores daily transactions and tracks the number of articles remaining in stock. The central business division of the company every morning needs to analyze all the reports that show the number of articles sold in every country, grouped by predefined categories.

The company collects this data by using IBM InfoSphere DataStage and creates the reports using IBM Cognos. Overnight, the company runs the following processes:

- IBM InfoSphere DataStage jobs to collect data from the local database of each store and then, using the procedures stored in the central database, to produce the aggregated data to create the business reports.
- IBM Cognos jobs to create the business reports to be used by the business analysts.

Both processes are performed manually by an operator. To reduce costs and to ensure that the SLA requirement of having data available every morning is satisfied, the company wants to automate the entire process.

Using IBM Workload Scheduler Plug-in for IBM InfoSphere DataStage and for IBM Cognos, the company can satisfy this objective because the product provides the plug-in necessary to automate and control the entire process.

Defining an IBM Workload Scheduler job to run an IBM Cognos report

Define IBM Workload Scheduler jobs to run IBM Cognos reports by using one of the supported product interfaces.

Distributed In a distributed environment, define an IBM Workload Scheduler job to run an IBM Cognos report by using the Dynamic Workload Console connected to a distributed engine, by using Application Lab, or using the **composer** command line.

z/OS In a z/OS environment, define an IBM Workload Scheduler job to run an IBM Cognos report by using the Dynamic Workload Console connected to a z/OS engine.

See Chapter 2, "Defining a job," on page 7 for more information about creating jobs using the various interfaces available. Some samples of IBM Cognos report job definitions are contained in the sections that follow.

Defining jobs by using the Dynamic Workload Console

You can define IBM Workload Scheduler jobs to run IBM Cognos reports by using the Dynamic Workload Console.

About this task

To define a job by using the Dynamic Workload Console, perform the following procedure. See Chapter 2, "Defining a job," on page 7 for information about defining jobs with other available interfaces.

Procedure

1. In the console navigation tree, expand **Administration** > **Workload Design** and click **Manage Workload Definitions**.
2. Select an engine and click **Go**. The Workload Designer opens.
3. In the Working List panel, select:

   z/OS **On z/OS egnine:**
   New > **Business Analytics** > **Cognos**

   Distributed **On a distributed engine:**
   New > **Job Definition** > **Business Analytics** > **Cognos**

   The properties of the job are displayed in the right-hand panel for editing.
4. In the properties panel, specify the attributes for the job definition you are creating. You can find detailed information about all the attributes in the help available with the panel. In particular:

   In the General panel:

   Distributed

   Environment:
   Enter the name of the IBM Workload Scheduler job that runs the IBM Cognos report.

   Enter the name of the workstation where you installed the IBM Workload Scheduler agent.

   z/OS

   Environment:
   Enter the name of the partitioned data set where you want to create the JCL.

   Enter the name of the JCL you want to create in the partitioned data set.

   Enter the name of the workstation where you installed the IBM Workload Scheduler agent.

   In the Cognos panel:

In the Credentials section:

Enter the namespace and the credentials related to the IBM Cognos report. If you do not want to specify them here, you can define them in the `CognosJobExecutor.properties` file. In this case IBM Workload Scheduler reads them from the `.properties` file when you retrieve any information by using a list or when you submit the job.

You do not need to specify this value if you set the **true** value for the **Allow anonymous access?** property in the **IBM Cognos Configuration** > **Local Configuration** > **Security** > **Authentication** > **Cognos** window.

In the Server connection section:

Enter the host name or TCP/IP address and the port of the IBM Cognos server you want to connect to. If you do not want to specify them here, you can define them in the `CognosJobExecutor.properties` file.

Select **Use SSL** connection security to communicate in SSL with the IBM Cognos server. If you do not select it the communication is HTTP.

In the Report section:

Enter the path to the report you want to run, the fully qualified path where you want to save the report, the format in which you want to generate the report and parameters if required for the report.

The path must exist and you must have the permission to write in it otherwise you receive an error message.

When you specify parameters that can have multiple values, use **-Value:** as separator. For example, you can write as follows:

```
Rome-Value:Paris
```

Parameters of type date, time, and time stamp, must be specified using a specific syntax. See "Specifying the parameter format for date, time, and time stamp" on page 31.

Values for parameters that require parameterized filters must be specified using the procedure described in "Specifying parameterized filters" on page 31.

In the Delivery options panel:

Use this panel to define the options to specify the delivery options for the IBM Cognos report. If you did not insert a value in the **Output file** field you must enter at least an email address.

5. Click **Save** to save the job definition in the database.

Job definition for IBM Cognos reports

Job definition properties and JSDL examples for IBM Cognos reports.

For more information about creating jobs using the various supported product interfaces, see Chapter 2, "Defining a job," on page 7.

Table 5 on page 26 describes the required and optional attributes for the definition of jobs to run IBM Cognos reports, together with a description of each attribute.

Table 5. Required and optional attributes for the definition of jobs running IBM Cognos reports.

Attribute	Description/value	Required
Namespace	The IBM Cognos namespace to log on to. It contains the IBM Cognos objects, such as groups, roles, data sources, distribution lists, and contacts. You do not have to specify this value if: • You specified it in the `Cognos JobExecutor .properties` file. • You set the **true** value for the **Allow anonymous access?** property in the **IBM Cognos Configuration** > **Local Configuration** > **Security** > **Authentication** > **Cognos** window.	
UserName	The user to use when logging on to the namespace.	✓ You do not have to specify this value if: • You specified it in the `Cognos JobExecutor .properties` file. • You set the **true** value for the **Allow anonymous access?** property in the **IBM Cognos Configuration** > **Local Configuration** > **Security** > **Authentication** > **Cognos** window.
password	The password of the authorized user. It is encrypted when you submit the job. You do not have to specify this value if: • You specified it in the `Cognos JobExecutor .properties` file. • You set the **true** value for the **Allow anonymous access?** property in the **IBM Cognos Configuration** > **Local Configuration** > **Security** > **Authentication** > **Cognos** window.	

Table 5. Required and optional attributes for the definition of jobs running IBM Cognos reports. (continued)

Attribute	Description/value	Required
serverAddress	The host name or TCP/IP address of the IBM Cognos server you want to connect to. You do not have to specify this value if: • You specified it in the `Cognos JobExecutor .properties` file. • You set the **true** value for the **Allow anonymous access?** property in the **IBM Cognos Configuration** > **Local Configuration** > **Security** > **Authentication** > **Cognos** window.	
port	The port to use for the connection. The default value is **9300**. If you select Use SSL, the default is **9334**. For detailed information, see the IBM Cognos documentation. You do not have to specify this value if: • You specified it in the `Cognos JobExecutor .properties` file. • You set the **true** value for the **Allow anonymous access?** property in the **IBM Cognos Configuration** > **Local Configuration** > **Security** > **Authentication** > **Cognos** window.	
SslCheck	Specify it to use SSL connection security to communicate with the IBM Cognos server. If you do not specify it the communication is HTTP.	
reportPath	The path to the report that you want to run.	✓

Table 5. Required and optional attributes for the definition of jobs running IBM Cognos reports. (continued)

Attribute	Description/value	Required
parametersValues	The list of parameters to associate to the job. When you specify parameters that can have multiple values, use **-Value:** as separator. For example, you can write as follows: `Rome-Value:Paris` Parameters of type date, time, and time stamp, must be specified using a specific syntax. See "Specifying the parameter format for date, time, and time stamp" on page 31. Values for parameters that require parameterized filters must be specified using the procedure described in "Specifying parameterized filters" on page 31.	
outputFile	The fully qualified path where you want to save the report. The path must exist and you must have the permission to write in it. The report is saved with the extension corresponding to the format you specified. IBM Workload Scheduler saves, in the path you specify, the report with its content. You must specify at least the path or an email address for the delivery options otherwise you receive an error message when you save the job definition.	

Table 5. Required and optional attributes for the definition of jobs running IBM Cognos reports. (continued)

Attribute	Description/value	Required
formatTypes	The format in which you want to generate the report. For reports, supported formats are: • CSV • Excel 2002 • Excel 2007 • HTML • HTML Fragment • HTML Web Archive • PDF • XML For interactive reports and views of interactive reports you can use only the HTML format. Even if, for a view of an interactive report, you select a format different from HTML, the product saves the output in HTML format when the job runs. The default value is **HTML**.	
emailGroup	The delivery options for the IBM Cognos report. If you did not insert a value for the **Output file** attribute, you must enter at least an email address. The email delivery status does not impact the job completion status. **To, Cc, Bcc** The email addresses to which you want to send the report. Address the message by typing at least an email address in one of the address fields, To, Cc (carbon copy), or Bcc (blind carbon copy). To specify multiple addresses divide them by using commas. **Subject** The subject of the email. **Body** The body of the email.	

The following example shows the job definition for an IBM Cognos report with only the required attributes specified:

```
$JOBS
NC125152#COGNOS_ONLY_REQUIRED_FIELDS
 TASK
    <?xml version="1.0" encoding="UTF-8"?>
<jsdl:jobDefinition xmlns:jsdl="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdl"
 xmlns:jsdlcognos="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdlcognos" name="COGNOS">
  <jsdl:application name="cognos">
    <jsdlcognos:cognos>
   <jsdlcognos:CognosParameters>
    <jsdlcognos:CognosPanel>
     <jsdlcognos:credentialsGroup>
      <jsdlcognos:namespace/>
      <jsdlcognos:userName/>
      <jsdlcognos:password/>
     </jsdlcognos:credentialsGroup>
     <jsdlcognos:serverConnectionGroup>
          <jsdlcognos:serverAddress/>
          <jsdlcognos:port/>
          <jsdlcognos:CheckSSLGroup/>
     </jsdlcognos:serverConnectionGroup>
          <jsdlcognos:reportGroup>
           <jsdlcognos:ReportPathGroup>
            <jsdlcognos:reportPath>
                        Address Report - Path:/content/package[@name='tws4apps']
                        /report[@name='Address Report']
                   </jsdlcognos:reportPath>
           </jsdlcognos:ReportPathGroup>
          <jsdlcognos:outputFile>C:\outputFile</jsdlcognos:outputFile>
           <jsdlcognos:formatTypes>PDF</jsdlcognos:formatTypes>
     </jsdlcognos:reportGroup>
    </jsdlcognos:CognosPanel>
    <jsdlcognos:OptionPanel>
     <jsdlcognos:emailGroup>
          <jsdlcognos:toAddress/>
          <jsdlcognos:ccAddress/>
          <jsdlcognos:bccAddress/>
          <jsdlcognos:subject/>
         <jsdlcognos:body/>
     </jsdlcognos:emailGroup>
    </jsdlcognos:OptionPanel>
   </jsdlcognos:CognosParameters>
  </jsdlcognos:cognos>
  </jsdl:application>
</jsdl:jobDefinition>
 RECOVERY STOP
```

The following example shows the job definition for an IBM Cognos report with all the attributes specified:

```
$JOBS
NC125152#REPFOREUROPEBUSINESS COGNOS_ALL_FIELDS
 TASK
    <?xml version="1.0" encoding="UTF-8"?>
<jsdl:jobDefinition xmlns:jsdl="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdl"
 xmlns:jsdlcognos="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdlcognos" name="COGNOS">
  <jsdl:application name="cognos">
    <jsdlcognos:cognos>
   <jsdlcognos:CognosParameters>
    <jsdlcognos:CognosPanel>
     <jsdlcognos:credentialsGroup>
      <jsdlcognos:namespace>NTLM</jsdlcognos:namespace>
      <jsdlcognos:userName>Administrator</jsdlcognos:userName>
      <jsdlcognos:password>{aes}SgB6gmS+3xj0Yq2QsINVOtsNCeZIIsMwt08kwO6ZCR4=
             </jsdlcognos:password>
     </jsdlcognos:credentialsGroup>
     <jsdlcognos:serverConnectionGroup>
      <jsdlcognos:serverAddress>nc112006</jsdlcognos:serverAddress>
      <jsdlcognos:port>9300</jsdlcognos:port>
      <jsdlcognos:CheckSSLGroup>
       <jsdlcognos:SslCheck/>
      </jsdlcognos:CheckSSLGroup>
     </jsdlcognos:serverConnectionGroup>
     <jsdlcognos:reportGroup>
      <jsdlcognos:ReportPathGroup>
       <jsdlcognos:reportPath>date and time report - in values -
                   Path:/content/package[@name='cognosTime']/interactiveReport
```

```
                [@name='date and time report - in values']
              </jsdlcognos:reportPath>
     </jsdlcognos:ReportPathGroup>
     <jsdlcognos:parametersValues>
      <jsdlcognos:parametersValue key="Date prompt">Between 2012-02-03 and 2012-04-15
              </jsdlcognos:parametersValue>
      <jsdlcognos:parametersValue key="Time prompt">-Value:01:00:00-Value:01:01:01
              </jsdlcognos:parametersValue>
      <jsdlcognos:parametersValue key="Date and time prompt">
               2012-02-03 15:05:00-Value:2012-02-03T16:01:00-Value:2012-02-03T16:00:00
              </jsdlcognos:parametersValue>
     </jsdlcognos:parametersValues>
     <jsdlcognos:outputFile>C:\Cognos reports\ReportForEuropeBusiness
            </jsdlcognos:outputFile>
     <jsdlcognos:formatTypes>HTML</jsdlcognos:formatTypes>
    </jsdlcognos:reportGroup>
   </jsdlcognos:CognosPanel>
   <jsdlcognos:OptionPanel>
    <jsdlcognos:emailGroup>
     <jsdlcognos:toAddress>gsg@it.abc.com,igg@it.im.com</jsdlcognos:toAddress>
     <jsdlcognos:ccAddress>ibf@it.abc.com</jsdlcognos:ccAddress>
     <jsdlcognos:bccAddress>igg@it.abc.com</jsdlcognos:bccAddress>
     <jsdlcognos:subject>Report from Cognos</jsdlcognos:subject>
     <jsdlcognos:body>Report generated by Cognos:</jsdlcognos:body>
    </jsdlcognos:emailGroup>
   </jsdlcognos:OptionPanel>
  </jsdlcognos:CognosParameters>
 </jsdlcognos:cognos>
 </jsdl:application>
</jsdl:jobDefinition>
 RECOVERY STOP
```

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 6. 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.

Specifying parameterized filters

When defining reports that use parameterized filters either using the Dynamic Workload Console, Application Lab, or **composer**, for the value, use the one reported in the Cognos Report Studio.

About this task

The following example demonstrates how to specify parameters that use parameterized filters by using the Dynamic Workload Console:

1. In the **Properties - Cognos** page of the Workload Designer in the Dynamic Workload Console, click the **Cognos** tab.
2. Select the name of the parameter you want to specify for the report.
3. In the Report section, click the addition (+) symbol for Parameter list to add a new parameter.
4. In the **Name** field, type the name of the parameter you want to specify for the report.
5. In the **Value** field, type the value reported in the Cognos Report Studio. To identify the value proceed as follows:
   a. Open Report Studio.
   b. Open the report to run.
   c. In the Insertable Objects pane, select the filter you want to use. The Properties page is displayed.
   d. Select the **Ref** value.

This example shows how to run the Cognos Employee Training by Year sample report, specifying for the **?pYear?** parameter the value associated with the filter **2004**. The Employee Training by Year sample report is located under `/Samples/Models/Dashboard Objects`. To run the report proceed as follows:

1. In the Insertable Objects pane, select the **2004** filter. The Properties panel is displayed.
2. Select **[go_data_warehouse].[2004]**.
3. Insert **[go_data_warehouse].[2004]** in the **Value** field.
4. Save the job definition.

To specify parameters that use parameterized filters using **composer**, perform the following procedure.

1. Open Report Studio.
2. Open the report to run.
3. In the Insertable Objects pane, select the filter you want to use. The Properties panel is displayed.
4. Select the **Ref** value.
5. Copy this value in the **<jsdlcognos:parametersValues>** attribute. Below an example for the Employee Training by Year sample report specifying for the **?pYear?** parameter the value associated with the filter **2004**:

```
<jsdlcognos:reportGroup>
   <jsdlcognos:ReportPathGroup>
     <jsdlcognos:reportPath>
       Employee Training - Path:/content/folder[@name='Samples']
                                 /folder[@name='Models']
                                /folder[@name='Dashboard Objects']
                               /report[@name='Employee Training']
     </jsdlcognos:reportPath>
   </jsdlcognos:ReportPathGroup>
   <jsdlcognos:parametersValues>
        <jsdlcognos:parametersValue>
           key="pYear">[go_data_warehouse].[2004]
        </jsdlcognos:parametersValue>
   </jsdlcognos:parametersValues>
        <jsdlcognos:outputFile>
```

```
            C:\Cognos reports\Employee Training
        </jsdlcognos:outputFile>
        <jsdlcognos:formatTypes>HTML</jsdlcognos:formatTypes>
    </jsdlcognos:reportGroup>
```

Scheduling and submitting job streams for IBM Cognos reports

You schedule IBM Workload Scheduler jobs for IBM Cognos reports by defining them in job streams.

See Chapter 3, “Scheduling and submitting jobs and job streams,” on page 9 for information about how to schedule and submit jobs and job streams using the various interfaces.

After you define an IBM Workload Scheduler job for an IBM Cognos report, add it to a job stream with all the necessary scheduling arguments and submit it. After submission, when the job is running (**EXEC** status), you can kill the IBM Workload Scheduler job that runs the IBM Cognos report if necessary. In particular, for IBM Cognos jobs this action is converted into a **Cancel** action for the IBM Cognos report.

The agent might become unavailable while the IBM Workload Scheduler job running the IBM Cognos report is running. When the agent becomes available again, IBM Workload Scheduler starts to monitor the report from where it stopped.

For information about monitoring jobs and job streams, see Chapter 4, “Monitoring IBM Workload Scheduler jobs,” on page 11.

For information about analyzing the job log, see Chapter 5, “Analyzing the job log,” on page 13.

Customizing IBM Workload Scheduler to run IBM Cognos reports

You can customize IBM Workload Scheduler to run IBM Cognos report by using the `CognosJobExecutor.properties` file.

The `CognosJobExecutor.properties` file is a text file that contains the server credentials, the authentication information, and the dispatch servlet name you specified when configuring the IBM Cognos product.

The properties file is automatically generated either when you perform a "Test Connection" from the Dynamic Workload Console in the job definition panels, or when you submit the job to run the first time. Once the file has been created, you can customize it. This is especially useful when you need to schedule several jobs of the same type. You can specify the values in the properties file and avoid having to provide information such as credentials and other information, for each job. You can override the values in the properties files by defining different values at job definition time.

The file is located in the directory:

agent_install_dir`/TWA/TWS/JavaExt/cfg`

Where *agent_install_dir* is the path where you installed the IBM Workload Scheduler dynamic agent or the IBM Workload Scheduler for z/OS agent. Where *agent_install_dir* is the path where you installed the IBM Workload Scheduler dynamic agent.

You can define the properties contained in the `.properties` file, except the **dispatchServlet** value, at job definition time also. In this case, IBM Workload Scheduler uses the values you specify at job definition time for running the report. Table 7 describes the properties contained in `CognosJobExecutor.properties`.

Table 7. Properties for running IBM Cognos reports

Property	Description/value	Required
namespace	The IBM Cognos namespace to log on to. You do not need to specify this value if you set the **true** value for the **Allow anonymous access?** property in the **IBM Cognos Configuration** > **Local Configuration** > **Security** > **Authentication** > **Cognos** window.	
username	The user to use when logging on to the namespace. You do not need to specify this value if you set the **true** value for the **Allow anonymous access?** property in the **IBM Cognos Configuration** > **Local Configuration** > **Security** > **Authentication** > **Cognos** window.	
password	The password of the authorized user. It is encrypted in the agent configuration file when you retrieve any information by using a list, or when you submit the report. You do not need to specify this value if you set the **true** value for the **Allow anonymous access?** property in the **IBM Cognos Configuration** > **Local Configuration** > **Security** > **Authentication** > **Cognos** window.	
serverAddress	The host name or TCP/IP address of the Cognos server you want to connect to.	
serverPort	The port to use for the connection. The default value is **9300**. If you use SSL, the default is **9334**.	
dispatchServlet	The dispatch you specified in the **IBM Cognos Configuration** > **Environment** > **Dispatcher Settings** window. The default value is **/p2pd/servlet/dispatch**.	✓

Example

This example shows a `CognosJobExecutor.properties` file.

```
namespace=cognosNamespace
username=userName
password=userPwd
serverAddress=nc112006
serverPort=9300
dispatchServlet=/p2pd/servlet/dispatch
```

Configuring the agent to use Cognos in SSL

Configure the IBM Workload Scheduler agent to connect to an IBM Cognos server that is using SSL.

About this task

To configure the agent to connect to an IBM Cognos server that is using SSL, perform the following procedure.

Note: On Windows operating systems, path with blanks must be specified between double quotes.

Procedure

1. On the IBM Cognos server, run the following command to export the certificate:

   On Windows operating systems:

   ```
   <Cognos_inst_path>\bin\ThirdPartyCertificateTool.bat -E -T
    -r \<certificate_dir>\<certificate_name>
    -k <Cognos_inst_path>\configuration\signkeypair\jCAKeystore
    -p <cognos_keystore_password>
   ```

   On UNIX and Linux operating systems:

   ```
   <Cognos_inst_path>/bin/ThirdPartyCertificateTool -E -T
    -r /<certificate_dir>/<certificate_name>
    -k <Cognos_inst_path>/configuration/signkeypair/jCAKeystore
    -p <cognos_keystore_password>
   ```

   where:

   cognos_inst_path
   Specify the path where you installed the IBM Cognos server.

   certificate_dir
   Specify the directory in which to export the IBM Cognos certificate.

   certificate_name
   Specify the name of the IBM Cognos certificate you export.

   cognos_keystore_password
   Specify the IBM Cognos password defined in the **IBM Cognos Configuration** > **Security** > **Cryptography** > **Cognos - Certificate Authority settings - Certificate Authority key store password**.

   For example, if you installed the IBM Cognos server on a UNIX operating system in the `/opt/abc/Cognos/c10` path, you want to export the `/tmp/cacert.cer` certificate and the Certificate Authority key store password is **pass00w0rd**, run the command as follows:

   ```
   /opt/abc/cognos/c10/bin/ThirdPartyCertificateTool.sh -E -T
    -r /tmp/cacert.cer
    -k /opt/abc/cognos/c10/configuration/signkeypair/jCAKeystore
    -p pass00w0rd
   ```

2. On the agent, run the following command to import the certificate into the agent keystore:

   On Windows operating systems:

   ```
   <agent_inst_path>\TWS\JavaExt\jre\jre\bin\keytool -import
    -file <exp_certificate_dir>\<certificate_name>
    -keystore <agent_inst_path>\TWS\JavaExt\jre\jre\lib\security\cacerts
    -storepass <keystore_password> -alias Cognos10
   ```

   On UNIX and Linux operating systems:

   ```
   <agent_inst_path>/TWS/JavaExt/jre/jre/bin/keytool -import
    -file <exp_certificate_dir>/<certificate_name>
    -keystore <agent_inst_path>/TWS/JavaExt/jre/jre/lib/security/cacerts
    -storepass <keystore_password> -alias Cognos10
   ```

where:

agent_inst_path
Specify the path where you installed the agent.

exp_certificate_dir
Specify the directory where you stored the exported IBM Cognos certificate.

certificate_name
Specify the certificate you want to import.

keystore_password
Specify the keystore password of the Java extension. The default is **changeit**.

For example, if you installed the agent on a Windows operating system in the `D:\TWS\Engine\tws_user\` path, you want to import the **cacert.cer** certificate in the `c:\app\certificate\` directory, and the password of the agent keystore is **a0password**, run the command as follows:

```
D:\TWS\Engine\tws_user\TWS\JavaExt\jre\jre\bin\keytool
 -import -file c:\app\certificate\cacert.cer
 -keystore D:\TWS\Engine\tws_user\TWS\JavaExt\jre\jre\lib\security\cacerts
 -storepass a0password -alias Cognos10
```

3. In the agent `JobManager.ini` configuration file, add the **JVMOptions** parameter as follows:

```
JVMOptions  = -Djavax.net.ssl.trustStore=
"<agent_inst_path>\TWS\JavaExt\jre\jre\lib\security\cacerts"
 -Djavax.net.ssl.trustStorePassword=<keystore_password>
```

On Windows operating systems:

```
JVMOptions  = -Djavax.net.ssl.trustStore=
"<agent_inst_path>\TWS\JavaExt\jre\jre\lib\security\cacerts"
 -Djavax.net.ssl.trustStorePassword=<keystore_password>
```

On UNIX and Linux operating systems:

```
JVMOptions  = -Djavax.net.ssl.trustStore=
"<agent_inst_path>/TWS/JavaExt/jre/jre/lib/security/cacerts"
 -Djavax.net.ssl.trustStorePassword=<keystore_password>
```

where:

agent_inst_path
Specify the path where you installed the agent.

keystore_password
Specify the keystore password of the Java extension.

For example, if you installed the agent on a Windows operating system in the `D:\TWS\Engine\tws_user\` path, the agent keystore path is `D:\TWS\Engine\tws_user\TWS\JavaExt\jre\jre\lib\security\cacerts` and the password agent keystore is **a0password**, add the **JVMOptions** parameter as follows:

```
JVMOptions  = -Djavax.net.ssl.trustStore=
"D:\TWS\Engine\tws_user\TWS\JavaExt\jre\jre\lib\security\cacerts"
 -Djavax.net.ssl.trustStorePassword=a0password
```

4. Start and stop the agent using the **ShutDownLwa** and **StartUpLwa** commands. See the sections about the commands in *User's Guide and Reference*.

Mapping between job statuses and IBM Cognos report statuses

Map job status to IBM Cognos report status to understand their processing.

Table 8 table shows how you can map the job status to the IBM Cognos report status based on the return code you find in the job log output.

Table 8. Mapping between IBM Workload Scheduler job statuses and IBM Cognos report statuses

IBM Cognos report status	Dynamic Workload Console and Application Lab job status	IBM Workload Scheduler job status	IBM Workload Scheduler for z/OS job status
Executing	Running	EXEC	Executing
Pending	Running	EXEC	Executing
Succeeded	Successful	SUCC	Completed
Failed	Error	ABEND	Error
Canceled	Error	ABEND	Error
Suspended	Running	EXEC	Executing

Job log output

The IBM Workload Scheduler for IBM Cognos report job log and content.

Purpose

The output of an IBM Workload Scheduler job for IBM Cognos report shows:

Distributed **Environment:**

- In the first part the JSDL definition you submitted.
- In the second part how the job completed.

See "Sample job log output."

z/OS **Environment:**

How the job completed. See "Sample job log in a z/OS environment" on page 38.

For information about accessing the job log, see Chapter 5, "Analyzing the job log," on page 13

Distributed

Sample job log output

This example shows the output of a job that run on a dynamic agent that completed successfully:

```
%sj NC125152#JOBS.REPOR1722160684;std=================
= JOB       : NC125152#JOBS[(0000 02/27/12),(JOBS)].REPOR1722160684
= TASK      : <?xml version="1.0" encoding="UTF-8"?&gt;
<jsdl:jobDefinition xmlns:jsdl="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdl"
 xmlns:jsdlcognos="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdlcognos"
 name="COGNOS">
  <jsdl:application name="cognos">
<jsdlcognos:cognos>
 <jsdlcognos:CognosParameters>
   <jsdlcognos:CognosPanel>

.....
.....

</jsdl:jobDefinition>
= TWSRCMAP  :
```

```
= AGENT     : NC125152
= Job Number: 1060841359
= Mon Feb 27 17:22:30 CET 2012
===============================================================
AWKCGE050I The IBM Cognos report with path
 "/content/package[@name='tws4apps']/report[@name='Address Report']" started
     running.
AWKCGE051I The IBM Cognos report with path "/content/package[@name='tws4apps']
/report[@name='Address Report']" completed successfully.
AWKCGE053I The IBM Cognos report results were sent by email to
     "joedoe@busy.company.com".
AWKCGE052I The IBM Cognos report results were saved in the file
 "C:\Cognos reports\ReportForEuropeBusiness.html".
===============================================================
= Exit Status           : 0
= Elapsed Time (Minutes) : 1
= Mon Feb 27 17:22:44 CET 2012
===============================================================
```

This example shows the output of a job that runs on a dynamic agent that completed with errors:

```
%sj NC125152#JOBS.REPOR1726171742;std=================
= JOB       : NC125152#JOBS[(0000 02/27/12),(JOBS)].REPOR1726171742
= TASK      : <?xml version="1.0" encoding="UTF-8"?>
<jsdl:jobDefinition xmlns:jsdl="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdl"
 xmlns:jsdlcognos="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdlcognos"
   name="COGNOS">
  <jsdl:application name="cognos">
    <jsdlcognos:cognos>
.....
.....


</jsdl:jobDefinition>
= TWSRCMAP  :
= AGENT     : NC125152
= Job Number: 1060841360
= Mon Feb 27 17:26:30 CET 2012
===============================================================
AWKCGE050I The IBM Cognos report with path "/content/package[@name='cognosTime']
/interactiveReport[@name='date and time report']" started running.
AWKCGE056E The IBM Cognos report completed with errors.
===============================================================
= Status Message:  AWKCGE056E The IBM Cognos report completed with errors.
= Exit Status           : -1
= Elapsed Time (Minutes) : 1
= Mon Feb 27 17:26:37 CET 2012
===============================================================
```

z/OS

Sample job log in a z/OS environment

This example shows the output of a job that run on a dynamic agent that completed successfully:

```
AWKCGE050I The IBM Cognos report with path
 "/content/folder[@name='Samples']/folder[@name='Models']
/package[@name='GO Data Warehouse\
(query)']/folder[@name='Report Studio Report Samples']
/report[@name='Total Revenue by Country']"
started running.
AWKCGE051I The IBM Cognos report with path
 "/content/folder[@name='Samples']/folder[@name='Models']
/package[@name='GO Data Warehouse\
(query)']/folder[@name='Report Studio Report Samples']
```

```
/report[@name='Total Revenue by Country']"
completed successfully.
AWKCGE052I The IBM Cognos report results were saved in the file "c:\addrep1.csv".
AWKCGE053I The IBM Cognos report results were sent by email to
   "ri.val@busy.company.com".
```

This example shows the output of a job that run on a dynamic agent that completed with errors:

```
AWKCGE050I The IBM Cognos report with path
 "/content/package[@name='tws4apps']
/folder[@name='Reports with parameters and prompts']
/interactiveReport[@name='Report 7 with special chars']" started running.
AWKCGE056E The IBM Cognos report completed with errors.
```

Chapter 9. IBM InfoSphere DataStage jobs

Use the IBM Workload Scheduler plug-in for IBM InfoSphere DataStage to schedule IBM InfoSphere DataStage jobs with IBM Workload Scheduler.

Take advantage of all the IBM Workload Scheduler scheduling capabilities to manage IBM InfoSphere DataStage jobs.

You can manage these jobs both in a distributed and in a z/OS environment, by selecting the appropriate engine.

Prerequisites

You must install the IBM Workload Scheduler agent on the same computer as the IBM InfoSphere DataStage server.

For information about the supported versions of the job plug-ins, generate a dynamic Data Integration report from the IBM Software Product Compatibility Reports web site, and select the **Supported Software** tab: Data Integration.

Business scenario

A retail company has many shops around the world. Each shop has its own local database which stores daily transactions and tracks the number of articles left in its store. The central business division of the company needs to analyze every morning all the reports that show the number of articles sold in every country, grouped by predefined categories.

The company collects this data by using IBM InfoSphere DataStage. The company runs IBM InfoSphere DataStage jobs overnight to collect data from the local database of each store and then, using the procedures stored in the central database, produces the aggregated data to create the business reports. The process that runs the IBM InfoSphere DataStage jobs overnight is performed manually by an operator. To reduce costs and to ensure that the SLA requirement of having data available every morning is satisfied, the company wants to automate this process.

Using IBM Workload Scheduler plug-in for IBM InfoSphere DataStage, the company can satisfy this objective because the product helps it to automate and control the entire process.

Defining an IBM Workload Scheduler job to run an InfoSphere DataStage job

Define IBM Workload Scheduler jobs to run InfoSphere DataStage jobs by using by using one of the supported product interfaces.

Distributed Define an IBM Workload Scheduler job to run an IBM InfoSphere DataStage job by using the Dynamic Workload Console connected to a distributed engine, by using Application Lab, or by using the **composer** command line.

z/OS Define an IBM Workload Scheduler job to run an IBM InfoSphere DataStage job by using the Dynamic Workload Console connected to a z/OS engine.

See Chapter 2, "Defining a job," on page 7 for more information about creating jobs using the various interfaces available. Some samples of using one or more of these interfaces to create an IBM InfoSphere DataStage job definition are contained in the sections that follow.

Job definition for IBM InfoSphere DataStage jobs

IBM Workload Scheduler job definition properties for running IBM InfoSphere DataStage jobs.

Table 9 describes the required and optional attributes for IBM InfoSphere DataStage jobs, together with a description of each attribute.

Table 9. Required and optional attributes for the job definition of IBM InfoSphere DataStage jobs.

Attribute	Description/value	Required
Domain	The domain to log on to. See **Note**.	
Server	The server to log on to. See **Note**.	
UserName	The user to use when logging on. See **Note**.	
password	The password of the authorized user. It is encrypted when you submit the job. See **Note**.	
ProjectName	The name of the project containing the job.	✔
JobName	The name of the job to run.	✔ Required if you do not specify the job alias
JobAlias	The alias associated to the job to run.	✔ Required if you do not specify the job name
FileRemotePath	The fully qualified path to the file that contains the parameter values to pass to the job.	
ParameterTableValues	The list of parameters to associate to the job.	
ForceReset	Specify it to reset the IBM InfoSphere DataStage job before it runs. When an IBM InfoSphere DataStage job has a status of **Crashed** or **Aborted**, you must reset it before running the job again.	

Table 9. Required and optional attributes for the job definition of IBM InfoSphere DataStage jobs. (continued)

Attribute	Description/value	Required
WarningLimit	Specify the maximum number of warnings that the InfoSphere DataStage job can reach before failing. Specify a value from 1 through 9999999. The default value is **50**.	
RowLimit	Specify the maximum number of rows to process in an IBM InfoSphere DataStage job before ending. Possible values are from 1 through 9999999. The default value is **1000**.	
DisableProjectErrorMessageHandler	Specify it to disable any error message handler that was set on a project. A message handler defines rules about how to handle messages generated when a parallel job is running. You can, for example, use a message handler to specify that certain types of message must not be written to the log. You define a project level message handler in the InfoSphere DataStage Administrator, and it applies to all parallel jobs within the specified project.	
DisableJobErrorMessageHandler	Specify it to disable any error message handler that was set on a job. From the IBM InfoSphere DataStage Designer, you can specify that any existing handler applies to a specific job. When you compile the job, the handler is included in the job executable as a local handler. In this case, it can be exported to other systems if necessary.	
UseDefault	Specify it to use the default values set for the project to generate the operational metadata when the IBM InfoSphere DataStage job runs. It is the default.	
GenerateOperationalMetadata	Specify it to generate operational metadata when running the IBM InfoSphere DataStage job. Operational metadata describe the events and processes that occur and the objects that are affected when you run the InfoSphere DataStage job.	

Table 9. Required and optional attributes for the job definition of IBM InfoSphere DataStage jobs. (continued)

Attribute	Description/value	Required
DoNotGenerateOperationalMetadata	Specify it to not generate operational metadata when running the IBM InfoSphere DataStage job.	

Note: If you do not want to specify this attribute in the XML, you can define it in the `DataStageJobExecutor.properties` file. You must define all or none of these values otherwise you receive an error message. See "Customizing IBM Workload Scheduler to run IBM InfoSphere DataStage jobs" on page 47.

The following example shows the job definition of an IBM InfoSphere DataStage job with only the required attributes specified:

```
NC112206#DS01
 TASK
   <?xml version="1.0" encoding="UTF-8"?>
<jsdl:jobDefinition xmlns:jsdl="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdl"
   xmlns:jsdldatastage="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdldatastage"
   name="DATASTAGE">
  <jsdl:application name="datastage">
    <jsdldatastage:datastage>
      <jsdldatastage:DataStageParameters>
         <jsdldatastage:DataStagePanel>
              <jsdldatastage:Logon>
                 <jsdldatastage:Domain>it112206.rome.it.com:9444</jsdldatastage:Domain>
                 <jsdldatastage:Server>it112206</jsdldatastage:Server>
                 <jsdldatastage:UserName>userName</jsdldatastage:UserName>
                 <jsdldatastage:password>password</jsdldatastage:password>
              </jsdldatastage:Logon>
              <jsdldatastage:JobDefinitionGroup>
                <jsdldatastage:ProjectNameGroup>
                  <jsdldatastage:ProjectName>DatastageReport</jsdldatastage:ProjectName>
                </jsdldatastage:ProjectNameGroup>
                    <jsdldatastage:JobNameButtonGroup>
                          <jsdldatastage:JobNameRadioButton>
                              <jsdldatastage:JobName>dsj01_succ</jsdldatastage:JobName>
                          </jsdldatastage:JobNameRadioButton>
                    </jsdldatastage:JobNameButtonGroup>
                      <jsdldatastage:FileRemotePath/>
              </jsdldatastage:JobDefinitionGroup>
              <jsdldatastage:JobExecutionGroup/>
        </jsdldatastage:DataStagePanel>
        <jsdldatastage:OptionsPanel>
                <jsdldatastage:JobOptionsGroup>
                        <jsdldatastage:WarningLimitButtonGroup>
                                <jsdldatastage:NoWarningLimitButton/>
                        </jsdldatastage:WarningLimitButtonGroup>
                        <jsdldatastage:RowLimitButtonGroup>
                                <jsdldatastage:NoRowLimitButton/>
                        </jsdldatastage:RowLimitButtonGroup>
                        <jsdldatastage:OperationalMetadataGroup>
                                <jsdldatastage:UseDefault/>
                        </jsdldatastage:OperationalMetadataGroup>
                </jsdldatastage:JobOptionsGroup>
        </jsdldatastage:OptionsPanel>
      </jsdldatastage:DataStageParameters>
    </jsdldatastage:datastage>
  </jsdl:application>
</jsdl:jobDefinition>
 RECOVERY STOP
```

The following example shows the job definition of an InfoSphere DataStage job with all the attributes specified:

```
NC112206#DS01
 TASK
    <?xml version="1.0" encoding="UTF-8"?>
<jsdl:jobDefinition xmlns:jsdl="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdl"
 xmlns:jsdldatastage="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdldatastage" name="DATASTAGE">
```

```
<jsdl:application name="datastage">
 <jsdldatastage:datastage>
     <jsdldatastage:DataStageParameters>
          <jsdldatastage:DataStagePanel>
              <jsdldatastage:Logon>
                    <jsdldatastage:Domain>it112206.rome.it.com:9444</jsdldatastage:Domain>
                    <jsdldatastage:Server>it112206</jsdldatastage:Server>
                    <jsdldatastage:UserName>userName</jsdldatastage:UserName>
                    <jsdldatastage:password>password</jsdldatastage:password>
               </jsdldatastage:Logon>
               <jsdldatastage:JobDefinitionGroup>
                    <jsdldatastage:ProjectNameGroup>
                           <jsdldatastage:ProjectName>DatastageReport</jsdldatastage:ProjectName>
                    </jsdldatastage:ProjectNameGroup>
                    <jsdldatastage:JobNameButtonGroup>
                              <jsdldatastage:JobAliasRadioButton>
                                   <jsdldatastage:JobAlias>dsj01_succ_id</jsdldatastage:JobAlias>
                              </jsdldatastage:JobAliasRadioButton>
                    </jsdldatastage:JobNameButtonGroup>
                       <jsdldatastage:FileRemotePath>/opt/remoteFile</jsdldatastage:FileRemotePath>
                       <jsdldatastage:ParameterTableValues>
                          <jsdldatastage:ParameterTableValue key="waitTime">10
                             </jsdldatastage:ParameterTableValue>
                          <jsdldatastage:ParameterTableValue key="date">2011-09-14
                             </jsdldatastage:ParameterTableValue>
                       </jsdldatastage:ParameterTableValues>
                    </jsdldatastage:JobDefinitionGroup>
                    <jsdldatastage:JobExecutionGroup>
                           <jsdldatastage:ForceReset/>
                    </jsdldatastage:JobExecutionGroup>
            </jsdldatastage:DataStagePanel>
            <jsdldatastage:OptionsPanel>
                  <jsdldatastage:JobOptionsGroup>
                          <jsdldatastage:WarningLimitButtonGroup>
                                 <jsdldatastage:WarningLimitButton>
                                    <jsdldatastage:WarningLimit>40</jsdldatastage:WarningLimit>
                                 </jsdldatastage:WarningLimitButton>
                          </jsdldatastage:WarningLimitButtonGroup>
                           <jsdldatastage:RowLimitButtonGroup>
                                 <jsdldatastage:RowLimitButton>
                                        <jsdldatastage:RowLimit>250</jsdldatastage:RowLimit>
                                 </jsdldatastage:RowLimitButton>
                           </jsdldatastage:RowLimitButtonGroup>
                          <jsdldatastage:DisableProjectErrorMessageHandler/>
                          <jsdldatastage:DisableJobErrorMessageHandler/>
                           <jsdldatastage:OperationalMetadataGroup>
                                  <jsdldatastage:GenerateOperationalMetadata/>
                           </jsdldatastage:OperationalMetadataGroup>
                    </jsdldatastage:JobOptionsGroup>
            </jsdldatastage:OptionsPanel>
      </jsdldatastage:DataStageParameters>
 </jsdldatastage:datastage>
</jsdl:application>
</jsdl:jobDefinition>
 RECOVERY STOP
```

Defining IBM Workload Scheduler jobs to run IBM InfoSphere DataStage jobs by using the Dynamic Workload Console

A description of the IBM InfoSphere DataStage job definition from the Dynamic Workload Console.

About this task

To define a job that runs an IBM InfoSphere DataStage job by using the Dynamic Workload Console, perform the following procedure. You can also define a job using the other available interfaces such as Application Lab, see Chapter 2, “Defining a job,” on page 7 for more information.

Procedure

1. In the console navigation tree, expand **Administration** > **Workload Design** and click **Manage Workload Definitions**
2. Select an engine. The **Workload Designer** is displayed.

3. In the Working List panel, select **New** > **Job Definition** > **Business Analytics** > **DataStage**. In a z/OS environment select **New** > **Business Analytics** > **DataStage**. The properties of the job are displayed in the right-hand panel for editing.
4. In the properties panel, specify the attributes for the job definition you are creating. You can find detailed information about all the attributes in the help available with the panel. In particular:

   In the General panel:

   Distributed

   Environment:

   Enter the name of the IBM Workload Scheduler job that runs the IBM InfoSphere DataStage job.

   z/OS

   Environment:

   Enter the name of the partitioned data set where you want to create the JCL.

   Enter the name of the JCL you want to create in the partitioned data set.

   In the DataStage panel:

   In the Credentials section:

   Enter the credentials related to the IBM InfoSphere DataStage job. If you do not want to specify them here, you can define them in the `DataStageJobExecutor.properties` file. In this case IBM Workload Scheduler reads them from the `.properties` file when you retrieve any information by using a list or when you submit the job.

   If you do not specify them either using the Dynamic Workload Console or in the `.properties` file, IBM Workload Scheduler assumes that you did not set any security on the IBM InfoSphere DataStage server and tries the connection to the IBM InfoSphere DataStage server anyway.

   You must specify all or none of these values either using the Dynamic Workload Console or the `.properties` file, otherwise you receive an error message. See "Customizing IBM Workload Scheduler to run IBM InfoSphere DataStage jobs" on page 47.

   In the Job Definition section

   Enter the project name and the job name or select them from the appropriate lists. IBM Workload Scheduler retrieves this information directly from the IBM InfoSphere DataStage server database. Alternatively you can use the job alias.

   You can view the list of parameters defined for the IBM InfoSphere DataStage job. Select the ones you want to define for the job and associate a value to them.

   Select **Reset job before running** to reset the IBM InfoSphere DataStage job before it runs. When an IBM InfoSphere DataStage job has a status of **Crashed** or **Aborted**, you must reset it before running the job again.

In the Options panel:

Use this panel to define the options for the IBM InfoSphere DataStage job.

5. Click **Save** to save the job definition in the database.

Scheduling and submitting job streams for IBM InfoSphere DataStage jobs

You schedule IBM Workload Scheduler IBM InfoSphere DataStage jobs by defining them in job streams.

See Chapter 3, "Scheduling and submitting jobs and job streams," on page 9 for more information about how to schedule and submit jobs and job streams using the various interfaces.

After you define an IBM Workload Scheduler IBM InfoSphere DataStage job, you add it to a job stream with all the necessary scheduling arguments and submit it. After submission you can kill the IBM Workload Scheduler for IBM InfoSphere DataStage job if necessary, this action is converted in a **Stop** action for the IBM InfoSphere DataStage job.

If the IBM Workload Scheduler agent becomes unavailable when you submit the job or while the job is running, IBM Workload Scheduler collects the job log when the agent restarts and assigns the **Error** or **ABEND** status to the IBM Workload Scheduler job, independently of the status of the job in IBM InfoSphere DataStage.

For information about monitoring jobs and job streams, see Chapter 4, "Monitoring IBM Workload Scheduler jobs," on page 11.

For information about analyzing the job log, see Chapter 5, "Analyzing the job log," on page 13.

Customizing IBM Workload Scheduler to run IBM InfoSphere DataStage jobs

You can customize IBM Workload Scheduler for running IBM InfoSphere DataStage jobs by using the `DataStageJobExecutor.properties` file.

The `DataStageJobExecutor.properties` file is a text file that contains the user credentials and the path where you installed the IBM InfoSphere DataStage Server.

The file is located in the directory:

agent_install_dir`/TWA/TWS/JavaExt/cfg`

Where *agent_install_dir* is the path where you installed the IBM Workload Scheduler dynamic agent or the IBM Workload Scheduler for z/OS agent.

The properties file is automatically generated either when you perform a "Test Connection" from the Dynamic Workload Console in the job definition panels, or when you submit the job to run the first time. Once the file has been created, you can customize it. This is especially useful when you need to schedule several jobs of the same type. You can specify the values in the properties file and avoid having to provide information such as credentials and other information, for each job. You can override the values in the properties files by defining different values at job definition time.

You can define the property contained in the `.properties` file, except the **installDir** property, at job definition time also. In this case IBM Workload Scheduler uses the values you specify at job definition time for running the job. You must define all or none of these properties either using the command line, the Dynamic Workload Console, or the `.properties` file, otherwise you receive an error message. If you do not define any of these properties either in the `.properties` file or at job definition time, IBM Workload Scheduler assumes that you did not set any security on the IBM InfoSphere DataStage server and tries the connection to the IBM InfoSphere DataStage server anyway. Table 10 describes the properties contained in `DataStageJobExecutor.properties`.

Table 10. Properties to run IBM InfoSphere DataStage jobs

Property	Description/value	Required
installDir	The IBM InfoSphere DataStage Server directory where you find the DataStage command, `dsjob`. The default is: **UNIX and Linux operating systems:** **/opt/IBM/InformationServer/Server/DSEngine/bin** **Windows operating systems:** **C:/IBM/InformationServer/Server/DSEngine/bin**	✔
Domain	The domain to log on to, expressed as *domain*:*port_number*	
Server	The server to log on to.	
UserName	The user to use when logging on.	
Password	The password of the authorized user. It is encrypted when you retrieve any information by using a list or when you submit the job.	

Example

This example shows a `.properties` file.

```
installDir=C:/ABC/InformationServer/Server/DSEngine/bin
Domain=nc112206.rmlb.it.abc.com:9444
Server=nc112206
UserName=isadmin
Password=ispass
```

Mapping between IBM Workload Scheduler and IBM InfoSphere DataStage job statuses

Map IBM Workload Scheduler job status to IBM InfoSphere DataStage job status to understand their processing.

Table 11 on page 49 table shows how you can map the IBM Workload Scheduler job status to the IBM InfoSphere DataStage job status based on the return code you find in the job log output.

Table 11. Mapping between IBM Workload Scheduler and IBM InfoSphere DataStage job statuses

IBM InfoSphere DataStage job return code	IBM InfoSphere DataStage command line job status	IBM InfoSphere DataStage director job status	Dynamic Workload Console and Application Lab job status	IBM Workload Scheduler job status	IBM Workload Scheduler for z/OS job status
0	RUNNING	Running	Running	EXEC	Executing
1	RUN OK	Finished	Successful	SUCC	Completed
2	RUN with WARNINGS	Finished (see log)	Successful	SUCC	Completed
3	RUN FAILED	Abort Error	Error	ABEND	Error
96	UNKNOWN	Crashed	Error	ABEND	Error
97	STOPPED	Stopped	Error	ABEND	Error
98	NOT RUNNABLE	Not compiled	Error	FAILED	Error

Any other return code or status you find in the IBM InfoSphere DataStage log generated either by using the IBM InfoSphere DataStage command line or the IBM InfoSphere DataStage Directory interface, is mapped to **error** if you are using the Dynamic Workload Console or to **FAILED** if you are using the IBM Workload Scheduler command line.

Job log output

The IBM Workload Scheduler for IBM InfoSphere DataStage job log and its content.

Purpose

The output of an IBM Workload Scheduler for IBM InfoSphere DataStage job is composed of two parts:

- The first part is the result of the IBM InfoSphere DataStage **dsjob -logsum** command.
- The second part is the result of the IBM InfoSphere DataStage **dsjob -report DETAIL** command.

The output shows the current job status. See Chapter 5, "Analyzing the job log," on page 13 for more information about accessing the job log.

Sample

This example shows the output of a job that completed successfully:

```
============================================================
0       RESET   Wed Oct 05 17:15:44 2011
        Log cleared by user
1       STARTED Wed Oct 05 17:18:28 2011
        Starting Job dsj01_succ.
2       INFO    Wed Oct 05 17:18:28 2011
        Environment variable settings:  (...)
3       INFO    Wed Oct 05 17:18:28 2011
        dsj01_succ: Set NLS locale to US-ENGLISH,US-ENGLISH,US-ENGLISH,
        US-ENGLISH,US-ENGLISH
4       INFO    Wed Oct 05 17:18:31 2011
        dsj01_succ..DB2_UDB_API_2.IDENT2:
        DSD.StageRun Active stage starting, tracemode = 0.
```

```
5       INFO    Wed Oct 05 17:18:31 2011
        dsj01_succ..DB2_UDB_API_2.IDENT2: NLS stage locale is
          US-ENGLISH,US-ENGLISH,US-ENGLISH,US-ENGLISH,US-ENGLISH
6       INFO    Wed Oct 05 17:18:31 2011
        dsj01_succ..InputDataFile: Using project default NLS map MS1252
7       INFO    Wed Oct 05 17:18:31 2011
        dsj01_succ..DB2_UDB_API_2: Using NLS map MS1252
8       INFO    Wed Oct 05 17:18:35 2011
        dsj01_succ..DB2_UDB_API_2: Executing BeforeSQL
9       INFO    Wed Oct 05 17:18:37 2011
        dsj01_succ..DB2_UDB_API_2:
        Transaction committed as part of link close processing.
10      INFO    Wed Oct 05 17:18:37 2011
        dsj01_succ..DB2_UDB_API_2.IDENT2: Stage statistics  (...)
11      INFO    Wed Oct 05 17:18:37 2011
        dsj01_succ..DB2_UDB_API_2.IDENT2: DSD.StageRun Active stage finishing.
12      INFO    Wed Oct 05 17:18:38 2011
        dsj01_succ..OutputDataFile.IDENT1:
        DSD.StageRun Active stage starting, tracemode = 0.
13      INFO    Wed Oct 05 17:18:38 2011
        dsj01_succ..OutputDataFile.IDENT1: NLS stage locale is
         US-ENGLISH,US-ENGLISH,US-ENGLISH,US-ENGLISH,US-ENGLISH
14      INFO    Wed Oct 05 17:18:38 2011
        dsj01_succ..DB2_UDB_API_2: Using NLS map MS1252
15      INFO    Wed Oct 05 17:18:40 2011
        dsj01_succ..OutputDataFile: Using project default NLS map MS1252
16      WARNING Wed Oct 05 17:18:41 2011
        Link report for link dsj01_succ.DB2_UDB_API_2.DSLink3 not found.
17      INFO    Wed Oct 05 17:18:41 2011
        dsj01_succ..OutputDataFile.IDENT1: Stage statistics  (...)
18      INFO    Wed Oct 05 17:18:41 2011
        dsj01_succ..OutputDataFile.IDENT1: DSD.StageRun Active stage finishing.
19      STARTED Wed Oct 05 17:18:42 2011
        Finished Job dsj01_succ.
************************************************
STATUS REPORT FOR JOB: dsj01_succ
Generated: 2011-10-05 17:19:11
   Job start time=2011-10-05 17:18:28
   Job end time=2011-10-05 17:18:41
   Job elapsed time=00:00:13
   Job status=2 (Finished with warnings)
      Stage: DB2_UDB_API_2.IDENT2, 10 rows input
      Stage start time=2011-10-05 17:18:37, end time=2011-10-05 17:18:37,
      elapsed=00:00:00
         Link: DSLink7, 10 rows
         Link: DSLink7, 10 rows
      Stage: OutputDataFile.IDENT1, 10 rows input,
           last error=2011-10-05 17:18:41\NC112206|isadmin\2\Link
           report for link dsj01_succ.DB2_UDB_API_2.DSLink3 not found.
      Stage start time=2011-10-05 17:18:41, end time=2011-10-05 17:18:41,
      elapsed=00:00:00
         Link: DSLink3, 10 rows,
         last error=2011-10-05 17:18:41\NC112206|isadmin\2\Link
         report for link dsj01_succ.DB2_UDB_API_2.DSLink3 not found.
         Link: DSLink3, 10 rows,
         last error=2011-10-05 17:18:41\NC112206|isadmin\2\Link
         report for link dsj01_succ.DB2_UDB_API_2.DSLink3 not found.
```

Analyzing the InfoSphere DataStage job properties

When the job is running you can analyze its properties to verify its status.

Before you begin

Passing variables between jobs in the same job stream instance

About this task

See Chapter 5, "Analyzing the job log," on page 13 for detailed information about how to access the job properties using the various interfaces available.

The job properties output is the result of the IBM InfoSphere DataStage **dsjob -jobinfo** command. This example shows the properties of a job that completed successfully with warnings.

Example

```
...
Extra Information
Job Status      : RUN with WARNINGS (2)
Job Controller  : not available
Job Start Time  : Wed Oct 05 17:18:28 2011
Job Wave Number : 142
User Status     : not available
Job Control     : 0
Interim Status  : NOT RUNNING (99)
```

Chapter 10. IBM Sterling Connect:Direct jobs

An IBM Sterling Connect:Direct job runs IBM Sterling Connect:Direct programs to transfer one or more files from a primary node to a secondary node.

Prerequisites

IBM Workload Scheduler plug-in for IBM Sterling Connect:Direct automates the entire file transfer process guaranteeing the success of any subsequent processing like decryption, renaming, parsing, and retransmission of those files. You have access to real-time monitoring, reporting, event management, and auditing. All the tools you need to react to delays or errors and automate recovery actions.

For information about the supported versions of the job plug-ins, generate a dynamic Data Integration report from the IBM Software Product Compatibility Reports web site, and select the **Supported Software** tab: Data Integration.

IBM Sterling Connect:Direct job definition

A description of the job properties and valid values are detailed in the context-sensitive help in the Dynamic Workload Console by clicking the question mark (?) icon in the top-right corner of the properties pane.

For information about creating jobs using the various supported product interfaces, see Chapter 2, “Defining a job,” on page 7.

For more information about IBM Sterling Connect:Direct , see IBM Sterling Connect:Direct

The following table lists the required and optional attributes for IBM Sterling Connect:Direct jobs:

Table 12. Required and optional attributes for the definition of an IBM Sterling Connect:Direct job

Attribute	Description and value	Required
Address	The host name or IP address of the workstation that is considered as the primary node where IBM Sterling Connect:Direct is installed.	✓
Port	The port number of the primary node workstation where IBM Sterling Connect:Direct is listening.	✓
User ID	The name of the user authorized to access the IBM Sterling Connect:Direct on the primary node workstation.	✓
Password	The password that is associated with the user that is authorized to access the IBM Sterling Connect:Direct on the primary node workstation.	✓
Node Name	The name of the workstation that is considered as the secondary node where IBM Sterling Connect:Direct is installed.	✓ (Only for Submit Process action)
User ID	The name of the user authorized to access the IBM Sterling Connect:Direct on the secondary node workstation.	✓ (Only for Submit Process action)
Password	The password that is associated with the user that is authorized to access the IBM Sterling Connect:Direct on the secondary node workstation.	✓ (Only for Submit Process action)

Table 12. Required and optional attributes for the definition of an IBM Sterling Connect:Direct job (continued)

Attribute	Description and value	Required
Platform	The secondary node workstation operating system: **Unknown** Unknown operating systems. **Windows** Windows operating systems. **OpenMVS** MVS operating systems. **OS/400** IBM i operating systems. **UNIX** UNIX operating systems.	✔ (Only for Submit Process action)
Submit file	The submit file action.	
Process File Name	On the primary node is the fully qualified path and name of the file that contains the IBM Sterling Connect:Direct process definition. The file extension is `.cdp`.	✔
Process File Location	The IBM Sterling Connect:Direct node where the Process File is located. If you do not specify this value, the default Process File Location is the Primary Node.	
New Name	The new name of the IBM Sterling Connect:Direct process associated to the file transfer action.	
Submit Process	The submit process action.	
Action type	**Send** The file transfer from primary node to secondary node. **Receive** The file transfer from secondary node to primary node.	✔
Local Filename Path (pNode)	**Send** On the primary node the value is the fully qualified path and name of the file to be uploaded to the secondary node. **Receive** On the primary node the value is the fully qualified path and name of the file to be created on the local target from the secondary node. The wildcard characters '*' and '?' are supported.	✔
Remote Filename Path (sNode)	**Send** On the secondary node the value is the fully qualified path and name of the file to be created on the remote target of the primary node. **Receive** On the secondary node the value is the fully qualified path and name of the file to be downloaded from the primary node. The wildcard characters '*' and '?' are supported.	✔
Destination Disposition	The action to perform: if the file exists in the destination location: **Replace** Replace the file if it already exists or create the file if it does not exist. **Append** Append the content at the end of the file if it already exists. This option is supported only for text format files. **Create** Create the file if it does not exist.	✔
Compression Type	The compression type: **None** The file is not compressed. **Extended** The file is compressed.	
Check Point Restart	**Default** Perform the default check. **None** Do not perform check. **Check** Perform the check.	✔
At Every	The file check point interval in KBs	✔ (Only if Check Point Restart value is `Check`)

Scheduling and stopping the job in IBM Workload Scheduler

You schedule IBM Workload Scheduler IBM Sterling Connect:Direct jobs by defining them in job streams. Add the job to a job stream with all the necessary scheduling arguments and submit the job stream.

You can submit jobs by using the Dynamic Workload Console, Application Lab or the **conman** command line. See Chapter 3, “Scheduling and submitting jobs and job streams,” on page 9 for information about how to schedule and submit jobs and job streams using the various interfaces.

After submitting the job, when the job is running and is reported in **EXEC** status in IBM Workload Scheduler, you can stop it if necessary, by using the **kill** command. This action is effective on both IBM Workload Scheduler job and IBM Sterling Connect:Direct jobs. The IBM Sterling Connect:Direct job is deleted. IBM Workload Scheduler assigns the **Error** or **ABEND** status with return code 0 to the IBM Workload Scheduler job.

Monitoring the job

If the IBM Workload Scheduler agent stops when you submit theIBM Workload Scheduler IBM Sterling Connect:Direct job or while the job is running, as soon as the agent becomes available again IBM Workload Scheduler begins monitoring the job from where it stopped.

For information about how to monitor jobs using the different product interfaces available, see Chapter 4, “Monitoring IBM Workload Scheduler jobs,” on page 11.

SterlingJobExecutor.properties configuration file

The properties file is automatically generated either when you perform a "Test Connection" from the Dynamic Workload Console in the job definition panels, or when you submit the job to run the first time. Once the file has been created, you can customize it. This is especially useful when you need to schedule several jobs of the same type. You can specify the values in the properties file and avoid having to provide information such as credentials and other information, for each job. You can override the values in the properties files by defining different values at job definition time.

The *TWS_INST_DIR*\TWS\JavaExt\cfg\SterlingJobExecutor.properties configuration properties file contains the following Primary and Secondary nodes properties :

```
primaryNodeAddress=primaryNodeAddress
primaryUserPwd={aes}7LqI0kLt2kiNWNi2QGIIAKxQat5KCN0SNez7ENweg9w=
primaryNodePort=primaryNodePort
primaryUsername=primaryUsername
secondaryUsername=secondaryUsername
secondaryUserPwd={aes}ns2erjqeEemph8T2hGvLTiP5hbC+OzqQloXmq9Hu4sk=
secondaryNodeAddress=secondaryNodeAddress
```

If you define an IBM Sterling Connect:Direct job with the `Submit file action`, the secondary node information is not read from the `SterlingJobExecutor.properties` configuration file. The job uses the secondary node name specified in the *Node Name* field of Dynamic Workload Console or, if not specified, the secondary node name contained in the IBM Sterling Connect:Direct job *Process File Name* input.

Job properties

While the job is running, you can track the status of the job and analyze the properties of the job. In particular, in the Extra Information section, if the job contains variables, you can verify the value passed to the variable from the remote system. Some job streams use the variable passing feature, for example, the value of a variable specified in job 1, contained in job stream A, is required by job 2 in order to run in the same job stream.

For information about how to display the job properties from the various supported interfaces, see Chapter 5, "Analyzing the job log," on page 13.

For example, from the **conman** command line, you can see the job properties by running:

```
conman sj <Sterling_job_name>;props
```

where *<Sterling_job_name>* is the IBM Sterling Connect:Direct job name.

For an IBM Sterling Connect:Direct job in the `Extra Information` section of the output command, you see the following properties:

Submit process action

```
Extra Information
  Action Selected = Send
  Check Point Restart = Default
  Compression Type = None
  Destination Disposition = Replace
  Destination File Path = c:\sterling\example_ste_1.exe
  Primary Node Address = austin2.usa.com:1363
  Primary Node User = Administrator
  Process Name = copy1
  Process Number = 145
  Secondary Node Name = austin2_bkp
  Secondary Node User = Administrator
  Source File Path = c:\sterling\examples\example_ste_1.exe
```

Submit file action

```
Extra Information
  Child Process Name = 56415021
  Primary Node Address = cleveland1.usa.com:1363
  Primary Node User = Administrator
  Process File Name = c:\sterling\processes\PROC1.cdp
  Process File Location= cleveland1.usa.com
  Process Name = Submit1
  Process Number = 416
  Secondary Node Name = losangeles1
  Secondary Node User = Administrator
```

Where:

Action Selected
: The action to perform that you specify in the *Action Selected* field.

Check Point Restart
: The check point restart value that you specify in the *Check Point Restart* field.

Child Process Name
: The name of the child process invoked by the parent process specified by **Process Name**.

Compression Type
The compression type value that you specify in the *Compression Type* field.

Destination Disposition
The action to perform that you specify in the *Destination Disposition* field.

Destination File Path
The absolute file path where you save the file.

Primary Node Address
The host name or IP address of the workstation that is considered as the primary node on which IBM Sterling Connect:Direct is installed that you specify in the *Address* field.

Primary Node User
The name of the user authorized to access IBM Sterling Connect:Direct on the primary node workstation that you specify in the *Process Name* field.

Process Name
The name of the IBM Sterling Connect:Direct process that you specify in the *Process Name* field.

Process Number
The IBM Sterling Connect:Direct process number.

Process File Name
The fully qualified path and name of the file that contains the IBM Sterling Connect:Direct process definition that you specify in the *Process File Name* field.

Process File Location
The IBM Sterling Connect:Direct node on which the Process File is located that you specify in *Process File Location* field.

Secondary Node Name
The name of the workstation that is considered as the secondary node on which IBM Sterling Connect:Direct is installed that you specify in the *Node Name* field.

Secondary Node User
The name of the user authorized to access the IBM Sterling Connect:Direct on the secondary node workstation that you specify in the *User ID* field.

Source File Path
The absolute file path from which you download the file.

You can export the IBM Sterling Connect:Direct job properties that you can see in the `Extra Information` section, to a successive job in the same job stream instance. For more information about the list of job properties that you can export, see the table about properties for IBM Sterling Connect:Direct jobs in *User's Guide and Reference*.

Submit Process action:
The following example shows the `EX_STE_SUB_PROC` job definition that performs the copy of `c:\repository\DBfiles\e*` non-compressed files from the `ny123456.usa.com` windows primary node workstation to the `Ny112130.usa.com` windows secondary node workstation with the `replace` Destination Disposition.

```
MDM_WIN_EAST#EX_STE_SUB_PROC
 TASK
    <?xml version="1.0" encoding="UTF-8"?>
<jsdl:jobDefinition xmlns:jsdl=
```

```
"http://www.abc.com/xmlns/prod/scheduling/1.0/jsdl"
xmlns:jsdlsterling=
"http://www.abc.com/xmlns/prod/scheduling/1.0/jsdlsterling" name="STERLING">
  <jsdl:application name="sterling">
    <jsdlsterling:sterling>
   <jsdlsterling:SterlingParameters>
    <jsdlsterling:connectionInfoPanel>
     <jsdlsterling:primaryNode>
      <jsdlsterling:primaryAddress>
              ny123456.usa.com</jsdlsterling:primaryAddress>
      <jsdlsterling:primaryPort>
               1363</jsdlsterling:primaryPort>
      <jsdlsterling:primaryCredentials>
       <jsdl:userName>Administrator</jsdl:userName>
       <jsdl:password>
          {aes}5HC6x+v0ZAszGSfOPNAxpJjPbNvVOq+vfIWdAw95kEA=
                       </jsdl:password>
      </jsdlsterling:primaryCredentials>
     </jsdlsterling:primaryNode>
     <jsdlsterling:secondaryNode>
      <jsdlsterling:secondaryNodeName>
         Ny112130.usa.com</jsdlsterling:secondaryNodeName>
      <jsdlsterling:secondaryCredentials>
       <jsdlsterling:secondaryUserID>
     Administrator</jsdlsterling:secondaryUserID>
       <jsdlsterling:password>
          {aes}jQcDnhTIaroI0q1TVLnGqGLaRtG3J9g+JeIhsBGcBF8=
                <jsdlsterling:password>
      </jsdlsterling:secondaryCredentials>
      <jsdlsterling:secondaryPlatform>
              Unknown</jsdlsterling:secondaryPlatform>
     </jsdlsterling:secondaryNode>
    </jsdlsterling:connectionInfoPanel>
    <jsdlsterling:actionPanel>
     <jsdlsterling:ProcessButtonGroup>
      <jsdlsterling:radioButtonDefinition>
       <jsdlsterling:ProcessDefinitionGroup>
        <jsdlsterling:ActionGroup>
         <jsdlsterling:actionType>Send
                    </jsdlsterling:actionType>
       <jsdlsterling:ActionFileGroup>
       <jsdlsterling:localFilenamePath>
        "c:\repository\DBfiles\e*"</jsdlsterling:localFilenamePath>
        <jsdlsterling:remoteFilenamePath>
         "c:\sterling\*"</jsdlsterling:remoteFilenamePath>
        </jsdlsterling:ActionFileGroup>
       </jsdlsterling:ActionGroup>
       <jsdlsterling:ProcessGroup>
        <jsdlsterling:destinationDisposition>
               RPL</jsdlsterling:destinationDisposition>
        <jsdlsterling:compressionType>
              EXTENDED</jsdlsterling:compressionType>
       </jsdlsterling:ProcessGroup>
       <jsdlsterling:CheckPointGroup>
        <jsdlsterling:checkPointRestart>
                  Check</jsdlsterling:checkPointRestart>
        <jsdlsterling:checkPointAtEvery
                     >1000</jsdlsterling:checkPointAtEvery>
       </jsdlsterling:CheckPointGroup>
      </jsdlsterling:ProcessDefinitionGroup>
     </jsdlsterling:radioButtonDefinition>
    </jsdlsterling:ProcessButtonGroup>
   </jsdlsterling:actionPanel>
  </jsdlsterling:SterlingParameters>
 </jsdlsterling:sterling>
```

```
  </jsdl:application>
</jsdl:jobDefinition>
 DESCRIPTION "Added by composer."
 RECOVERY STOP
```

Submit File action:

The following example shows the EX_STE_SUB_FILE job definition that uses the c:/sterling/processes/PROC1.cdp Process File saved on the Ny112130.usa.com windows secondary node workstation.

```
MDM_WIN_EAST#EX_STE_SUB_FILE
 TASK
    <?xml version="1.0" encoding="UTF-8"?>
<jsdl:jobDefinition xmlns:jsdl="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdl"
xmlns:jsdlsterling=
"http://www.abc.com/xmlns/prod/scheduling/1.0/jsdlsterling" name="STERLING">
  <jsdl:application name="sterling">
    <jsdlsterling:sterling>
   <jsdlsterling:SterlingParameters>
    <jsdlsterling:connectionInfoPanel>
     <jsdlsterling:primaryNode>
      <jsdlsterling:primaryAddress>
      ny123456.usa.com</jsdlsterling:primaryAddress>
      <jsdlsterling:primaryPort>1363</jsdlsterling:primaryPort>
      <jsdlsterling:primaryCredentials>
       <jsdl:userName>Administrator</jsdl:userName>
       <jsdl:password>
   {aes}IhgUjKAJ1fFcNTsRnNcn4KSoxowJrqV7m/lHF9LeXTo=
                    </jsdl:password>
     </jsdlsterling:primaryCredentials>
    </jsdlsterling:primaryNode>
    <jsdlsterling:secondaryNode>
     <jsdlsterling:secondaryNodeName>
         Ny112130.usa.com</jsdlsterling:secondaryNodeName>
     <jsdlsterling:secondaryCredentials>
      <jsdlsterling:secondaryUserID>
              Administrator</jsdlsterling:secondaryUserID>
      <jsdlsterling:password>
         {aes}eFH8XJLD67gHkiJlgHjsCjgTJVCVdswVAoheU2rc+FM=
               </jsdlsterling:password>
     </jsdlsterling:secondaryCredentials>
     <jsdlsterling:secondaryPlatform>Windows
                          </jsdlsterling:secondaryPlatform>
    </jsdlsterling:secondaryNode>
   </jsdlsterling:connectionInfoPanel>
   <jsdlsterling:actionPanel>
    <jsdlsterling:ProcessButtonGroup>
     <jsdlsterling:radioButtonFile>
      <jsdlsterling:ProcessFileGroup>
       <jsdlsterling:processFileName>
             "c:/sterling/processes/PROC1.cdp"
                  </jsdlsterling:processFileName>
       <jsdlsterling:processFileLocation>
            Ny112130.usa.com</jsdlsterling:processFileLocation>
       <jsdlsterling:processName>
                proc1</jsdlsterling:processName>
      </jsdlsterling:ProcessFileGroup>
     </jsdlsterling:radioButtonFile>
    </jsdlsterling:ProcessButtonGroup>
   </jsdlsterling:actionPanel>
  </jsdlsterling:SterlingParameters>
 </jsdlsterling:sterling>
 </jsdl:application>
</jsdl:jobDefinition>
 DESCRIPTION "Added by composer."
 RECOVERY STOP
```

Job log content

For information about how to display the job log from the various supported interfaces, see Chapter 5, “Analyzing the job log,” on page 13.

For example, you can see the job log content by running `conman sj <Sterling_job_name>;stdlist`, where *<Sterling_job_name>* is the IBM Sterling Connect:Direct job name.

For an IBM Sterling Connect:Direct job log, you see the following information:

```
sj @#@.a1;std

============================================================
= JOB       : WKS_1#JOBS[(0000 04/03/14),(JOBS)].A1
= TASK      : <?xml version="1.0" encoding="UTF-8"?>
<jsdl:jobDefinition xmlns:jsdl=
"http://www.abc.com/xmlns/prod/scheduling/1.0/jsdl"
xmlns:jsdlsterling=
"http://www.abc.com/xmlns/prod/scheduling/1.0/jsdlsterling" name="STERLING">
```

```
<jsdl:variables>
  <jsdl:stringVariable name=
"tws.jobstream.name">JOBS</jsdl:stringVariable>
  <jsdl:stringVariable name=
"tws.jobstream.id">JOBS</jsdl:stringVariable>
  <jsdl:stringVariable name=
"tws.job.name">A1</jsdl:stringVariable>
  <jsdl:stringVariable name=
"tws.job.workstation">WKS_1</jsdl:stringVariable>
  <jsdl:stringVariable name=
"tws.job.iawstz">201404030000</jsdl:stringVariable>
  <jsdl:stringVariable name=
"tws.job.promoted">NO</jsdl:stringVariable>
  <jsdl:stringVariable name=
"tws.job.resourcesForPromoted">10</jsdl:stringVariable>
  <jsdl:stringVariable name="tws.job.num">
 678705192</jsdl:stringVariable>
</jsdl:variables>
<jsdl:application name="sterling">
  <jsdlsterling:sterling>
                      <jsdlsterling:SterlingParameters>
                       <jsdlsterling:connectionInfoPanel>
                        <jsdlsterling:primaryNode>
               <jsdlsterling:primaryAddress>
                 nc112129.romelab.it.abc.com</jsdlsterling:primaryAddress>
                 <jsdlsterling:primaryPort>1363</jsdlsterling:primaryPort>
                                    <jsdlsterling:primaryCredentials>
                                <jsdl:userName>Administrator</jsdl:userName>
                                          <jsdl:password>
                             {aes}3mrvR/UH4QIXvIpaccMAQr156nu/yVaHXEGaWmIZSDE=
                                          </jsdl:password>
                                    </jsdlsterling:primaryCredentials>
                                    </jsdlsterling:primaryNode>
                 <jsdlsterling:secondaryNode>
                          <jsdlsterling:secondaryNodeName>
                               NC112130</jsdlsterling:secondaryNodeName>
                                <jsdlsterling:secondaryCredentials>
                                     <jsdlsterling:secondaryUserID>
                                       Administrator</jsdlsterling:secondaryUserID>
                                        <jsdlsterling:password>
                                  {aes}THwo8M/LmpApHlPfB6r4FUtrbB+0SDS2YF7gUePvjVI=
                                          </jsdlsterling:password>
                                          </jsdlsterling:secondaryCredentials>
                                     <jsdlsterling:secondaryPlatform>
                                Windows</jsdlsterling:secondaryPlatform>
               </jsdlsterling:secondaryNode>
                   </jsdlsterling:connectionInfoPanel>
                        <jsdlsterling:actionPanel>
                                    <jsdlsterling:ProcessButtonGroup>
                                    <jsdlsterling:radioButtonDefinition>
                                      <jsdlsterling:ProcessDefinitionGroup>
                                           <jsdlsterling:ActionGroup>
                                             <jsdlsterling:actionType>
                                              Send</jsdlsterling:actionType>
                                                   <jsdlsterling:ActionFileGroup>
                  <jsdlsterling:localFilenamePath>
                             c:\sterling\ely\ely*</jsdlsterling:localFilenamePath>
                  <jsdlsterling:remoteFilenamePath>
                             c:\sterling\*</jsdlsterling:remoteFilenamePath>
                            </jsdlsterling:ActionFileGroup>
                 </jsdlsterling:ActionGroup>
                   <jsdlsterling:ProcessGroup>
                    <jsdlsterling:destinationDisposition>
                        RPL</jsdlsterling:destinationDisposition>
                    <jsdlsterling:compressionType>
                      NONE</jsdlsterling:compressionType>
                   </jsdlsterling:ProcessGroup>
                  <jsdlsterling:CheckPointGroup>
                 <jsdlsterling:checkPointRestart>
                     Default</jsdlsterling:checkPointRestart>
                             <jsdlsterling:checkPointAtEvery/>
                              </jsdlsterling:CheckPointGroup>
                              </jsdlsterling:ProcessDefinitionGroup>
                              </jsdlsterling:radioButtonDefinition>
                              </jsdlsterling:ProcessButtonGroup>
                              </jsdlsterling:actionPanel>
                    </jsdlsterling:SterlingParameters>
             </jsdlsterling:sterling>
</jsdl:application>
<jsdl:resources>
  <jsdl:orderedCandidatedWorkstations>
    <jsdl:workstation>E292ED57CADA44A3830D9FF0F495F57E</jsdl:workstation>
  </jsdl:orderedCandidatedWorkstations>
</jsdl:resources>
</jsdl:jobDefinition>
= TWSRCMAP  :
= AGENT     : WKS_1
= Job Number: 678705192
= Thu Apr 3 18:39:26 CEST 2014
===============================================================
Monitor Process
```

```
  File name: c:\sterling\ely\ely.exe Percentage: 5% Bytes Sent: 3801030
  File name: c:\sterling\ely\ely.exe Percentage: 46% Bytes Sent: 25994964
  File name: c:\sterling\ely\ely1.exe Percentage: 14% Bytes Sent: 8388480
  File name: c:\sterling\ely\ely1.exe Percentage: 88% Bytes Sent: 48975318
  File name: c:\sterling\ely\ely2.exe Percentage: 45% Bytes Sent: 25339614
  File name: c:\sterling\ely\ely3.exe Percentage: 17% Bytes Sent: 10288995
  File name: c:\sterling\ely\ely3.exe Percentage: 56% Bytes Sent: 31521456
  Total Bytes: 54476696
  Percentage: 100%
Process Name: SENDRECV  Process Number: 183  Return Code= 0
============================================================
= Exit Status           : 0
= Elapsed Time (Minutes) : 2
= Thu Apr 3 18:40:38 CEST 2014
============================================================
```

See also

From the Dynamic Workload Console you can perform the same task as described in

the *Dynamic Workload Console User's Guide*, section about Creating job definitions.

For more information about how to create and edit scheduling objects, see

the *Dynamic Workload Console User's Guide*, section about Designing your Workload.

Business scenario

This scenario shows how the integration between IBM Workload Scheduler and IBM Sterling Connect:Direct can provide multiple platform support and offer data transfer and security capabilities, as well as system stability and efficiency, while exploiting at the same time the job scheduling and monitoring features of IBM Workload Scheduler. IBM Sterling Connect:Direct also allows for file transfer compression and has a very efficient processing speed.

Scenario goal

This scenario shows how the IBM Sterling Connect:Direct and IBM Workload Scheduler integration is an agile, scalable, and flexible solution for end-to-end file management and automation in a secure environment. IBM Sterling Connect:Direct interfaces with operating system security and provides a comprehensive audit trail of data movement through extensive statistics logs.

Business Scenario

Finch International Bank is an international banking corporation with headquarters in the U.S.A. and branches in several foreign countries. They offer a wide variety of banking solutions and services, however, their primary customers most commonly use ATMs and customer call centers. Over the next few months, they plan to acquire a smaller bank and seamlessly integrate it into their business operations. To achieve this objective, they need a software offering that is able to provide multiple platform support and offer data transfer and security capabilities, as well as system stability and efficiency while automating all scheduling and monitoring operations. They also require vast amounts of computing power to keep their systems running with minimal interruption.

By deploying an integrated solution that uses IBM Sterling Connect:Direct and IBM Workload Scheduler, the company can schedule and monitor the transfer of high volumes of files with no defined limits on file sizes. The solution scalability helps ensure that Finch International Bank would be able to handle peak demand and keep pace as they increase the number of branches.

Using IBM Workload Scheduler, the company schedules an IBM Sterling Connect:Direct job to connect to all ATMs at the end of the business day and retrieve a log of all operations performed during the day. When handling sensitive data, such as bank account balances, money withdrawals, and cash deposits, security is a must and any breaches would be have a serious impact on the bank reputation. The IBM Sterling Connect:Direct job can safely retrieve all data in secure and reliable manner and send a report to the IBM Workload Scheduler server.

The report is then parsed for analysis and uploaded into the database.

Chapter 11. IBM WebSphere MQ jobs

Before creating IBM WebSphere MQ jobs, you must complete some prerequisite steps.

Prerequisite steps

For information about the supported versions of the job plug-ins, generate a dynamic Data Integration report from the IBM Software Product Compatibility Reports web site, and select the **Supported Software** tab: Data Integration.

To create an IBM WebSphere MQ job definition, you must first complete the prerequisite steps that are listed in the following procedure.

1. Install a supported version of IBM WebSphere MQ.
2. On the IBM WebSphere MQ server workstation, create a user to use in the IBM Workload Scheduler job 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 Administrator group.
3. Allow the user that is defined in step 1 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://www-01.ibm.com/support/knowledgecenter/SSFKSJ_7.5.0/com.ibm.mq.sec.doc/q013290_.htm.

IBM WebSphere MQ job definition

An IBM WebSphere MQ job enables communication among applications that run in different distributed environments at different times.

A description of the job properties and valid values are detailed in the context-sensitive help in the Dynamic Workload Console by clicking the question mark (?) icon in the top-right corner of the properties pane.

For information about creating jobs using the various supported product interfaces, see Chapter 2, “Defining a job,” on page 7.

For more information about IBM WebSphere MQ, see the IBM WebSphere MQ online product documentation in IBM Knowledge Center.

The following table lists the required and optional attributes for IBM WebSphere MQ jobs:

Table 13. Required and optional attributes for the definition of an IBM WebSphere MQ job

Attribute	Description and value	Required
MQ Server	The host name or IP address of the workstation where IBM WebSphere MQ is installed.	✓
MQ Port	The port number of the workstation where IBM WebSphere MQ is listening.	✓
User name	The name of the user authorized to run the IBM WebSphere MQ commands on the IBM WebSphere MQ server.	

Table 13. Required and optional attributes for the definition of an IBM WebSphere MQ job (continued)

Attribute	Description and value	Required
Password	The password that is associated with the user that is authorized to run the IBM WebSphere MQ commands on the IBM WebSphere MQ server.	
MQ Queue Manager	The name of the IBM WebSphere MQ Queue Manager.	✓
MQ Channel	The name of the IBM WebSphere MQ Channel.	✓
Operation	**Request/Response** The IBM WebSphere MQ Request/Response operation type. **Publish** The IBM WebSphere MQ Publish operation type.	✓
MQ Request Queue	The name of the IBM WebSphere MQ Queue to which send the request message.	✓
MQ Response Queue	The name of the IBM WebSphere MQ Queue to which receive the response message.	✓
Wait Interval (sec)	The number of seconds to wait for the request/response operation to complete.	✓
MQ Queue	The name of the IBM WebSphere MQ Queue to which send the publish message.	✓
MQ Topic	The name of the IBM WebSphere MQ Topic to which send the publish message.	✓
MQ Message	The message to include in the Request or Publish MQ Operation.	✓

Scheduling and stopping the job in IBM Workload Scheduler

You schedule IBM Workload Scheduler IBM WebSphere MQ jobs by defining them in job streams. Add the job to a job stream with all the necessary scheduling arguments and submit the job stream.

You can submit jobs by using the Dynamic Workload Console, Application Lab or the **conman** command line. See Chapter 3, "Scheduling and submitting jobs and job streams," on page 9 for information about how to schedule and submit jobs and job streams using the various interfaces.

After submission, when the job is running and is reported in **EXEC** status in IBM Workload Scheduler, you can stop it if necessary, by using the **kill** command. However, this action is effective only for the Request/Response scenario, therefore the IBM Workload Scheduler processes do not wait to receive a response from the IBM WebSphere MQ job.

Monitoring the job

If the IBM Workload Scheduler agent stops when you submit the IBM Workload Scheduler IBM WebSphere MQ job or while the job is running, as soon as the agent restarts in the Request/Response scenario, IBM Workload Scheduler begins monitoring the job from where it stopped and waits for the Response phase.

For information about how to monitor jobs using the different product interfaces available, see Chapter 4, "Monitoring IBM Workload Scheduler jobs," on page 11.

Job properties

While the job is running, you can track the status of the job and analyze the properties of the job. In particular, in the Extra Information section, if the job contains variables, you can verify the value passed to the variable from the remote

system. Some job streams use the variable passing feature, for example, the value of a variable specified in job 1, contained in job stream A, is required by job 2 in order to run in the same job stream.

For more information, see the table about properties for IBM WebSphere MQ jobs in *User's Guide and Reference*.

For information about how to display the job properties from the various supported interfaces, see Chapter 5, "Analyzing the job log," on page 13.

For example, from the **conman** command line, you can see the job properties by running:

```
conman sj <MQ_job_name>;props
```

where <*MQ_job_name*> is the IBM WebSphere MQ job name.

For an IBM WebSphere MQ job in the `Extra Information` section of the output command, you see the following properties:

```
Extra Information
  Channel = Channel1
  CorrelationID = 414D5120514D5F6E6330363030303220D215305320024304
  Manager = QueueManager1
  Message ID = 414D5120514D5F6E6330363030303220D215305320024303
  Response message = Received original message: 'Info done'
  Request Message = Need info
  Port = 1414
  Server = NY1_Win.usa.com
```

where

Channel
The name of the IBM WebSphere MQ Channel that you specify in the *MQ Channel* field.

CorrelationID
The ID that correlates the request and response.

Manager
The name of the IBM WebSphere MQ Queue Manager that you specify in the *MQ Queue Manager* field.

Message ID
The IBM WebSphere MQ message ID.

Response message
The IBM WebSphere MQ response message.

Request Message
The IBM WebSphere MQ request message that you specify in the *MQ Message* field.

Port The port number of the workstation where IBM WebSphere MQ is listening that you specify in the *MQ Port* field.

Server The host name or IP address of the workstation where IBM WebSphere MQ is installed that you specify in the *MQ Server* field.

You can export the IBM WebSphere MQ job properties that you can see in the `Extra Information` section, to a successive job in the same job stream instance. For more information about the list of job properties that you can export, see the table about properties for IBM WebSphere MQ jobs in *User's Guide and Reference*.

The following example shows the job definition for an IBM WebSphere MQ job that performs a Request/Response operation:

```
$JOBS
WASMQ_WS#REQRES
 TASK
    <?xml version="1.0" encoding="UTF-8"?>
<jsdl:jobDefinition xmlns:jsdl="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdl"
xmlns:jsdlwebspheremq=
"http://www.abc.com/xmlns/prod/scheduling/1.0/jsdlwebspheremq" name="WEBSPHEREMQ">
  <jsdl:application name="webspheremq">
    <jsdlwebspheremq:webspheremq>
   <jsdlwebspheremq:WebSphereMQParameters>
   <jsdlwebspheremq:WebSphereMQMainPanel>
  <jsdlwebspheremq:PropertyFileGroup>
  <jsdlwebspheremq:option>webspheremqServer4.properties</jsdlwebspheremq:option>
     </jsdlwebspheremq:PropertyFileGroup>
     <jsdlwebspheremq:PropertiesGroup>
      <jsdlwebspheremq:server>localhost</jsdlwebspheremq:server>
      <jsdlwebspheremq:port>1414</jsdlwebspheremq:port>
      <jsdlwebspheremq:user>agentuser</jsdlwebspheremq:user>
    <jsdlwebspheremq:password>
       {aes}DrM1RhdBkMwl9YGD9QW21NgEMlG8eE4N0VciTpzI8d8=</jsdlwebspheremq:password>
    <jsdlwebspheremq:manager>QM_ADMINIB_897G50K</jsdlwebspheremq:manager>
     <jsdlwebspheremq:channel>S_ADMINIB_897G50K   </jsdlwebspheremq:channel>
     </jsdlwebspheremq:PropertiesGroup>
     <jsdlwebspheremq:OperationGroup>
      <jsdlwebspheremq:RequestResponseGroup>
       <jsdlwebspheremq:request>default</jsdlwebspheremq:request>
       <jsdlwebspheremq:response>postcard</jsdlwebspheremq:response>
       <jsdlwebspheremq:timeout>300</jsdlwebspheremq:timeout>
       <jsdlwebspheremq:abendif>error</jsdlwebspheremq:abendif>
      </jsdlwebspheremq:RequestResponseGroup>
     </jsdlwebspheremq:OperationGroup>
    </jsdlwebspheremq:WebSphereMQMainPanel>
    <jsdlwebspheremq:WebSphereMQMessagePanel>
     <jsdlwebspheremq:MessageGroup>
      <jsdlwebspheremq:message>Hello World</jsdlwebspheremq:message>
     </jsdlwebspheremq:MessageGroup>
    </jsdlwebspheremq:WebSphereMQMessagePanel>
   </jsdlwebspheremq:WebSphereMQParameters>
  </jsdlwebspheremq:webspheremq>
  </jsdl:application>
</jsdl:jobDefinition>
 RECOVERY STOP
```

The following example shows the job definition for a WebSphere MQ job that performs a Publish operation:

```
$JOBS
WASMQ_WS#PUBLISH
 TASK
    <?xml version="1.0" encoding="UTF-8"?>
<jsdl:jobDefinition xmlns:jsdl="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdl"
xmlns:jsdlwebspheremq=
"http://www.abc.com/xmlns/prod/scheduling/1.0/jsdlwebspheremq" name="WEBSPHEREMQ">
  <jsdl:application name="webspheremq">
    <jsdlwebspheremq:webspheremq>
   <jsdlwebspheremq:WebSphereMQParameters>
    <jsdlwebspheremq:WebSphereMQMainPanel>
    <jsdlwebspheremq:PropertyFileGroup>
   <jsdlwebspheremq:option>webspheremqServer4.properties</jsdlwebspheremq:option>
     </jsdlwebspheremq:PropertyFileGroup>
     <jsdlwebspheremq:PropertiesGroup>
      <jsdlwebspheremq:server>localhost</jsdlwebspheremq:server>
      <jsdlwebspheremq:port>1414</jsdlwebspheremq:port>
    <jsdlwebspheremq:user>agentuser</jsdlwebspheremq:user>
```

```
    <jsdlwebspheremq:password>
         aes}DrM1RhdBkMwl9YGD9QW21NgEMlG8eE4N0VciTpzI8d8=</jsdlwebspheremq:password>
    <jsdlwebspheremq:manager>QM_ADMINIB_897G50K</jsdlwebspheremq:manager>
     <jsdlwebspheremq:channel>S_ADMINIB_897G50K</jsdlwebspheremq:channel>
     </jsdlwebspheremq:PropertiesGroup>
     <jsdlwebspheremq:OperationGroup>
      <jsdlwebspheremq:PublishGroup>
   <jsdlwebspheremq:QueueOrTopicCombo>topic</jsdlwebspheremq:QueueOrTopicCombo>
     <jsdlwebspheremq:queueortopic>mytopic</jsdlwebspheremq:queueortopic>
      </jsdlwebspheremq:PublishGroup>
     </jsdlwebspheremq:OperationGroup>
    </jsdlwebspheremq:WebSphereMQMainPanel>
    <jsdlwebspheremq:WebSphereMQMessagePanel>
     <jsdlwebspheremq:MessageGroup>
      <jsdlwebspheremq:message>Hello World</jsdlwebspheremq:message>
     </jsdlwebspheremq:MessageGroup>
    </jsdlwebspheremq:WebSphereMQMessagePanel>
   </jsdlwebspheremq:WebSphereMQParameters>
  </jsdlwebspheremq:webspheremq>
  </jsdl:application>
</jsdl:jobDefinition>
 RECOVERY STOP
```

See also

From the Dynamic Workload Console you can perform the same task as described in

the *Dynamic Workload Console User's Guide*, section about Creating job definitions.

For more information about how to create and edit scheduling objects, see

the *Dynamic Workload Console User's Guide*, section about Designing your Workload.

Business scenario

Managing online transactions quickly and reliably: a business scenarioThis scenario shows how the integration between IBM WebSphere MQ and IBM Workload Scheduler implements an integrated message queuing infrastructure that can transfer large amounts of information between applications in the network in near real-time while at the same time using the job scheduling and monitoring features of IBM Workload Scheduler. IBM WebSphere MQ delivers a reliable infrastructure for transaction data and file-based information with a relatively small footprint.

Scenario goal

This scenario shows how the IBM Workload Scheduler and IBM WebSphere MQ integration is a resilient, scalable, and reliable solution for end-to-end file management and job scheduling in a secure environment.

Business Scenario

Ripley's Organic Shop is a large retailer, specializing in organic food, health, and wellbeing products. The shop is based in the U.K. and has branches in several European countries. It wants to take advantage of the increasing interest for natural and biological products and plans to increase its market share by joining the online market and providing European-wide delivery. It therefore needs a robust infrastructure to quickly manage online purchases. This is especially important in today's competitive Internet market, where competition is increasing by the hour.

To achieve this objective, Ripley's Organic Shop needs a software offering that can provide multiple platform support, while at the same time automating purchase notification to the warehouse to allow the shipping process to start as soon as possible. Having a timely and efficient delivery is vital when competing on the Internet and trying to gain and retain new customers.

By deploying an integrated solution that uses IBM WebSphere MQ and IBM Workload Scheduler, the company can generate an MQ message as soon as a customer makes an order; an IBM Workload Scheduler job listens for the message and when it receives it, starts an IBM Workload Scheduler job stream.

The job stream contains a number of jobs that send all the details of the order to the warehouse. When the order has completed and all the items are packaged and ready to be shipped, a dependency is released on two jobs in the job stream, one that notifies the delivery service that the package is ready to be collected from the warehouse and delivered to the customer and the other to send an email or text message to the customer with the shipment tracking number and the status of the order.

Chapter 12. Hadoop Distributed File System jobs

A Hadoop Distributed File System job defines, schedules, monitors, and manages file transfer jobs between your workstation and the Hadoop Distributed File System server.

Prerequisites

The IBM Workload Scheduler plug-in for Hadoop Distributed File System enables you to access the Hadoop Distributed File System from any computer, and work on files and directories. You can download a file, upload a file or free text, append a file or free text to another file, rename or delete a file, create a directory, and wait for the creation of a file on a Hadoop Distributed File System server.

For information about the supported versions of the job plug-ins, generate a dynamic Data Integration report from the IBM Software Product Compatibility Reports web site, and select the **Supported Software** tab: Data Integration.

Before you can define Hadoop Distributed File System jobs, you must install an IBM Workload Scheduler agent with a connection to the Hadoop Distributed File System server.

Hadoop Distributed File System job definition

A description of the job properties and valid values are detailed in the context-sensitive help in the Dynamic Workload Console by clicking the question mark (?) icon in the top-right corner of the properties pane.

For more information about creating jobs using the various supported product interfaces, see Chapter 2, “Defining a job,” on page 7.

The following table lists the required and optional attributes for Hadoop Distributed File System jobs:

Table 14. Required and optional attributes for the definition of a Hadoop Distributed File System job

Attribute	Description and value	Required
Connection properties - Hadoop Distributed File System section		
Hostname	The hostname of the Hadoop Distributed File System server.	✓
Port	The port of the Hadoop Distributed File System server.	✓
Protocol	The protocol for connecting to the Hadoop Distributed File System server. Supported values are **http** and **https**.	
User	The user to be used for accessing the Hadoop Distributed File System server.	
Password	The password to be used for accessing the Hadoop Distributed File System server.	
Connection properties - Retry options section		
Number of retries	The number of times the program retries performing the operation.	
Retry interval (seconds)	The number of seconds the program waits before retrying the operation.	
Action properties - Upload section		
File on Hadoop Distributed File System	The name and path of the file on the Hadoop Distributed File System server. Use this option to upload a file from the local workstation to the Hadoop Distributed File System server.	✓

Table 14. Required and optional attributes for the definition of a Hadoop Distributed File System job (continued)

Attribute	Description and value	Required
Permissions	The permissions to be defined for the file on the Hadoop Distributed File System server.	
Overwrite	Specifies whether the file on the Hadoop Distributed File System server should be overwritten, if existing.	
Upload a file	The name and path of the file on the local workstation.	
File content	Specifies the file content to be written into the file on the Hadoop Distributed File System server.	
Action properties - Download section		
File on Hadoop Distributed File System	The name and path of the file on the Hadoop Distributed File System server. Use this option to download a file from theHadoop Distributed File System server to the local workstation.	✓
Save file as	Specify the name and path of the file to be saved locally	✓
Action properties - Append section		
File on Hadoop Distributed File System	The name and path of the file on the Hadoop Distributed File System server. Use this option to append a file from the local workstation or a specific content to a file the Hadoop Distributed File System server.	✓
Append a file	The name and path of the file to be appended to the specified file on the Hadoop Distributed File System server.	
Append this content	Specify the content to be appended to the file on the Hadoop Distributed File System server.	
Action properties - Rename section		
File or directory on Hadoop Distributed File System	The name and path of the file or directory on the Hadoop Distributed File System server. Use this option to modify the name of a file or directory on the Hadoop Distributed File System server.	✓
New path on Hadoop Distributed File System	The new name of the file or directory on the Hadoop Distributed File System server.	✓
Action properties - Delete section		
File or directory on Hadoop Distributed File System	The name and path of the file or directory on the Hadoop Distributed File System server. Use this option to delete a file or directory on the Hadoop Distributed File System server.	✓
Recursive	Specifies whether this action should be recursive.	
Action properties - Create directory section		
Directory on Hadoop Distributed File System	The name and path of the directory on the Hadoop Distributed File System server. Use this option to create a directory on the Hadoop Distributed File System server.	✓
Permissions	Specifies the permissions to be assigned to the directory.	
Action properties - Wait for a file section		
File or directory on Hadoop Distributed File System	The name and path of the file or directory on the Hadoop Distributed File System server. Use this option to define a dependency in the job for the creation on the Hadoop Distributed File System server of a file or directory. When the file or directory are created, the job status changes to **successful**.	✓

Scheduling and stopping the job in IBM Workload Scheduler

You schedule IBM Workload Scheduler Hadoop Distributed File System jobs by defining them in job streams. Add the job to a job stream with all the necessary scheduling arguments and submit the job stream.

You can submit jobs by using the Dynamic Workload Console, Application Lab or the **conman** command line. See Chapter 3, “Scheduling and submitting jobs and job streams,” on page 9 for information about how to schedule and submit jobs and job streams using the various interfaces.

After submission, when the job is running and is reported in **EXEC** status in IBM Workload Scheduler, you can stop it if necessary, by using the **kill** command.

However, this action is effective only for the **Wait for a file** action. If you have defined different actions in your job, the **kill** command is ignored.

Monitoring the job

If the IBM Workload Scheduler agent stops when you submit the IBM Workload Scheduler Hadoop Distributed File System job or while the job is running, when the agent becomes available again the job status changes to **UNKOWN** and you have to resubmit the job. If the job consists of the **Wait for a file** action, as soon as the agent becomes available again IBM Workload Scheduler begins monitoring the job from where it stopped.

For information about how to monitor jobs using the different product interfaces available, see Chapter 4, "Monitoring IBM Workload Scheduler jobs," on page 11.

Job properties

While the job is running, you can track the status of the job and analyze the properties of the job. In particular, in the Extra Information section, if the job contains variables, you can verify the value passed to the variable from the remote system. Some job streams use the variable passing feature, for example, the value of a variable specified in job 1, contained in job stream A, is required by job 2 in order to run in the same job stream.

For information about how to display the job properties from the various supported interfaces, see Chapter 5, "Analyzing the job log," on page 13.

For example, from the **conman** command line, you can see the job properties by running:

```
conman sj <job_name>;props
```

where *<job_name>* is the Hadoop Distributed File System job name.

The properties are listed in the `Extra Information` section of the output command.

For more information about passing variables between jobs, see the section about passing job properties from one job to another in the same job stream instance in *User's Guide and Reference*.

Job log content

For information about how to display the job log from the various supported interfaces, see Chapter 5, "Analyzing the job log," on page 13.

For example, you can see the job log content by running `conman sj <job_name>;stdlist`, where *<job_name>* is the Hadoop Distributed File System job name.

See also

From the Dynamic Workload Console you can perform the same task as described in

the *Dynamic Workload Console User's Guide*, section about Creating job definitions.

For more information about how to create and edit scheduling objects, see

the *Dynamic Workload Console User's Guide*, section about Designing your Workload.

Chapter 13. Hadoop Map Reduce jobs

A Hadoop Map Reduce job defines, schedules, monitors, and manages the execution of Hadoop Map Reduce .jar files. You can bundle your Map Reduce code in a .jar file and run it using this job.

Prerequisites

For information about the supported versions of the job plug-ins, generate a dynamic Data Integration report from the IBM Software Product Compatibility Reports web site, and select the **Supported Software** tab: Data Integration.

Hadoop Map Reduce job definition

A description of the job properties and valid values are detailed in the context-sensitive help in the Dynamic Workload Console by clicking the question mark (?) icon in the top-right corner of the properties pane.

For more information about creating jobs using the various supported product interfaces, see Chapter 2, "Defining a job," on page 7.

The following table lists the required and optional attributes for Hadoop Map Reduce jobs:

Table 15. Required and optional attributes for the definition of a Hadoop Map Reduce job

Attribute	Description and value	Required
Hadoop Installation Directory	The directory where you installed Hadoop. For example, if Hadoop is installed in this path: **/opt/hadoop/hadoop_2.6.0/bin/hadoop**, you must specify the **/opt/hadoop/hadoop_2.6.0** path for this attribute.	
Jar File	The path and name of the jar file containing the Hadoop Map Reduce code	✓
Main Class	The Java class containing the main method to run when the job is loaded.	
Arguments	The arguments of the job are provided to the main method	

Scheduling the job in IBM Workload Scheduler

You schedule IBM Workload Scheduler Hadoop Map Reduce jobs by defining them in job streams. Add the job to a job stream with all the necessary scheduling arguments and submit the job stream.

You can submit jobs by using the Dynamic Workload Console, Application Lab or the **conman** command line. See Chapter 3, "Scheduling and submitting jobs and job streams," on page 9 for information about how to schedule and submit jobs and job streams using the various interfaces.

Monitoring the job

If the IBM Workload Scheduler agent stops when you submit the IBM Workload Scheduler Hadoop Map Reduce job or while the job is running, when the agent becomes available again, the job status changes to **ABEND** and you have to resubmit the job. The Hadoop Map Reduce job status changes to **UNDEFINED**. You can view this information in the **Extra information** section of the Hadoop Map Reduce job in the Dynamic Workload Console.

For information about how to monitor jobs using the different product interfaces available, see Chapter 4, “Monitoring IBM Workload Scheduler jobs,” on page 11.

HadoopMapReduceJobExecutor.properties file

The properties file is automatically generated either when you perform a "Test Connection" from the Dynamic Workload Console in the job definition panels, or when you submit the job to run the first time. Once the file has been created, you can customize it. This is especially useful when you need to schedule several jobs of the same type. You can specify the values in the properties file and avoid having to provide information such as credentials and other information, for each job. You can override the values in the properties files by defining different values at job definition time.

The *TWS_INST_DIR*\TWS\JavaExt\cfg\HadoopMapReduceJobExecutor.properties file contains the following properties:

```
# Hadoop install directory
hadoopDir=/usr/local/hadoop
# Hadoop RunJar Main Class
className=
# Hadoop RunJar Arguments
arguments=
```

The **hadoopDir** property must be specified either in this file or when creating the Hadoop Map Reduce job definition in the Dynamic Workload Console. For more information, see the Dynamic Workload Console online help.

Job properties

While the job is running, you can track the status of the job and analyze the properties of the job. In particular, in the Extra Information section, if the job contains variables, you can verify the value passed to the variable from the remote system. Some job streams use the variable passing feature, for example, the value of a variable specified in job 1, contained in job stream A, is required by job 2 in order to run in the same job stream.

For information about how to display the job properties from the various supported interfaces, see Chapter 5, “Analyzing the job log,” on page 13. For example, from the **conman** command line, you can see the job properties by running:

```
conman sj <job_name>;props
```

where <*job_name*> is the Hadoop Map Reduce job name.

The properties are listed in the `Extra Information` section of the output command.

For information passing variables between jobs, see the section about passing job properties from one job to another in the same job stream instance in *User's Guide and Reference*.

Job log content

For information about how to display the job log from the various supported interfaces, see Chapter 5, “Analyzing the job log,” on page 13.

For example, you can see the job log content by running `conman sj <job_name>;stdlist`, where *<job_name>* is the Hadoop Map Reduce job name.

See also

From the Dynamic Workload Console you can perform the same task as described in

the *Dynamic Workload Console User's Guide*, section about Creating job definitions.

For more information about how to create and edit scheduling objects, see

the *Dynamic Workload Console User's Guide*, section about Designing your Workload.

Chapter 14. Apache Oozie jobs

An Apache Oozie job defines, schedules, monitors, and controls the execution of Oozie workflows and Hadoop jobs like: MapReduce, Pig, Hive, and Sqoop.

Prerequisites

For information about the supported versions of the job plug-ins, generate a dynamic Data Integration report from the IBM Software Product Compatibility Reports web site, and select the **Supported Software** tab: Data Integration.

Before you can define Oozie jobs, you must create the IBM Workload Scheduler agent connection to the Oozie server.

Oozie job definition

A description of the job properties and valid values are detailed in the context-sensitive help in the Dynamic Workload Console by clicking the question mark (?) icon in the top-right corner of the properties pane.

For more information about creating jobs using the various supported product interfaces, see Chapter 2, "Defining a job," on page 7.

The following table lists the required and optional attributes for Oozie jobs:

Table 16. Required and optional attributes for the definition of an Oozie job

Attribute	Description and value	Required
Connection attributes		
hostname	The host name of the Oozie server.	If you do not specify the hostname attribute, then hostname, protocol, and VerifyCheckbox attributes are read from the properties file.
port	The port number where the Oozie server is listening.	
protocol	The protocol for connecting to the Oozie server. Supported values are **http** and **https**.	
userName	The user to be used for accessing the Oozie server.	
password	The password to be used for accessing the Oozie server.	
keyStore FilePath	The fully qualified path of the keystore file containing the private key that is used to make the connection.	
keyStore Password	The password that protects the private key and is required to make the connection.	Required only if you specify a keystore file path.
HostnameVerify Checkbox	Supported values are **true** and **false**. • When the value is **true**, the syntax of the Oozie server name, as featured in the keystore file, must match exactly the URL. If they do not match, no authorization is granted to access the server. • When the value is **false**, the control on the server name is not enforced.	
NumberOfRetries	The number of times the program retries in case of connection failure. Default value is 0.	

Table 16. Required and optional attributes for the definition of an Oozie job (continued)

Attribute	Description and value	Required
RetryIntervalSeconds	The number of seconds the program waits before retrying in case of connection failure. Default value is 30.	
Action attributes for all the job types		
nodeName	The URL of the Hadoop name-node.	✓
jobTracker	The URL of the Hadoop job-tracker.	✓
jobUserName	The name of the user submitting the Hadoop job.	✓
libPath	The path in the Hadoop file system, where the jar files necessary to the Hadoop job reside.	✓
Action attributes for Oozie workflow job type		
workflowPath	The path in the Hadoop file system, where the workflow application resides.	✓
Action attributes for MapReduce job type		
Mapper-task classname	The map-task classname.	✓
Reducer-task classname	The reducer-task classname.	✓
Mapper-task input directory	The map-task input directory.	✓
Reducer-task output directory	The reduce-task output directory.	✓
Action attributes for Hive, Pig, and Sqoop job types		
Actual command or script	The actual command or script that you want to run with your job.	✓
Parameters	The parameters, and related values, that you are passing to your job.	
Options	The options that you are passing to your job.	
Advanced attributes		
customPropertiesTableValue	Additional properties, and related values, that you might want to pass to your job. For example: `<jsdloozie:customPropertiesTableValue key="examplesRoot">examples</jsdloozie: customPropertiesTableValue>` where `examplesRoot` is the property and `examples` is its value.	
timeout	The monitoring time. It determines for how long the job is monitored. At the end of the timeout interval the job fails. Default value is 7200 seconds.	
pollingPeriod	The monitoring frequency. It determines how often the job is monitored. Default value is 15 seconds.	

Note:

If incorrect values are specified for **timeout** and **pollingPeriod** at job definition time, during the job execution the incorrect values are replaced as follows:

- If numeric values are specified that are lower than the minimum allowed values, they are replaced with:

  timeout
  10 seconds (the minimum allowed value)

  pollingPeriod
  5 seconds (the minimum allowed value)

- If non-numeric values are specified, they are replaced with:

  timeout
  7200 seconds (the default value)

  pollingPeriod
  15 seconds (the default value)

Scheduling and stopping a job in IBM Workload Scheduler

You schedule IBM Workload Scheduler Oozie jobs by defining them in job streams. Add the job to a job stream with all the necessary scheduling arguments and submit the job stream.

You can submit jobs by using the Dynamic Workload Console, Application Lab or the **conman** command line. See Chapter 3, "Scheduling and submitting jobs and job streams," on page 9 for information about how to schedule and submit jobs and job streams using the various interfaces.

After submission, when the job is running and is reported in **EXEC** status in IBM Workload Scheduler, you can stop it if necessary, by using the **kill** command. This action stops also the program execution on the Oozie server.

Monitoring a job

If the IBM Workload Scheduler agent stops when you submit the Oozie job, or while the job is running, the job restarts automatically as soon as the agent restarts.

For information about how to monitor jobs using the different product interfaces available, see Chapter 4, "Monitoring IBM Workload Scheduler jobs," on page 11.

OozieJobExecutor.properties file

The properties file is automatically generated either when you perform a "Test Connection" from the Dynamic Workload Console in the job definition panels, or when you submit the job to run the first time. Once the file has been created, you can customize it. This is especially useful when you need to schedule several jobs of the same type. You can specify the values in the properties file and avoid having to provide information such as credentials and other information, for each job. You can override the values in the properties files by defining different values at job definition time.

The *TWS_INST_DIR*\TWS\JavaExt\cfg\OozieJobExecutor.properties file contains the following properties:

```
#Oozie properties
hostname=
port=
protocol=http
user=
password=
keyStoreFilePath=
keyStorePassword=
HostnameVerifyCheckbox=false
NumberOfRetries=0
RetryIntervalSeconds=30
nodeName=
jobTracker=
jobUserName=
libPath=
pollingPeriod=15
timeout=7200
#add here the custom oozie job properties in the format
CUSTOMOOZIEPROPERTY.<property_name>=<property_value>
#For example CUSTOMOOZIEPROPERTY.queueName=default
```

For a description of each property, see the corresponding job attribute description in Table 16 on page 77.

Job properties

While the job is running, you can track the status of the job and analyze the properties of the job. In particular, in the Extra Information section, if the job contains variables, you can verify the value passed to the variable from the remote system. Some job streams use the variable passing feature, for example, the value of a variable specified in job 1, contained in job stream A, is required by job 2 in order to run in the same job stream.

For information about how to display the job properties from the various supported interfaces, see Chapter 5, "Analyzing the job log," on page 13. For example, from the **conman** command line, you can see the job properties by running:

```
conman sj <job_name>;props
```

where <*job_name*> is the Oozie job name.

The properties are listed in the `Extra Information` section of the output command.

For information about passing job properties, see the topic about passing job properties from one job to another in the same job stream instance in the *User's Guide and Reference*.

Job log content

For information about how to display the job log from the various supported interfaces, see Chapter 5, "Analyzing the job log," on page 13.

For example, you can see the job log content by running `conman sj <job_name>;stdlist`, where <*job_name*> is the Oozie job name.

See also

From the Dynamic Workload Console you can perform the same task as described in

the *Dynamic Workload Console User's Guide*, section about Creating job definitions.

For more information about how to create and edit scheduling objects, see

the *Dynamic Workload Console User's Guide*, section about Designing your Workload.

Chapter 15. Apache Spark jobs

Apache Spark jobs define, schedule, monitor, and control the execution of Apache Spark processes.

Prerequisites

For information about the supported versions of the job plug-ins, generate a dynamic Data Integration report from the IBM Software Product Compatibility Reports web site, and select the **Supported Software** tab: Data Integration.

Apache Spark job definition

A description of the job properties and valid values are detailed in the context-sensitive help in the Dynamic Workload Console by clicking the question mark (?) icon in the top-right corner of the properties pane.

For more information about creating jobs using the various supported product interfaces, see Chapter 2, "Defining a job," on page 7.

The following table lists the required and optional attributes for Apache Spark jobs:

Table 17. Required and optional attributes for the definition of an Apache Spark job

Attribute	Description and value	Required
Connection attributes		
Url	The Apache Spark server Url. It must have the following format: http://<SPARK_SERVER>:8080/json (dashboard address).	If not specified in the job definition, it must be supplied in the plug-in properties file.
REST Url	The Apache Spark server Url to execute REST API calls. It must have the following format: http://<SPARK_SERVER>:6066 where 6066 is the default port for REST API calls.	If not specified in the job definition, it must be supplied in the plug-in properties file.
Resource Name	The full path to the .jar, .py, or .R file that contains the application code.	✓
Resource Type	The type of resource specified in the Resource Name field.	
Main Class	The entry point for your application. For example, org.apache.spark.examples.SparkPi.	✓
Arguments	The arguments passed to the main method of your main class, if any. If more than one argument is present, use commas to separate the different arguments.	
Application Name	The name of the application.	✓
JAR	The full path to a bundled jar including your application and all dependencies. The URL must be globally visible inside your cluster, for instance, an hdfs path or a file path that is present on all nodes.	✓
Deploy Mode	The deploy mode of Apache Spark driver program: **Cluster** To deploy your driver inside the cluster **Client** To deploy your driver locally as an external client	
Spark Master	The master URL for the cluster. For example, spark://23.195.26.187:7077.	✓

Table 17. Required and optional attributes for the definition of an Apache Spark job (continued)

Attribute	Description and value	Required
Driver Cores	Number of cores to use for the driver process, only in cluster mode.	
Driver Memory	Amount of memory in gigabytes to use for the driver process.	
Executor Cores	The number of cores to use on each executor. It is ignored when Apache Spark runs in standalone mode: in this case, it gets the value of Driver Cores since the executor is launched within a driver jvm process.	
Executor Memory	Amount of memory in gigabytes to use per executor process. It is ignored when spark runs in standalone mode: in this case, it gets the value of Driver Memory since the executor is launched within a driver jvm process.	✓
Variable List	The list of variables with related values that you want to specify. Click the plus (+) sign to add one or more variables to the variable list. Click (-) sign to remove one or more variables from the variable list. You can search a variable in the list by specifying the variable name in the filter box.	

Note: Required and optional attributes cannot contain double quotation mark.

Scheduling and stopping a job in IBM Workload Scheduler

You schedule IBM Workload Scheduler Apache Spark jobs by defining them in job streams. Add the job to a job stream with all the necessary scheduling arguments and submit the job stream.

You can submit jobs by using the Dynamic Workload Console, Application Lab or the **conman** command line. See Chapter 3, “Scheduling and submitting jobs and job streams,” on page 9 for information about how to schedule and submit jobs and job streams using the various interfaces.

After submission, when the job is running and is reported in **EXEC** status in IBM Workload Scheduler, you can stop it if necessary, by using the **kill** command. This action stops also the program execution on the Apache Spark server.

Monitoring a job

If the IBM Workload Scheduler agent stops when you submit the Apache Spark job, or while the job is running, the job restarts automatically as soon as the agent restarts.

For information about how to monitor jobs using the different product interfaces available, see Chapter 4, “Monitoring IBM Workload Scheduler jobs,” on page 11.

ApacheSparkJobExecutor.properties

The properties file is automatically generated either when you perform a "Test Connection" from the Dynamic Workload Console in the job definition panels, or when you submit the job to run the first time. Once the file has been created, you can customize it. This is especially useful when you need to schedule several jobs of the same type. You can specify the values in the properties file and avoid having to provide information such as credentials and other information, for each job. You can override the values in the properties files by defining different values at job definition time.

The *TWS_INST_DIR*\TWS\JavaExt\cfg\ApacheSparkJobExecutor.properties file contains the following properties:

```
url= http://<SPARK_SERVER>:8080/json
sparkurl= http://<SPARK_SERVER>:6066
drivercores=1
drivermemory=1
executorcores=1
executormemory=1
timeout=36000
```

The url and sparkurl properties must be specified either in this file or when creating the Apache Spark job definition in the Dynamic Workload Console. For more information, see the Dynamic Workload Console online help.

The timeout property represents the time, in seconds, that IBM Workload Scheduler waits for a reply from Apache Spark server. When the timeout expires with no reply, the job terminates with abend status. The timeout property can be specified only in the properties file.

For a description of each property, see the corresponding job attribute description in Table 17 on page 81.

Job properties

While the job is running, you can track the status of the job and analyze the properties of the job. In particular, in the Extra Information section, if the job contains variables, you can verify the value passed to the variable from the remote system. Some job streams use the variable passing feature, for example, the value of a variable specified in job 1, contained in job stream A, is required by job 2 in order to run in the same job stream.

For information about how to display the job properties from the various supported interfaces, see Chapter 5, "Analyzing the job log," on page 13. For example, from the **conman** command line, you can see the job properties by running:

```
conman sj <job_name>;props
```

where <*job_name*> is the Apache Spark job name.

The properties are listed in the `Extra Information` section of the output command.

For information about passing job properties, see the topic about passing job properties from one job to another in the same job stream instance in the *User's Guide and Reference*.

The following example shows an Apache Spark job definition via composer command line:

```
<?xml version="1.0" encoding="UTF-8"?>
<jsdl:jobDefinition xmlns:jsdl="http://www.ibm.com/xmlns/prod/scheduling/1.0/jsdl"
xmlns:jsdlapachespark="http://www.ibm.com/xmlns/prod/scheduling/1.0/jsdlapachespark" name="APACHESPARK">
 <jsdl:application name="apachespark">
  <jsdlapachespark:apachespark>
   <jsdlapachespark:ApacheSparkParameters>
   <jsdlapachespark:Connection>
    <jsdlapachespark:connectionInfo>
    <jsdlapachespark:url>{url}</jsdlapachespark:url>
    <jsdlapachespark:sparkurl>{sparkurl}</jsdlapachespark:sparkurl>
    </jsdlapachespark:connectionInfo>
   </jsdlapachespark:Connection>
   <jsdlapachespark:Action>
    <jsdlapachespark:ResourceProperties>
    <jsdlapachespark:resourcename>{resourcename}</jsdlapachespark:resourcename>
    <jsdlapachespark:resourcetype>{resourcetype}</jsdlapachespark:resourcetype>
    <jsdlapachespark:mainclass>{mainclass}</jsdlapachespark:mainclass>
    <jsdlapachespark:arguments>{arguments}</jsdlapachespark:arguments>
    </jsdlapachespark:ResourceProperties>
```

```
    <jsdlapachespark:SparkProperties>
    <jsdlapachespark:appname>{appname}</jsdlapachespark:appname>
    <jsdlapachespark:jars>{jars}</jsdlapachespark:jars>
    <jsdlapachespark:deploymode>{deploymode}</jsdlapachespark:deploymode>
    <jsdlapachespark:sparkmaster>{sparkmaster}</jsdlapachespark:sparkmaster>
    <jsdlapachespark:drivercores>{drivercores}</jsdlapachespark:drivercores>
    <jsdlapachespark:drivermemory>{drivermemory}</jsdlapachespark:drivermemory>
    <jsdlapachespark:executorcores>{executorcores}</jsdlapachespark:executorcores>
              <jsdlapachespark:executormemory>{executormemory}
                                 </jsdlapachespark:executormemory>
    </jsdlapachespark:SparkProperties>
    <jsdlapachespark:EnvVariables>
    <jsdlapachespark:variablelistValues pairsList="jsdlapachespark:variablelistValue">
                         </jsdlapachespark:variablelistValues>
    </jsdlapachespark:EnvVariables>
                        </jsdlapachespark:Action>
            </jsdlapachespark:ApacheSparkParameters>
 </jsdlapachespark:apachespark>
</jsdl:application>
</jsdl:jobDefinition>
```

Job log content

For information about how to display the job log from the various supported interfaces, see Chapter 5, “Analyzing the job log,” on page 13.

For example, you can see the job log content by running `conman sj <job_name>;stdlist`, where *<job_name>* is the Apache Spark job name.

See also

From the Dynamic Workload Console you can perform the same task as described in

the *Dynamic Workload Console User's Guide*, section about Creating job definitions.

For more information about how to create and edit scheduling objects, see

the *Dynamic Workload Console User's Guide*, section about Designing your Workload.

Chapter 16. Amazon EC2 jobs

An Amazon EC2 job defines, schedules, monitors, and controls operations related to Amazon EC2 virtual computing environments, known as *instances*. You can add one or more Amazon EC2 jobs in the job stream that automates your business process flow, to provide a flexible and dynamic allocation of cloud resources to your workload.

Prerequisites

For information about the supported versions of the job plug-ins, generate a dynamic Data Integration report from the IBM Software Product Compatibility Reports web site, and select the **Supported Software** tab: Data Integration.

Before you can define Amazon EC2 jobs, you must have the Access Key ID and the Secret Access Key to use Amazon EC2 API(s).

Amazon EC2 job definition

A description of the job properties and valid values are detailed in the context-sensitive help in the Dynamic Workload Console by clicking the question mark (?) icon in the top-right corner of the properties pane.

For more information about creating jobs using the various supported product interfaces, see Chapter 2, "Defining a job," on page 7.

The following table lists the required and optional attributes for Amazon EC2 jobs:

Table 18. Required and optional attributes for the definition of an Amazon EC2 job

Attribute	Description and value	Required
Connection attributes		
Access Key ID	The Access Key ID associated to your Amazon EC2 account.	✓
Secret Access Key	The Secret Access Key associated to your Amazon EC2 account.	✓
Dry-Run Checkbox	Supported values are **true** and **false**. • When the value is **true**, Amazon EC2 verifies the required permission to run the requested action, without actually making the request. • When the value is **false**, Amazon EC2 doesn't verifies the required permission to run the requested action. Default is **false**.	
Action attributes when managing an existing Amazon EC2 instance		
Instance	The name of the instance that you want to work with.	✓
Change Power State	To change the power state of the instance, specify the new state: • Start • Stop • Reboot	
Create Amazon Machine Image (AMI)	To create an Amazon EC2 Machine Image that provides the information required to launch the instance.	
Image Name	The Amazon EC2 Machine Image name.	
Description	The Amazon EC2 Machine Image description.	

Table 18. Required and optional attributes for the definition of an Amazon EC2 job (continued)

Attribute	Description and value	Required
No Reboot Instance Checkbox	Supported values are **true** and **false**. • When the value is **true**, you do not want Amazon EC2 to reboot the instance. • When the value is **false**, you do want Amazon EC2 to reboot the instance. Default is **false**.	
Remove	Select this option to remove the instance.	
Action attributes when creating a new Amazon EC2 instance		
Amazon Machine Image (AMI)	The Amazon EC2 Machine Image (AMI) name.	✓
Instance Type	The hardware of the host computer used for your instance.	✓
Network	The network interface to your instance. If you don't specify this attribute, the Amazon EC2 default value is used.	
Subnet	The ID of the subnet where your instance is created. If you don't specify this attribute, the Amazon EC2 default value is used.	
Security-group	The security group to be assigned to your instance. If you don't specify this attribute, the instance is automatically assigned to the Amazon EC2 default security group.	
EBS Volume size	The size (GB) of the Elastic Block Storage device that you can attach to the instance.	

AmazonEC2JobExecutor.properties file

Additional properties needed to run Amazon EC2 are set in the **plug-in properties file**

The properties file is automatically generated either when you perform a "Test Connection" from the Dynamic Workload Console in the job definition panels, or when you submit the job to run the first time. Once the file has been created, you can customize it. This is especially useful when you need to schedule several jobs of the same type. You can specify the values in the properties file and avoid having to provide information such as credentials and other information, for each job. You can override the values in the properties files by defining different values at job definition time.

The *TWS_INST_DIR*\TWS\JavaExt\cfg\AmazonEC2JobExecutor.properties file contains the following properties:

```
region=
maxresults=
keypair=
```

region=*region*
The region where the instance is created. If the subscription took place after May 17, 2017, default value is us_west-2, otherwise it is us_east-1.

maxresult= *maximum_number_of_results*
The maximum number of results to return in a single call.Default value is 250.

keypair= *key_pair_name*
The name associated to the public and private keys that you use to log in to your instance.

The **region**, **maxresults**, and **keypair** properties can be specified only in the AmazonEC2JobExecutor.properties file.

Scheduling and stopping a job in IBM Workload Scheduler

You schedule IBM Workload Scheduler Amazon EC2 jobs by defining them in job streams. Add the job to a job stream with all the necessary scheduling arguments and submit the job stream.

You can submit jobs by using the Dynamic Workload Console, Application Lab or the **conman** command line. See Chapter 3, "Scheduling and submitting jobs and job streams," on page 9 for information about how to schedule and submit jobs and job streams using the various interfaces.

After submission, when the job is running and is reported in **EXEC** status in IBM Workload Scheduler, you can stop it if necessary, by using the **kill** command.

Monitoring a job

If the IBM Workload Scheduler agent stops when you submit the Amazon EC2 job, or while the job is running, the job restarts automatically as soon as the agent restarts.

For information about how to monitor jobs using the different product interfaces available, see Chapter 4, "Monitoring IBM Workload Scheduler jobs," on page 11.

Job properties

While the job is running, you can track the status of the job and analyze the properties of the job. In particular, in the Extra Information section, if the job contains variables, you can verify the value passed to the variable from the remote system. Some job streams use the variable passing feature, for example, the value of a variable specified in job 1, contained in job stream A, is required by job 2 in order to run in the same job stream.

For information about how to display the job properties from the various supported interfaces, see Chapter 5, "Analyzing the job log," on page 13. For example, from the **conman** command line, you can see the job properties by running:

```
conman sj <job_name>;props
```

where *<job_name>* is the Amazon EC2 job name.

The properties are listed in the `Extra Information` section of the output command.

For information about passing job properties, see the topic about passing job properties from one job to another in the same job stream instance in the *User's Guide and Reference*.

The following example shows the job definition for an Amazon EC2 job that changes the power state of an instance:

```
<?xml version="1.0" encoding="UTF-8"?>
<jsdl:jobDefinition xmlns:jsdl="http://www.XXX.com/xmlns/prod/scheduling/1.0/jsdl"
       xmlns:jsdlaws="http://www.XXX.com/xmlns/prod/scheduling/1.0/jsdlaws" name="AWS">
    <jsdl:application name="aws">
        <jsdlaws:aws>
            <jsdlaws:AwsParameters>
                <jsdlaws:Connection>
                    <jsdlaws:connectionInfo>
                        <jsdlaws:key1>YYYYYYYYYY</jsdlaws:key1>
                        <jsdlaws:key2>ZZZZZZZZZZZZ</jsdlaws:key2>
                    </jsdlaws:connectionInfo>
                </jsdlaws:Connection>
```

```
                    <jsdlaws:ManageInstance>
                        <jsdlaws:instance>
                            <jsdlaws:instancename></jsdlaws:instancename>
                        </jsdlaws:instance>
                        <jsdlaws:actions>
                            <jsdlaws:changepowerstate>
                                <jsdlaws:powerstate>nonepowerstate</jsdlaws:powerstate>
                            </jsdlaws:changepowerstate>
                        </jsdlaws:actions>
                    </jsdlaws:ManageInstance>
                    <jsdlaws:CreateInstance>
                        <jsdlaws:image>ami-2c33ed43 - Windows_Server-2008-SP2-English-32Bit-Base-
                          2017.05.10 - i386</jsdlaws:image>
                        <jsdlaws:amitype>t2.micro</jsdlaws:amitype>
                        <jsdlaws:network>vpc-ffeb7f97 | pnp-vpc-eu-central-1</jsdlaws:network>
                        <jsdlaws:subnet>subnet-2237664a | hws-eu-pvtsubnet | eu-central-1a</jsdlaws:subnet>
                        <jsdlaws:securitygroup>sg-ce8b37a5 | pnp-eu-common-pvtsubnet-windows-sg | security
                          group for windows instances hosted in pnp us private subnets</jsdlaws:securitygroup>
                        <jsdlaws:rootvolumesize>1</jsdlaws:rootvolumesize>
                    </jsdlaws:CreateInstance>
                </jsdlaws:AwsParameters>
            </jsdlaws:aws>
        </jsdl:application>
    </jsdl:jobDefinition>
```

Job log content

For information about how to display the job log from the various supported interfaces, see Chapter 5, “Analyzing the job log,” on page 13.

For example, you can see the job log content by running `conman sj <job_name>;stdlist`, where *<job_name>* is the Amazon EC2 job name.

See also

From the Dynamic Workload Console you can perform the same task as described in

the *Dynamic Workload Console User's Guide*, section about Creating job definitions.

For more information about how to create and edit scheduling objects, see

the *Dynamic Workload Console User's Guide*, section about Designing your Workload.

Chapter 17. IBM SoftLayer jobs

An IBM SoftLayer job defines, schedules, monitors, and controls operations related to IBM SoftLayer virtual servers. You can add one or more IBM SoftLayer jobs in the job stream that automates your business process flow, to provide a flexible and dynamic allocation of cloud resources to your workload.

Prerequisites

For information about the supported versions of the job plug-ins, generate a dynamic Data Integration report from the IBM Software Product Compatibility Reports web site, and select the **Supported Software** tab: Data Integration.

Before you can define IBM SoftLayer jobs, you must have a SoftLayer account. Log in to the SoftLayer Customer Portal and get the user name and API key required to connect to the SoftLayer cloud.

IBM SoftLayer job definition

A description of the job properties and valid values are detailed in the context-sensitive help in the Dynamic Workload Console by clicking the question mark (?) icon in the top-right corner of the properties pane.

For more information about creating jobs using the various supported product interfaces, see Chapter 2, "Defining a job," on page 7.

The following table lists the required and optional attributes for IBM SoftLayer jobs:

Table 19. Required and optional attributes for the definition of an IBM SoftLayer job

Attribute	Description and value	Required
Connection attributes		
Url	The SoftLayer cloud URL. Default value is api-dev.softlayer.com/rest/v3.	✓
Username	The user name associated to your IBM SoftLayer account.	✓
Key	The API access key associated to your IBM SoftLayer account.	✓
Action attributes when managing an existing IBM SoftLayer virtual server		
Virtual Server	The IBM SoftLayer virtual server whose configuration you want to change.	✓
Change Power State	To change the power state of the virtual server, specify the new state: • Power on • Power off • Reboot • Pause • Resume	
Take Snapshot	To capture an image of the virtual server to quickly replicate its configuration.	
Image Type	The image type: • Flex Image • Image Template	
Image Name	The Image Template name.	
Notes	Any note about the image template.	
Remove	To remove the virtual server.	

Table 19. Required and optional attributes for the definition of an IBM SoftLayer job (continued)

Attribute	Description and value	Required
Action attributes when creating a new IBM SoftLayer virtual server		
Host Name	The host name for the new virtual server.	✓
Domain	The domain for the new virtual server.	✓
Location	The IBM SoftLayer geographical location (data center) for the new virtual server.	✓
O.S.	The operating system to install on the new virtual server.	✓
Number of CPUs	The number of CPU cores to allocate.	✓
Memory	The amount of memory to allocate in megabytes.	✓
Billing	The billing type for the new virtual server: • Hourly • Monthly	✓
Disk Type	The disk type for the new virtual server: • Local • SAN (Storage Area Network)	✓

IBMSoftLayerJobExecutor.properties file

The properties file is automatically generated either when you perform a "Test Connection" from the Dynamic Workload Console in the job definition panels, or when you submit the job to run the first time. Once the file has been created, you can customize it. This is especially useful when you need to schedule several jobs of the same type. You can specify the values in the properties file and avoid having to provide information such as credentials and other information, for each job. You can override the values in the properties files by defining different values at job definition time.

The *TWS_INST_DIR*\TWS\JavaExt\cfg\IBMSoftLayerJobExecutor.properties file contains the following properties:

```
url=url (default value is api-dev.softlayer.com/rest/v3)username=username
timeout=number of seconds (default value is 3600)
location=[{"longname":"longname","name":"name" },
{"longname":"longname","name":"name" },...]
operating system=[{"operatingsystemlongname":"operatingsystemlongname",
"operatingSystemReferenceCode":"operatingSystemReferenceCode "},
{"operatingsystemlongname":"operatingsystemlongname",
"operatingSystemReferenceCode":"operatingSystemReferenceCode "},...]
```

The **timeout** property can be specified only in the properties file and represents the maximum time in seconds that the job waits for IBM SoftLayer to complete the requested action. When the timeout expires, the job is terminated with ABEND status. When the properties file is created, the timeout default is set to 3600. If the property is modified and the timeout is set to blank, the job waits for 600 seconds. For a description of each of the properties, see the corresponding job attribute description. The following is an example of the IBM SoftLayer properties file:

```
url=api-dev.softlayer.com/rest/v3
username=my_name
timeout=44400
location=[{"longname":"Amsterdam","name":"ams01"},{"longname":"Amsterdam","name":"ams03"},
{"longname":"Chennai","name":"che01"},{"longname":"Dallas","name":"dal01"},{"longname":"Dallas","name":"dal05"},
{"longname":"Dallas","name":"dal06"},{"longname":"Dallas","name":"dal09"},{"longname":"Dallas","name":"dal10"},
{"longname":"Dallas","name":"dal12"},{"longname":"Dallas","name":"dal13"},{"longname":"Frankfurt","name":"fra02"}]
operatingsystem=[{"operatingsystemlongname":"CentOS Latest","operatingSystemReferenceCode":"CENTOS_LATEST"},
{"operatingsystemlongname":"CentOS Latest (64 bit)","operatingSystemReferenceCode":"CENTOS_LATEST_64"},
{"operatingsystemlongname":"CentOS Latest (32 bit)","operatingSystemReferenceCode":"CENTOS_LATEST_32"},
{"operatingsystemlongname":"Red Hat Enterprise Linux 7.x Minimal Install
(64 bit)","operatingSystemReferenceCode":"REDHAT_7_64"}]
```

Scheduling and stopping a job in IBM Workload Scheduler

You schedule IBM Workload Scheduler IBM SoftLayer jobs by defining them in job streams. Add the job to a job stream with all the necessary scheduling arguments and submit the job stream.

You can submit jobs by using the Dynamic Workload Console, Application Lab or the **conman** command line. See Chapter 3, "Scheduling and submitting jobs and job streams," on page 9 for information about how to schedule and submit jobs and job streams using the various interfaces.

After submission, when the job is running and is reported in **EXEC** status in IBM Workload Scheduler, you can stop it if necessary, by using the **kill** command.

Monitoring a job

If the IBM Workload Scheduler agent stops when you submit the IBM SoftLayer job, or while the job is running, the job restarts automatically as soon as the agent restarts.

For information about how to monitor jobs using the different product interfaces available, see Chapter 4, "Monitoring IBM Workload Scheduler jobs," on page 11.

Job properties

While the job is running, you can track the status of the job and analyze the properties of the job. In particular, in the Extra Information section, if the job contains variables, you can verify the value passed to the variable from the remote system. Some job streams use the variable passing feature, for example, the value of a variable specified in job 1, contained in job stream A, is required by job 2 in order to run in the same job stream.

For information about how to display the job properties from the various supported interfaces, see Chapter 5, "Analyzing the job log," on page 13. For example, from the **conman** command line, you can see the job properties by running:

```
conman sj <job_name>;props
```

where *<job_name>* is the IBM SoftLayer job name.

The properties are listed in the `Extra Information` section of the output command.

For information about passing job properties, see the topic about passing job properties from one job to another in the same job stream instance in the *User's Guide and Reference*.

The following example shows the job definition for an IBM SoftLayer job that changes the power state of an instance:

```
<?xml version="1.0" encoding="UTF-8"?>
<jsdl:jobDefinition xmlns:jsdl="http://www.xxx.com/xmlns/prod/scheduling/1.0/jsdl"
xmlns:jsdlsoftlayer="http://www.xxx.com/xmlns/prod/scheduling/1.0/jsdlsoftlayer" name="SOFTLAYER">
 <jsdl:application name="softlayer">
  <jsdlsoftlayer:softlayer>
   <jsdlsoftlayer:SoftLayerParameters>
    <jsdlsoftlayer:Connection>
         <jsdlsoftlayer:connectionInfo>
             <jsdlsoftlayer:url></jsdlsoftlayer:url>
           <jsdlsoftlayer:username>my_name</jsdlsoftlayer:username>
                                  <jsdlsoftlayer:key>
                                      xxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

```
                                                        </jdlsoftlayer:key>
        </jdlsoftlayer:connectionInfo>
    </jdlsoftlayer:Connection>
    <jdlsoftlayer:ManageInstance>
         <jdlsoftlayer:virtualserver>
            <jdlsoftlayer:virtualservername></jdlsoftlayer:virtualservername>
         </jdlsoftlayer:virtualserver>
                      <jdlsoftlayer:actions>
             <jdlsoftlayer:changepowerstate>
                           <jdlsoftlayer:powerstate>nonepowerstate</jdlsoftlayer:powerstate>
                 </jdlsoftlayer:changepowerstate>
         </jdlsoftlayer:actions>
    </jdlsoftlayer:ManageInstance>
    <jdlsoftlayer:CreateInstance>
          <jdlsoftlayer:hostname>hostname</jdlsoftlayer:hostname>
          <jdlsoftlayer:domain>example.com</jdlsoftlayer:domain>
          <jdlsoftlayer:location>Amsterdam - ams01</jdlsoftlayer:location>
          <jdlsoftlayer:operatingsystem>CentOS 6.x Minimal Install (64 bit) –
                                        CENTOS_6_64</jdlsoftlayer:operatingsystem>
          <jdlsoftlayer:numberofcpus>cpus1</jdlsoftlayer:numberofcpus>
          <jdlsoftlayer:memory>memory1</jdlsoftlayer:memory>
          <jdlsoftlayer:billing>hourly</jdlsoftlayer:billing>
          <jdlsoftlayer:disktype>local</jdlsoftlayer:disktype>
    </jdlsoftlayer:CreateInstance>
   </jdlsoftlayer:SoftLayerParameters>
  </jdlsoftlayer:softlayer>
 </jdsl:application>
</jdsl:jobDefinition>
```

Job log content

For information about how to display the job log from the various supported interfaces, see Chapter 5, “Analyzing the job log,” on page 13.

For example, you can see the job log content by running `conman sj <job_name>;stdlist`, where *<job_name>* is the IBM SoftLayer job name.

See also

From the Dynamic Workload Console you can perform the same task as described in

the *Dynamic Workload Console User's Guide*, section about Creating job definitions.

For more information about how to create and edit scheduling objects, see

the *Dynamic Workload Console User's Guide*, section about Designing your Workload.

Chapter 18. Microsoft Azure jobs

A Microsoft Azure job defines, schedules, monitors, and controls operations related to Microsoft Azure virtual machines. You can add one or more Microsoft Azure jobs in the job stream that automates your business process flow, to provide a flexible and dynamic allocation of cloud resources to your workload.

Prerequisites

For information about the supported versions of the job plug-ins, generate a dynamic Data Integration report from the IBM Software Product Compatibility Reports web site, and select the **Supported Software** tab: Data Integration.

Before you can define Microsoft Azure jobs, you must have a Microsoft Azure Tenant ID, a Client ID, and a Client Secret Key.

Microsoft Azure job definition

A description of the job properties and valid values are detailed in the context-sensitive help in the Dynamic Workload Console by clicking the question mark (?) icon in the top-right corner of the properties pane.

For more information about creating jobs using the various supported product interfaces, see Chapter 2, “Defining a job,” on page 7.

The following table lists the required and optional attributes for Microsoft Azure jobs:

Table 20. Required and optional attributes for the definition of a Microsoft Azure job

Attribute	Description and value	Required
Connection attributes		
Subscription	The ID that uniquely identifies your subscription to Microsoft Azure.	✓
Client	The Client ID associated to your Microsoft Azure account.	✓
Tenant	The Tenant ID associated to your Microsoft Azure account.	✓
Key	The Secret Key associated to your Microsoft Azure account.	✓
Action attributes when managing an existing Microsoft Azure virtual machine		
Virtual Machine	The name of the virtual machine that you want to work with.	✓
Change Power State	To change the power state of the virtual machine, specify the new state: • Start • Stop • Restart • Deallocate • Generalize • Delete	
Generalize	To generalize a virtual machine.	
Capture a Custom Image	To create a virtual machine image.	
Image Name	The name of the virtual machine image.	
Add a Tag	To add a tag to the virtual machine.	

Table 20. Required and optional attributes for the definition of a Microsoft Azure job (continued)

Attribute	Description and value	Required
Tag Name	The name of the tag.	
Tag Value	The value of the tag.	
Deallocate	To deallocate the virtual machine.	
Delete	To delete the virtual machine.	
Action attributes when creating a new Microsoft Azure virtual machine		
VM Name	The name of the virtual machine that you want to create.	✓
Resource Group	The container that holds all the resources for an application.	✓
Primary Network	The primary network interface to your virtual machine.	✓
Primary Private IP	The private IP address for the primary network interface. If not specified, a dynamic IP address is assigned.	
Primary Public IP	The public IP address for the primary network interface. If not specified, a dynamic IP address is assigned.	
From Image	The virtual machine image name.	✓
Username	The user name to log on to the virtual machine.	✓
Password	The password to log on to the virtual machine.	✓
Size	The size of the virtual machine.	✓

MicrosoftAzureJobExecutor.properties file

The properties file is automatically generated either when you perform a "Test Connection" from the Dynamic Workload Console in the job definition panels, or when you submit the job to run the first time. Once the file has been created, you can customize it. This is especially useful when you need to schedule several jobs of the same type. You can specify the values in the properties file and avoid having to provide information such as credentials and other information, for each job. You can override the values in the properties files by defining different values at job definition time.

The *TWS_INST_DIR*\TWS\JavaExt\cfg\MicrosoftAzureJobExecutor.properties file contains the following properties:

```
region=
subscription=
client=
tenant=
key=
```

region The region where the virtual machine is created.

subscription
The ID that uniquely identifies your subscription to Microsoft Azure.

client The Microsoft Azure client ID associated to your account.

tenant The Microsoft Azure tenant ID associated to your account.

key The Microsoft Azure client secret key associated to your account.

The following is an example of a Microsoft Azure properties file:

```
region=uswest1
subscription=ffa52f27-be12-4cad-b1ea-c2c241b6cceb
client=b52dd125-9272-4b21-9862-0be667bdf6dc
tenant=72f988bf-86f1-41af-91ab-2d7cd011db47
key=ebc6e170-72b2-4b6f-9de2-99410964d2d0
```

Scheduling and stopping a job in IBM Workload Scheduler

You schedule IBM Workload Scheduler Microsoft Azure jobs by defining them in job streams. Add the job to a job stream with all the necessary scheduling arguments and submit the job stream.

You can submit jobs by using the Dynamic Workload Console, Application Lab or the **conman** command line. See Chapter 3, "Scheduling and submitting jobs and job streams," on page 9 for information about how to schedule and submit jobs and job streams using the various interfaces.

After submission, when the job is running and is reported in **EXEC** status in IBM Workload Scheduler, you can stop it if necessary, by using the **kill** command.

Monitoring a job

If the IBM Workload Scheduler agent stops when you submit the Microsoft Azure job, or while the job is running, the job restarts automatically as soon as the agent restarts.

For information about how to monitor jobs using the different product interfaces available, see Chapter 4, "Monitoring IBM Workload Scheduler jobs," on page 11.

Job properties

While the job is running, you can track the status of the job and analyze the properties of the job. In particular, in the Extra Information section, if the job contains variables, you can verify the value passed to the variable from the remote system. Some job streams use the variable passing feature, for example, the value of a variable specified in job 1, contained in job stream A, is required by job 2 in order to run in the same job stream.

For information about how to display the job properties from the various supported interfaces, see Chapter 5, "Analyzing the job log," on page 13. For example, from the **conman** command line, you can see the job properties by running:

```
conman sj <job_name>;props
```

where *<job_name>* is the Microsoft Azure job name.

The properties are listed in the `Extra Information` section of the output command.

For information about passing job properties, see the topic about passing job properties from one job to another in the same job stream instance in the *User's Guide and Reference*.

The following example shows the job definition for a Microsoft Azure job that creates a new virtual machine:

```
<?xml version="1.0" encoding="UTF-8"?>
<jsdl:jobDefinition xmlns:jsdl="http://www.xxx.com/xmlns/prod/scheduling/1.0/jsdl"
 xmlns:jsdlazure="http://www.xxx.com/xmlns/prod/scheduling/1.0/jsdlazure" name="AZURE">
    <jsdl:application name="azure">
```

```
            <jsdlazure:azure>
                <jsdlazure:AzureParameters>
                    <jsdlazure:Connection>
                        <jsdlazure:connectionInfo>
                            <jsdlazure:subscription>xxxxxxxxxxxx</jsdlazure:subscription>
                            <jsdlazure:client>yyyyyyyyyyyyy</jsdlazure:client>
                            <jsdlazure:tenant>ZZZZZZZZZZZZZZZZ</jsdlazure:tenant>
                            <jsdlazure:key>ABCABCABCABCABCABC</jsdlazure:key>
                        </jsdlazure:connectionInfo>
                    </jsdlazure:Connection>
                    <jsdlazure:ManageInstance>
                        <jsdlazure:virtualmachine>
                            <jsdlazure:virtualmachinename></jsdlazure:virtualmachinename>
                        </jsdlazure:virtualmachine>
                        <jsdlazure:actions>
                            <jsdlazure:changepowerstate>
                                <jsdlazure:powerstate>nonepowerstate</jsdlazure:powerstate>
                            </jsdlazure:changepowerstate>
                        </jsdlazure:actions>
                    </jsdlazure:ManageInstance>
                    <jsdlazure:CreateVM>
                        <jsdlazure:vmname>VirtualMachine</jsdlazure:vmname>
                        <jsdlazure:resourcegroup>davidtestrg</jsdlazure:resourcegroup>
                        <jsdlazure:primarynetwork>10.0.0.0/24</jsdlazure:primarynetwork>
                        <jsdlazure:primaryprivateip></jsdlazure:primaryprivateip>
                        <jsdlazure:primarypublicip></jsdlazure:primarypublicip>
                        <jsdlazure:fromimage>UBUNTU_SERVER_16_04_LTS</jsdlazure:fromimage>
                        <jsdlazure:username>TestUno</jsdlazure:username>
                        <jsdlazure:password>Passw0rd</jsdlazure:password>
                        <jsdlazure:size>STANDARD_D2_V2</jsdlazure:size>
                    </jsdlazure:CreateVM>
                </jsdlazure:AzureParameters>
            </jsdlazure:azure>
        </jsdl:application>
    </jsdl:jobDefinition>
```

Job log content

For information about how to display the job log from the various supported interfaces, see Chapter 5, "Analyzing the job log," on page 13.

For example, you can see the job log content by running `conman sj <job_name>;stdlist`, where *<job_name>* is the Microsoft Azure job name.

See also

From the Dynamic Workload Console you can perform the same task as described in

the *Dynamic Workload Console User's Guide*, section about Creating job definitions.

For more information about how to create and edit scheduling objects, see

the *Dynamic Workload Console User's Guide*, section about Designing your Workload.

Chapter 19. Informatica PowerCenter jobs

Use the IBM Workload Scheduler plug-in for Informatica PowerCenter to schedule Informatica PowerCenter workflows and to track their outcomes from the Dynamic Workload Console, Application Lab, and from the IBM Workload Scheduler command line.

You can define, run, and manage these jobs both in a distributed and in a z/OS environment, by selecting the appropriate IBM Workload Scheduler or IBM Workload Scheduler for z/OS engine in the Dynamic Workload Console.

In IBM Workload Scheduler environments, the plug-in jobs run on dynamic agents.

z/OS In IBM Workload Scheduler for z/OS environments, the plug-in jobs run on IBM Workload Scheduler for z/OS Agents.

In both environments the agent running the jobs, where a portion of the plug-in is installed, must have a working connection with the Informatica Web Services Hub.

For information about the supported versions of the job plug-ins, generate the Data Integration report on the IBM Software Product Compatibility Reports web site, and select the **Supported Software** tab.

Prerequisites

You can run the IBM Workload Scheduler plug-in for Informatica PowerCenter both in a distributed and in a z/OS environment.

You must have a supported version of Informatica PowerCenter installed to use this job plug-in.

For information about the supported versions of the job plug-ins, generate the Data Integration report from the IBM Software Product Compatibility Reports site, and select the **Supported Software** tab.

Distributed Distributed **To define, run, and manage job types with advanced options for Informatica PowerCenter, install:**

- The IBM Workload Scheduler master domain manager
- A dynamic agent connected:
  - To the master domain manager

  or
  - To a dynamic domain manager connected to the master domain manager.
- The dynamic agent running the plug-in must have a working connection with the Informatica PowerCenter Web Services Hub.

z/OS z/OS **To define, run, and manage job types with advanced options for Informatica PowerCenter, install:**

- The IBM Workload Scheduler for z/OS controller.
- An IBM Workload Scheduler for z/OS agent connected to:
  - The IBM Workload Scheduler for z/OS controller.

or

– A dynamic domain manager connected to the IBM Workload Scheduler for z/OS controller.

- The IBM Workload Scheduler for z/OS agent running the plug-in must have a working connection with the Informatica PowerCenter Web Services Hub.

For detailed information about the IBM Workload Scheduler supported operating systems, see the System Requirements Document.

For detailed information about the Informatica PowerCenter supported operating systems and installation requirements, see the Informatica PowerCenter documentation.

Defining an IBM Workload Scheduler Informatica PowerCenter job to schedule workflows

Define IBM Workload Scheduler jobs to schedule Informatica PowerCenter applications using any one of the supported interfaces.

Distributed Define an IBM Workload Scheduler job to schedule Informatica PowerCenter workflows by using the Dynamic Workload Console connected to a distributed engine, Application Lab, or by using the **composer** command line.

z/OS Define an IBM Workload Scheduler job to run an Informatica PowerCenter job by using the Dynamic Workload Console connected to a z/OS engine.

See Chapter 2, "Defining a job," on page 7 for more information about creating jobs using the various interfaces available. Some samples of using one or more of these interfaces to create an Informatica PowerCenter job definition are contained in the sections that follow.

PowerCenter job definition

IBM Workload Scheduler job definition properties for running PowerCenter jobs.

The following table lists the required and optional attributions for the PowerCenter job definition, together with a description of each attribute.

Table 21. Required and optional attributes for the job definition of PowerCenter jobs.

Attribute	Description/value	Required
UserName	The name used to access the PowerCenter repository. See **Note**.	✓
password	The password used to access the PowerCenter repository. It is encrypted when you submit the job. See **Note**.	✓
repositoryDomain	The domain where the repository is located. See **Note**.	
serviceDomain	The domain where the PowerCenter Integration Service is located. See **Note**.	

Table 21. Required and optional attributes for the job definition of PowerCenter jobs. (continued)

Attribute	Description/value	Required
repository	The name of the PowerCenter repository where the workflow is located.	✔
service	The name of the integration service used to run the workflow.	✔
folder	The name of the folder where the workflow is located in the repository that you selected.	✔
workflow	The name of the workflow that you want to run.	✔
wkfParamFile	The full path and name of the file, stored on the Informatica PowerCenter server, that contains a list of parameters to be passed to the workflow at runtime.	

Note: If you do not want to specify a value for this attribute in the XML, you can define it in the `PowerCenterJobExecutor.properties` file. See "Customizing IBM Workload Scheduler to run Informatica PowerCenter jobs" on page 103 for details.

The following example shows the job definition of a PowerCenter job with all the attributes specified:

```
$JOBS
LINUX206#PC-FULL
 TASK
<?xml version="1.0" encoding="UTF-8"?>
<jsdl:jobDefinition xmlns:jsdl="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdl"
 xmlns:jsdlpowercenter="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdlpowercenter" name="POWERCENTER">
  <jsdl:application name="powercenter">
    <jsdlpowercenter:powercenter>
      <jsdlpowercenter:PowerCenterParameters>
        <jsdlpowercenter:PowerCenterPanel>
          <jsdlpowercenter:logon>
            <jsdlpowercenter:userName>Administrator</jsdlpowercenter:userName>
            <jsdlpowercenter:password>{aes}BPnRnktQdkmJt3HIy/r4Z4EVy40EWhUGpur+qshPdhU=</jsdlpowercenter:password>
            <jsdlpowercenter:repositoryDomain>Domain_nc125123</jsdlpowercenter:repositoryDomain>
            <jsdlpowercenter:serviceDomain>Domain_nc125123</jsdlpowercenter:serviceDomain>
            <jsdlpowercenter:repository>MyRepository</jsdlpowercenter:repository>
          </jsdlpowercenter:logon>
           <jsdlpowercenter:jobDefinitionGroup>
             <jsdlpowercenter:projectNameGroup>
               <jsdlpowercenter:service>IntegrationService</jsdlpowercenter:service>
               <jsdlpowercenter:folder>tws4apps</jsdlpowercenter:folder>
               <jsdlpowercenter:workflow>DB2_COPY_FROM_SOURCE_TO_TARGET</jsdlpowercenter:workflow>
             </jsdlpowercenter:projectNameGroup>
                <jsdlpowercenter:wkfParamFile>C:\Informatica variables file.txt</jsdlpowercenter:wkfParamFile>
           </jsdlpowercenter:jobDefinitionGroup>
          </jsdlpowercenter:PowerCenterPanel>
       </jsdlpowercenter:PowerCenterParameters>
    </jsdlpowercenter:powercenter>
  </jsdl:application>
</jsdl:jobDefinition>
DESCRIPTION "Added by composer1."
RECOVERY STOP
```

The following example shows the job definition of the same PowerCenter job with only the required attributes specified:

```
$JOBS
LINUX206#PC-REQD
 TASK
<?xml version="1.0" encoding="UTF-8"?>
<jsdl:jobDefinition xmlns:jsdl="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdl"
 xmlns:jsdlpowercenter="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdlpowercenter" name="POWERCENTER">
  <jsdl:application name="powercenter">
    <jsdlpowercenter:powercenter>
      <jsdlpowercenter:PowerCenterParameters>
```

```
        <jsdlpowercenter:PowerCenterPanel>
          <jsdlpowercenter:logon>
            <jsdlpowercenter:userName/>
            <jsdlpowercenter:password/>
            <jsdlpowercenter:repositoryDomain/>
            <jsdlpowercenter:serviceDomain/>
            <jsdlpowercenter:repository>MyRepository</jsdlpowercenter:repository>
          </jsdlpowercenter:logon>
           <jsdlpowercenter:jobDefinitionGroup>
             <jsdlpowercenter:projectNameGroup>
               <jsdlpowercenter:service>IntegrationService</jsdlpowercenter:service>
               <jsdlpowercenter:folder>tws4apps</jsdlpowercenter:folder>
               <jsdlpowercenter:workflow>DB2_COPY_FROM_SOURCE_TO_TARGET</jsdlpowercenter:workflow>
             </jsdlpowercenter:projectNameGroup>
                <jsdlpowercenter:wkfParamFile/>
           </jsdlpowercenter:jobDefinitionGroup>
          </jsdlpowercenter:PowerCenterPanel>
        </jsdlpowercenter:PowerCenterParameters>
    </jsdlpowercenter:powercenter>
  </jsdl:application>
</jsdl:jobDefinition>
DESCRIPTION "Added by composer1."
RECOVERY STOP
```

Defining IBM Workload Scheduler jobs to schedule Informatica PowerCenter workflows with the Dynamic Workload Console

Schedule Informatica PowerCenter workflows from IBM Workload Scheduler.

To define a job to schedule an Informatica PowerCenter workflow from the Dynamic Workload Console, perform the following procedure. You can also define a job using the other available interfaces such as Application Lab, see Chapter 2, “Defining a job,” on page 7 for more information.

Distributed **To define a job of type `PowerCenter` in the Dynamic Workload Console:**

1. Select **Administration** > **Workload Design** > **Manage Workload Definitions**.
2. Select an engine and click **Go**.
3. Select **New** > **Job Definition** > **>Business Analytics** > **PowerCenter**.
   The Properties panel for the new job is displayed.
4. In the **General** tab, enter:
   - The name of the job definition.
   - The name of the workstation on which the job runs.
   - A return code mapping expression.
   - A description of the job.
5. In the **Affinity** tab, define the affinity relationship with other jobs, if it exists.
6. In the **Recovery options** tab, specify the recovery options to be followed if the job abends.
7. In the **PowerCenter** tab, specify the following information to define the options related to the PowerCenter workflow that you want the job to run:

   Credentials
   Use this section to define the credentials necessary to run the workflow.

   User Name
   The name used to access the repository. You can leave blank if a valid value is provided in the `PowerCenterJobExecutor.properties` properties file.

Password
The password used to access the repository. You can leave blank if a valid value is provided in the `PowerCenterJobExecutor.properties` properties file.

Repository Domain
The domain where the repository is located. Alternatively, a valid value provided in the `PowerCenterJobExecutor.properties` properties file. This field is optional.

Service Domain
The domain where the Integration Service is located. Alternatively, a valid value provided in the `PowerCenterJobExecutor.properties` properties file. This field is optional.

Repository Name
The repository where the workflow is located. Click the **Repository List** tab to get a list of selectable repositories.

Workflow information
Use this section to identify the workflow that you want the job to run.

Service Name
The integration service used to run the workflow. Click the **Service List** tab to get a list of selectable integration services.

Folder Name
The folder in the repository that you selected where the workflow is located. Click the **Folder List** tab to get a list of selectable folders.

Workflow Name
The name of the workflow that you want to run. Click the **Workflow List** tab to get a list of selectable workflows located in the folder that you indicated in the previous field.

Workflow Parameter File
The full path and name of the parameters file, stored on the Informatica PowerCenter server, that contains a list of parameters to be passed to the workflow when its run is issued. You can find instructions to write and use parameters files in the Informatica PowerCenter documentation guides.

z/OS z/OS **To define a job of type `PowerCenter` in the Dynamic Workload Console:**

1. Select **Administration** > **Workload Design** > **Manage Workload Definitions**.
2. Select a z/OS engine.
3. Select **New** > **Business Analytics** > **PowerCenter**.
   The Properties panel for the new job is displayed.
4. In the **General** tab, enter:

- The name of the partitioned dataset where you want to create the JCL.
- The name of the JCL that you want to create in the partitioned dataset.
- The workstation that you want to be the target of the action buttons on the job-specific tab. The value is not saved.

5. In the **PowerCenter** tab, specify the following information to define the options related to the PowerCenter workflow that you want the job to run:

   Credentials
   Use this section to define the credentials necessary to run the workflow.

   User Name
   The name used to access the repository. You can leave blank if a valid value is provided in the `PowerCenterJobExecutor.properties` properties file.

   Password
   The password used to access the repository. You can leave blank if a valid value is provided in the `PowerCenterJobExecutor.properties` properties file.

   Repository Domain
   The domain where the repository is located. Alternatively, a valid value provided in the `PowerCenterJobExecutor.properties` properties file. This field is optional.

   Service Domain
   The domain where the Integration Service is located. Alternatively, a valid value provided in the `PowerCenterJobExecutor.properties` properties file. This field is optional.

   Repository Name
   The repository where the workflow is located. Click the **Repository List** tab to get a list of selectable repositories.

   Workflow information
   Use this section to identify the workflow that you want the job to run.

   Service Name
   The integration service used to run the workflow. Click the **Service List** tab to get a list of selectable integration services.

   Folder Name
   The folder in the repository that you selected where the workflow is located. Click the **Folder List** tab to get a list of selectable folders.

   Workflow Name
   The name of the workflow that you want to run. Click the **Workflow List** tab to get a list of selectable workflows located in the folder that you indicated in the previous field.

Workflow Parameter File
The full path and name of the parameters file, stored on the Informatica PowerCenter server, that contains a list of parameters to be passed to the workflow when its run is issued. You can find instructions to write and use parameters files in the Informatica PowerCenter documentation guides.

Customizing IBM Workload Scheduler to run Informatica PowerCenter jobs

A property file is added in the plug-in configuration directory on the agent to provide plug-in configuration parameters and repetitive keys.

The `PowerCenterJobExecutor.properties` file is a text file that contains configuration parameters. The file is located on the IBM Workload Scheduler agent in the *TWS_home*`\JavaExt\cfg` (`/JavaExt/cfg`) directory.

The properties file is automatically generated either when you perform a "Test Connection" from the Dynamic Workload Console in the job definition panels, or when you submit the job to run the first time. Once the file has been created, you can customize it. This is especially useful when you need to schedule several jobs of the same type. You can specify the values in the properties file and avoid having to provide information such as credentials and other information, for each job. You can override the values in the properties files by defining different values at job definition time.

The file contains two types of properties for the use of the plug-in jobs:

- Credential properties that are repeated in all the plug-in job definitions. If you specify them in this file, you can leave the corresponding fields blank in the job definition and the values are retrieved from the properties file at runtime.

  The properties are:

  userName
  The name used to access the repository.

  password
  The password used to access the repository. The password is encrypted the first time it is used (either in a pick list or at the runtime of a job).

  repositoryDomain
  The domain where the repository is located.

  serviceDomain
  The domain where the Integration Service is located.

  The values specified for any of these properties in the file are overridden by the job definition values when entered in the corresponding fields.
- Properties required to establish a connection with the Informatica Web Services Hub. It is mandatory that you specify these properties in the file.

  The properties are:

  hostName
  The hostname or the IP address of the computer hosting the Informatica Web Services Hub; that is, the service that provides the web services used for accessing the workflows.

  port The port number of the Informatica Web Services Hub.

isSSLEnabled
Specifies if the Informatica Web Services Hub is enabled to the SSL protocol. Set this property to `true` or `false`.

If `IsSSLEnabled=true`, you must also change the `JVMOption` key in file `JobManager.ini` located in directory *TWS_home*`/ITA/cpa/config` (`\ITA\cpa\config`) on the agent. See "Configuring the agent for SSL."

= **use_load_balancer**
= Specifies if the Informatica Web Services Hub is behind a load balancer. Set this property to `YES` or `NO`.

= If `use_load_balancer=YES`, you must also set `errorMsgs=TimeOut`, and `checkWfStatusBeforeWait=true`.

= **polling**
= This property is effective only if `use_load_balancer=YES`. It specifies the monitoring frequency of the workflow status. Set this property to `NO` or to an integer equal to or greater than 1000 (milliseconds). If you specify `polling=1000`, the workflow status is retrieved every second. Set `polling=NO` if `use_load_balancer=NO`.

= **no_infa_log**
= Specifies if you do not want to retrieve the Informatica PowerCenter workflow output in the IBM Workload Scheduler job log. Set this property to `YES` if you do not want to retrieve the workflow output, otherwise set this property to `NO`.

= **errorMsgs**
= This property is effective only if `use_load_balancer=YES`. It sets a pipe "`|`" as delimiter for error messages. If `use_load_balancer=YES`, set this property to `TimeOut` and never modify this value.

= **checkWfStatusBeforeWait**
= This property is effective only if `use_load_balancer=YES`. It specifies if the Informatica PowerCenter workflow status has to be monitored. If `use_load_balancer=YES`, set this property to `true`, otherwise set this property to `false`.

In the file the properties are specified each in a line, using the `key=value` syntax. See the following example:

```
port=7334
password=mypassword
isSSLEnabled=false
userName=Administrator
serviceDomain=Domain_NY004114
hostName=NY004114.citylab.com
repositoryDomain=Domain_NY004114
use_load_balancer=YES
polling=No
no_infa_log=YES
errorMsgs=TimeOut
checkWfStatusBeforeWait=true
```

Configuring the agent for SSL

If the Informatica WebServices Hub is enabled to the SSL protocol, you must change configuration options on the agent where you installed the plug-in.

If `IsSSLEnabled=true` in the `PowerCenterJobExecutor.properties` properties file, you must also change the `JVMOption` key in file `JobManager.ini` located in directory *TWS_home*`/ITA/cpa/config` (`\ITA\cpa\config`) on the agent. In this case, `JVMOption` should contain the following:

```
-Djava.protocol.handler.pkgs=com.sun.net.ssl.internal.www.protocol
  -Djavax.net.ssl.trustStore=keystore_pathfile_name
```

where *keystore_pathfile_name* is the path and the filename of the truststore used to access the protected web services hub. For example:

```
-Djavax.net.ssl.trustStore=/opt/abc/TWA/ssl/wsh.keystore
```

Scheduling and submitting job streams for PowerCenter jobs

Submitting IBM Workload Scheduler for PowerCenter jobs.

See Chapter 3, “Scheduling and submitting jobs and job streams,” on page 9 for more information about how to schedule and submit jobs and job streams using the various interfaces.

After you define an IBM Workload Scheduler for PowerCenter job, you add it to a job stream with all the necessary scheduling arguments and submit it.

After submission you can kill the IBM Workload Scheduler for PowerCenter job, if necessary. This action is converted to an **Abort** action for the PowerCenter workflow.

The IBM Workload Scheduler agent might become unavailable while the job running the PowerCenter workflow is in execution. When the agent becomes available again, IBM Workload Scheduler starts to monitor the job from where it stopped.

For information about monitoring jobs and job streams, see Chapter 4, “Monitoring IBM Workload Scheduler jobs,” on page 11.

For information about analyzing the job log, see Chapter 5, “Analyzing the job log,” on page 13.

Monitoring IBM Workload Scheduler jobs that run Informatica PowerCenter workflows

When the scheduled time to run a plug-in job is reached, the job is run by the agent and the selected workflow is invoked with the chosen parameters.

You can monitor and even interrupt the job by using the monitoring features of IBM Workload Scheduler. You can monitor jobs by using any of the product interfaces.

For information about monitoring jobs and job streams, see Chapter 4, “Monitoring IBM Workload Scheduler jobs,” on page 11.

When monitoring the job from Dynamic Workload Console, you can display detailed information about the Informatica PowerCenter workflow and run actions either on the workflow, or on any first-level tasks that are in the workflow, if these are session tasks or worklets. You cannot display or run actions on :

- Tasks that are not session tasks.

- Inner session tasks.
- Inner worklet tasks.

During the workflow execution, the **Workflow details** panel displays information about active worklets or session tasks, that is, worklets or session tasks that already started on the Informatica PowerCenter server. The **Workflow details** panel does not display information about:

- Worklets or session tasks that have not yet started.
- Workflow instances related to a previous run.
- Worklets or session tasks that are running but not with their original name (that is, they have been renamed by using Informatica PowerCenter Workflow Manager).

If all the worklets or session tasks fall into this list, the **Workflow details** panel is empty.

Note: Distributed To display workflow details, click the hyperlink **Workflow details** in the **Job Type** column, in both the **Monitor jobs** and **Monitor Critical jobs** views of Dynamic Workload Console. However, if the version of your engine is earlier than V9.3.0.2, workflow details are displayed only in the **Monitor jobs** view.

Note: z/OS To display workflow details, click the hyperlink **Workflow details** in the **Job Type** column in the **Monitor jobs** view of the Dynamic Workload Console. The **Monitor Critical jobs** view does not display workflow details.

Note: To display the **Workflow details** panel, your dynamic domain manager must be at version 9.3.0.2 or later.

From the **Workflow details** panel of Dynamic Workload Console, if the Informatica PowerCenter workflow fails, you can restart it from the failed task. For details about restarting an Informatica PowerCenter workflow, see the procedure for restarting a workflow from the failed task: "Procedure for restarting an Informatica PowerCenter workflow from the failed task" on page 107.

When the job completes, the status of the plug-in job reflects the status of the run workflow and a job log is made available. The job log shows the status, start date, and end date of any first-level tasks that are in the workflow, if these are session tasks or worklets.

Note: If worklets or session tasks are renamed by using Informatica PowerCenter Workflow Manager, an erroneous status is reported in the job log. For details, see Incorrect worklet status displayed in the job log.

Details that are produced by Informatica about the run of the workflow are also copied into the job log after the task status.

For detailed information about how to access the job properties by using the various interfaces available, see Chapter 5, "Analyzing the job log," on page 13.

Messages

All the messages that are issued by the plug-in are described in *IBM Workload Automation: Messages and Codes*.

Procedure for restarting an Informatica PowerCenter workflow from the failed task

You can restart an Informatica PowerCenter workflow from the failed task, by using the Dynamic Workload Console.

About this task

To restart an Informatica PowerCenter workflow from the failed task, run the following steps:

Procedure

1. From the navigation toolbar, click **System Status and Health**.
2. In the **Workload Monitoring** section, click **Monitor Workload**.
3. From the engine drop-down list, select the name of the IBM Workload Scheduler engine connection from where you want to work with Informatica PowerCenter jobs.
4. From the object type drop-down list, select the object type **Job** .
5. From the drop-down list of defined tasks or queries for monitoring jobs, select to display the related list of jobs. If you have a predefined task to display Informatica PowerCenter jobs, click that task. A list of jobs is displayed.

   Distributed

   Distributed environment
   The **Job Type** column displays **PowerCenter Workflow details**.

   z/OS

   z/OS environment
   The **Advanced Job Type** column displays **PowerCenter Workflow details**. To display the **Advanced Job Type** column in the table, edit the **Task Properties** and in **Column Definition**, add the **Advanced Job Type** column to the **Selected Columns** list. Move the column up to define the order of the column in the table and make it more visible.
6. Click the hyperlink **Workflow details**. The **Workflow details** panel opens.
7. Select the action that you want to run either on the workflow or on the single task (worklet task or session task):
   a. Actions on the workflow:

      Refresh
      Refreshes the Workflow Details panel with the latest updates on the remote Informatica PowerCenter system to synchronize the two views.

      Recover
      Restarts the workflow from the failed task.

      Stop Stops the workflow.

      Abort Aborts the workflow.

      Distributed **Rerun job**
      Restarts the IBM Workload Scheduler job. The Informatica PowerCenter workflow restarts from the beginning. If you select to rerun the job, to display the workflow details you must close the current **Workflow details** panel and open the one related to the new instance of the job.

b. Actions on the single task:

Stop Stops the task.

Abort Aborts the task.

Restart
Restarts the task.

8. Confirm the action that you want to run.

Mapping PowerCenter workflow status to job status

Map job status to PowerCenter workflow status to understand their processing.

Table 22 table shows how you can map the job status to the PowerCenter workflow status based on the return code you find in the job log output.

Table 22. Mapping between IBM Workload Scheduler job statuses and PowerCenter workflow statuses

PowerCenter workflow status	Dynamic Workload Console job status	IBM Workload Scheduler job status	IBM Workload Scheduler for z/OS job status
Running	Running	EXEC	Executing
Succeeded	Successful	SUCC	Completed
Failed	Error	ABEND	Error
Aborted	Error	ABEND	Error
Stopped	Error	ABEND	Error
Suspended	Running	EXEC	Executing

Known problems and workarounds

This section lists problems known with the job plug-in and available workarounds.

The following problems are known:

- "Incorrect worklet status displayed in the job log"
- "Cannot submit jobs after a Web Services Hub restart" on page 109

Incorrect worklet status displayed in the job log

The problem occurs when renaming worklets o session tasks using the Informatica PowerCenter Workflow Manager. In this case, an erroneous status is reported in the IBM Workload Scheduler job log.

Summary

Incorrect worklet or session task properties are shown in the job log after the IBM Workload Scheduler job run.

Problem symptom

Despite the successful completion of a worklet or session tasks, the IBM Workload Scheduler job log displays its status as UNKNOWN and does not display the Start and Completion times, as shown below:

```
Task Name            Start Time          Completion Time        Status
-------------------------------------------------------------------------------
Worklet_Renamed                                                  UNKNOWN
```

Solution

To avoid this problem, you must use the same worklet or session task name when rerunning a workflow.

The problem is due to an Informatica PowerCenter defect, for which change request 296860 is outstanding. A formal solution to the problem should be provided by the Informatica HotFix that will address this change request.

Cannot submit jobs after a Web Services Hub restart

IBM Workload Scheduler plug-in for Informatica jobs fail to submit after an Informatica PowerCenter Web Services Hub restart.

Summary

A restart of the PowerCenter Web Services Hub prevents the proper submission of IBM Workload Scheduler plug-in for Informatica jobs.

Problem symptom

Following a restart of the Web Services Hub, the IBM Workload Scheduler jobs launched from the command line end in `FAIL` state (`Error` state in the Dynamic Workload Console) and return the following exception in the job log:

```
AWKIPC005E Failed to run workflow.
 ---------------------------------------
Remote Exception
 ---------------------------------------
```

Solution

After restarting the Hub, to enable the correct submission of plug-in jobs, connect to the Informatica PowerCenter Web Services Hub URL and follow these steps:

1. In the Navigator pane, expand **Web Service** -> **Batch WebService**, and then click **Integration WebService**.
2. In the Operations pane, click **Try-It** from the toolbar.
3. In the Web Service Operations Navigator pane, click **login**.
4. Fill out the form in the right pane, specifying the required information in the **UserName**, **RepositoryName**, and **Password** text fields.
5. Click **Send**.
6. In the SOAP Response pane, copy the value for the **SessionId** tag.
7. In the Web Service Operations Navigator pane, click **getWorkflowLog**.
8. Paste the value copied previously in the **SessionId** text field and then enter the required information in the **FolderName**, **WorkflowName**, **Timeout**, and **ServiceName** text fields.
9. Click **Send.**

   You can now submit jobs safely again.

The problem is due to an Informatica Powercenter defect, for which change request 296859 is outstanding. A formal solution to the problem should be provided by the Informatica HotFix that will address this change request.

Chapter 20. Oracle E-Business Suite jobs

Use the IBM Workload Scheduler plug-in for Oracle E-Business Suite to automate, monitor, and control your Oracle E-Business Suite applications.

Take advantage of all of the IBM Workload Scheduler scheduling capabilities to manage Oracle E-Business Suite and the comprehensive suite of integrated, global business applications it provides. The applications are managed by IBM Workload Scheduler by defining the operations you perform with the application in an IBM Workload Scheduler job.

You can manage Oracle E-Business Suite applications both in a distributed and in a z/OS environment, by selecting the appropriate engine.

The Oracle E-Business Suite plug-in and the Oracle E-Business Suite instance can be installed on machines having different operating systems.

Prerequisites

Before you run Oracle E-Business Suite jobs, complete the following actions.

1. On the Oracle E-Business Suite server, in the sqlnet.ora configuration file that is located in the directory:
   - `ORACLE_HOME/network/admin` (Windows systems)
   - `$ORACLE_HOME/network/admin` (UNIX systems)

   comment out the following instructions:
   - SQLNET.EXPIRE_TIME = 10
   - TCP.VALIDNODE_CHECKING=yes
2. Stop and start the Oracle Listener, as described at the following link: http://docs.oracle.com/cd/B28359_01/server.111/b32009/strt_stp.htm#UNXAR156.

Business scenario

ANYLife New York Life Insurance experienced an amazing growth in business during the last few years. As a result, several new branches were opened in different countries. To support this growth and be ready for further expansion, ANYLife decided to improve the efficiency of its internal processes, HR, Payroll, Finance, and Procurement, and optimize its overhead costs. In particular, ANYLife decided to improve the management of Financial Processes, showing recurring peaks at close of month and quarter times. As a solution ANYLife chose to invest in Oracle E-Business Suite a comprehensive suite of integrated, global business applications that enable organizations to make better decisions, reduce costs, and increase performance. Today however, as the operational environment becomes more complex, the built-in scheduling capabilities of Oracle E-Business Suite are no longer sufficient and often require a manual intervention. This is very crucial to ANYLife, especially during the financial close process. Moreover, as the business grows, ANYLife needs to integrate Oracle E-Business Suite with other external business applications.

The solution is IBM Workload Scheduler integration with Oracle E-Business Suite to automate, monitor, and control Oracle E-Business Suite applications, reduce

complexity, manual tasks, and batch execution time. Thanks to the integration among different systems, and by conditioning the execution of Oracle E-Business Suite applications and other external business applications, ANYLife can have the entire financial close process controlled by IBM Workload Scheduler.

A single point of control during the financial close process reduces complexity and allows for an error-free execution of the batch jobs, and the financial reports are always available without delay. ANYLife has been able to reduce administration overhead, improve the operations efficiency and increase the reliability of the enterprise. The company optimized business results while achieving a high return on investments.

Defining an IBM Workload Scheduler job to schedule Oracle E-Business Suite applications

Define IBM Workload Scheduler jobs to schedule Oracle E-Business Suite applications by using either the Dynamic Workload Console or the command line.

Distributed Define an IBM Workload Scheduler job to schedule Oracle E-Business Suite applications by using the Dynamic Workload Console connected to a distributed engine, Application Lab, or by using the **composer** command line.

z/OS Define an IBM Workload Scheduler job to run an Oracle E-Business Suite job by using the Dynamic Workload Console connected to a z/OS engine.

See Chapter 2, "Defining a job," on page 7 for more information about creating jobs using the various interfaces available. Some samples of using one or more of these interfaces to create an Oracle E-Business Suite job definition are contained in the sections that follow.

Job definition for Oracle E-Business Suite jobs

IBM Workload Scheduler job definition properties and JSDL examples for running Oracle E-Business Suite jobs.

Table 23 describes the required and optional attributes for Oracle E-Business Suite jobs, together with a description of each attribute.

Table 23. Required and optional attributes for the job definition of Oracle E-Business Suite jobs.

Attribute	Description	Required
Hostname	The Oracle E-Business Suite server address.	✔ Required if not specified in the Oracle E-Business Suite job plug-in properties file.
Port	The port number of the Oracle E-Business Suite server.	✔
SID	The Oracle E-Business Suite server identifier.	✔ Required if not specified in the Oracle E-Business Suite job plug-in properties file.

Table 23. Required and optional attributes for the job definition of Oracle E-Business Suite jobs. (continued)

Attribute	Description	Required
Username	The name of the user authorized to access the Oracle E-Business Suite server.	✔ Required if not specified in the Oracle E-Business Suite job plug-in properties file.
Password	The password associated with the user authorized to access the Oracle E-Business Suite server.	✔ Required if not specified in the Oracle E-Business Suite job plug-in properties file.
Driver Classpath	The path of the JAR file that contains the drivers required to connect to Oracle E-Business Suite.	✔ Required if not specified in the Oracle E-Business Suite job plug-in properties file.
Application User	The name of a valid Oracle E-Business Suite application user.	✔
Application Identifier	The name of the Oracle E-Business Suite application module used to sign on to Oracle E-Business Suite application.	✔
Responsibility Identifier	A valid responsibility for the Oracle E-Business Suite application module.	✔
Concurrent Program	The Oracle E-Business Suite job name.	✔
Application Name	The name of the Oracle E-Business Suite application that registered the job.	✔
Organization Name	The name of the Oracle E-Business Suite operating unit (ORG_ID).	✔
Parameters	The Oracle E-Business Suite application parameters, if any.	
Printer Name	The name of the printer. If the specified printer doesn't exist, the job execution doesn't fail.	
Print Copies	The number of copies that you want to print.	
Users to notify	The list of users that must be notified by the Oracle E-Business Suite application. Input format is: `<template application name, template code, language, territory, format>`	

Defining IBM Workload Scheduler jobs to run Oracle E-Business Suite jobs by using the Dynamic Workload Console

You can define jobs using the Dynamic Workload Console when you are working in either a distributed environment or in a z/OS environment.

About this task

To define a job that runs an Oracle E-Business Suite job by using the Dynamic Workload Console, complete the following procedure. See Chapter 2, "Defining a job," on page 7 for information about defining jobs with other available interfaces.

A description of the job properties and valid values are detailed in the context-sensitive help in the Dynamic Workload Console by clicking the question mark (?) icon in the top-right corner of the properties pane.

Procedure

1. In the console navigation tree, expand **Administration** > **Workload Design** and click **Manage Workload Definitions**.
2. Specify an engine name, either distributed or z/OS. The Workload Designer is displayed.
3. In the Working List panel, select **New** > **Job Definition** > **ERP** > **Oracle E-Business**. In a z/OS environment, select **New** > **ERP** > **Oracle E-Business**. The properties of the job are displayed in the right-hand panel for editing.
4. In the properties panel, specify the attributes for the job definition that you are creating. You can find detailed information about all the attributes in the help available with the panel. In particular:

   In the General panel:

   Distributed

   Distributed Environment:

   Enter the name of the IBM Workload Scheduler job that runs the Oracle E-Business Suite application.

   Enter the name of the workstation where the IBM Workload Scheduler job is to run.

   z/OS

   z/OS Environment:

   Enter the name of the partitioned data set where you want to create the JCL.

   Enter the name of the JCL that you want to create in the partitioned data set.

   Enter the name of the workstation where the IBM Workload Scheduler job is to run.

   In the Oracle E-Business Suite panel:

   In the Server section:

   Enter the credentials that are related to the Oracle E-Business Suite server. If you do not want to specify them here, you can define them in the `OracleEBusinessJobExecutor.properties` file. In this case IBM Workload Scheduler reads them from the `.properties` file when you submit the job. Use the **Test**

Connection button to verify the connection to the Oracle E-Business Suite server using the credentials specified.

You must specify the credentials either using the Dynamic Workload Console or the `.properties` file, otherwise you receive an error message. See "Customizing IBM Workload Scheduler to run Oracle E-Business Suite jobs" on page 116.

For a description of the parameters in the Server section, see "Job definition for Oracle E-Business Suite jobs" on page 112 or refer to the help available with the panel.

In the Application section
Enter the Oracle E-Business Suite application user and the application job attributes. Pick lists are available for easy selection. IBM Workload Scheduler retrieves this information directly from the Oracle E-Business Suite Server. Click **Test Application** to verify that the information you entered for the Application User, the Application Identifier and the Responsibility Identifier are correct.

For a description of the parameters in the Application section, see "Job definition for Oracle E-Business Suite jobs" on page 112 or refer to the help available with the panel.

5. Click **Save** to save the job definition in the database.

Scheduling and submitting job streams for Oracle E-Business Suite jobs

You schedule IBM Workload Scheduler Oracle E-Business Suite jobs by defining them in job streams.

See Chapter 3, "Scheduling and submitting jobs and job streams," on page 9 for information about how to schedule and submit jobs and job streams using the various interfaces available with the product.

After you define an IBM Workload Scheduler for Oracle E-Business Suite job, you add it to a job stream with all the necessary scheduling arguments and submit it. After submission, when the job is running and is reported in **EXEC** status in IBM Workload Scheduler, you can stop it if necessary, by using the **kill** command. The **kill** command stops the job in IBM Workload Scheduler, but not in the Oracle E-Business Suite environment.

If the IBM Workload Scheduler agent becomes unavailable when you submit the IBM Workload Scheduler for Oracle E-Business Suite job or while the job is running, IBM Workload Scheduler collects the job log when the agent restarts and assigns the **Error** or **ABEND** status to the job.

For information about monitoring jobs and job streams, see Chapter 4, "Monitoring IBM Workload Scheduler jobs," on page 11.

For information about analyzing the job log, see Chapter 5, "Analyzing the job log," on page 13.

Customizing IBM Workload Scheduler to run Oracle E-Business Suite jobs

You can customize IBM Workload Scheduler to run Oracle E-Business Suite jobs by editing the `OracleEBusinessJobExecutor.properties` file.

The `OracleEBusinessJobExecutor.properties` file is a text file, which is located in the directory:

agent_install_dir`/TWA/TWS/JavaExt/cfg`

Where, *agent_install_dir* is the path where you installed the IBM Workload Scheduler dynamic agent or the IBM Workload Scheduler for z/OS agent.

The properties file assigns default values to the Oracle E-Business Suite job properties. You can override the values set by the installation at a later time.

The properties file is automatically generated either when you perform a "Test Connection" from the Dynamic Workload Console in the job definition panels, or when you submit the job to run the first time. Once the file has been created, you can customize it. This is especially useful when you need to schedule several jobs of the same type. You can specify the values in the properties file and avoid having to provide information such as credentials and other information, for each job. You can override the values in the properties files by defining different values at job definition time.

You can define the properties contained in the `.properties` file also at job definition time. In this case, IBM Workload Scheduler uses the values that you specify at job definition time for running the job.

Table 24. Properties to run Oracle E-Business Suite jobs

Property	Description	Required
sid	The Oracle E-Business Suite server identifier.	
interval	The monitoring frequency. It determines how often the job is monitored. Default value is 10 seconds.	✓
username	The name of the user authorized to access the Oracle E-Business Suite server.	
printerCopies	The number of copies that you want to print.	
driver_class_path	The path of the JAR file that contains the drivers required to connect to Oracle E-Business Suite server.	
timeout	The monitoring time. It determines for how long the job is monitored. At the end of the timeout interval the job fails. Default value is 7200 seconds.	✓
hostname	The Oracle E-Business Suite server address.	
printerName	The name of the default printer.	
password	The password that is associated with the user authorized to access the Oracle E-Business Suite server.	
parameters	The Oracle E-Business Suite application parameters.	

Example

This example shows the default `.properties` file for Oracle E-Business Suite jobs.

```
sid=
interval=10
username=
printerCopies=
driver_class_path=
timeout=7200
hostname=
printerName=
password=
parameters=
```

Mapping between IBM Workload Scheduler job statuses and Oracle E-Business Suite application statuses

IBM Workload Scheduler job status can be mapped to Oracle E-Business Suite application status.

Table 25 shows how you can map the IBM Workload Scheduler job status in the job log output to the status of the Oracle E-Business Suite application.

Table 25. Mapping between IBM Workload Scheduler and Oracle E-Business Suite application statuses

Oracle E-Business Suite application statuses	**Dynamic Workload Console and Application Lab**	**IBM Workload Scheduler statuses**
Request Failure or Request not Found		UT (unsupported task)
Inactive	Blocked	SUSP
Pending	Waiting	WAIT
Pending Normal	Waiting	ADD
Running Normal	Running	EXEC
Completed Normal	Successful	SUCC
Completed Warning	Successful	SUCC
Completed Error	Error	ABEND
Completed Terminated	Error	ABEND
Completed Canceled	Error	ABEND

For more information about job management, see *IBM Workload Scheduler User's Guide and Reference*.

Job log output

The IBM Workload Scheduler for Oracle E-Business Suite job log and its content.

The output of an IBM Workload Scheduler for Oracle E-Business Suite job log is composed of two parts:

- The first part is the job definition in XML format.
- The second part is the output of the job.

The output shows the current job status.

Sample

This example shows the output of a job that completed successfully:

```
===============================================================
= JOB : NC005079_1#JOBS[(0000 07/06/14),(JOBS)].ORACLE
= TASK : <?xml version="1.0" encoding="UTF-8"?>
xmlns:jsdl="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdl"
 xmlns:jsdloracleebusiness="http://www.abc.com/xmlns/prod/scheduling/1.0/
 jsdloracleebusiness" name="ORACLEEBUSINESS">
.
.
</jsdl:jobDefinition>
= TWSRCMAP :
= AGENT : NC005079_1
= Job Number: 627460662
= Tue Aug 5 11:51:37 CEST 2014
===============================================================
Found:SYSADMIN
Found:SYSADMIN System Administrator
AWKDBE039W Printer values have not been set.
Submitted successfully with RUN ID:7449273
Workload Scheduler - Oracle E-Business Suite Applications nc005072
Job Id:7449273
http://nc005072.romelab.it.abc.com:8000/OA_HTML/AppsLogin
Monitoring is started with status retrieved every [sec]:10
---------------------------------------------------------------
Phase:Pending
Status:Standby
Development Phase:PENDING
Development Status:STANDBY
---------------------------------------------------------------
Phase:Completed
Status:Normal
Development Phase:COMPLETE
Development Status:NORMAL
Message:Normal completion
---------------------------------------------------------------
Completed successfully with RUN ID:7449273
Execution time [sec]:40
Development Status:NORMAL
Message:Normal completion
===============================================================
= Exit Status : 0
= Elapsed Time (Minutes) : 1
= Tue Aug 5 11:52:18 CEST 2014
===============================================================
```

Analyzing the Oracle E-Business Suite job properties

When the job is running, you can analyze its properties to verify the job status.

About this task

This example shows the job properties contained in the Extra Information section of an Oracle E-Business Suite job.

Example

```
Extra Information
Development Phase=COMPLETE
Development Status=NORMAL
Job Id=7449273
Message=Normal completion
Phase=Completed
Status=Normal
```

Chapter 21. Salesforce jobs

IBM Workload Scheduler integrates with Salesforce to provide the capability of automating, monitoring, and controlling workflows containing batch APEX jobs.

Prerequisites

You gain greater control of your Salesforce jobs with both calendar-based and event-based workload automation, as well as providing a single point of control to handle exceptions and automate recovery processes.

For information about the supported versions of the job plug-ins, generate a dynamic Data Integration report from the IBM Software Product Compatibility Reports web site, and select the **Supported Software** tab: Data Integration.

Before you start to create a 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 TWSListApexClass

```
@RestResource(urlMapping='/TWSListApexClass/*')
global with sharing class TWSListApexClass{
//This Apex class exposes the TWSListApexClass 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 as default at job definition time.

Business Scenario

WWMail4U.Inc offers mail and e-commerce market products and services worldwide. As an organization, WWMail4U.Inc manages large amounts of complex data traffic.

WWMail4U.Inc operates in a very competitive market, and to maintain a leading role, it recently implemented cloud solutions to provide business applications as a service to its customers. WWMail4U.Inc's top priority is to have its SAP source servers aligned with the SalesForce Server within the cloud environment. The company's SAP workload is already controlled by IBM Workload Scheduler and the plan is to extend this control to all their (batch) business processes.

Thanks to the integration between IBM Workload Scheduler and Salesforce, WWMail4U.Inc has its entire business process chain in a single job stream controlled by IBM Workload Scheduler.

Salesforce job definition

A description of the job properties and valid values are detailed in the context-sensitive help in the Dynamic Workload Console by clicking the question mark (?) icon in the top-right corner of the properties pane.

For more information about creating jobs using the various supported product interfaces, see Chapter 2, "Defining a job," on page 7.

The following table lists the required and optional attributes for Salesforce jobs:

Table 26. Required and optional attributes for the definition of a Salesforce job

Attribute	Description and value	Required
Server	The Salesforce server that Salesforce provides you, after your registration.	✓
User name	The name of the user authorized to access the Salesforce server.	✓
Password	The password that is associated with the user that is authorized to access the Salesforce server.	✓
APEX Class	The APEX batch class that is supported for IBM Workload Scheduler. You can execute only Salesforce Apex batch classes. If you specify a non-batch class, the job fails.	✓

Scheduling and stopping the job in IBM Workload Scheduler

You schedule IBM Workload Scheduler Salesforce jobs by defining them in job streams. Add the job to a job stream with all the necessary scheduling arguments and submit the job stream.

You can submit jobs by using the Dynamic Workload Console, Application Lab or the **conman** command line. See Chapter 3, "Scheduling and submitting jobs and job streams," on page 9 for information about how to schedule and submit jobs and job streams using the various interfaces.

After submission, when the job is running and is reported in **EXEC** status in IBM Workload Scheduler, you can stop it if necessary, by using the **kill** command from the Dynamic Workload Console. However, this action is effective only for the Request/Response scenario, therefore the IBM Workload Scheduler processes do not wait to receive a response from the Salesforce job.

Monitoring the job

If the IBM Workload Scheduler agent stops when you submit the IBM Workload Scheduler Salesforce job or while the job is running, as soon as the agent restarts in the Request/Response scenario, IBM Workload Scheduler begins monitoring the job from where it stopped and waits for the Response phase.

For information about how to monitor jobs using the different product interfaces available, see Chapter 4, “Monitoring IBM Workload Scheduler jobs,” on page 11.

Job properties

While the job is running, you can track the status of the job and analyze the properties of the job. In particular, in the Extra Information section, if the job contains variables, you can verify the value passed to the variable from the remote system. Some job streams use the variable passing feature, for example, the value of a variable specified in job 1, contained in job stream A, is required by job 2 in order to run in the same job stream.

For more information about passing variables between jobs, see the related section in *User's Guide and Reference*.

For information about how to display the job properties from the various supported interfaces, see Chapter 5, “Analyzing the job log,” on page 13.

For example, from the **conman** command line, you can see the job properties by running:

```
conman sj <Salesforce_job_name>;props
```

where <*Salesforce_job_name*> is the Salesforce job name.

For a Salesforce job in the `Extra Information` section of the output command, you see the following properties:

```
Extra Information
  Apex batch class = TWSBatchTest
  Apex job ID = 7072000000eLnYOAA0
  Job item processed = 1
  Number of errors= 0
  Server address = regionA.salesforce.com
  Batch status = Completed
  Total Job items = 1
  User name = userabc@xyz.com
```

where

Apex batch class
: The APEX batch class that is supported for IBM Workload Scheduler.

Apex job ID
: The Salesforce job ID.

Job item processed
: The number of the processed job items.

Number of errors
: The number of the errors.

Server address
: The Salesforce server that you specify in the `Server` field.

Batch status
: The status of batch job

Total Job items
: The total number of processed job items.

User name
The name of the user authorized to access the Salesforce server that you specify in the `User name` field.

You can export the Salesforce job properties that you can see in the `Extra Information` section, to a successive job in the same job stream instance. For more information about the list of job properties that you can export, see the table about properties for Salesforce jobs in *User's Guide and Reference*.

The properties file is automatically generated either when you perform a "Test Connection" from the Dynamic Workload Console in the job definition panels, or when you submit the job to run the first time. Once the file has been created, you can customize it. This is especially useful when you need to schedule several jobs of the same type. You can specify the values in the properties file and avoid having to provide information such as credentials and other information, for each job. You can override the values in the properties files by defining different values at job definition time.

The following example shows the job definition for a Salesforce job :

```
NEWYORK-01#JOB-SF-0000
TASK
<?xml version="1.0" encoding="UTF-8"?>
<jsdl:jobDefinition xmlns:jsdl=
"http://www.abc.com/xmlns/prod/scheduling/1.0/jsd
l" xmlns:jsdlsalesforce=
"http://www.abc.com/xmlns/prod/scheduling/1.0/jsdlsalesforce"
name="SALESFORCE">
<jsdl:application name="salesforce">
<jsdlsalesforce:salesforce>
<jsdlsalesforce:SalesforceParameters>
<jsdlsalesforce:SalesforceParms>
<jsdlsalesforce:ServerConnection>
<jsdlsalesforce:Server>regionA.salesforce.com
sforce.com</jsdlsalesforce:Server>
<jsdlsalesforce:UserID>userabc@xyz.com
</jsdlsalesforce:UserID>
<jsdlsalesforce:password>{aes}+D
2UAAxhxtYf8ENfb7LNr0DLRt0hwKPHlDiA2/PO1e4=
</jsdlsalesforce:password>
</jsdlsalesforce:ServerConnection>
<jsdlsalesforce:APEXJobDetails>
   <jsdlsalesforce:APEXClass>TWSBatchTest
    </jsdlsalesforce:APEXClass>
</jsdlsalesforce:APEXJobDetails>
</jsdlsalesforce:SalesforceParms>
</jsdlsalesforce:SalesforceParameters>
</jsdlsalesforce:salesforce>
</jsdl:application>
</jsdl:jobDefinition>
RECOVERY STOP
```

Job log content

For information about how to display the job log from the various supported interfaces, see Chapter 5, "Analyzing the job log," on page 13.

For example, you can see the job log content by running the command `conman sj <Salesforce_job_name>;stdlist`, where *<Salesforce_job_name>* is the Salesforce job name.

For a Salesforce job log, you see the following information:

```
============================================================
= JOB : NY0000000000#JOBS[(0000 05/08/14),(JOBS)].SF_MAR0318376017
= TASK : <?xml version="1.0" encoding="UTF-8"?>
<jsdl:jobDefinition xmlns:jsdl=
"http://www.abc.com/xmlns/prod/scheduling/1.0/jsdl" xmlns:jsdlsalesforce=
"http://www.abc.com/xmlns/prod/scheduling/1.0/jsdlsalesforce" name="SALESFORCE">
<jsdl:variables>
<jsdl:stringVariable name=
       "tws.jobstream.name">JOBS</jsdl:stringVariable>
<jsdl:stringVariable name=
        "tws.jobstream.id">JOBS</jsdl:stringVariable>
<jsdl:stringVariable name="tws.job.name">
          SF_MAR0318376017</jsdl:stringVariable>
<jsdl:stringVariable name=
       "tws.job.workstation">NY0000000000</jsdl:stringVariable>
<jsdl:stringVariable name=
         "tws.job.iawstz">201405080000</jsdl:stringVariable>
<jsdl:stringVariable name=
........."tws.job.promoted">NO</jsdl:stringVariable>
<jsdl:stringVariable name=
........."tws.job.resourcesForPromoted">10</jsdl:stringVariable>
<jsdl:stringVariable name=
........."tws.job.num">607245960</jsdl:stringVariable>
</jsdl:variables>
<jsdl:application name="salesforce">
<jsdlsalesforce:salesforce>
<jsdlsalesforce:SalesforceParameters>
<jsdlsalesforce:SalesforceParms>
<jsdlsalesforce:ServerConnection>
<jsdlsalesforce:Server>
        regionA.salesforce.com</jsdlsalesforce:Server>
<jsdlsalesforce:UserID>userabc@xyz.com</jsdlsalesforce:UserID>
<jsdlsalesforce:password>
{aes}+D2UAAxhxtYf8ENfb7LNr0DLRt0hwKPHlDiA2/PO1e4=
</jsdlsalesforce:password>
</jsdlsalesforce:ServerConnection>
<jsdlsalesforce:APEXJobDetails>
<jsdlsalesforce:APEXClass>TWSBatchTest</jsdlsalesforce:APEXClass>
</jsdlsalesforce:APEXJobDetails>
</jsdlsalesforce:SalesforceParms>
</jsdlsalesforce:SalesforceParameters>
</jsdlsalesforce:salesforce>
</jsdl:application>
<jsdl:resources>
<jsdl:orderedCandidatedWorkstations>
<jsdl:workstation>
690830601B8D4681AF38D3529BC5199E</jsdl:workstation>
</jsdl:orderedCandidatedWorkstations>
</jsdl:resources>
</jsdl:jobDefinition>
= TWSRCMAP :
= AGENT : NC125181_1
= Job Number: 607245960
= Thu May 22 17:18:49 CEST 2014
================================================================
Apex Batch job ID: 7072000000eLnYOAA0
Apex job completed with success
Apex Job ID: 7072000000eLnYOAA0
Status: Completed
Total Batches: 1
Batches Processed: 1
Failures: 0
================================================================
= Exit Status : 0
= Elapsed Time (Minutes) : 1
= Thu May 22 17:18:53 CEST 2014
================================================================
```

See also

From the Dynamic Workload Console you can perform the same task as described in

the *Dynamic Workload Console User's Guide*, section about Creating job definitions.

For more information about how to create and edit scheduling objects, see

the *Dynamic Workload Console User's Guide*, section about Designing your Workload.

Part 3. Access methods

Access methods are used to extend the job scheduling functions of IBM Workload Scheduler to other systems and applications. They run on extended agents, dynamic agents, and IBM Workload Scheduler for z/OS agents. They enable communication between external systems (SAP R/3, z/OS) and IBM Workload Scheduler and launch jobs and return the status of jobs.

For information about the supported versions of the plug-ins and access methods, run the Data Integration report and select the **Supported Software** tab.

Chapter 22. Installing and configuring the access methods

The access methods documented in this guide are packaged with IBM Workload Scheduler and are automatically installed with the product on dynamic and fault-tolerant agents.

To be entitled to use an access method, you must purchase the corresponding chargeable component. For details about installing an IBM Workload Scheduler dynamic or fault-tolerant agent, see IBM Workload Scheduler Planning and Installation.

To use any of the access methods on supported agents, you create an options file, which configures the access method and defines the workstation and the jobs that extend the scheduling capability to external systems or applications.

Setting options for the access methods

An options file is a text file located in the `methods` directory of the IBM Workload Scheduler installation, containing a set of options to customize the behavior of the access method. The options must be written one per line and have the following format (with no spaces included):

option=value

All access methods use two types of options files: a global options file and one or more local options files. The names of the local options files are generically referred to as `XANAME_<`*accessmethod*`>`.opts on extended agents and `DYNAMIC_AGENT_FILE_<`*accessmethod*`>`.opts on dynamic agents. The file names specified for the local options files for both types of agents must respect the following rules:

- Both`XANAME` and `DYNAMIC_AGENT_FILE` in the file name must be upper case alphanumeric characters. For example, if the installation of the `r3batch` access method includes two extended agent workstations, `CPU1` and `CPU2`, the names of the local options files are `CPU1_r3batch.opts` and `CPU2_r3batch.opts`.
- Double-byte character set (DBCS), single-byte character set (SBCS), and bidirectional text are not supported. For information about acceptable values for the extended agent workstation name, See Table 27 on page 135.

Dynamic agents and IBM Workload Scheduler for z/OS agents

Global options file

A common configuration file created by default for each access method installed, whose settings apply to all the dynamic agent workstations defined for that method. When the global options file is created, it contains only the **LJuser** option, which represents the operating system user ID used to launch the access method. You can customize the global options file by adding the options appropriate for the access method.

The name of the global options file is *accessmethod*`.opts`, which, depending on your operating system, corresponds to:

For PeopleSoft

`psagent.opts`

For SAP R/3

`r3batch.opts`

For z/OS

`mvsjes.opts, mvsopc.opts`

Local options file

One or more configuration files that are specific to each access method. The name of this file is *optionsfile_accessmethod*`.opts` and they are saved to the path <*TWA_DIR*>`/TWS/methods`.

In a distributed environment

- If you are defining a job to run the access method by using the Dynamic Workload Console, it is the options file you specify in the **New** > **Job definition** > **ERP** > **Access Method** XA Task tab.
- If you are defining the SAP R/3 job to run the access method by using the Dynamic Workload Console, it is the options file you specify in the **New** > **Job definition** > **ERP** > **SAP Job on Dynamic Workstations** XA Task tab.
- If you are defining the job to run the access method by using **composer**, it is the options file you specify in the **target** attribute of the job definition.

If you do not create a local options file, the global options file is used.

In a z/OS environment

- If you are defining a job to run the access method by using the Dynamic Workload Console, it is the options file you specify in the **New** > **ERP** > **Access Method** XA Task tab.
- If you are defining the SAP R/3 job to run the access method by using the Dynamic Workload Console, it is the options file you specify in the **New** > **ERP** > **SAP** XA Task tab.
- If you are defining the job to run the access method by using the **JOBREC** statement, it is the name of the workstation where the access method runs.

If you do not create a local options file, the global options file is used.

If you do not specify an option in the *optionsfile_accessmethod*`.opts` file, while the access method is running, the product uses the values specified for that option in the global options file. If you do not specify options either in the *optionsfile_accessmethod*`.opts` or in the global option file, the product issues an error message.

If the SAP R/3 access method is installed for `AGENT1` workstation, but you have two external SAP systems on which to schedule jobs, then in the <*TWA_DIR*>`/TWS/methods` directory, you create the following options files:

- `SAP1_AGENT1_r3batch.opts`
- `SAP2_AGENT1_r3batch.opts`

Each file contains the options specific to each external SAP system, for example, the connection information.

For pools and dynamic pools containing *n* agents, you must create an options file for the dynamic pool and copy it in the *TWA_DIR*/TWS/methods of each agent of the pool so that all members of the pool have a local options file with the same name. Then you must create another options file for the specific agent in the same directory. For example, if the SAP R/3 access method is installed for **AGENT1** and **AGENT2** which belong to the dynamic pool **DYN_POOL**, create in the <TWA_DIR>/TWS/methods directory of each agent the following options files:

AGENT1

- FILEOPTS_AGENT1_r3batch.opts
- FILEOPTS_DYN_POOL_r3batch.opts

AGENT2

- FILEOPTS_AGENT2_r3batch.opts
- FILEOPTS_DYN_POOL_r3batch.opts

Extended agents

All access methods use two types of options file:

Global options file
A common configuration file created by default for each access method installed, whose settings apply to all the extended agent workstations defined for that method. When the global options file is created, it contains only the **LJuser** option, which represents the operating system user ID used to launch the access method. You can customize the global options file by adding the options appropriate to the access method.

The name of the global options file is *accessmethod*.opts, which, depending on your operating system, corresponds to:

For PeopleSoft
psagent.opts

For SAP R/3
r3batch.opts

For z/OS
mvsjes.opts, mvsopc.opts

For custom access methods
netmth.opts

Local options file
A configuration file that is specific to each extended agent workstation within a particular installation of an access method. The name of this file is *XANAME_accessmethod*.opts, where:

XANAME
Is the name of the extended agent workstation.

accessmethod
Is the name of the access method.

If you do not create a local options file, the global options file is used. Every extended agent workstation, except for z/OS, must have a local options file with its own configuration options.

The options files must be located in the `<TWA_DIR>/TWS/methods` directory. They are read when the supported agent is started. Options are specific to each access method. For details about how to configure each access method, see the following sections:

PeopleSoft
"Configuring the PeopleSoft access method" on page 144.

SAP R/3
"Configuring the SAP R/3 access method" on page 207.

z/OS "Configuring the z/OS access method" on page 166.

Option value inheritance

This property is currently available for r3batch only. Local options files can inherit existing values from the same options in the global options file `r3batch.opts`. For an access method, the options are listed twice; once as global options and once as local options. If the local options file does not contain a value for the option, then the value for that option in the global options file is used. Otherwise the option value in the local options file is always used.

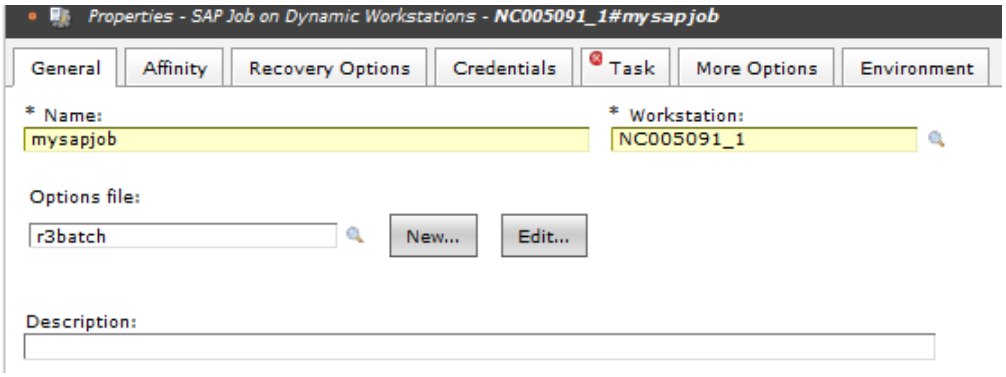
For example, you might want to define the same value for the **Ljuser** option and a different value for the **retrieve_joblog** option. To do this, you define the **Ljuser** option value in the `r3batch.opts` file. Then you define a different value for the **retrieve_joblog** option in each local options file. This results in the following actions when launching the SAP R/3 job:

- The value for the **Ljuser** option is extracted from the r3batch.opts file.
- The value for the **retrieve_joblog** option is taken from each local options file.

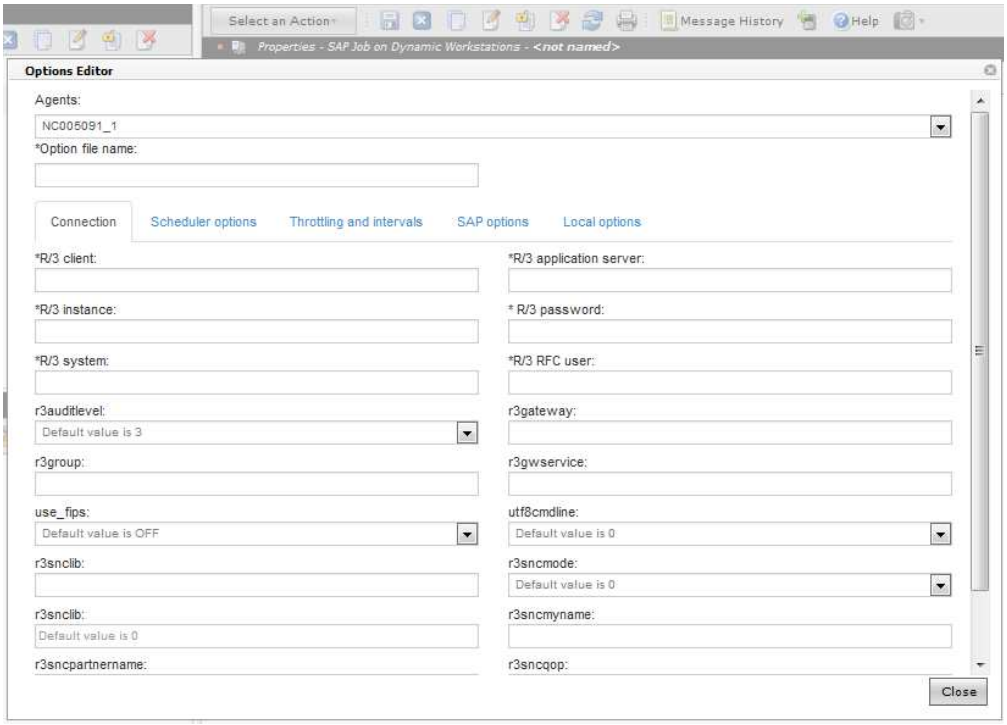
Editing the options files from the Dynamic Workload Console

You can modify a local or global options file, or create a local options file, by using either a text editor or the Option Editor described in "Using the Option Editor" on page 131. On dynamic agents, for both SAP and PeopleSoft (access method job type) jobs, the Dynamic Workload Console provides an Options Editor integrated into the graphical user interface panel, where you can edit existing options files or create a new options file.

For SAP jobs, the Options Editor is available on the **General** tab.



Select to edit or create a new options file. An Options Editor panel displays all the related options for the r3batch access method:



For PeopleSoft jobs, the Options Editor is available on the **XA Task** tab of the Access Method job type.

Using the Option Editor

Using the Option Editor.

About this task

How you use the Option Editor to perform the following tasks:

- Modify local or global options file, see "Modifying local or global options files" on page 133.
- Create a local options file, see "Creating local options files" on page 133.

To start the Option Editor, go to the `TWS_home/methods/opted` directory of your IBM Workload Scheduler installation and, depending on your operating system, run the following command:

On Windows operating systems

```
opted.bat
```

On UNIX operating systems

```
opted.sh
```

Note: To use the Option Editor on a UNIX workstation, you must have a graphical environment.

The Option Editor automatically loads all the existing global and local options files grouped by access method.

The Option Editor window has three main areas, as shown in Figure 1. To choose which areas you want to see, select **View** > **Show**. The areas are:

File Options Tree
Shows a list of all the existing options files, grouped by method.

Option Descriptor
Gives a description of the current selection.

File Options View
Displays the options of a selected file in any of the three available views.

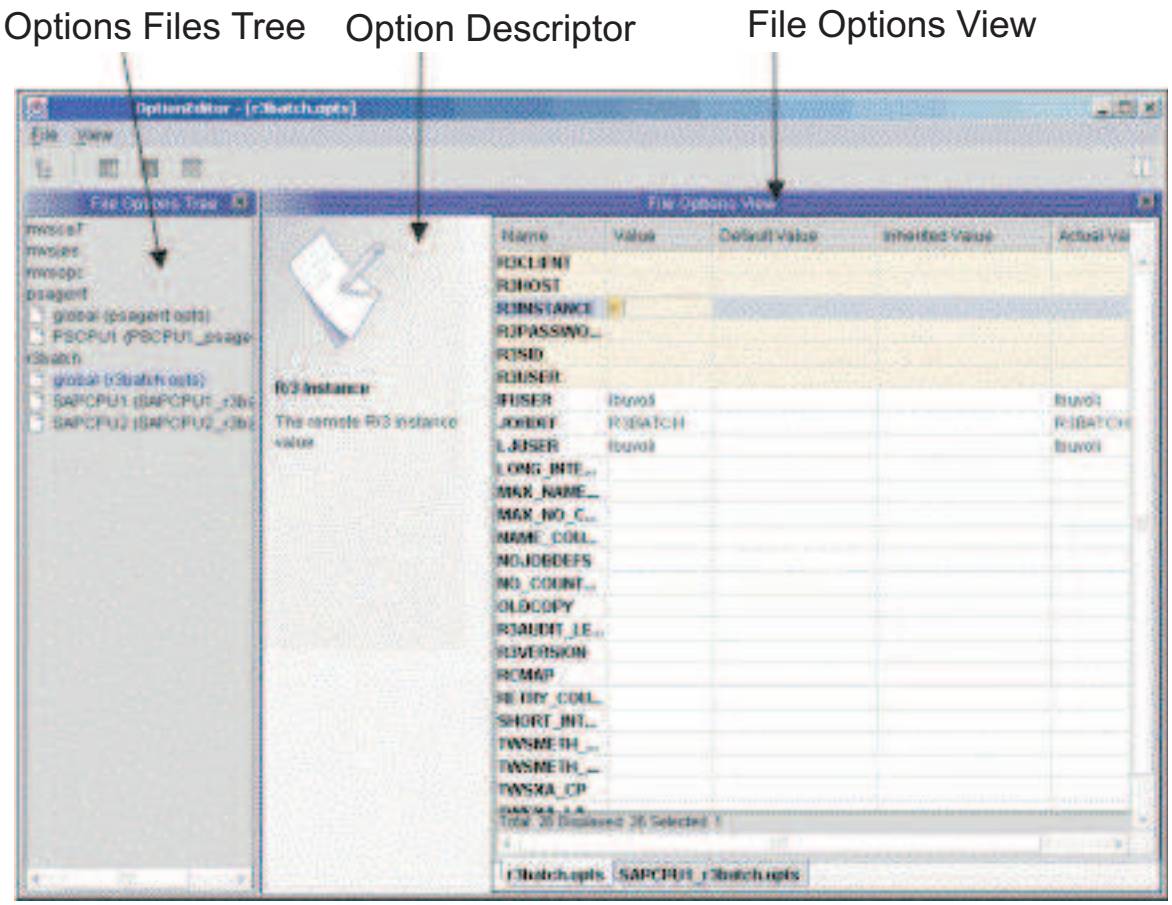


Figure 1. The Option Editor

The Option Editor provides three possible views of an options file. To change the view in which the options file is displayed select **View** > **Display As**. The views are:

Simple
Displays the options as a sequence of tabs that you can select to edit one option at a time. To view or edit an option, select the tab with the option name to display the field for the value. This is the easiest way to edit options, because you only see the actual value that is used in the file. Inherited or default values are not displayed.

Table Provides a tabular view of all the options for a selected file. This is the default view. For each option the following columns are displayed:

Name The name of the option.

Value The value specified in the file.

Default Value
The value used by the method if not specified in the options file or inherited.

Inherited Value
The value obtained from the global options file if inheritance is supported by the access method. For a detailed explanation, see "Option value inheritance" on page 130.

Actual Value
The value used at run time. The values are used in the order: value, if available; inherited value, if supported; default value.

Text Displays an options file in the typical format, showing only the options that have a value. This view is generally used for preview purposes, because files are shown in read-only form. Password fields are shown encrypted.

Mandatory options are identified by a yellow background and are marked with an asterisk (*). Options that are not correctly entered are shown with a red background. The Option Editor performs only syntactic checks.

Restrict access to the Option Editor. If you have multiple installations of a supported agent, you can increase security by maintaining only one copy of the Option Editor, for example, on the master workstation.

Modifying local or global options files

About this task

To modify local or global options files, using the Option Editor, perform the following steps:

1. From the **File Options Tree** area, select the options file that you want to modify. The options are displayed in the **File Options View** area.
2. Select the option that you want to modify and modify its value.
3. Save and close the options file.

Creating local options files

About this task

You create local options files when you define a new supported agent workstation. For PeopleSoft and SAP access method, you can create a local options file right from the Workload Designer in the Dynamic Workload Console when defining the job definition. Alternatively, for these access methods and the z/OS access method, you can create a local options file using the Option Editor.

To create a local options file, using the Option Editor, perform the following steps:

1. Click **File** > **New** in the menu bar. The New Option File window is displayed.
2. In the **Insert XA CPU Name** field:

   Extended agents
   Enter the name of the extended agent workstation *XANAME* for which you want to create an options file.

   Dynamic agents and IBM Workload Scheduler for z/OS agents

optionsfile
The name of the options file. This value can be different from the dynamic agent and IBM Workload Scheduler for z/OS agent workstation name.

3. Select an access method from the **Insert Method Name** drop-down menu.

   Extended agents

   accessmethod
   The access method you selected.

   Dynamic agents and IBM Workload Scheduler for z/OS agents

   accessmethod
   The access method you selected.
4. Enter values for the options you want to define.
5. Save and close the options file.

Defining supported agent workstations

A workstation definition is required for each entity of an access method through which IBM Workload Scheduler schedules and launches jobs. For further details about supported agents, see Chapter 1, "Supported agent workstations," on page 3.

Creating a workstation using the Dynamic Workload Console

About this task

How to create a workstation definition for supported agents using the Dynamic Workload Console.

Dynamic agents and IBM Workload Scheduler for z/OS Agents
The agents are automatically registered to the IBM Workload Scheduler network. For further information about the dynamic agents registration, see *IBM Workload Scheduler User's Guide and Reference*.

Extended agents

To define an extended agent workstation using the Dynamic Workload Console, perform the following steps:

1. From the Dynamic Workload Console portfolio, click **Administration** > **Workload Environment Design** > **Create Workstations**.
2. Select an engine, distributed or z/OS, from the list and click **Create Workstation**.
3. In the Workstations properties panel, specify the attributes for the extended agent workstation you are creating. For all the details about available fields and options, see the online help by clicking the "?" in the top-right corner. In the workstation definition, specify the access method and other properties, as shown in Table 27 on page 135. For further information about the workstation definition properties, see *IBM Workload Scheduler User's Guide and Reference*
4. To assign the workstation to an existing domain or to create a new domain, click **Assign to Domain**.
5. Click **Save**.

The following table shows how to complete some specific fields of the workstation properties panel for **extended agents**.

Table 27. How to complete the extended agents definition. This table shows how to complete the extended agents definition

Field	Description by Access Method		
	PeopleSoft	**z/OS**	**SAP R/3**
Name	The name for the extended agent workstation. For all access methods (except for z/OS, which always has a limit of 8 characters), the name must start with a letter and can contain alphanumeric characters, dashes, and underscores. The maximum length is 16 characters. Workstation names must be unique and cannot be the same as workstation class and domain names. Double-byte character set (DBCS), single-byte character set (SBCS), and bidirectional text are not supported. If a workstation name contains these characters and, as a result, the options file name contains the same name, the workstation cannot be validated by the SAP system. For all the access methods, this name must be consistent with the name of the options file associated with the extended agent workstation. That is, if the options file name is `MYXAGENT_`*`accessmethod`*`.opts`, then `MYXAGENT` and **Name** must be the same.		
Node Name	**null**	The node name or IP address of the z/OS system. Fully qualified domain names are accepted.	**null**
TCP Port	Any number other than 0.	The TCP/IP address (port number) of the z/OS gateway on the z/OS system. Enter the same value as the SYSTSIN variable PORT.	Any number other than 0.
Access Method	**psagent**	Depending on your job scheduling interface, one of the following: **mvsjes** To launch and monitor z/OS jobs using JES2 or JES3. **mvsopc** To launch and monitor z/OS jobs using IBM Workload Scheduler for z/OS. **Note:** In UNIX operating systems, the name is case sensitive and must be lowercase.	**r3batch** **Note:** In UNIX the name is case sensitive and must be lowercase.

Creating a workstation using the command line

You can define supported agents workstations also using the **composer** command line of IBM Workload Scheduler.

Dynamic agents

The following example shows a definition for a dynamic agent workstation named *LINUX248* that uses the secure protocol *https* to connect to the Broker server.

```
CPUNAME LINUX248
  DESCRIPTION "This workstation was automatically created."
  OS UNIX
  NODE linux248.romelab.it.abc.com SECUREADDR 31114
  TIMEZONE Europe/Rome
  FOR MAESTRO HOST NC118003_DWB
```

```
    AGENTID "FD640FCA740311E18C4EE96D727FA991"
    TYPE AGENT
    PROTOCOL HTTPS
END
```

Extended agents

The following example shows a definition for a z/OS extended agent workstation named *MVSCPU* that uses the `mvsjes` access method.

```
cpuname MVSCPU description "zOS extended agent"
     os other
     node mvsesa36.rome.abc.com
     tcpaddr 5000
     domain masterdm
     for maestro
        type x-agent
        host ROCIOUS
        access mvsjes
end
```

For details about defining workstations with **composer**, see the *IBM Workload Scheduler User's Guide and Reference*.

Defining workstations for end-to-end scheduling

About this task

How to create a workstation definition for end-to-end environment.

Scheduling in an end-to-end environment means that in IBM Workload Scheduler for z/OS you are scheduling and monitoring jobs that are physically running on IBM Workload Scheduler workstations. For the agents supported in the z/OS environment, see Chapter 1, "Supported agent workstations," on page 3.

Extended agents

Extended agent workstations must be defined as fault-tolerant workstations in IBM Workload Scheduler for z/OS.

A fault-tolerant workstation is the IBM Workload Scheduler for z/OS definition of an existing IBM Workload Scheduler agent in the distributed network. The IBM Workload Scheduler agent is where the job associated with the fault-tolerant workstation actually runs in the distributed network.

To define the extended agent workstation in IBM Workload Scheduler for z/OS, you must:

1. Define the workstation in the `CPUREC` initialization statement. For an example, see "Creating the CPUREC statement for extended agents" on page 137.
2. Add the same workstation definition to the database using ISPF or the Dynamic Workload Console. For a description of how to define the workstation using the Dynamic Workload Console, see *Dynamic Workload Console User's Guide*. For an example, see "Defining the workstation with ISPF" on page 138.

IBM Workload Scheduler for z/OS agents

To define the agent workstation with z-centric capability in IBM Workload Scheduler for z/OS, add the workstation definition to the database using ISPF or the Dynamic Workload Console. For further information, see *Scheduling End-to-end with z-centric Capabilities*.

Creating the CPUREC statement for extended agents

This section is valid only for Extended agents. Create the CPUREC statement for the workstation in the TOPOLOGY initialization statement. The TOPOLOGY initialization statement is used to define parameters related to the topology of the connected IBM Workload Scheduler network. Such a network topology statement is made up of one or more (one for each domain) DOMREC statements that describe the topology of the distributed network, and by several CPUREC statements, one for each fault-tolerant workstation.

The following example shows a CPUREC statement for an SAP R/3 extended agent workstation named R3XA. The extended agent is hosted by an IBM Workload Scheduler agent named TWSA, which is also the domain manager of DOMAIN1.

```
***************TPLGINFO MEMBER ***************************

/*********************************************************************/
/* DOMREC: Domain definition                                         */
/*********************************************************************/
DOMREC   DOMAIN(DOMAIN1)
         DOMMNGR(TWSA)
         DOMPARENT(MASTERDM)
/*********************************************************************/
/* CPUREC: Extended agent workstation definition                     */
/*********************************************************************/
CPUREC   CPUNAME(R3XA)
         CPUOS(OTHER)
         CPUNODE(NODE1)
         CPUDOMAIN(DOMAIN1)
         CPUHOST(TWSA)
         CPUTYPE(XAGENT)
         CPUACCESS(r3batch)
         CPUUSER(TWSuser)
         CPUTZ('Europe/Rome')
/*********************************************************************/
/* CPUREC: Domain manager workstation definition                     */
/*********************************************************************/
CPUREC   CPUNAME(TWSA)
         CPUNODE(NODE1)
         CPUAUTOLINK(ON)
         CPUDOMAIN(DOMAIN1)
         CPUTYPE(FTA)
         CPUUSER(TWSuser)
         CPUTZ('Europe/Rome')
```

The following keywords define R3XA as an extended agent:

CPUACCESS
The extended agent access method. For SAP R/3, it is r3batch.

CPUHOST
The name of the IBM Workload Scheduler workstation hosting the extended agent. It cannot be another standard agent or extended agent.

CPUTYPE
The workstation type. For an extended agent, it must be XAGENT.

Note: The CPUREC statement does not exist for an IBM Workload Scheduler for z/OS agent workstation.

For further information about CPUREC for extended agents, see *Customization and Tuning*.

Defining the workstation with ISPF
About this task

This section shows the ISPF definition for extended agents and agents with z-centric capability.

Extended agents

In ISPF, define the workstation as `computer automatic` and then set the *FT Work station* field to **Y**. The `CPUREC` statement with the three keywords described in "Creating the CPUREC statement for extended agents" on page 137 provides the extended agent specification.

Note: Make sure you write the `CPUREC` statement before making the ISPF or Dynamic Workload Console definition, because they have no effect without the `CPUREC` statement.

```
-------------- CREATING GENERAL INFORMATION ABOUT A W0RK STATION --------------
 Command ===>

 Enter the command R for resources  A for availability or M for access method
 above, or enter data below:

 WORK STATION NAME   ===> R3XA
 DESCRIPTION         ===> Extended agent for R/3 access method_____________________
 WORK STATION TYPE   ===> C         G  General, C  Computer, P  Printer
 REPORTING ATTR      ===> A         A  Automatic, S  Manual start and completion
                                    C  Completion only, N  Non reporting
 FT Work station     ===> Y         FT Work station, Y or N
 PRINTOUT ROUTING    ===> SYSPRINT  The ddname of daily plan printout data set
 SERVER USAGE        ===> N         Parallel server usage C , P , B or N

 Options:
  SPLITTABLE         ===> N         Interruption of operation allowed, Y or N
  JOB SETUP          ===> N         Editing of JCL allowed, Y or N
  STARTED TASK, STC  ===> N         Started task support, Y or N
  WTO                ===> N         Automatic WTO, Y or N
  DESTINATION        ===> ________  Name of destination
 Defaults:
  TRANSPORT TIME     ===> 00.00     Time from previous work station  HH.MM
  DURATION           ===> ________  Duration for a normal operation  HH.MM.SS
```

Figure 2. Defining an Extended Agent workstation

IBM Workload Scheduler for z/OS agents

For detailed information and examples about the ISPF definition of IBM Workload Scheduler for z/OS agents with z-centric capabilities, see *Scheduling End-to-end with z-centric capabilities*.

Defining jobs for supported agents

To run and monitor a PeopleSoft, SAP R/3, or z/OS job with IBM Workload Scheduler, the supported agents, or access method require an IBM Workload Scheduler job definition, where you specify the external job you want to schedule, the workstation (also defined in IBM Workload Scheduler) on which it is to run, and any recovery actions. To define the job, use either of the following methods:

- Dynamic Workload Console.
- IBM Workload Scheduler **composer** command line.

If you are scheduling in an end-to-end environment, to define the job, use either of the following methods:

- Dynamic Workload Console.
- IBM Workload Scheduler for z/OS ISPF dialogs. You must also create a member in the SCRIPTLIB with a JOBREC statement for the job.

Jobs defined for supported agents are added to job streams and scheduled in the same way as any other job in IBM Workload Scheduler and IBM Workload Scheduler for z/OS.

Defining jobs with the Dynamic Workload Console

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.

To define jobs, follow these steps:

1. From the Dynamic Workload Console portfolio, click **Administration** > **Workload Design** > **Manage Workload Definitions**.
2. Specify an engine name, either distributed or z/OS. The Workload Designer window 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** or **SAP Job on Dynamic Workstations**. See "Creating SAP Standard R/3 jobs from the Dynamic Workload Console" on page 224.
   - For z/OS and PeopleSoft, **ERP** > **Access Method**.
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 "Create an SAP job and associate it to an IBM Workload Scheduler job" on page 224 or "Creating an SAP job from the Dynamic Workload Console" on page 228. You can create native SAP R/3 Standard jobs on a remote SAP system directly from the Dynamic Workload Console.

Defining jobs using the command line

You can also define jobs using the **composer** command line of IBM Workload Scheduler.

Dynamic agents

The following example describes an IBM Workload Scheduler job named DYN_JOB_R3_0001 that runs on a dynamic agent workstation named NC112015_1. The IBM Workload Scheduler launches a job in an SAP environment named JOB_APPS_93.

```
NC112015_1#DYN_JOB_R3_0001
 TASK
<?xml version="1.0" encoding="UTF-8"?>
<jsdl:jobDefinition
     xmlns:jsdl="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdl"
     xmlns:jsdlxa="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdlxa"
```

```
                    name="r3">
  <jsdl:application name="r3" plugin="xajob">
    <jsdlxa:xajob accessMethod="r3batch" target="NW73LIN_r3batch">
            <jsdlxa:taskString>/ -job JOB_APPS_93 -i 14514200 -c c
                 -flag ENABLE_APPL_RC </jsdlxa:taskString>
        </jsdlxa:xajob>
  </jsdl:application>
</jsdl:jobDefinition>
 RECOVERY STOP
```

Extended agents

The following example describes an IBM Workload Scheduler job named psjob2 that runs on a PeopleSoft extended agent workstation named xaps002. IBM Workload Scheduler logs on to UNIX operating system as psjobs and launches a job under PeopleSoft. The PeopleSoft process is named XRFWIN. If recovery is needed, IBM Workload Scheduler runs job recov2 and then continues processing.

```
xaps002#psjob2
  streamlogon psjobs
  scriptname
   -process XRFWIN -type 'SQR Report' -runcontrol 1 -runlocationdescr PSNT
  description "peoplesoft job #2"
  recovery continue after recov2
```

The arguments of scriptname differ by application. For details, see:

- "Task string parameters for PeopleSoft jobs" on page 151.
- "Task string to define SAP jobs" on page 233.
- "Task definition syntax for z/OS jobs scheduled with IBM Workload Scheduler" on page 168.

For more information about using the **composer** command line to define jobs, see *User's Guide and Reference*.

Defining jobs for end-to-end scheduling

Extended agents

Extended agent jobs scheduled to run in an end-to-end environment cannot be defined using the Dynamic Workload Console or the IBM Workload Scheduler command line, but must be added to the SCRIPTLIB of IBM Workload Scheduler for z/OS.

In the OPERATIONS ISPF panel of IBM Workload Scheduler for z/OS, extended agent jobs are defined like any other job, but with the specific attribute for a job defined on an extended agent workstation. The following example shows the definition of a job named SAPJOB. This is the IBM Workload Scheduler for z/OS job that drives the running of on SAP R/3 job (named BAPRINT46B as shown in the next example). It shows as an extended agent job because the associated workstation is an extended agent workstation named R3XA.

```
--------------------------------- OPERATIONS -----------------Row 1 to 1 of 1
Command ===>                                                  Scroll ===> PAGE

Enter/Change data in the rows, and/or enter any of the following
row commands:
I(nn) - Insert, R(nn),RR(nn) - Repeat, D(nn),DD - Delete
S - Select operation details, J - Edit JCL
Enter the TEXT command above to include operation text in this list, or,
enter the GRAPH command to view the list graphically.

Application           : APLL1            FTW appl

Row  Oper      Duration  Job name  Internal predecessors           Morepreds
cmd  ws   no.  HH.MM.SS                                          -IntExt-
'''' R3XA 001  00.00.01  SAPJOB___  ___ ___ ___ ___ ___ ___ ___ ___   0  0
****************************** Bottom of data ********************************
```

Figure 3. Defining an Extended Agent job for end-to-end scheduling

For each job, create a member in the SCRIPTLIB of IBM Workload Scheduler for z/OS with details about the job in a JOBREC statement. A SAPJOB member was created for the job of the previous example. It contains a JOBREC statement like this:

```
JOBREC
  JOBCMD('/-job BAPRINT46B -user MAESTRO -i 14160001 -c C')
  JOBUSR(twsila)
```

The string in JOBCMD is read and interpreted by the access method before running the job. The job of this example, BAPRINT46B, was previously defined on SAP R/3 and assigned with an ID of 14160001, that was manually written in JOBCMD.

The following example is for a PeopleSoft job. The entire string that follows the JOBCMD keyword must be enclosed within quotation marks ("), because for PeopleSoft jobs single quotes are already used in the string.

```
JOBREC
  JOBCMD("/ -process XRFWIN -type 'SQR Report' -runcontrol IWS")
  JOBUSR(PsBuild)
```

IBM Workload Scheduler for z/OS agents

For information about the jobs definition for agent with z-centric capabilities, see *Scheduling End-to-end with z-centric capabilities*.

The arguments of JOBCMD differ by application. For details, see:

- "Task string parameters for PeopleSoft jobs" on page 151.
- "Task string to define SAP jobs" on page 233 or "Defining SAP jobs dynamically" on page 249.
- "Task definition syntax for z/OS jobs scheduled with IBM Workload Scheduler" on page 168.

Submitting jobs

About this task

To submit jobs on the supported agent workstation, perform the following steps:

1. Verify that the application system to which the job belongs and the related database is up and running.
2. Launch the job. For details, see:

   Dynamic agents

- *IBM Workload Scheduler User's Guide and Reference* for **conman** command line.
- *Dynamic Workload Console User's Guide* for Dynamic Workload Console.

Extended agents

- *IBM Workload Scheduler User's Guide and Reference* for **conman** command line.
- *Dynamic Workload Console User's Guide* for Dynamic Workload Console.

IBM Workload scheduler for z/OS agents

- *IBM Workload Scheduler for z/OS: Scheduling End-to-end with z-centric Capabilities* for **ISPF** panel.
- *Dynamic Workload Console User's Guide* for Dynamic Workload Console.

Chapter 23. Access method for PeopleSoft

What you need and what you can do with Access method for PeopleSoft.

Using Access method for PeopleSoft you can run and monitor PeopleSoft jobs from the IBM Workload Scheduler environment. These jobs can be run as part of a schedule or submitted for ad-hoc job processing. PeopleSoft extended agent or dynamic agent jobs can have all of the same dependencies and recovery options as other IBM Workload Scheduler jobs. PeopleSoft jobs must be defined in IBM Workload Scheduler to be run and managed in the IBM Workload Scheduler environment.

For information about the supported versions of the plug-ins and access methods, run the Data Integration report and select the **Supported Software** tab.

Features

Look at the tasks you can perform by using Access method for PeopleSoft.

Using Access method for PeopleSoft, you can perform the following tasks:

- Use IBM Workload Scheduler standard job dependencies on PeopleSoft jobs.
- Schedule PeopleSoft jobs to run on specified days, times, and in a prescribed order.
- Define inter-dependencies between PeopleSoft jobs and IBM Workload Scheduler jobs that run on different applications such as SAP R/3 and Oracle E-Business Suite.
- Define inter-dependencies between PeopleSoft jobs and jobs that run on different operating systems.

Roles and responsibilities

Here you can see the roles and responsibilities of all the actors involved in the process model, and the tasks they perform.

In a typical enterprise, different users contribute to the implementation and operation of the product. Table 28 describes the roles and responsibilities of all those involved in the process model, showing the tasks they perform.

Table 28. Roles and responsibilities in Access method for PeopleSoft

User role	User task
IBM Workload Scheduler configurator	"Defining the configuration options" on page 144
IBM Workload Scheduler developer	• "Defining PeopleSoft jobs in IBM Workload Scheduler" on page 151 • "Configuring the job status mapping policy" on page 153
PeopleSoft administrator	• "Creating a batch processing ID in PeopleSoft" on page 147 • "Configuring the ITWS_PSXA PeopleSoft project" on page 148 • "Uploading the PeopleSoft project" on page 149

Scheduling process for the PeopleSoft supported agents

IBM Workload Scheduler can launch and monitor jobs in the PeopleSoft process scheduler using a PeopleSoft extended agent or dynamic agent workstation. The PeopleSoft supported agent (extended agent or dynamic agent) is defined in a standard IBM Workload Scheduler workstation definition. This definition is a logical workstation name and specifies the access method as `psagent`. The access method is used to communicate job requests to the PeopleSoft process scheduler.

To launch a PeopleSoft job, IBM Workload Scheduler runs the `psagent` method, passing it information about the job. An options file provides the method with the path, the executable, and other information about the PeopleSoft process scheduler and application server used to launch the job. The supported agent t can then access the PeopleSoft process request table and make an entry in the table to launch the job. Job progress and status information is written to the job's standard list file.

For extended agents, there is no need to install Database connectivity on fault-tolerant agents hosting PeopleSoft extended agents because the method currently uses the PeopleSoft 3-tier architecture. You must configure at least one PeopleSoft Application Server for the supported agent to work. The application server must be active to successfully submit jobs to the PeopleSoft process scheduler.

PeopleSoft job tracking in IBM Workload Scheduler

A PeopleSoft job is a collection of processes that run together as a single unit. IBM Workload Scheduler jobs can be defined in one of the following ways:

- As PeopleSoft jobs, that is, as a collection of PeopleSoft processes. In this case, the status of the PeopleSoft job is tracked, not the status of the individual processes within the job.
- As PeopleSoft processes. In this case, the status of the individual process is tracked and IBM Workload Scheduler schedules can be defined to create complex inter-dependencies and recovery options between PeopleSoft processes.

Security

Security for the PeopleSoft jobs is handled by standard IBM Workload Scheduler security.

Configuring the PeopleSoft access method

This section provides detailed reference information about the PeopleSoft options and how to define them in the options file.

Defining the configuration options

The IBM Workload Scheduler installation process creates a default global options file for the `psagent` access method, named `psagent.opts`. You can also create local files in the *TWS_home*`/methods` as following:

Extended agent
XANAME`_psagent.opts` where *XANAME* is the extended agent workstation name.

Dynamic agent

*DYNAMIC_AGENT_FILE*_psagent.opts where *DYNAMIC_AGENT_FILE* is any text string. This string does not necessarily correspond to the name of the dynamic agent workstation since the dynamic agent can have more than one .opts file associated. For more information, see "Setting options for the access methods" on page 127.

To edit both options file, you can use either the Option Editor available with this product, or any other text editor. On dynamic workstations, you can edit the options files from the job definition panels in the Dynamic Workload Console. For details about how to create and edit the options files with the Option Editor, see "Setting options for the access methods" on page 127. For examples of options files for this access method, see "PeopleSoft options file example" on page 146.

Table 29 describes the options for the psagent access method. Option names are case insensitive. Before you use a manually-created options file, check that all the option names are written correctly, otherwise they will be ignored.

Table 29. Psagent access method options

Option	Description
CHECKINTERVAL	(Optional) Specifies the frequency (in seconds) with which the **psagent** monitors a submitted process up to completion. The default is 120.
LJUSER	(Optional) Specifies the ID of the IBM Workload Scheduler user that runs the **psagent** to launch jobs (LJ tasks). This user must be a valid IBM Workload Scheduler user on the IBM Workload Scheduler hosting workstation.
PS_DISTSTATUS	(Optional) Determines whether the distribution status of the PeopleSoft request is taken into account when determining the status of the IBM Workload Scheduler job. Values are *0* (not taken into account) or *1* (taken into account - the default value).
PSFT_DOMAIN_PWD	(Optional) Specifies the encrypted password (case-sensitive) of the PeopleSoft domain used for the connection to the PeopleSoft application server. For details about how to encrypt the password, see "Encrypting PeopleSoft operator passwords" on page 147.
PSFT_OPERATOR_ID	(Mandatory) Specifies the PeopleSoft operator ID used for the connection to the PeopleSoft application server.
PSFT_OPERATOR_PWD	(Mandatory) Specifies the encrypted password (case-sensitive) of the PeopleSoft operator ID used for the connection to the PeopleSoft application server. For details about how to encrypt the password, see "Encrypting PeopleSoft operator passwords" on page 147.
PSJOAPATH	(Optional) Specifies the full path name of the psjoa.jar file, containing both the path and the psjoa.jar filename. If this option is not set, the following default path name is used: *TWS_home*/methods/psjoa.jar Ensure that you identify the version of the psjoa.jar file that corresponds to the version of PeopleSoft that you are using.

Table 29. Psagent access method options (continued)

Option	Description
RUNLOCATION	(Optional) Specifies the default PeopleTools process server that processes the requests.
SERVER_NAME_LIST	(Mandatory) Specifies the list of application servers that the **psagent** tries to connect to. It is a comma-separated list of addresses in the format: *server*:*port* [,*server*:*port*] ... where: *server* Specifies the host name or TCP/IP address of the server *port* Specifies the port number the server is listening on.
TWS_MAX_WAIT_TIME	(Optional) Specifies the maximum time that the supported agent waits (timeout) after a failed operation on the PeopleSoft application server before retrying the operation. The default is 10 seconds.
TWS_MIN_WAIT_TIME	(Optional) Specifies the minimum time that the supported agent waits (timeout) after a failed operation on the PeopleSoft application server before retrying the operation. The default is 5 seconds.
TWS_RETRY	(Optional) The maximum number of times that the supported agent attempts to re-run a failed operation on the PeopleSoft application server. The default is 5.
TWSXA_INLINE_CI	(Optional) Specifies the name of the component interface that the `psagent` invokes to submit jobs to PeopleSoft. The default is `ITWS_PROCESSREQUEST`. If you use this default, you must perform the customization steps described in "Configuring the ITWS_PSXA PeopleSoft project" on page 148. If you do not plan to schedule jobs containing in-line variables, and you do not want to perform the additional customization steps, you must replace the default value with `PROCESSREQUEST`. This is the component interface invoked by previous versions of the access method; it does not allow the use of in-line variables.
TWSA_SCHED_METH	(Optional) Specifies the name of the PeopleSoft method invoked by the component interface specified in `TWSXA_INLINE_CI`. Both `ITWS_PROCESSREQUEST` and `PROCESSREQUEST` use the default method `Schedule`. If you are using either of these component interfaces, leave the default. If you are using a different component interface, specify the name of the method called by your component interface, respecting the case of the PeopleSoft object name.

PeopleSoft options file example

Below is a sample options file. It can help you determine your specific site requirements although your options file might be different.

Remember to save the file in the *TWS_home*\methods directory.

```
LJuser=TwsUsr
CheckInterval=120
PSFT_OPERATOR_ID=PSHC
PSFT_OPERATOR_PWD=*****
SERVER_NAME_LIST=9.87.120.36:9000
```

If you create the options file manually, you must encrypt the PeopleSoft operator password, as described in "Encrypting PeopleSoft operator passwords."

Encrypting PeopleSoft operator passwords: When you add or change the PeopleSoft operator password using the Option Editor or the Dynamic Workload Console, the password is automatically encrypted and inserted into the file, and appears as asterisks on the screen.

When you add or change the PeopleSoft user password using a text editor, you must run the **pwdcrypt** program to encrypt the password before writing it in the file. To run the encryption program, enter the following command:

```
pwdcrypt password
```

The program returns an encrypted version that you can then copy and paste into the options file.

Connecting to more than one PeopleSoft application server

It might be necessary for the `psagent` method to connect to more than one PeopleSoft application server. For example, a single installation of PeopleSoft might have a TEST, DEMO, and PRODUCTION environment, each with a separate application server. This requires that the `psagent` method uses a separate connect string for each application server.

To support this, you can set up multiple PeopleSoft extended agent workstations that connect to the same method but use different options files. When a workstation starts the method, it first looks for the options file with extended agent workstation name prepended to `psagent.opts`. For example, a PeopleSoft extended agent named `ps847system` would have the following options file:

```
PS847SYSTEM_psagent.opts
```

The **psagent** method searches first for an options file with the extended agent workstation name, and then for the default `psagent.opts` file. This allows the user to set up an extended agent for each PeopleSoft application server.

To connect to only one application server, use the default name for the options file, **psagent.opts**.

Note: In case you specify some connection properties in your local option files, make sure that the same properties are commented out in your global option file, with the exception of the global property **LJuser**. This action is needed to avoid that warning messages related to duplicate properties are displayed in the job log.

Creating a batch processing ID in PeopleSoft

Create an operator ID in PeopleSoft dedicated to batch scheduling. This operator ID must be granted authority to use the Component Interface in the PeopleTools environment. All the jobs submitted by IBM Workload Scheduler should use this operator ID.

Configuring the ITWS_PSXA PeopleSoft project

About this task

The configuration steps described in this section are necessary to enable IBM Workload Scheduler to schedule PeopleSoft jobs that have in-line variables in their definitions.

The ITWS_PROCESSREQUEST component interface works around some limitations of the PeopleSoft APIs when invoked from a batch environment. Because of these limitations, IBM Workload Scheduler cannot schedule jobs defined with in-line bind variables. With current PeopleSoft APIs, data that is stored in the PeopleSoft database and referred to by a runcontrol ID parameter that is used to retrieve a runcontrol data record, needs to be loaded into the Component Buffer before scheduling the API invocation. This cannot be done from a batch environment. Therefore, when invoking the PeopleSoft scheduling APIs from a batch interface, the data related to the runcontrol ID is not available for the submission of a job, even though it is available in the database. When unresolved data is present in the submitted job, the PeopleSoft system refuses submission and ends with an error.

The ITWS_PROCESSREQUEST component interface enables IBM Workload Scheduler to schedule PeopleSoft jobs that have in-line variables in their definitions. By invoking this component interface, the access method provides the ability to use data stored in the PeopleSoft database to resolve in-line variable values by taking data from the database and substituting it with variable definitions. It then allows job submission regardless of the use of in-line variable definitions in the jobs. The variable substitution mechanism does not support work records, so if the PeopleSoft process uses work records in its parameter list, you find a message similar to the following in the IBM Workload Scheduler joblog:

```
Error Position:  21
Return:  942 - ORA-00942: table or view does not exist
Statement:
select nvsdlist from PS_NVS_WRK WHERE BUSINESS_UNIT = :1 AND REPORT_ID = :2
Original Statement:
SELECT NVSDLIST FROM PS_NVS_WRK WHERE BUSINESS_UNIT = :1 AND REPORT_ID = :2.
```

To identify work records, use the following PeopleSoft naming conventions:

- A derived work record name ends with '_WRK'.
- A work record definition name for Structured Query Report reports starts with R_

When you use IBM Workload Scheduler to submit a process that has in-line bind variables, the name of the process type in the PeopleSoft GUI becomes ITWS_*process type*. For example, SQR Process becomes ITWS_SQR Process.

To schedule a job that contains in-line variables in its definition you must perform the following tasks:

- Leave the value of the TWSXA_INLINE_CI option set to ITWS_PROCESSREQUEST, that is the default value. See “Defining the configuration options” on page 144 for a detailed explanation.
- Upload the PeopleSoft project as described in “Uploading the PeopleSoft project” on page 149.

Uploading the PeopleSoft project

About this task

This section describes how to upload a new PeopleSoft project related to PeopleTools 8.44, or later, into the PeopleSoft database. The name of the PeopleSoft project is `ITWS`.

After installing the product, complete the following steps:

1. Mount the PT844 PeopleSoft project directory or copy it to the workstation from where you launch the Application Designer. IBM Workload Scheduler installs the PeopleSoft project directories, as shown in the following structure:

   ```
   TWS_HOME\methods\
   \---PeopleSoft
           \---PT844
            \---ITWS_PSXA
                    ITWS_PSXA.ini
                    ITWS_PSXA.XML
   ```

2. Start the Application Designer and from the sign-on window select to start the Application Designer in tier-two mode by entering the following information:
   - **Connection Type**: *database used*; for example, Oracle
   - **Database Name**: *database instance name*
   - **User ID**: *PeopleSoft operator name*; for example, PS
   - Password of user ID
3. Using the Application Designer, select **Tools** -> **Copy Project**-> **From file...**
4. Using the browser, edit the full path to specify the folder where the project that you want to load is located.

   The project is contained in the *TWS_home*`/methods/PeopleSoft/PT844` subdirectories.

   After you specify the project folder, a list of projects appears in the **Project Name** field of the Copy Project From File window.
5. Choose `ITWS_PSXA` and click **Open**. If you already configured `ITWS_PSXA` (perhaps after installing a fix pack), a confirmation window enquires if you want to replace the existing one. Click **Yes**.

   The Copy window is displayed showing a list of definition types.
6. Click **Options** to select the new settings.
   a. Click **Report Filter**
   b. Click **Select All**
   c. Click **OK**
   d. Click **Select All**
   e. Click **Copy**. A progress bar is displayed.

   After loading the project, the PeopleSoft Database contains the following objects:
   - ITWS process type definitions
   - ITWS permissions list
   - ITWS component interfaces
7. Create the `ITWS_ROLE` security role. You can use either the PeopleSoft Web GUI or the Application Designer. Follow the steps below:

   From the menu of the PeopleSoft Web GUI:
   a. Select: **People tools** -> **Security** -> **Permission and Roles** -> **Roles**
   b. Select the **Add a new value** tab

c. Type or select ITWS_ROLE in the **Role Name** field
d. Select the **Permissions list** tab -> **ITWS** -> **Save**

From the Application Designer GUI:

a. Using Maintain Security, edit the ITWS_ROLE window
b. Select the **Permissions list** tab -> **ITWS** -> **Save**

8. Grant ITWS_ROLE authority to all users who want to schedule jobs from IBM Workload Scheduler. You can use either the PeopleSoft Web GUI or the Application Designer. Follow the steps below:

   From the PeopleSoft Web GUI:

   a. Select: **People tools** -> **Security** -> **User Profiles**
   b. Type the user name of the user who wants to schedule jobs from IBM Workload Scheduler
   c. Select the **Roles** tab
   d. Add ITWS_ROLE and save

   From the Application Designer GUI:

   a. Using Maintain Security, edit the user name
   b. Select the **Roles** tab
   c. Add ITWS_ROLE and save

9. Add the ITWS process type definitions to the required PeopleTools process scheduler. You can use either the PeopleSoft Web GUI or the Application Designer. Follow the steps below:

   From the PeopleSoft Web GUI:

   a. Select **PeopleTools** -> **Process Scheduler** -> **Servers**
   b. Select your PeopleTools server
   c. Add the ITWS_* Type definitions and save

   From the Application Designer GUI:

   a. Select **Process Scheduler Manager**
   b. Select your PeopleTools server
   c. Add the ITWS_* Type definitions and save

   Note: From the SQL interactive command line, the same task can be performed by the following sample statement, customized for your database environment:

```
INSERT INTO PS_SERVERCLASS SELECT o.SERVERNAME,
o.OPSYS,'ITWS_'||o.PRCSTYPE,o.PRCSPRIORITY,
o.MAXCONCURRENT FROM PS_SERVERCLASS
o WHERE (  SELECT count(*) FROM PS_SERVERCLASS i WHERE
i.SERVERNAME=o.SERVERNAME AND   i.OPSYS=o.OPSYS AND
i.PRCSTYPE='ITWS_'||o.PRCSTYPE ) = 0
AND ( select count(*) from PS_PRCSTYPEDEFN
a where a.PRCSTYPE='ITWS_'||o.PRCSTYPE AND a.OPSYS=o.OPSYS ) > 0
```

10. Restart the process servers.

You do not need to change the existing IBM Workload Scheduler job definitions, except for the scheduling nVision process, where the runcontrol ID must be specified using the *BUSINESS_UNIT.REPORT_ID* convention.

The following is an example of a job definition for the scheduling nVision process:

```
-process 'NVSRUN' -type nVision-Report -runcontrol AUS01.VARIABLE
```

where NVSRUN is the process name and AUS01.VARIABLE is the *BUSINESS_UNIT.REPORT_ID*.

Defining PeopleSoft jobs

This section provides job definition information for jobs using the extended agent for PeopleSoft.

Defining PeopleSoft jobs in IBM Workload Scheduler

An IBM Workload Scheduler job definition is required for every PeopleSoft job you want to manage. An IBM Workload Scheduler job is associated to an already defined PeopleSoft job and its definition includes:

- The name of the IBM Workload Scheduler job that runs the PeopleSoft job
- The name of the extended agent or dynamic workstation or workstation class where the IBM Workload Scheduler job runs
- The name of the user launching the job
- Recovery options
- The Script file specifications

For more information, refer to "Defining jobs for supported agents" on page 138.

Task string parameters for PeopleSoft jobs

This section describes the task string parameters that control the operation of PeopleSoft jobs. You must specify them in the following places when you define their associated IBM Workload Scheduler jobs:

- In the **Task string** field of the Task page of the Properties - Job Definition panel, if you use the Dynamic Workload Console
- As arguments of the scriptname keyword in the job definition statement, if you use the IBM Workload Scheduler command line.
- As arguments of the JOBCMD keyword in the JOBREC statement in the SCRIPTLIB of IBM Workload Scheduler for z/OS, if you are scheduling in an end-to-end environment. In this case the entire string following the JOBCMD keyword must be enclosed within quotation marks (").

  The following is an example of a JOBREC statement:

```
JOBREC
  JOBCMD("/-process process_name -type 'process_type' -runcontrol runcontrol_ID")
  JOBUSR(TWS_user_name)
```

  where:

  process_name
  The process name for the PeopleSoft job.

  process_type
  The process type for the PeopleSoft job. This entry must be enclosed within single quotes.

  runcontrol_ID
  The runcontrol ID for the PeopleSoft job.

  TWS_user_name
  The IBM Workload Scheduler for z/OS user who runs the psagent access method from the end-to-end scheduling environment.

Table 30 on page 152 describes the parameters to define PeopleSoft jobs.

Table 30. Task string parameters for PeopleSoft jobs

Parameter	Description
-process	The process name for the PeopleSoft job.
-type	The process type for the PeopleSoft job. This entry must be enclosed within single quotes.
-runcontrol	The runcontrol ID for the PeopleSoft job.
-outputdest	The destination of the PeopleSoft job output.
-outputtype	The output type of the PeopleSoft job. Possible values are: • Any • Email • File • None • Printer • Web • Window If you do not specify any value, IBM Workload Scheduler uses the value associated to the PeopleSoft job you are submitting. **Note:** Depending on the PeopleSoft configuration, some combinations of the value of this option with the value of the **outputformat** option are not supported. In this case the PeopleSoft default value is used.
-outputformat	The output format of the PeopleSoft job. Valid values are: **None** PDF **CSV** PS **DOC** RPT **Default** RTF **HP** SPF **HTM** TXT **LP** WKS **OTHER** XLS **Note:** Depending on the PeopleSoft configuration, some combinations of the value of this option with the value of the **outputtype** option are not supported. In this case the PeopleSoft default value is used.
-runlocationdescr	The PeopleSoft process scheduler responsible for processing the PeopleSoft job.
-foldername	The name of the report folder used for this job. The folder must have been already created using PeopleSoft Report Manager.
tracelvl	Specify the trace setting for the job. Possible values are: **1** Only error messages are written in the trace file. This is the default. **2** Informational messages and warnings are also written in the trace file. **3** A most verbose debug output is written in the trace file. Refer to "Configuring the tracing utility" on page 184 for detailed information.

Note: No syntax checking is performed on the output control values (`outputdest`, `outputtype`, `outputformat`, and `foldername`). If the values are not recognized, defaults are used.

The following is an example of a task string specification for a PeopleSoft 8.44 job:

```
-process XRFWIN -type 'SQR Report' -runcontrol 1 -runlocationdescr PSNT
```

Configuring the job status mapping policy

IBM Workload Scheduler calculates the status of an IBM Workload Scheduler job based on the PeopleSoft job Run Status and Distribution Status. In PeopleSoft, the run status monitors the running of the job until it reaches a final status; the distribution status monitors the status of the output of the job. If the final status of a PeopleSoft job is neither success nor warning, IBM Workload Scheduler ignores the distribution status and the IBM Workload Scheduler job status is ABEND.

If the final status of a PeopleSoft job is success or warning, you can decide whether to use the distribution status of the PeopleSoft job when determining the status of the IBM Workload Scheduler job by setting the PS_DISTSTATUS option in the options file:

0 The distribution status is ignored and the IBM Workload Scheduler job status is calculated as shown in Table 32 on page 154.

1 The distribution status is used and the IBM Workload Scheduler job status is calculated as shown in Table 31. This is the default value.

Table 31 shows the relationship between the run status, the distribution status, and the IBM Workload Scheduler job status. The return code associated with the status is shown in parentheses. IBM Workload Scheduler uses this return code to evaluate the return code condition you specified in the **Return Code Mapping Expression** field in the Properties panel of the job definition. For more details about this field, refer to the online help by clicking the "?" in the top-right corner of the panel.

Table 31. Relationship between the run status, the distribution status, and the IBM Workload Scheduler job status

PeopleSoft job run status	PeopleSoft job distribution status	IBM Workload Scheduler job status
• Success (9) • Warning (17)	• Posted (5) • None (0)	SUCC
• Success (9) • Warning (17)	• Not Posted (4) • Delete (6)	ABEND
• Success (9) • Warning (17)	• Not Available (1) • Processing (2) • Generated (3) • Posting (7)	EXEC
• Cancel (1) • Delete (2) • Error (3) • Canceled (8) • No Success (10) • Blocked (18) • Restart (19)	Any distribution status	ABEND

Table 32 on page 154 shows the relationship between the PeopleSoft run status and the IBM Workload Scheduler job status. The return code associated with the status is shown in parentheses. IBM Workload Scheduler uses this return code to evaluate the return code condition you specified in the **Return Code Mapping Expression** field in the Properties panel of the job definition. For more details about this field, refer to the online help by clicking the "?" in the top-right corner of the panel.

Table 32. Relationship between the run status and the IBM Workload Scheduler job status

PeopleSoft final run status	IBM Workload Scheduler status
Cancel (1)	ABEND
Delete (2)	ABEND
Error (3)	ABEND
Hold (4)	WAIT
Queued (5)	WAIT
Initiated (6)	INIT
Processing (7)	EXEC
Canceled (8)	ABEND
Success (9)	SUCC
No Success (10)	ABEND
Pending (16)	EXEC
Warning (17)	SUCC
Blocked (18)	ABEND
Restart (19)	ABEND

Note: If IBM Workload Scheduler fails to retrieve the status of the PeopleSoft job, the IBM Workload Scheduler job status is **DONE**.

Chapter 24. Access method for z/OS

What you need to know and to do before using the Access method for z/OS.

Using Access method for z/OS you can schedule and control z/OS jobs using the job scheduling features of IBM Workload Scheduler.

Note: Throughout this publication, the term z/OS is used to refer also to supported versions of OS/390®.

Note: For detailed information, see System Requirements Document.

The access method for z/OS is installed automatically when you install a dynamic or a fault-tolerant agent. To be entitled to its use, you must purchase a separate chargeable component beside IBM Workload Scheduler or IBM Workload Scheduler for z/OS agents.

For information about the supported versions of the plug-ins and access methods, run the Data Integration report and select the **Supported Software** tab.

Features

Using Access method for z/OS you can:

- Use IBM Workload Scheduler to schedule z/OS jobs to run at specific times and in a prescribed order.
- Define dependencies between IBM Workload Scheduler jobs running on different systems and operating systems.
- Define dependencies for IBM Workload Scheduler jobs based on the completion of z/OS jobs that were not launched by IBM Workload Scheduler.
- Define dependencies for IBM Workload Scheduler jobs based on the existence of files on a z/OS system.

Roles and responsibilities

In a typical enterprise, different users contribute to the implementation and operation of the product. Table 33 describes the roles and responsibilities of all the users in the process model, showing the tasks they perform.

Table 33. Roles and responsibilities in Access method for z/OS

User role	User task
z/OS administrator	• "Installing, configuring, and uninstalling the z/OS gateway" on page 156 • "Downloading z/OS gateway fixes from FTP" on page 163
IBM Workload Scheduler configurator	"Defining the configuration options" on page 166
IBM Workload Scheduler developer	"Defining z/OS jobs in IBM Workload Scheduler" on page 168

Installing, configuring, and uninstalling the z/OS gateway

Access method for z/OS consists of the z/OS access method that must be located on the IBM Workload Scheduler agent, and of the gateway software that is located on the z/OS system.

The Access method for z/OS is installed automatically when you install a dynamic or a fault-tolerant agent. To be entitled to its use, however, you must purchase a separate chargeable component beside IBM Workload Scheduler or IBM Workload Scheduler for z/OS agents. Ask your IBM representative for details.

To install, configure, and uninstall the z/OS gateway, refer to the following sections.

Installing

You can install the z/OS gateway module in either of these two ways:

- Unload the files from the IBM Workload Scheduler CD. See "Unloading the files from the CD."
- Unload the files from a 3480 tape cartridge written in non-IDRC (uncompressed) format. See "Unloading the files from the tape" on page 157.

Unloading the files from the CD

About this task

The z/OS gateway files are stored in the ZOS directory of the product CD and are named:

- LOADLIB
- SAMPLES

To unload the files onto your z/OS system:

1. From your TSO session emulator, select the ISPF command shell (TSO command) and use the File Transfer utility (Send to Host) to transfer the LOADLIB library and SAMPLES member from the CD to the z/OS system, setting the transfer for a logical record length of 80 and a fixed record format.
2. Receive the members in output data sets using the INDSN option. This unloads 12 load modules into the output library and two samples into the sample library.

For example:

LOADLIB

1. Issue the following command:

   ```
   TSO RECEIVE INDSN('TWS4APPS.LOADLIB.L80')
   ```

   A prompt is displayed similar to the following:

   ```
   INMR901I Dataset TWS84.XAGENT.V8R4M0.FIXPAC04.DRV1511.LOADLIB
   from TWSUSR2 on NODENAME NMR906A
   Enter restore parameters or 'DELETE' or 'END' +
   ***
   ```

2. Reply:

   ```
   da('TWS4APPS.LOADLIB')
   ```

where "da" means "data set" and the MVS™ data set name in quotes is the name you want for the output loadlib data set.

Some IEBCOPY messages are displayed as the library is uncompressed.

SAMPLIB

1. Issue the following command:

   ```
   TSO RECEIVE INDSN('TWS4APPS.SAMPLIB.L80')
   ```

   A prompt is displayed similar to the following:

   ```
   INMR901I Dataset TWS84.XAGENT.V8R4M0.FIXPAC04.DRV1511.SAMPLIB
   from TWSUSR2 on NODENAME NMR906A
   Enter restore parameters or 'DELETE' or 'END' +
   ***
   ```

2. Reply:

   ```
   da('TWS4APPS.SAMPLIB')
   ```

   where "da" means "data set" and the MVS data set name in quotes is the name you want for the output samplib data set.

   Some IEBCOPY messages are displayed as the library is uncompressed.

Unloading the files from the tape

About this task

The z/OS gateway files are supplied on a 3480 tape cartridge written in non-IDRC (uncompressed) format.

Modify and submit the JCL below to unload the tape. Customize the job card and modify the following parameters according to your environment standards:

- Enter an appropriate job name.
- Identify a 3480 tape device.

```
//MVSXAUNL JOB (876903,D07),'OPCL3',MSGLEVEL=(1,1),
//        MSGCLASS=A,CLASS=A,NOTIFY=&SYSUID
//*********************************************************************
//*                                                                   *
//* THIS IS THE JOB THAT UNLOADS THE WORKLOAD SCHEDULER FOR           *
//* APPLICATIONS z/OS Access Method Version 8.4 TO CUSTOMIZE          *
//*                                                                   *
//*********************************************************************
//STEP01   EXEC PGM=IEBCOPY
//SYSPRINT DD SYSOUT=*
//INDD     DD DSN=TWSX.V8R4M0.SAMPLES,
//            DISP=(OLD,PASS),UNIT=600,
//            VOL=SER=ABC001,
//            LABEL=(1,SL)
//OUTDD    DD DSN=TWSX.V8R4M0.SAMPLES,
//            DISP=(NEW,CATLG),
//            SPACE=(32760,(2,2,10)),
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=0),
//            UNIT=3390,VOL=SER=OPC00C
//SYSUT3   DD UNIT=SYSDA,SPACE=(TRK,(20,1,10))
//SYSUT4   DD UNIT=SYSDA,SPACE=(TRK,(20,1,10))
//SYSIN    DD *
         COPY OUTDD=OUTDD,INDD=((INDD,R))
//STEP02   EXEC PGM=IEBCOPY
//SYSPRINT DD SYSOUT=*
//INDD     DD DSN=TWSX.V8R4M0.SERVICE.APFLIB1,
//            DISP=(OLD,PASS),UNIT=600,
//            VOL=SER=ABC001,
//            LABEL=(2,SL)
//OUTDD    DD DSN=TWSX.V8R4M0.SERVICE.APFLIB1,
```

```
//            DISP=(NEW,CATLG),
//            SPACE=(32760,(50,50,50)),
//            DCB=(RECFM=U,BLKSIZE=32760),
//            UNIT=3390,VOL=SER=OPC00C
//SYSUT3   DD UNIT=SYSDA,SPACE=(TRK,(20,1,10))
//SYSUT4   DD UNIT=SYSDA,SPACE=(TRK,(20,1,10))
//SYSIN    DD *
         COPY OUTDD=OUTDD,INDD=((INDD,R))
//*
```

Configuring

About this task

To configure the z/OS gateway:

1. Authorize the TWS4APPS.LOADLIB in APF, or copy its contents into another authorized load library. See "Setting APF authorizations on z/OS" on page 159 for details.
2. Add EEWTCP00 to the AUTHCMD list in IKJTSO00 (SYS1.PARMLIB)
3. Set the RACF® permissions so that the user who will use the gateway can issue the PARMLIB command. See "Setting RACF authorizations on z/OS" on page 159 for details.
4. Make the IKJTSO00 change effective by performing an IPL, or by issuing the following command:

   ```
   PARMLIB UPDATE(00)
   ```

5. Create a PARMLIB member with the appropriate startup parameters for EEWSPACE and EEWSERVE.

   Note: This member must have the *PACK OFF* option set in its profile. If *PACK ON* is set, the started task will end with *RC=04*.
6. Copy EEWSPACE and EEWSERVE to the PROCLIB (from SAMPLIB) and edit it (for example, include STEPLIB, and specify the appropriate PARMLIB member name).
7. Verify that the TCP/IP port specified in the PARMLIB member is not in use. To do this, issue the following command and review the output:

   ```
   TSO NETSTAT PORTLIST
   ```

   If the port is in use, choose another port that is not in use and modify the PARMLIB member.
8. Ensure that the IEFU84 exit is enabled by checking the SYS1.PARMLIB member SMFPRMxx, or by issuing the following console command:

   ```
   D SMF,O
   ```

   If the SMFPRMxx member must be changed, to make the changes effective issue the command:

   ```
   SET SMF=xx
   ```
9. Set the RACF permissions for the started tasks EEWSPACE and EEWSERVE. For details, see "Setting RACF authorizations on z/OS" on page 159.
10. Start EEWSPACE.
11. When EEWSPACE is up, start EEWSERVE.

Setting APF authorizations on z/OS

About this task

This section describes how to authorize the load library in APF, by following these steps:

1. Issuing the **SETPROG** command from the console log. For example:

   ```
   SETPROG APF,ADD,DSN=twsx.SERVICE.APFLIB1,
   VOL=xxxxxx
   ```

   where: *xxxxxx* is the volume serial number where the load library is located, or:

   ```
   SETPROG APF,ADD,DSN=twsx.SERVICE.APFLIB1,VOL=SMS
   ```

   which indicates a volume controlled by SMS.
2. Update the PROGxx member of SYS1.PARMLIB, or the authorization will be lost at your next IPL.
3. Add EEWTCP00 to the AUTCHCMD NAMES section of SYS1.PARMLIB(IKJTSOxx).

Setting RACF authorizations on z/OS

About this task

This section describes how to set RACF permissions.

To set the RACF permissions to authorize the PARMLIB command to be used by the user "userone", issue the following commands:

```
rdefine tsoauth parmlib uacc(upd)
permit parmlib class(tsoauth) id(userone) acc(upd)
setropts raclist(tsoauth) refresh
```

To set the RACF permissions for the started tasks EEWSPACE and EEWSERVE, issue the following commands:

```
redefine started EEWSPACE.**
   stdata(user(<user_ID>) group(group_name))
redefine started EEWSERVE.**
   stdata(user(<user_ID>) group(group_name))
setropts raclist(started) refresh
```

Uninstalling

About this task

To uninstall the z/OS gateway:

1. Stop the started tasks EEWSPACE and EEWSERVE.
2. Cancel the TWS4APPS.LOADLIB library and the TWS4APPS.SAMPLES member.
3. Remove the started task entries from the RACF database by issuing the following commands:

   ```
   rdelete started EEWSPACE.**
   rdelete started EEWSERVE.**
   setropts raclist(started) refresh
   ```

Additional information

The following topics provide additional information for the z/OS extended agent:

- "Gateway software components" on page 160
- "IEFU84 Exit" on page 160
- "Security" on page 160

- "SYSTSIN variables" on page 161
- "SYSTSIN variables" on page 161
- "z/OS gateway version" on page 163

Gateway software components

The two z/OS program components of the IBM Workload Scheduler gateway are:

EEWTCP02
This program establishes that IBM Workload Scheduler is tracking on the z/OS system. The program is started by the EEWSPACE job.

EEWTCP00
This is the "gateway" program that manages TCP/IP communications between IBM Workload Scheduler and the z/OS system. It is started by the EEWSERVE job. EEWTCP00 translates IBM Workload Scheduler commands to z/OS equivalents, routes z/OS information back to IBM Workload Scheduler, and performs EBCDIC-ASCII data conversions.

Both of the programs run as started tasks, with a TIME=NOLIMIT parameter. EEWTCP02 is always started first, followed by EEWTCP00. If the programs must be stopped for any reason, they should be stopped, not canceled, to ensure that they shut down properly without impacting other programs that use the IEFU84 Exit.

IEFU84 Exit

The extended agent for z/OS tracks job streams using the IEFU84 exit. This exit must be turned on in the SMF parm member in SYS1.PARMLIB. IBM distributes a dummy IEFU84 exit with the operating system that is an IEFBR14 program. The EEWSPACE job dynamically chains to the IEFU84 exit. If the IEFU84 exit is currently being used, EEWSPACE will "front-end" the IEFU84 exit, obtain the information it requires, and then branch to the existing user exit. When EEWSPACE is stopped, it removes itself from the chain and restores the chain to its original status. It is important to note that EEWSPACE has no effect on any existing IEFU84 exits, which continue to run normally.

Security

Security is enforced in several areas, usually, RACF, Top Secret, and ACF2. The EEWSERVE job must have the ability to submit jobs that run under the user IDs that are supplied in the JCL to be submitted. The JCL must not contain passwords. This can be authorized by using SURROGAT class resources in RACF, and the equivalents in ACF2 and Top Secret. PROPCNTL class resources in RACF can be used to prevent submitted jobs from running under the EEWSERVE user ID. ACF2 and Top Secret equivalents can also be used. Resource class JESJOBS in RACF, and ACF2 or Top Secret equivalents, can be used to control which job names and user IDs (with or without passwords) can be submitted by EEWSERVE.

Startup

About this task

Follow these steps:

Procedure

1. Customize and start the EEWSPACE procedure (following the commented instructions it contains) to start the extended agent Gateway Data Space. The

job must be a started task and must not be canceled. See "SYSTSIN variables" for a description of the parameter settings. EEWSPACE creates the Data Space and installs the IEFU84 exit. To stop the job, use the `STOP EEWSPACE`command from any z/OS console.

Note:

a. EEWSPACE must be active before EEWSERVE is started.
b. To shut down, stop EEWSERVE before stopping EEWSPACE.

2. Customize and start the EEWSERVE procedure by following the commented instructions it contains. For a description of the parameter settings, see "SYSTSIN variables."
3. To stop the job, use the `STOP EEWSERVE` command from any z/OS console.

SYSTSIN variables

Table 34 lists all the SYSTSIN variables and their description. Modify the settings as required for your site configuration. The default values are shown in parentheses.

Table 34. SYSTSIN variables

Variable	Description
COMPLETIONCODE(LASTSTEP)	Specifies the job completion code of a JES multi-step job. This variable can have one of the following values: **LASTSTEP** The completion code for a JES multi-step job is determined by the last run step in the job. This is the default value. **MAXSTEP** The completion code is determined by the highest completion code of any run step in the job. Any nonzero condition code in the last step (if LASTSTEP was selected) or in any step (if MAXSTEP was selected) causes the job to be considered unsuccessfully completed, unless differently specified using the condcode option in the job definition in IBM Workload Scheduler. If a step is flushed, it is not taken into consideration when determining the completion code of the job, unless the flushed step is the last one, in which case the job is always considered as completed unsuccessfully.
DEBUG(NO)	If set to YES, it causes the gateway to output diagnostic messages. Use only in coordination with IBM Software Support.
INTERLINKSUBSYSTEM(ACSS)	The name of the subsystem used by Interlink TCP/IP stack. This variable is ignored if Interlink is not used as TCP/IP stack.

Table 34. SYSTSIN variables (continued)

Variable	Description
JESCMDCHR($)	The job command recognition character. The default is set to dollar sign ($) for JES2 systems and to asterisk (*) for JES3 systems. Change this variable only if a different command recognition character is being used.
JESINTERFACE(CONSOLE)	CONSOLE is the only supported value for JES and it is the default value. Set to NO if you do not use this interface.
MAXWAIT(500)	The maximum amount of time, in hundredths of a second, to wait for a response to commands. This variable is ignored if you set JESINTERFACE to NO.
MCSSTORAGE(3)	The amount of storage, in megabytes, used by each extended console used by the gateway. This variable is ignored if you set JESINTERFACE to NO.
OPCINTERFACE(PIF)	PIF is the only supported interface for IBM Workload Scheduler for z/OS and is the default value for this variable. Set to NO if you do not use this interface.
OPCMSGCLASS(*)	The message class for the dynamically allocated message logs used by IBM Workload Scheduler for z/OS. The asterisk causes the class to be set to the same value as EEWSERVE. Ignored if IBM Workload Scheduler for z/OS is not used.
OPCSUBSYSTEM(OPCS)	The subsystem name used for communications with the IBM Workload Scheduler for z/OS control region.
PEERADDRESS(0:0:0:0:0:0:0:0)	The default, 0:0:0:0:0:0:0:0, permits access by any host. For better security, enter the IP address of the Workload Scheduler host of the z/OS extended agent. **Note:** 1. Depending on the Internet Protocol you are using, specify an IPv4 or IPv6 address by including also the "." (for IPv4) or ":" (for IPv6) between the 0s. 2. To connect to an extended agent that supports only Internet Protocol version 4, you must use IPv4.
PORT(5000)	The TCP/IP port number used by IBM Workload Scheduler and the gateway for communications. This must be the same as the value entered in the TCP/IP address field of the z/OS extended agent workstation definition.
PUTLINE(YES)	When set to YES, it directs trace information to DDNAME SYSTSPRT.
QLIMIT(2000)	The maximum number of messages to be queued to an extended console.

Table 34. SYSTSIN variables (continued)

Variable	Description
SUBSYS(UNIS)	The prefix used by the extended agent for z/OS as the first four characters of extended console names. It is also used as the first four characters of internal reader DDNAMES. Change only in coordination with IBM Software Support.
SVCDUMP(NO)	When set to YES, abends cause a SVC dump. Use only in coordination with IBM Software Support.
TCPIPSTACK(IBM)	The vendor of TCP/IP stack (IBM, INTERLINK, or OPENCONNECT).
TCPNAME(TCPIP)	The name of the TCP/IP address space when the IBM version of TCP/IP stack is used.
TERMINATOR(X'25')	The transaction termination character. Do not change the default unless asked to do so by IBM Software Support.
WTP(NO)	When set to YES, it directs trace information to SYSLOG as write-to-programmer information. This can be used if SYSTSPRT does not meet your needs.
ZOSV1R2(NO)	Set to YES if you are using the JES3 interface with z/OS V1R2 or later. This parameter is ignored if you are not using the JES3 interface, because: • If you are using the JES2 interface, the level of the operating system does not make any difference to the product

z/OS gateway version

The version of `EEWSERVE` (and `EEWSPACE`) appears in the first line of the `EEWSERVE` (and `EEWSPACE`) log. For example:

```
EEWTCP10 VERSION RELEASE MODIFICATION LEVEL = VxRyMz
```

where *x* is the version, *y* the release, *z* the modification level.

Downloading z/OS gateway fixes from FTP

About this task

This section describes how to obtain the files in a fix or fix pack from the IBM software FTP site.

If a fix or fix pack for Access method for z/OS is issued by IBM, you can receive it by downloading the files from the IBM software FTP site.

Download the z/OS gateway fix pack files as follows:

1. Allocate two data sets with `LRECL=80 RECFM=80` to hold the downloaded files. For example:
   - `TWS4APPS.LOADLIB.L80` (for the load library)
   - `TWS4APPS.SAMPLIB.L80` (for the samples library)

Use the file characteristics shown in Table 35.

Table 35. File characteristics for obtaining the gateway fix pack files by FTP

Characteristic	Value
Organization	PS
Record format	FB
Record length	80
Block size	27920
1st extent cylinders	1
Secondary cylinders	1

Note: These files are not allocated as type PDS but as regular sequential files.

2. Use FTP to retrieve the LOADLIB and SAMPLES fix pack files from the download site, by logging in as anonymous, with your e-mail address as the password. Issue the following commands:

```
tso ftp ftp.software.ibm.com
anonymous
your_e-mail_address
cd software/support/patches/patches_8.4.0/
cd patch_name
cd ZOS
bin
get loadlib_file_name 'TWS4APPS.LOADLIB.L80' (rep
get samples_file_name 'TWS4APPS.SAMPLIB.L80' (rep
quit
```

For example, for Fix Pack 01 the variables in this list of commands would have the following values:

patch_name
```
8.4.0-TIV-TWSWSE-FP0001
```

loadlib_file_name
```
LOADLIB_820WSEFP07
```

samples_file_name
```
SAMPLES_820WSEFP07
```

Note: The data set names in quotes on the get commands (the MVS file names) must match the files that were allocated in step 1 on page 163.

3. The downloaded files are in an 80-byte packed format. To ensure that the files have been downloaded correctly, browse them. The beginning of the output should be similar to the following:

```
BROWSE TWS4APPS.LOADLIB.L80 Line
\INMR01. ....&......NODENAME......TWSUSR2......A......A......20
....... \INMR02..........IEBCOPY......... ........ ....... .....
..........."8. .... ................TWS84..XAGENT..V8R4M0..FIXPAC04..DRV1511..LO
```

If it is not, retry the downloads.

4. Receive the downloaded data sets, as follows:

LOADLIB

a. Issue the following command:

```
TSO RECEIVE INDSN('TWS4APPS.LOADLIB.L80')
```

A prompt is displayed similar to the following:

```
INMR901I Dataset TWS84.XAGENT.V8R4M0.FIXPAC04.DRV1511.LOADLIB
from TWSUSR2 on NODENAME NMR906A
Enter restore parameters or 'DELETE' or 'END' +
***
```

b. Reply:

```
da('TWS4APPS.LOADLIB')
```

where da means data set and the MVS data set name in quotes is the name you want for the output loadlib data set.

Some IEBCOPY messages are displayed as the library is uncompressed.

SAMPLIB

a. Issue the following command:

```
TSO RECEIVE INDSN('TWS4APPS.SAMPLIB.L80')
```

A prompt is displayed similar to the following:

```
INMR901I Dataset TWS84.XAGENT.V8R4M0.FIXPAC04.DRV1511.SAMPLIB
from TWSUSR2 on NODENAME NMR906A
Enter restore parameters or 'DELETE' or 'END' +
***
```

b. Reply:

```
da('TWS4APPS.SAMPLIB')
```

where da means data set and the MVS data set name in quotes is the name you want for the output **samplib** data set.

Some IEBCOPY messages are displayed as the library is uncompressed.

After receiving the files, the file characteristics change to those shown in Table 36.

Table 36. File characteristics for the LOADLIB file after receiving it

Characteristic	**Value**
Data Set Name	TWS4APPS.LOADLIB
Organization	PO
Record format	U
Record length	0
Block size	32760
1st extent blocks	10
Secondary blocks	5
Data set name type	PDS

Table 37. File characteristics for the SAMPLIB file after receiving it

Characteristic	**Value**
Data Set Name	TWS4APPS.SAMPLIB
Organization	PO
Record format	FB
Record length	80
Block size	27920
1st extent blocks	4

Table 37. File characteristics for the SAMPLIB file after receiving it (continued)

Characteristic	Value
Secondary blocks	1
Data set name type	PDS

Configure the downloaded fix pack files as described in "Configuring" on page 158.

Locating product support

To find the IBM Workload Scheduler support page, see the appendix on support information in *Troubleshooting Guide*.

Use the **Search Support** option to search for items of interest to you. Useful terms to enter for Access method for z/OS are: "TWS4APPS", message IDs, ABEND codes, "EEWSERVE", "MVS xagent", "TWS applications z/OS", or the interface types ("TWS for z/OS", JES2, JES3).

Configuring the z/OS access method

IBM Workload Scheduler launches jobs on an extended agent or a dynamic agent for z/OS workstation. The supported agent for z/OS is defined in a standard IBM Workload Scheduler workstation definition, which gives it a name and identifies the access method to be used. The extended agent or dynamic agent for z/OS workstation is a workstation definition linked to an instance of the z/OS system.

To launch a job on a supported agent for z/OS workstation, IBM Workload Scheduler runs the access method, passing it information about the job. The access method communicates with the instance of the z/OS host and monitors the job through completion, writing job progress and status information to the job's standard list file.

See "Defining supported agent workstations" on page 134 to learn how to define a supported agent workstation in IBM Workload Scheduler.

Defining the configuration options

Every installed instance of the z/OS access method must have a matching options file. You can create it during or after the installation of the access method with either the Option Editor (see "Setting options for the access methods" on page 127) or any common text editor.

The options file must be located on the IBM Workload Scheduler hosting computer for the extended agent or dynamic agent in the *TWS_home*\methods directory. If you do not create one, the agent uses by default one of the global options files (either mvsjes.opts or mvsopc.opts).

Table 38 on page 167 describes the options that you can define for the z/OS access method.

Table 38. Access method for z/OS access method options

Options File Entries	Description
BLOCKTIME=*min*	(Optional) Defines the amount of time, in minutes, the method waits for a response to a status check before timing out. This value must be less than the value of **CHECKINTERVAL** (described below) and of IBM Workload Scheduler's local option **bm check status**. Fractional values are accepted; for example, .5 for 30 seconds, or 1.5 for one minute and 30 seconds. The default is 2. **Note:** Only change this option from the default value if specific network problems cause delays in the transmission of data from the z/OS gateway.
CHECKINTERVAL=*min*	(Optional) Defines the polling rate, in minutes, for checking the status of z/OS jobs that were launched by the method. Fractional values are accepted; for example, .5 for 30 seconds, or 1.5 for one minute and 30 seconds. The default is 2. When checking non-IBM Workload Scheduler-launched jobs on z/OS that are used as dependencies, the method uses the IBM Workload Scheduler local option **bm check status** instead of **CHECKINTERVAL** to determine its polling rate.
CFUSER=*name*	(Optional [1]) Assigns the user name used by the access method to check file dependencies (CF tasks). It can be the same as **LJUSER**.
GSUSER=*name*	(Optional [1]) Assigns the user name used by the access method to check non-IBM Workload Scheduler-launched jobs on z/OS that are used as dependencies (GS tasks). The default is **root**.
LJUSER=*name*	(Optional [1]) Assigns the user name used by the access method to launch jobs (LJ tasks). This must be a valid UNIX or Windows user who submits local jobs and can connect to the IBM Workload Scheduler z/OS gateway on the z/OS system. The default is the login parameter in the job definition.
RETRYCOUNT=*count*	(Optional) Defines the number of times a status check is attempted before IBM Workload Scheduler writes a timeout message to a job's stdlist file, and marks it in the abend state. For details, see options **CHECKINTERVAL** and **BLOCKTIME**. The default is 10.

Note:

1. For best results, allow *LJUSER*, *CFUSER*, and *GSUSER* to take the default values.

Defining jobs in z/OS

In z/OS, jobs that are scheduled with IBM Workload Scheduler are defined as described in the following sections:

- "For JES jobs" on page 168
- "For IBM Workload Scheduler for z/OS jobs" on page 168

Defining z/OS jobs in IBM Workload Scheduler

IBM Workload Scheduler job definitions are required for each z/OS job you that want to schedule and launch with IBM Workload Scheduler. They are defined in the same ways as other IBM Workload Scheduler jobs and include job name, user name, special script name options, and optional recovery options.

Remember that you should include neither special characters, other than dash (-) and underscore (_), nor national characters in the IBM Workload Scheduler job name. Such characters are not supported in z/OS, and when the IBM Workload Scheduler job is passed to z/OS by the access method, z/OS rejects the name and abends the job if it finds them.

See "Defining jobs for supported agents" on page 138 for reference.

Task definition syntax for z/OS jobs scheduled with IBM Workload Scheduler

The following are descriptions of the task definition syntax (command line "scriptname") for z/OS jobs that IBM Workload Scheduler schedules and launches from extended agent workstations using the **mvsjes** (JES2/3 jobs) or **mvsopc** (IBM Workload Scheduler for z/OS jobs) methods.

You specify these task string parameters in the following places when you define their associated IBM Workload Scheduler jobs:

- In the **Task string** field of the Task page of the Properties - Job Definition panel, if you use the Dynamic Workload Console
- As arguments of the `scriptname` keyword in the job definition statement, if you use the IBM Workload Scheduler command line.
- As arguments of the `JOBCMD` keyword in the `JOBREC` statement in the `SCRIPTLIB` of IBM Workload Scheduler for z/OS, if you are scheduling in an end-to-end environment.

For JES jobs:
The syntax is:

```
dataset [<|= condcode]
```

where:

dataset Specifies the JES job data set or the name of a member of a partitioned data set.

condcode
Specifies the condition code that indicates successful job completion. If preceded by <, the condition code must be less than or equal to this value. If preceded by =, the condition code must be equal to this value. If omitted, " = 0000" is used. Note that there must be a space on both sides of the operator (< or =).

Example:

```
gold.apayable.cntl(apayjob1) = 0004
```

For IBM Workload Scheduler for z/OS jobs: The syntax is:

```
appl  [IA(yymmddhhmm)|IATIME(hhmm)] [...]
      [DEADLINE(yymmddhhmm)|DEADLINETIME(hhmm)]
      [PRIORITY(pri)]
      [CPDEPR(Y|N|P|S)]
```

where:

appl The name of the IBM Workload Scheduler for z/OS application to be inserted into the current plan.

IA The input arrival date and time in the form: `yymmddhhmm`.

IATIME
The input arrival time in the form: hhmm.

DEADLINE
The deadline arrival date and time in the form: yymmddhhmm.

DEADLINETIME
The deadline arrival time in the form: hhmm.

PRIORITY
The priority (1-9) at which to run the application.

CPDEPR
The current plan dependency resolution selection.

Y Add all successor and predecessor dependencies.

N Do not add any dependencies, (the default.)

P Add predecessor dependencies.

S Add successor dependencies.

For complete descriptions of the parameters, refer to the IBM Workload Scheduler for z/OS documentation.

Example:

```
PREFABJOB44 IA(0202181000) PRIORITY(5) CPDEPR(Y)
```

Task definition syntax for other z/OS jobs

The following are descriptions of the task definition syntax (command line *scriptname*) for z/OS jobs that are to be monitored for completion. The completion of these z/OS jobs can be used as *follows* dependencies for IBM Workload Scheduler-launched jobs. The jobs to be monitored can be JES or IBM Workload Scheduler for z/OS.

IBM Workload Scheduler monitors these jobs until their status changes to *success*.

The details of the outcome of such jobs must be checked in the subsystem where the jobs were launched. IBM Workload Scheduler only records whether or not these jobs completed successfully. To find the reason for the failed submission or completion of one of these jobs, or to check for dependency failures, work with the host subsystem operator who can obtain this information from the EEWSERVE log.

The basic syntax is:

```
tws-job follows XAname::"mvs-job"
```

where:

tws-job The name of the IBM Workload Scheduler job that depends on the completion of the specified z/OS job.

XAname
The name of the IBM Workload Scheduler extended agent workstation

associated with the scheduler of the z/OS job, that is, an extended agent defined with the **mvsjes** or **mvsopc** method. The two colons (::) are a required delimiter.

mvs-job
The identification of the z/OS job. This string must be enclosed in quotation marks. See the syntax descriptions below.

For JES jobs:
The syntax is:

```
"jobname[<|= condcode]"
```

where:

jobname
The name of the job in JES.

condcode
The condition code that indicates successful job completion. If preceded by <, the condition code must be less than or equal to this value. If preceded by =, the condition code must be equal to this value. If omitted, " = 0000" is used. There must be a space on both sides of the operator (< or =).

Example:

```
job5 follows jesworkstation::"apayable = 0004"
```

For IBM Workload Scheduler for z/OS jobs:
The syntax is:

```
"application[IA(yymmddhhmm)|IATIME(hhmm)][...]"
            [JOBNAME(jobname)]
            [OPNO(num)]
```

where:

application
The name of the IBM Workload Scheduler for z/OS application (job stream) in the current plan.

IA The input arrival date and time.

IATIME
The input arrival time.

JOBNAME
The z/OS job name.

OPNO
The operation number (1-255). If included, the application is considered completed when it reaches this operation number.

For complete descriptions of the parameters, refer to the IBM Workload Scheduler for z/OS documentation. For example:

```
joba follows twsworkstation::"PREFABJOB44 IA(0202181000) JOBNAME(PFJ3)"
```

Operational considerations for the EEWSERVE gateway task

The following considerations apply:

EEWSERVE not running
If the EEWSERVE task on the mainframe is not running, and an IBM Workload Scheduler job with no follows dependency is submitted from the

extended agent, the job will show an *error* status and will fail, that is, the job will not run after the EEWSERVE task is started. However, if an IBM Workload Scheduler job has a follows dependency for an external (non-IBM Workload Scheduler) job which runs under JES or Access method for z/OS, the internal check job (CJ) command is reissued after EEWSERVE is started. The extended agent workstation still shows its status as *linked* even if EEWSERVE is not running.

For this reason, if a z/OS automation product such as NetView® is available on the mainframe, write a rule to detect any outages of the EEWSERVE task.

Instance limitations in LPARs
Due to the ENQ/DEQ mechanism in use, only one instance of the EEWTCP02 task (default name EEWSPACE) can be run on a z/OS LPAR. If a second instance is started, it fails with RC=04. So even if you use different started task names and PORT numbers, only one instance of EEWSPACE or EEWSERVE can exist concurrently on a z/OS LPAR.

File (OPENS) dependencies syntax on z/OS files

IBM Workload Scheduler jobs and job streams can use z/OS files as dependencies. The basic syntax is:

```
tws-job opens XAname#"hlq1.hlq2.hlq3"
```

where:

tws-job The name of the IBM Workload Scheduler job dependent on the specified z/OS file.

XAname
The name of the IBM Workload Scheduler extended agent workstation associated with the scheduler of the z/OS job, that is, an extended agent defined with the **mvsjes** or **mvsopc** method.

Note: The # sign is a required delimiter.

hlq1.hlq2.hlq3
The identification of the z/OS file in high level qualifier terms.

Note: This string must be enclosed in quotation marks.

For more information, see "Checking for files on z/OS" on page 174.

Reference information

This section describes job states when operating on JES and IBM Workload Scheduler for z/OS in the IBM Workload Scheduler environment.

Technical overview

The z/OS gateway uses an extended MCS console to communicate with JES. The program issues the `MCSOPER` macro to activate an extended MCS console. The z/OS gateway can then receive messages and command responses by issuing the `MCSOPMSG` macro, and can issue commands by issuing the `MGCRE` macro. All the return codes from the extended MCS macros are handled as described in *IBM z/OS Programming: Authorized Assembler Services Reference, Volume 3, SA22-7611*.

Managing JES jobs

The following sections describe how to manage JES jobs.

Launching JES jobs: To launch and monitor a JES job, IBM Workload Scheduler passes the name of the JCL data set or partition data set it wants to run to the z/OS gateway, which, in turn, submits it to JES. Submissions occur using dynamically allocated internal readers in JES. The gateway allocates an internal reader at the start of each task and then submits the job to the reader.

When a job is submitted, the job name and JES job ID are also entered in the Tablespace. When an SMF record containing relevant job scheduling data is passed through the IEFU84 exit, the job and condition code information are made available to IBM Workload Scheduler. Because IBM Workload Scheduler keeps track of both the job name and the JES job ID, it can check for the specific job it submitted. (Currently, the Gateway uses Type 30 SMF records and also subtypes 1, 4, 5.)

IBM Workload Scheduler checks submitted jobs periodically to see if they are active. If an IBM Workload Scheduler-submitted job is not active and no information about it is found through the IEFU84 exit, the job is marked as **abend** in IBM Workload Scheduler displays. This situation might occur if a job fails for security reasons or JCL syntax problems.

JES job states: Table 39 lists JES job states with respect to IBM Workload Scheduler.

Table 39. JES job states with respect to IBM Workload Scheduler

IBM Workload Scheduler Job State	JES Job State	Comment
intro	Not available	IBM Workload Scheduler is starting the method.
wait	Queued	Job is queued.
wait	Not available	If the job remains in this state, it might be due to a security violation in z/OS. Check the job on the z/OS system.
exec	Executing	Job is running.
succ	Completed	Job's condition code meets the completion criteria in the IBM Workload Scheduler job definition.
abend	Completed	Job condition code does not meet the completion criteria in the IBM Workload Scheduler job definition, or a system or user abend has occurred. System abend codes, in hexadecimal, are prefixed with "S", and user abend codes, in decimal, are prefixed with "U". Both types of code are written to the job stdlist file.
extrn	Not available	Status unknown. Can occur only when checking a job that is used as a dependency.

Monitoring JES jobs: The details of the outcome of JES jobs must be requested from the subsystem where these jobs were launched. From IBM Workload Scheduler you should only expect to find out if these jobs completed successfully. To find the reason for a failed submission or failed completion of one of these jobs or to check for dependency failures, the IBM Workload Scheduler operator should work with the host subsystem operator who can obtain this information from the EEWSERVE log.

Checking JES jobs: To check a JES job that was not launched by IBM Workload Scheduler, the name of the job is passed by IBM Workload Scheduler to the gateway. Because IBM Workload Scheduler did not submit the job, the JES job ID is not available. The Gateway enters the name in the Tablespace, and waits for information about the job to appear in SMF records passed through the IEFU84 exit.

The IEFU84 exit cannot handle every job without impacting the performance of the entire system because it is invoked for each job running on the z/OS system.

- If the job is not present in the gateway dataspace, the IEFU84 exit does not perform any action.
- If the job is submitted by IBM Workload Scheduler, the gateway inserts the job into the dataspace. In this case the IEFU84 exit monitors the status of the job and of each step contained in the job.
- If the job is not submitted by IBM Workload Scheduler, the gateway inserts the job into the dataspace only if the gateway receives a request from IBM Workload Scheduler to check its status because the job represents an internetwork dependency.

To have the internetwork dependencies of a z/OS job correctly handled by IBM Workload Scheduler for z/OS system, ensure that there are no occurrences of the z/OS job in any job queue including the output queue. If any occurrences of the z/OS job are present then purge them. The internetwork dependencies of a z/OS job are handled by IBM Workload Scheduler in the following ways:

- If there are no occurrences of z/OS jobs in the job queues, the gateway inserts the job into the dataspace the first time it receives the request from IBM Workload Scheduler to check the job status. The gateway inserts the job into the dataspace with an unknown job ID ready to be monitored.
- When the z/OS job is submitted, the IEFU84 exit finds the job in the dataspace and updates the corresponding entry with the JES job ID. From now on the z/OS job is monitored using the associated JES job ID. If the job completes successfully, the gateway returns the information to IBM Workload Scheduler, and the internetwork dependency is correctly resolved.

Managing IBM Workload Scheduler for z/OS jobs

The following sections describe how to manage IBM Workload Scheduler for z/OS jobs.

Launching IBM Workload Scheduler for z/OS jobs: To launch and monitor an IBM Workload Scheduler for z/OS job, IBM Workload Scheduler passes the application name, and other optional parameters, it wants to run to the z/OS Gateway. If it exists in the IBM Workload Scheduler for z/OS database, the application is inserted into the current plan. The input arrival, deadline arrival, priority, and automatic dependency resolution parameters, if included, override any values specified in IBM Workload Scheduler for z/OS.

At a rate defined by the **CheckInterval** value in the method options file, IBM Workload Scheduler checks the status of the occurrence (application) in IBM Workload Scheduler for z/OS.

IBM Workload Scheduler for z/OS operation states: Table 40 on page 174 lists IBM Workload Scheduler for z/OS operation states with respect to IBM Workload Scheduler.

Table 40. IBM Workload Scheduler for z/OS operation states with respect to IBM Workload Scheduler

IBM Workload Scheduler Job State	IBM Workload Scheduler for z/OS Operation State
wait	pending
wait	undecided
wait	wait
wait	ready
exec	started
succ	complete
abend	interrupted
abend	error
abend	deleted
abend	Not applicable
extrn	Not applicable

IBM Workload Scheduler for z/OS occurrence states: Table 41 lists IBM Workload Scheduler for z/OS operation occurrence states with respect to IBM Workload Scheduler.

Table 41. IBM Workload Scheduler for z/OS operation occurrence states with respect to IBM Workload Scheduler

IBM Workload Scheduler Job Stream State	IBM Workload Scheduler for z/OS Occurrence State
wait	pending
wait	undecided
exec	started
succ	complete
abend	error
abend	deleted
abend	Not applicable
extrn	Not applicable. Status unknown. Can occur only when checking a job that is used as a dependency.

Checking IBM Workload Scheduler for z/OS jobs: To check an IBM Workload Scheduler for z/OS job that was not launched by IBM Workload Scheduler, the name of the application, and optionally the operation, is passed to the gateway. A check is made to see if the occurrence or operation is in the current plan. If it is not found, IBM Workload Scheduler rechecks at a rate defined by the **bm check status** value in its local options file.

Checking for files on z/OS

The existence of a file can be used as a job dependency in IBM Workload Scheduler. To check for the existence of a file on z/OS, IBM Workload Scheduler passes the file name to the Gateway. The file name is allocated with DISP=OLD, and is considered to exist if the following conditions apply:

- The data is cataloged
- It is allocated

- It is not being used by another task

If the data set does not exist, IBM Workload Scheduler continues to wait and check for the file at a frequency determined by the `bm check file` option in the `localopts` file of the fault-tolerant workstation that is hosting the extended agent. The localopts options are described in the *Planning and Installation Guide*.

Note: IBM Workload Scheduler can only use fully qualified data set names for non-partitioned files. If a Generation Data Group name is to be used, it must be the fully qualified name and not a relative name (for example, xxxxx.xxxxx(-1) cannot be used).

Timing considerations

When IBM Workload Scheduler checks dependencies on z/OS jobs *not* launched by IBM Workload Scheduler, certain timing issues are critical to ensuring that any associated job dependencies are correctly resolved. For the correct resolution of these external dependencies, IBM Workload Scheduler must attempt to resolve the dependency at least once *before* the z/OS job is submitted. After the z/OS job has been submitted and has successfully completed, the next periodic check of the dependency by IBM Workload Scheduler can manage the dependency.

External dependencies are checked by IBM Workload Scheduler in the following circumstances:

- If the external dependency on an IBM Workload Scheduler z/OS job is the only dependency in the job, the dependency is checked immediately after the plan is generated or extended. However, as the plan might have a period of several days, weeks, or months, this might not be very frequently.
- Subsequently to the first check, the dependency is checked with a frequency determined by the IBM Workload Scheduler configuration parameters.
- If the external dependency is preceded by another dependency, the external dependency is not checked until the other dependency is resolved.

Thus, when creating external dependencies in IBM Workload Scheduler on IBM Workload Scheduler z/OS jobs, you should schedule the job so that the first dependency check takes place before the z/OS job is submitted.

If this synchronization is not taken into account, IBM Workload Scheduler might wait indefinitely to resolve a job dependency. A similar problem can occur as the result of a communication failure between the z/OS and IBM Workload Scheduler environments that prevents IBM Workload Scheduler from determining the status of a z/OS job to satisfy a job dependency.

Diagnostic information

z/OS jobs submitted by IBM Workload Scheduler can fail to complete for a number of reasons. The step in the submission process in which a job fails determines how much information is available and is provided by IBM Workload Scheduler as follows:

- If a job fails before it is actually initiated (usually the result of a JCL or security problem), IBM Workload Scheduler recognizes that it no longer exists, and marks it as abend in the `conman` command line displays. No further information is provided.
- If a job fails after being started, IBM Workload Scheduler:
  1. Obtains its condition code and user abend code, if any
  2. Writes them to the job standard list file

3. Marks the job as **abend** in the conman command line or Dynamic Workload Console displays

Job standard lists can be displayed with the conman command line and with the Dynamic Workload Console.

Troubleshooting

To assist in troubleshooting, ensure that the JES log is obtained for the EEWSPACE and EEWSERVE started tasks. This helps in determining the context in which a message was issued. Depending on the job scheduling interface you use, additional helpful information might be obtained from other logs.

```
EEWI27I APPLICATION application WAS INSERTED IN CP WITH INPUT
ARRIVAL DATE AND TIME yymmddhhss

EEWI28W yymmdd hhmmss APPLICATION appl WAS NOT INSERTED IN
 CURRENT PLAN WITH INPUT ARRIVAL DATE AND TIME iadatetime

EEWI29I yymmdd hhmmss TASK task MODULE module ISSUED, MACRO macro NEAR LABEL label
 WITH RETURN CODE = code AND ERROR NUMBER = err

EEWI30S yymmdd hhmmss module CA7SPAN MUST BE 4 DIGITS IN FORMAT HHMM

EEWI31E TASK task MODULE module LAUNCH OF JOB 'jobname' FAILED

EEWI32S yymmdd hhmmss module AT LEAST ONE INTERFACE MUST BE DIFFERENT FROM NO

EEWI33W yymmdd hhmmss TASK task APPLICATION application NOT FOUND

EEWI34W APPLICATION application NOT FOUND

EEWI35W JCL dataset(member) NOT FOUND

EEWI36W yymmdd hhmmss IA and IATIME cannot be specified together

EEWI37W yymmdd hhmmss DEADLINE and DEADLINETIME cannot be specified together

EEWI38I jobname(jobid) nl n2 result (restype)
```

- n1 indicates the number of seconds passed from the request
- n2 indicates the number of seconds of CPU time consumed
- *result* can assume one of the following values:

  ABEND
  If the job abends. In this case *restype* can be:

  Sxyz In case of System Abend

  Unnnn
  in case of User Abend

  CONDCOD
  If the job does not end successfully due to the condition code of one step that does not match the definition. In this case *restype* contains: the RC=nnnnn value of the return code of the last step that has been run, if LASTSTEP specified, or of the worst step that does not match the definition of the job on the distributed side.

  EXEC If the job is running or is in the input queue.

  JCLERRO
  If the job failed due to a JCL error.

  SUCCES
  If the job completed successfully.

  UNKNOWN
  If the jobid is unknown

  blank In case of an internetwork dependency when the manual submission was not performed.

Note: All the above messages are written in the EEWSPACE or in the EEWSERVE log files. These are the files indicated in the SYSTSPRT DD card of the respective procedure. In the files the messages are written starting from column 1, except for the messages that do not contain the date and time after the message identifier, for example EEWI27I. These messages appear with different characteristics in the z/OS system and in IBM Workload Scheduler. In the z/OS system log the messages appear in the text of another message and in some cases they might appear truncated. This is because the maximum length of each text record is limited to 251 characters. In IBM Workload Scheduler they are always displayed in their complete form.

The module names are:

Module Name	Description
EEWPRE84	Previous SMF exit
EEWTCP00	Main processing routine
EEWTCP01	Server test vehicle
EEWTCP02	Main dataspace construction routine
EEWTCP05	Establish ESTAE routine to issue failure message
EEWTCP07	Find data set name associated with open ACB/DCB
EEWTCP08	Find data set name associated with DDNAME
EEWTCP10	Initialize and examine variables
EEWTCP15	Locate and initialize control blocks
EEWTCP20	Locate and initialize control blocks
EEWTCP21	Client test vehicle
EEWTCP22	Client test vehicle
EEWTCP23	Client test vehicle
EEWTCP25	Concurrent server
EEWTCP26	Concurrent server Interlink TCP/IP provider
EEWTCP27	Concurrent server for Openconnect TCP/IP stack
EEWTCP30	Child server task IBM Workload Scheduler
EEWTCP31	Child server task for Interlink TCP/IP stack
EEWTCP32	Child server task
EEWTCP84	SMF record exit for SMFEWTM
EEWTCP87	IBM Workload Scheduler interface
EEWTCP88	IBM Workload Scheduler interface post
EEWTCP89	CA-7 BTI
EEWTCP90	Issue command and wait for response
EEWTCP91	Issues TERROR to format messages and issues WTOS
EEWTCP92	Find substring within string
EEWTCP93	Issue CA-7 command and wait for response
EEWTCP94	STIMER exit to post ECB past in parm
EEWTCP95	Calls IKJEFF02 to extract buffer using EEWTCP99
EEWTCP96	ESTAE routine to issue failure message
EEWTCP97	Calls IKJEFF19 (DAIRFAIL/VSAMFAIL) to issue message

Module Name	Description
EEWTCP98	Calls IKJEFF02 to issue message from EEWTCP99
EEWTCP99	Message table
EEWTCPC7	Check CA-7 job
EEWTCPCA	Check application request handler
EEWTCPCF	Check file request handler
EEWTCPCJ	Check job request handler
EEWTCPCO	Check operation request handler
EEWTCPCV	Enumerate job
EEWTCPED	String encrypt/decrypt
EEWTCPEJ	Enumerate job request handler
EEWTCPFJ	Free job request handler
EEWTCPIA	Insert application
EEWTCPIE	String initialization
EEWTCPKJ	Kill job request handler
EEWTCPKO	Delete IBM Workload Scheduler application
EEWTCPL7	Launch CA-7 job request handler
EEWTCPLJ	Launch job request handler
EEWTCPLO	Insert IBM Workload Scheduler application
EEWTCPQ7	Query CA-7 job request handler
EEWTCPQJ	Query job request handler
EEWTCPQO	Query IBM Workload Scheduler application
EEWTCPQS	Query subsystem request handler
EEWTCPRC	Return code
EEWTCPSC	System abend
EEWTCPSE	String encryption/decryption
EEWTCPUC	User abend
EEWTCPWT	Wait for specified amount of time
EEWTCPXX	Invalid request handler

APAR PQ88345 add note below.

To assist in troubleshooting, be sure to obtain the JES log for the EEWSPACE and EEWSERVE started tasks. This will help in determining the context in which a message was issued. Depending on the job scheduling interface you use, additional helpful information may be obtained from other logs. For example, if you use CA-7, you should obtain the following:

- The CA-7 log
- The console log for the interval covering the test period
- The job log of the job resulting in error (if this is the case)
- The UNIX script file related to that job

Chapter 25. Common serviceability for the access methods

This section provides information common to all the access methods including return code mapping, configuring the tracing utility, and troubleshooting the access method.

The return code mapping feature

The return code mapping feature provides a standard way of mapping messages into return code values. You can also customize the return code mapping. This feature is available for the following access methods:

- PeopleSoft
- SAP R/3

The return code mapping feature provides more granularity when defining the success or failure policies of jobs and improved flexibility in controlling job execution flows based on execution results. Job return code mapping provides the following capabilities:

- Users can define a job final status (successful or failed) based on a condition on the return code of the execution of the program or script of the job.
- The return code can be provided also to the recovery job that is associated with it in the job definition. This causes the recovery job to perform different processing based on the return code.

Parameters

Optional comment. All the lines starting with this symbol (#) are not used for mapping.

pattern*n*
Pattern strings delimited by quotation marks (“ and ”). If you use only one pattern string, you can omit the quotation marks. If the pattern string contains a quotation marks character, then it must be escaped by backslash (\). The string can contain the following wildcards and special characters:

Asterisk (*)
Matches an arbitrary number of characters.

Question mark (?)
Matches a single character.

Backslash (\)
Escape character.

RC value
The return code value. This value is sent by the method to IBM Workload Scheduler by a `%RC nnnn` message.

Creating a return code mapping file

You can create a return code mapping file to customize your own return codes with respect to certain conditions that might affect a job when it runs. Use this file to set the success condition of the job, which IBM Workload Scheduler uses to assess if the job completes successfully or in error. The return code is sent to IBM Workload Scheduler in the form of a `%RC nnnn` message. If this message is received, the job state is updated accordingly.

Each method has its own set of files to map the messages into return code values. The mapping files can be either global or local for a workstation.

Return code mapping files that are specific to a workstation are named according to the following scheme:

TWS_home/methods/rcm/*accessmethod-type-workstation*.rcm

Global mapping files have a file name according to the following scheme:

TWS_home/methods/rcm/*accessmethod-type*.rcm

For the PeopleSoft access method, *type* is always equal to rcmap. For the SAP R/3 access method, *type* is as described in "Return code mapping file names for r3batch" on page 183.

Syntax
About this task

Use the following syntax to create the return code mapping file:

```
[#] "pattern1" "pattern2"..."patternn" = RC value
```

Examples

The following is an example of a return code mapping file. The line numbers in bold do not belong to the file, but are shown for reference:

```
1.   # This is an RC mapping file for joblog.
2.
3.   "User * missing "  = 102
4.   "\*\*\*"  = 103
5.   "User \
6.   * \
7.   missing"  = 102
```

In this example:

- Line **1** is a comment and is not used for mapping.
- Line **2** is blank and is ignored. All blanks preceding or following a pattern string are ignored, as well as those between the equals sign and the return code value.
- Line **3** matches every message starting with the string *User* and ending with the string *missing*.
- Line **4** matches every message starting with three asterisks (*) followed by a blank. When you use the asterisk in this way and not as a wildcard, you must escape it with a backslash.
- Lines **5** through **7** contain a pattern taking several lines. It matches the same messages as the pattern of line **3**.

Considerations

Note the following facts:

- The order of the pattern lines is important because the first matching pattern line is used to build the return code value.
- Empty pattern strings ("") are ignored by the pattern matching procedure.

For example, the following is a valid pattern sequence. The first line is more restrictive than the second line.

```
"625" "User * missing" = 104
"" "User * missing" = 102
```

The following pattern sequence is formally valid, but the second pattern line is never used. Because the first line is more general, it is always matched first.

```
"" "User * missing" = 102
"625" "User * missing" = 104
```

Return code mapping for psagent

For the PeopleSoft access method, you can write return code mapping files associating the internal states listed in Table 42.

When no return code mapping files are defined, or when a string returned by the access method does not satisfy any of the matching patterns of the mapping file, the access method uses the respective standard return codes listed in the tables.

Table 42. Job states and return codes for the PeopleSoft access method

psagent job state	psagent return code
"CANCEL"	1
"DELETE"	2
"ERROR"	3
"HOLD"	4
"QUEUED"	5
"INITIATED"	6
"PROCESSING"	7
"CANCELED"	8
"SUCCESS"	9
"NO SUCCESSPOSTED"	10
"POSTED"	11
"NOT POSTED"	12
"RESEND"	13
"POSTING"	14
"GENERATED"	15

Return code mapping for r3batch

About this task

Using return code mapping with `r3batch` can be useful in overcoming differences in the return code mechanisms of R/3, which returns a mixture of messages and numbers, and of IBM Workload Scheduler, which handles exclusively numeric return codes. By customizing the return code mapping files listed in "Return code mapping file names for r3batch" on page 183, you can map messages from R/3 logs, spool lists, and exceptions from RFC function modules into return code values that IBM Workload Scheduler can handle.

Note that when you do not use this feature, `r3batch` does not send any return codes to IBM Workload Scheduler. In this case, IBM Workload Scheduler displays only the `r3batch` exit code, which cannot be used to set up `rccondsucc` conditions.

The return code mapping mechanism works as follows:

1. r3batch reads the output retrieved from the R/3 system (R/3 job log, process chain log, spool list, and so on appended to the stdlist of the related IBM Workload Scheduler job).
2. Following your specifications in the rcm files, the R/3 return messages or codes are mapped into your custom return codes and passed on to IBM Workload Scheduler.
3. These return codes are used together with the rccondsucc keyword set in the extended agent job definition and handled accordingly. Return code mapping is meaningful only if you use the return codes to write the expressions that determine job completion. Conversely, in the case of this extended agent, the use of rccondsucc is significant only if IBM Workload Scheduler gets return codes (not exit codes) from the access method.

To use the return code mapping feature:

- Leave the value of the rcmap option as ON (this is the default).
- Depending on which R/3 logs you want r3batch to read and map, leave the default settings of the retrieve_joblog, retrieve_pchainlog, and retrieve_spoollist options as ON and manually create the corresponding rcm files.
- If you want to map messages from the R/3 syslog, set the log_r3syslog option to ON and manually create the corresponding rcm file.

When setting up your return code mapping for r3batch, consider the following:

- You can define any return code numbers for your use because there are no reserved return codes for the access method or for IBM Workload Scheduler.
- Mapping files are scanned sequentially: the first match found performs the corresponding mapping. When you define a mapping file, write the most restrictive strings first.
- When you define a mapping file, remember that the R/3 log messages are read in their entirety. If you want to map only a part of the entry, you must use the wildcard characters.
- If two lines match two different patterns, then the return code is set to the higher value. In general the return code is set to the highest value among the ones yielded by the matched patterns. This is shown in the following example:

  The job log returned after job PAYT410 has run is:

```
*** ERROR 778 ***  EEWO0778E Failed to modify the job PAYT410 with job id
***       05710310.

*** ERROR 176 ***  EEWO0176E Failed to add step 1.

*** ERROR 552 ***  EEWO0552E The R/3 job scheduling system has found an
***       error for user name * and job name PAYT410. Please check R/3
***       syslog.

*** ERROR 118 ***  EEWO0118E Execution terminated. Could not create and
***       start an instance of the R/3 batch job.
ERROR LEVEL=118
```

  and the system log contains the following line:

```
|011:05:12|MAESTRO|SAPMSSY1|EFT|> Step 1 contains illegal values
```

  The r3batch-joblog.rcm file contains the following matching line:

```
"118""*"=100
```

  while the r3batch-syslog.rcm file contains the following matching line:

```
"*MAESTRO*Step 1 contains illegal values"=9999
```

In this case, the return code sent back to IBM Workload Scheduler is 9999 because it is the higher of the two matching patterns.

- If no matching takes place, no return code is sent to IBM Workload Scheduler.

Return code mapping file names for r3batch

`r3batch` uses the global return code mapping files listed below. You must manually create the `rcm` directory under *TWS_home*`/methods` and the mapping files you want to implement.

TWS_home/**methods/rcm/r3batch-joblog.rcm**

Maps messages from the R/3 job log of a job into return code values. If this file is not present, the messages in the joblog are ignored.

The format of the mapping file is:

```
 message_text_pattern
[program_pattern[message_number_pattern[message_id_pattern]]]=RCvalue
```

where *program_pattern* is the external program that produced the output shown in the job log and *message_id_pattern* is the message class. For example, the following line appended in the job log:

```
04/26/2005 10:08:04 00
    550Step 001 started (program BTCTEST, variant GIULIO, user name TWSDEV)
```

will match the following pattern line in *TWS_home*`/methods/rcm/r3batch-joblog.rcm`:

```
"*Step*" "*" "550" "*"=5
```

because:

message_text_pattern
: `"Step 001 started (program BTCTEST, variant GIULIO, user name TWSDEV)"`

program_pattern
: `"*"`

message_number_pattern
: `"550"`

message_id_pattern
: `"*"`

TWS_home/**methods/rcm/r3batch-pchainlog.rcm**

Maps messages from the protocol of a Process Chain into return code values. If this file is not present, the messages in the protocol are ignored.

The format of the mapping file is:

```
 message_number_pattern
[message_id_pattern[message_variable1[message_variable2
[message_variable3[message_variable4[message_type]]]]]]=RCvalue
```

TWS_home/**methods/rcm/r3batch-spoollist.rcm**

Maps messages in the job spool list of an R/3 job into return code values. If this file is not present, the messages in the spool list are ignored.

The format of the mapping file is:

```
spool_list_row_pattern=RCvalue
```

TWS_home/**methods/rcm/r3batch-syslog.rcm**
Maps messages in the syslog of an R/3 system into return code values. The R/3 system log should be checked only when R/3 returns the generic 552 error to `r3batch`.

If this file is not present, the messages in the system log are ignored.

The format of the mapping file is:

```
system_log_row_pattern=RCvalue
```

If you plan to map system log messages, be sure to set the `log_r3syslog` option of `r3batch` to `ON` (the default is `OFF`).

TWS_home/**methods/rcm/r3batch-msgrc.rcm**
Maps ABAP exceptions and BAPI return codes of RFC function modules into return code values. If this file is not present, the mapping is done using a hardcoded table.

The format of the mapping file is:

```
message_number=RCvalue
```

message_number is the error message number. The last message number is always used. That is, if two error messages are generated, only the second one is checked against the mapping file.

Mapping return codes for intercepted jobs

About this task

To set up return code mapping for intercepted jobs, after defining the appropriate return code conditions in the `r3batch-joblog.rcm` file, do the following:

1. Create a customized template file named *TWS_home*`/methods/r3batch_icp/rctemplate.jdf` containing the following:

   ```
   alias;rccondsucc "Success Condition"
   ```

   where the "Success Condition" must match a condition saved in the `rcm` file.
2. Modify the *TWS_home*`/methods/r3batch_icp/`*XANAME*`_r3batch.icp` referring to the `jdf` file you created as follows:

   ```
   client job_mask user_mask rctemplate
   ```

   IBM Workload Scheduler manages the intercepted R/3 job as a docommand job with all the options specified in the customized `jdf` file. You can check if your intercepted job is correctly submitted by reading the job_interceptor joblog.

Configuring the tracing utility

Learn how to configure the trace utility for all the access methods.

IBM Workload Scheduler logs all the processing information in the *TWS_home*`/methods/`*accessmethod*`.properties` configuration file.

Note: If you delete this file accidentally, IBM Workload Scheduler creates a new file with all the default values and contains the following comment:

```
# This file was automatically created using the default values.
```

Customizing the .properties file

About this task

Depending on the access method you are working with, customize the trace parameters in the following properties files:

psagent.properties
For the PeopleSoft access method.

r3batch.properties, r3evmon.properties
For the SAP R/3 access method.

With this access method, you can also specify debug and trace parameters in the single job definitions. See "Creating SAP Standard R/3 jobs from the Dynamic Workload Console" on page 224 and "Task string to define SAP jobs" on page 233.

mvsjes.properties, mvsopc.properties
For the z/OS access method, depending on the scheduler with which you are working.

For each .properties file you can customize the following parameters:

*accessmethod***.trace.tracers.level**
Specify the level of tracing you want to set. Possible values are:

DEBUG_MIN
Only error messages are written in the trace file. This is the default.

DEBUG_MID
Informational messages and warnings are also written in the trace file.

DEBUG_MAX
A most verbose debug output is written in the trace file.

The value you set in the .properties file applies to all the jobs of the corresponding access method. To specify a different trace setting for a particular job, specify the following option in the job definition:

```
-tracelvl=(1|2|3)
```

where:
- `1 = DEBUG_MIN`
- `2 = DEBUG_MID`
- `3 = DEBUG_MAX`

Note: When making changes to the trace level setting, the changes are effective immediately after saving the .properties file. No restart is required.

*accessmethod***.trace.handlers.traceFile.fileDir**
Specifies the path where the trace file is created. Depending on the access method, the default is:

SAP R/3
TWS_home/methods/traces

All other access methods
TWS_home/methods

Ensure that the new path you specify has already been created as a fully qualified path with write permissions.

Traces are written in XML format. Always use slashes (or backslashes) when you specify a new path, even if you are working on Windows operating systems.

The trace files give information about the method execution to the desired level of detail. The minimum trace level is always on, to guarantee a First-Failure Data Capture (FFDC) ability. The trace file name is:

trace-psagent.log
For the PeopleSoft access method.

trace-r3batch.log, trace-*XAname***-r3evmon.log**
For the SAP R/3 access method.

trace-mvsjes.log, trace-mvsopc.log
For the z/OS access method. Depending on the scheduler with which you are working.

accessmethod.**trace.tracers.logging**
Specifies to enable or disable the trace utility. Possible values are:

true To enable the trace utility. This is the default value.

false To disable the trace utility. If you set this parameter to **false**, no traces are written in the trace-*accessmethod*.log file even if there are problems.

r3batch.trace.handlers.traceFile.maxFiles
The maximum number of trace files that are created before the oldest one is deleted. If this parameter is set to 1, the current trace file is never replaced and can grow without limit.

r3batch.trace.handlers.traceFile.maxFileSize
The maximum size (in bytes) that the trace file can reach before it is renamed and a new trace file is created. This parameter is valid only if the r3batch.trace.handlers.traceFile.maxFiles is set to a value greater than 1.

Configuration file example for the SAP access method

The following `r3batch.properties` file is an example of a configuration file for the SAP access method with the following characteristics:

- The level of tracing set is DEBUG_MID. This means that not only error messages but also informational messages and warnings are written in the trace file.
- The trace file is created in the `/home/maestro/methods` directory.
- The tracing process creates three trace files, whose maximum size can be 10 MB.

```
r3batch.organization=ABC
r3batch.product=IWS
r3batch.component=R3BATCH
r3batch.trace.tracers.level=DEBUG_MID
r3batch.trace.tracers.listenerNames=r3batch.trace.handlers.traceFile
r3batch.trace.tracers.logging=true
r3batch.trace.handlers.traceFile.fileDir=/home/maestro/methods
r3batch.trace.handlers.traceFile.formatterName=r3batch.trace.formatter
r3batch.trace.handlers.traceFile.maxFileSize=104805100
r3batch.trace.handlers.traceFile.maxFiles=3
```

Part 4. Integration with SAP

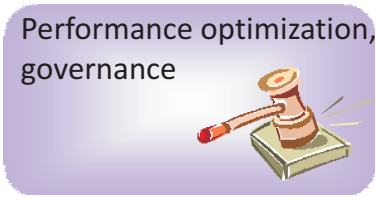
The following sections give you information about IBM Workload Scheduler for SAP, the SAP access method and job plug-ins, and how to schedule jobs by using the SAP Solution Manager.

Chapter 26. Introducing IBM Workload Scheduler for SAP

Improve SAP operations and enable business growth with IBM Workload Scheduler.

Use IBM Workload Scheduler for SAP, to create, schedule, and control SAP jobs using the job scheduling features of IBM Workload Scheduler. IBM Workload Scheduler supported agent workstations help extend the product scheduling capabilities to SAP through the R/3 batch access method . In addition, you can define IBM Workload Scheduler job plug-ins for SAP BusinessObjects BI and SAP PI Channel. With the SAP Solution Manager integration, you can have the IBM Workload Scheduler engine run job scheduling tasks available from the Solution Manager user interface.

IBM Workload Scheduler provides a single and simplified point of planning, control and optimization of end-to-end production services across heterogeneous IT infrastructures. It enables you to control SAP operations from z/OS indifferently.



Apply policies to environments, preserve and ensure good throughput

- Interceptions of jobs
- List, create, maintain and activate SAP Criteria Profiles
- R3batch performance

Prepare business workflows running on SAP reusing elements present on the SAP server

- Creation of ABAP jobs on SAP from IBM Workload Scheduler UI
- Return code customization
- BW suppport (InfoPackage, Process Chain)
- Single click IWS-SAP integration

Be aware of important events happening inside SAP and react

Automated launching on SAP and global tracking of workload progress

- Track and troubleshoot killed child jobs
- Display process chains and restart from failure point
- Pilot SAP PI channel status
- Automate and control SAP BusinessObjects BI reports

IBM Workload Scheduler is certified by SAP for the following SAP interfaces:

- BC-XBP 6.10 (V2.0) - Background Processing

- BC-XBP 7.00 (V3.0) - Background Processing
- BW-SCH 3.0 - Business Information Warehouse
- SAP Solution Manager

Certification Category: Background Processing, Business Information Warehouse, Job Scheduling, Platform User Licensing Compliant, Scheduling, Solution Manager Ready, System Management

SAP Certified - Integration with SAP NetWeaver. The R3batch process has been updated with the latest SAP NetWeaver RFC library.

Note: For detailed information, see the SAP online product partner directory .

Features

Table 43 shows the tasks you can perform with IBM Workload Scheduler for SAP either in a distributed or an end-to-end environment, or both.

Table 43. IBM Workload Scheduler for SAP features

Feature	Distributed environment	End-to-end
Using IBM Workload Scheduler standard job dependencies and controls on SAP jobs	✔	✔
Listing jobs, defining jobs, variants, and extended variants using the IBM Workload Scheduler interface	✔	✔
Defining jobs and variants dynamically at run time	✔	✔
Scheduling SAP jobs to run on specified days and times, and in a prescribed order	✔	✔
Scheduling SAP BusinessObjects Business Intelligence (BI) jobs to gain greater control over your SAP BusinessObjects Business Intelligence (BI) reports through the IBM Workload Scheduler plug-in for SAP BusinessObjects Business Intelligence (BI).	✔	✔
Scheduling SAP Process Integration (PI) Channel jobs to control communication channels between the Process Integrator and a backend SAP R/3 system.	✔	✔
Scheduling and monitoring job scheduling tasks available from the SAP Solution Manager user interface.	✔	
Defining the national language support options	✔	✔
Using the SAP Business Warehouse Support functions	✔	✔
Customizing job execution return codes	✔	✔
Using SAP logon groups for load balancing and fault-tolerance	✔	✔

Table 43. IBM Workload Scheduler for SAP features (continued)

Feature	Distributed environment	End-to-end
Using Business Component-eXternal Interface Background Processing (XBP 2.0 and later) interface support to:	• Collect intercepted jobs • Track child jobs • Keep all job attributes when you rerun a job • Raise events	• Track child jobs • Keep all job attributes when you rerun a job • Raise events
Using Business Component-eXternal Interface Background Processing (XBP 3.0) interface support to:	• Create criteria profiles to log raised events, reorganize the event history, and intercept and relaunch jobs, according to the criteria you specify. • SAP application log and application return code • Spool list request and display for jobs that have run. • Temporary variants	• Create criteria profiles to log raised events, reorganize the event history, and intercept and relaunch jobs, according to the criteria you specify. • SAP application log and application return code • Spool list request and display for jobs that have run. • Temporary variants
Assigning an SAP job to a server group, for batch processing	✓	✓
Exporting SAP factory calendars and adding their definitions to the IBM Workload Scheduler database	✓	
Defining internetwork dependencies and event rules for IBM Workload Scheduler based on SAP events	✓	
Defining event rules based on IDoc records	✓	
Defining event rules based on CCMS Monitoring Architecture alerts	✓	
Rerunning a job that submits a process chain from a specific process, from failed processes, or as a new instance	✓	✓
Displaying the details of a job that submits a process chain	✓	✓
Enabling job throttling	✓	✓

Chapter 27. Access method for SAP

The SAP R/3 batch access method enables communication between an external SAP R/3 system and IBM Workload Scheduler and provides a single point of entry for automating the launching of jobs, monitoring the status of jobs and managing exceptions and recovery.

Using the SAP access method you can run and monitor SAP jobs from the IBM Workload Scheduler environment. These jobs can be run as part of a schedule or submitted for ad-hoc job processing. SAP extended agent or dynamic agent jobs can have all of the same dependencies and recovery options as other IBM Workload Scheduler jobs. SAP jobs must be defined in IBM Workload Scheduler to be run and managed in the IBM Workload Scheduler environment.

IBM Workload Scheduler provides a single and simplified point of planning, control and optimization of end-to-end production services across heterogeneous IT infrastructures. It enables you to control SAP operations from z/OS indifferently.

Scheduling process for the agent workstation hosting the r3batch access method

IBM Workload Scheduler launches jobs in SAP using IBM Workload Scheduler jobs defined to run on a supported agent workstation.

Supported agent workstations include:

- dynamic agents
- extended agents
- IBM Workload Scheduler for z/OS Agents

See Chapter 1, “Supported agent workstations,” on page 3 for more details about these agent workstations.

The supported agent workstations use the access method, `r3batch`, to pass SAP job-specific information to predefined SAP instances. The access method uses information provided in an options file to connect and launch jobs on an SAP instance.

Multiple extended agent workstations can be defined to use the same host, by using multiple options entries or multiple options files. Using the SAP extended agent name as a key, `r3batch` uses the corresponding options file to determine which instance of SAP will run the job. It makes a copy of a template job in SAP and marks the job as "`scheduled`". It then monitors the job through to completion, writing job progress and status information to a job standard list on the host workstation.

On dynamic agent workstations, more than one options file can be associated to the workstation.

For more information about job management, refer to the *IBM Workload Scheduler: User's Guide and Reference*.

For more detailed information about configuration files on extended agents and dynamic agents, see “Configuring the SAP R/3 access method” on page 207.

Roles and responsibilities

In a typical enterprise, different users contribute to the implementation and operation of the product. Table 44 describes the roles and responsibilities of all users in the process model, showing the tasks they perform.

Table 44. Roles and responsibilities in IBM Workload Scheduler for SAP

User role	User task
IBM Workload Scheduler administrator	• “Creating the IBM Workload Scheduler RFC user” on page 197 • “Creating the authorization profile for the IBM Workload Scheduler user” on page 197 • “Copying the correction and transport files” on page 200 • “Importing ABAP/4 function modules into SAP R/3” on page 200
IBM Workload Scheduler configurator	• “Changing the IBM Workload Scheduler RFC user ID password” on page 203 • “Migrating from previous versions” on page 206 • “Print parameter and job class issues” on page 205 • “Defining the configuration options” on page 209 • “Connecting to the SAP system” on page 220 • “Creating SAP Standard R/3 jobs from the Dynamic Workload Console” on page 224 • “Using the BDC Wait option” on page 267 • “Implementing job interception” on page 269 • “Defining user authorizations to manage SAP R/3 Business Warehouse InfoPackages and process chains” on page 278 • “Setting and using job throttling” on page 293 • “Exporting SAP R/3 factory calendars” on page 297 • “Setting National Language support options” on page 327

Table 44. Roles and responsibilities in IBM Workload Scheduler for SAP (continued)

User role	User task
IBM Workload Scheduler developer	• "Editing a standard SAP job" on page 232 • "Task string to define SAP jobs" on page 233 • "Displaying details about a standard SAP job" on page 241 • "Verifying the status of a standard SAP job" on page 242 • "Deleting a standard SAP job from the SAP database" on page 243 • "Balancing SAP workload using server groups" on page 243 • "Defining SAP jobs dynamically" on page 249 • "Managing SAP R/3 Business Warehouse InfoPackages and process chains" on page 279 • "Defining an IBM Workload Scheduler job that runs an SAP PI Channel job" on page 341 • See the section about prerequisite steps to create SAP BusinessObjects BI in *User's Guide and Reference*.
IBM Workload Scheduler developer	• "Defining internetwork dependencies and event rules based on SAP R/3 background events" on page 301 • "Defining event rules based on IDoc records" on page 309 • "Defining event rules based on CCMS Monitoring Architecture alerts" on page 316
IBM Workload Scheduler operator	• "Rerunning a standard SAP job" on page 247 • "Mapping between IBM Workload Scheduler and SAP job states" on page 244 • "Raising an SAP event" on page 246 • "Killing an SAP job instance" on page 245 • "Displaying details about a process chain job" on page 284

Configuring user authorization (Security file)

IBM Workload Scheduler manages security through the use of a configuration file, the security file. In the security file, you specify which scheduling objects a user can manage and how. You define these settings by writing user definitions. A user definition is an association between a name and a set of users, the objects they can access, and the actions they can perform on the specified objects.

For more detailed information about the security file, security file syntax, and how to configure the security file, see "Configuring user authorization (Security file)" in the *Administration Guide*.

The following table displays the access keywords required to grant authorization to access and work with SAP scheduling objects assigned to IBM Workload Scheduler users.

Table 45. Access keywords for activities with SAP scheduling objects. This table shows access keywords for activities with SAP scheduling objects

Activity		Access keywords required
Dynamic Workload Console	Define or search for SAP jobs on an extended agent workstation.	display on the workstation
	Retrieve the spool list on an extended agent workstation.	display on the workstation
	Rerun from a step on an extended agent.	rerun on the job
	Define or search for SAP jobs on a dynamic agent workstation, pool, or dynamic pool.	display and run on the workstation
	Retrieve the spool list on a dynamic agent workstation, pool, or dynamic pool.	display and run on the job
	Rerun from a step on a dynamic agent workstation, pool, or dynamic pool.	rerun on the job

Configuring the SAP R/3 environment

You must configure the SAP R/3 environment before using the SAP R/3 access method.

To communicate and manage the running of jobs on SAP R/3 systems using the access method for SAP R/3, complete the following configuration steps in the SAP R/3 environment.

The steps require that you have knowledge of an SAP R/3 Basis Administrator.

Overview

About this task

Here is an overview of the customization procedure:

Procedure

1. Create a new user ID for RFC communications in SAP R/3 for IBM Workload Scheduler.
2. Create the authorization profile as described in "Creating the authorization profile for the IBM Workload Scheduler user" on page 197.
3. Copy the correction and transport files from the IBM Workload Scheduler server to the SAP R/3 server.
4. Import the correction and transport files into SAP R/3 and verify the installation.

Results

Note: The import procedure adds new ABAP/4 function modules and several new internal tables to the SAP R/3 system. It does not modify any of the existing objects.

Creating the IBM Workload Scheduler RFC user

About this task

For IBM Workload Scheduler to communicate with SAP R/3, you must create a user ID in SAP R/3 for IBM Workload Scheduler batch processing. For security reasons, use a new user ID rather than an existing one.

1. Create a new RFC user ID.
2. Give this new RFC user ID the following attributes:
   - A user type of **CPIC**, **Communications**, or **DIALOG**, depending on the SAP R/3 release.
   - A password at least six characters in length. IBM Workload Scheduler requires this password to start or monitor SAP R/3 jobs. If this password changes in SAP R/3, you must update the options file used by `r3batch` with the new password.
   - The appropriate security profiles, depending on your version of SAP R/3.

Creating the authorization profile for the IBM Workload Scheduler user

The two ways to create the authorization profile for the IBM Workload Scheduler user.

There are two alternative ways to perform this task:

- Using transaction `su02` and manually creating the profile.
- Using the Profile Generator (transaction `PFCG`).

Using transaction su02 and manually creating the profile

About this task

Perform the following steps:

1. Write a profile name, for example Z_TWS, and a description.
2. Manually add the authorizations according to the following table:

Object	Description	Authorization
S_ADMI_FCD	System authorizations	S_ADMI_ALL
S_APPL_LOG	Application logs	S_APPL_L_E2E
S_BTCH_ADM	Background processing: Background administrator	S_BTCH_ADM
S_BTCH_JOB	Background processing: Operations on background jobs	S_BTCH_ALL
S_BTCH_NAM	Background processing: Background user name	S_BTCH_ALL
S_DEVELOP	ABAP Workbench: full authorization to modify objects of type PROG	E_ABAP_ALL
S_LOG_COM	Authorization to run external commands	S_LOGCOM_ALL
S_PROGRAM	ABAP: program run checks	S_ABAP_ALL

Object	Description	Authorization
S_RFC	Authoritation. check for RFC access	S_RFC_ALL
S_RZL_ADM	CCMS: System Administration	S_RZL_ALL
S_SPO_ACT	Spool: Actions	S_SPO_ALL
S_SPO_DEV	Spool: Device authorizations	S_SPO_DEV_AL
S_XMI_LOG	Internal access authorizations for XMI log	S_XMILOG_ADM
S_XMI_PROD	Authorization for external management interfaces (XMI)	S_XMI_ADMIN

The authorizations are located in the "Basis: Administration" object class.

Depending on the version of SAP R/3, the authorization S_RFC_ALL are located either in the "Cross-application Authorization Objects" or in the "Non-application-specific Authorization Objects" object class.

3. Save the profile.
4. Go to the user maintenance panel and assign the profile to the IBM Workload Scheduler SAP R/3 user.
5. Save the user data.

Using transaction PFCG (Profile Generator)

About this task

Perform the following steps:

1. Write a name, for example ZTWS, in **Role Name**.
2. Click **Create Role** and write a description for the role, such as "Role for the TWS user."
3. Save the role.
4. Select **Authorizations**.
5. Click **Change Authorization Data**.
6. In the pop-up, select **Templates**.
7. Manually add the following authorization objects:

Object	Description
S_ADMI_FCD	System authorizations
S_APPL_LOG	Application logs
S_BTCH_ADM	Background processing: Background administrator
S_BTCH_JOB	Background processing: Operations on background jobs
S_BTCH_NAM	Background processing: Background user name
S_PROGRAM	ABAP: Program run checks
S_DEVELOP	ABAP Workbench: full authorization to modify objects of type PROG
S_LOG_COM	Authorization to run external commands
S_RFC	Authorization check for RFC access
S_RZL_ADM	CCMS: System Administration

Object	Description
S_SPO_ACT	Spool: Actions
S_SPO_DEV	Spool: Device authorizations
S_XMI_LOG	Internal access authorizations for XMI log
S_XMI_PROD	Authorization for external management interfaces (XMI)

8. Fill in the values according to the following scheme:

Object	Description
S_ADMI_FCD	System authorizations • System administration function: Full authorization
S_APPL_LOG	Activity: Display • Application log Object name: Full authorization • Application log subobject: Full authorization
S_BTCH_ADM	Background processing: Background administrator • Background administrator ID: Full authorization
S_BTCH_JOB	Background processing: Operations on background jobs • Job operations: Full authorization • Summary of jobs for a group: Full authorization
S_BTCH_NAM	Background processing: Background user name • Background user name for authorization check: Full authorization
S_PROGRAM	ABAP: Program run checks • User action ABAP/4 program: Full authorization • Authorization group ABAP/4 program: Full authorization
S_RFC	Authorization check for RFC access • Activity: Full authorization • Name of RFC to be protected: Full authorization • Type of RFC object to be protected: Full authorization
S_RZL_ADM	Activity: Full authorization
S_SPO_ACT	Spool: Actions • Authorization field for spool actions: Full authorization • Value for authorization check: Full authorization
S_SPO_DEV	Spool: Device authorizations • Spool - Long device names: Full authorization
S_XMI_LOG	Internal access authorizations for XMI log • Access method for XMI log: Full authorization
S_XMI_PROD	Authorization for external management interfaces (XMI) • XMI logging - Company name: ABC* • XMI logging - Program name: MAESTRO* • Interface ID: Full authorization

9. Save the authorizations.
10. Generate a profile. Use the same name that you wrote in **Role Name**.
11. Exit the authorization management panel and select **User**.
12. Add the IBM Workload Scheduler user to the role.
13. Save the role.

Copying the correction and transport files

About this task

The setup file loads four correction and transport files into the IBM Workload Scheduler home directory. Copy these correction and transport files to the SAP R/3 server and import them into the SAP R/3 database, as follows:

1. On your SAP R/3 database server, log on to the SAP R/3 system as an administrator.
2. Copy the control file and data file from the *TWS_home*\methods directory to the following directories on your SAP R/3 database server:

   ```
   copy control_file /usr/sap/trans/cofiles/
   copy data_file /usr/sap/trans/data/
   ```

   The names of *control_file* and *data_file* vary from release to release. The files are located in *TWS_home*\methods and have the following file names and format:

   For SAP R/3 releases earlier than 6.10:
   - K000*xxx*.TV1 (control file) and R000*xxx*.TV1 (data file)
   - K900*xxx*.TV2 (control file) and R900*xxx*.TV2 (data file)

   For SAP R/3 releases 6.10, or later:
   - K9000*xx*.TV1 (control file) and R9000*xx*.TV1 (data file)
   - K9007*xx*.TV1 (control file) and R9007*xx*.TV1 (data file)

   where *x* is a digit generated by the SAPsystem.

Specifically, for IBM Workload Scheduler version 9.4 the following files are used:

For SAP R/3 releases earlier than 6.10:
- K000538.TV1 (for standard jobs scheduling)
- R000538.TV1 (for standard jobs scheduling)
- K900294.TV2 (for IDoc monitoring and job throttling)
- R900294.TV2 (for IDoc monitoring and job throttling)

For SAP R/3 releases 6.10, or later:
- K900044.TV1 (for standard jobs scheduling)
- R900044.TV1 (for standard jobs scheduling)
- K900751.TV1 (for IDoc monitoring and job throttling)
- R900751.TV1 (for IDoc monitoring and job throttling)

Importing ABAP/4 function modules into SAP R/3

How to generate, activate and commit new ABAP/4 modules to a SAP R/3 system.

About this task

This section describes the procedure to generate, activate, and commit new ABAP/4 function modules to your SAP R/3 system and several new internal tables. You do not modify any existing SAP R/3 system objects. For information about the supported SAP R/3 releases, see the System Requirements Document at http://www-01.ibm.com/support/docview.wss?rs=672 &uid=swg27045181#accmthdplug.

The number of ABAP/4 modules that you install with the import process varies from release to release. The modules are installed in the *TWS_home*\methods directory and have the following file names and format:

- K9000*xx*.TV1 (function modules for standard jobs scheduling extensions)
- K9007*xx*.TV1 (function modules for IDoc monitoring and job throttling)

where *x* is a digit generated by the SAP system.

To import ABAP/4 function modules into SAP R/3:

Procedure

1. Change to the following directory:

   ```
   cd /usr/sap/trans/bin
   ```

2. Add the transport file to the buffer:

   ```
   tp addtobuffer transport sid
   ```

   where:

   transport
   : The transport request file.

   sid
   : The SAP R/3 system ID.

   For example, if the transport file in the *TWS_home*\methods directory is named K9000*xxx*.TV1, the transport request is tv1K9000*xxx*.

3. Run the **tp tst** command to test the import:

   ```
   tp tst transport sid
   ```

   After running this command, examine the log files in the /user/sap/trans/log directory for error messages. Warnings of severity level 4 are normal.

   If there are errors, check with a person experienced in correction and transport, or try using unconditional modes to do the import.

4. Run the following command to import all the files in the buffer:

   ```
   tp import transport sid
   ```

   This command generates the new ABAP/4 modules and commits them to the SAP R/3 database. They automatically become active.

   After running this command, examine the log files located in the /user/sap/trans/log directory for error messages. Warnings of severity level 4 are normal.

   If a problem is encountered, use unconditional mode when running this step:

   ```
   tp import transport sid U126
   ```

5. When the import is complete, check the log files located in the /usr/sap/trans/log directory to verify that the ABAP/4 modules were imported successfully.

   If you apply the standard transport and the IDOC transport, 26 ABAP/4 modules are installed by the import process. For a list of the transport files to be used, refer to "Importing ABAP/4 function modules into SAP R/3" on page 200. Table 46 on page 202 lists the ABAP modules installed.

Table 46. ABAP/4 modules installed

ABAP/4 module	Installed?
ENQUEUE_/IBMTWS/EQ_XAPPL	✓
DEQUEUE_/IBMTWS/EQ_XAPPL	✓
/IBMTWS/UNREGISTER_XAPPL	✓
/IBMTWS/GET_XAPPL_REGISTRATION	✓
/IBMTWS/MODIFY_JOB_CLASS	✓
/IBMTWS/REGISTER_XAPPL	✓
J_1O1_BDC_STATUS	✓
J_1O1_DATE_TIME	✓
J_1O1_IDOC_SELECT	✓
J_1O1_JOB_ADJUST_CLIENT	✓
J_1O1_JOB_FIND	✓
J_1O1_JOB_FINDALL	✓
J_1O1_JOB_HAS_EXTENDED_VARIANT	✓
J_1O1_JOB_LOG	✓
J_1O1_RAISE_EVENT	✓
J_1O1_REPORT_ALL_SELECTIONS	✓
J_1O1_REPORT_GET_TEXTPOOL	✓
J_1O1_VARIANT_COPY	✓
J_1O1_VARIANT_CREATE	✓
J_1O1_VARIANT_DELETE	✓
J_1O1_VARIANT_EXISTS	✓
J_1O1_VARIANT_GET_DEFINITION	✓
J_1O1_VARIANT_GET_HELP_VALUES	✓
J_1O1_VARIANT_MAINTAIN_CNT_TBL	✓
J_1O1_VARIANT_MAINTAIN_SEL_TBL	✓
J_1O1_VARIANT_MODIFY	✓

Table 47 shows the contents of the ABAP modules for the IDoc records and job throttling feature.

Table 47. ABAP/4 modules contents

Object	Description	Used by...
/IBMTWS/	Type = Development Namespace. For IBM Workload Scheduler.	Internal use only
/IBMTWS/EQ_XAPPL	Type = Lock Object. Synchronizes the job throttler instances and job interception collector jobs that are running against the same SAP system.	Job throttling Job interception
/IBMTWS/GET_ XAPPL_REGISTRATION	Type = Function Module. It is used to query for existing external application registration data in table IBMTWS/XAPPL, for example the registration data of a job throttler instance or job interception collector.	Job throttling Job interception

Table 47. ABAP/4 modules contents (continued)

Object	Description	Used by...
/IBMTWS/ MODIFY_JOB_CLASS	Type = Function Module. Modifies the job class of an intercepted job that is controlled by the job throttler. For details, see "Step 3. Enabling job class inheritance" on page 294.	Job throttling Job interception
/IBMTWS/ REGISTER_XAPPL	Type = Function Module. Registers an external application, for example the job throttler.	Job throttling Job interception
/IBMTWS/TWS4APPS	Type = Function group. For IBM Workload Scheduler.	Internal use only
/IBMTWS/ UNREGISTER_XAPPL	Type = Function Module. Unregisters an external application, for example the job throttler.	Job throttling Job interception
/IBMTWS/XAPPL	Type = Table. Stores the registration data of external applications. An external application can be a job throttler instance or a job interception collector.	Job throttling Job interception
J_1O1_IDOC_SELECT	Type = Function Module. Selects IDoc records from SAP internal tables. For details, see "Defining event rules based on IDoc records" on page 309.	IDoc event rules
J_1O1_TWS_EDIDC	Type = Data structure in FM interface	Function module J_1O1_IDOC_SELECT
J_1O1_TWS_IDOC_ SELECTION	Type = Data structure in FM interface	Function module J_1O1_IDOC_SELECT
J_1O1_TWS_STATE_ SELECTION	Type = Data structure in FM interface	Function module J_1O1_IDOC_SELECT

Changing the IBM Workload Scheduler RFC user ID password

About this task

If the password of the IBM Workload Scheduler RFC user ID is modified after the initial installation, the options file used by `r3batch` must be updated with this change.

In UNIX, log on as root to the system where IBM Workload Scheduler is installed.

In Windows, log on as an administrator and start a DOS shell on the system where IBM Workload Scheduler is installed, as follows:

Procedure

1. Generate an encrypted version of the new password using the **enigma** command in *TWS_home*`/methods`. To do this in a command shell, type:

   `enigma` *newpwd*

   where *newpwd* is the new password for the IBM Workload Scheduler RFC user ID.

   The **enigma** command prints an encrypted version of the password.

2. Copy the encrypted password into the options file, which is located in the *TWS_home*/methods directory. The file can be edited with any text editor.

Results

Ensure that you copy the password exactly, preserving uppercase, lowercase, and punctuation. The encrypted password looks similar to:

```
{3des}Hchwu6IsF5o=
```

If the encrypted password is not entered correctly, IBM Workload Scheduler is unable to start or monitor SAP R/3 batch jobs.

Securing data communication

You can increase the security of your SAP system through the use of an external security product. Secure Network Communications (SNC) can integrate the external security product with the SAP system.

Data communication paths between the client and server components of the SAP system that use the SAP protocols RFC or DIAG are more secure with SNC. The security is strengthened through the use of additional security functions provided by an external product that are otherwise not available with SAP systems.

SNC provides security at application level and also end-to-end security. IBM Workload Scheduler is extended to read SNC configuration parameters and forward them to the SAP RFC communication layer used when logging in to the SAP system. IBM Workload Scheduler does not provide or ship SNC software but instead enables the use of third-party SNC products to secure the RFC communication.

Levels of protection

You can apply one of the following levels of protection:

Authentication only
: This is the minimum level of security protection available with SNC. The system verifies the identity of the communication partners.

Integrity protection
: The system detects any changes to the data which might have occurred between the two components communicating.

Privacy protection
: This is the maximum level of security protection available with SNC. The system encrypts the messages being transferred so that any attempt to eavesdrop is useless. Privacy protection also includes integrity protection of the data.

The following options in the local options file are used to configure SNC for IBM Workload Scheduler:

- **r3snclib**: the path and file name of the SNC library.
- **r3sncmode**: enables or disables SNC between r3batch and the SAP R3 system.
- **r3sncmyname**: the name of the user sending the RFC for SNC.
- **r3sncpartnername**: the SNC name of the SAP R3 communication partner (application server).
- **r3sncqop**: the SNC protection level.

See “Defining the local options” on page 210 for a description of these options in the local options file.

Print parameter and job class issues

The workstation running the r3batch access method for SAP R/3 uses the official RFC interfaces of SAP R/3 for job scheduling. When you migrate from previous versions of SAP R/3, there can be problems with print parameters in jobs launched by IBM Workload Scheduler. This is because of limitations in the RFC interfaces.

These limitations are no longer true with XBP 2.0 and later.

The following is a list of print parameters supported by BAPI XBP 1.0 for SAP R/3 release 4.6*x* and later:

- archiving mode
- authorization
- columns
- delete after output
- lines
- number of copies
- output device
- print immediately
- recipient
- sap cover page
- selection cover page
- spool retention period

To resolve the loss of print parameters when copying a job, install the appropriate SAP R/3 Support Package as stated in the SAP R/3 notes 399449 and 430087.

The same applies to the job class. Official SAP R/3 interfaces only allow class C jobs. Installing the SAP R/3 Support Package also resolves this issue.

Unicode support

Access method for SAP supports the Unicode standard.

What is Unicode

Unicode was devised to address the problem caused by the profusion of code sets. Since the early days of computer programming hundreds of encodings have been developed, each for small groups of languages and special purposes. As a result, the interpretation of text, input, sorting, display, and storage depends on the knowledge of all the different types of character sets and their encodings. Programs are written to either handle one single encoding at a time and switch between them, or to convert between external and internal encodings.

The problem is that there is no single, authoritative source of precise definitions of many of the encodings and their names. Transferring text from one computer to another often causes some loss of information. Also, if a program has the code and the data to perform conversion between many subsets of traditional encodings, then it needs to hold several Megabytes of data.

Unicode provides a single character set that covers the languages of the world, and a small number of machine-friendly encoding forms and schemes to fit the needs of existing applications and protocols. It is designed for best interoperability with both ASCII and ISO-8859-1, the most widely used character sets, to make it easier for Unicode to be used in applications and protocols.

Unicode makes it possible to access and manipulate characters by unique numbers, their Unicode code points, and use older encodings only for input and output, if at all. The most widely used forms of Unicode are:

- UTF-32, with 32-bit code units, each storing a single code point. It is the most appropriate for encoding single characters.
- UTF-16, with one or two 16-bit code units for each code point. It is the default encoding for Unicode.
- UTF-8, with one to four 8-bit code units (bytes) for each code point. It is used mainly as a direct replacement for older MBCS (multiple byte character set) encodings.

Unicode support on r3batch

Starting with R/3 version 4.7 (R/3 Enterprise), Unicode is used on all layers of the R/3 system:

- UTF-8, UTF-16, and UTF-32 on the database
- UTF-16 on the application server and graphical user interface

`r3batch` uses the UTF-8 code page internally. Because it communicates with SAP R/3 at the application server layer, it uses UTF-16 when communicating with Unicode-enabled SAP R/3 systems.

To use Unicode support, the following conditions must be met:

- Access method for SAP must run on one of the following operating systems:
  - Microsoft Windows Server 2003 and later on IA32, 32-bit
  - Microsoft Windows Server 2003 and later on x64, 64-bit
  - Microsoft Windows Server 2003 and later on IA64, 64-bit
  - IBM AIX®, 64-bit
  - Sun Solaris Operating Environment, 64-bit
  - Sun Solaris Operating Environment for Opteron
  - HP-UX for Integrity
  - HP-UX for PA-RISC, 64-bit
  - Linux on xSeries
  - Linux on zSeries, 64-bit

  The product does not support Unicode on the other operating systems where it can be installed.
- The SAP R/3 systems that communicate with `r3batch` must be running Unicode-enabled SAP R/3 versions.

If these conditions are not met, you cannot use Unicode support and must make sure that `r3batch`, the Dynamic Workload Console, and the target SAP R/3 system code page settings are aligned. Use the options related to national language support described in “SAP R/3 supported code pages” on page 328.

Migrating from previous versions

This version of IBM Workload Scheduler for SAP R/3 supports all the SAP R/3 versions listed in "Detailed system requirements" http://www-01.ibm.com/support/docview.wss?uid=swg27045181. The IBM Workload Scheduler access method for SAP R/3 uses the official SAP R/3 RFC interfaces for job scheduling. These are:

- The BC-XBP 6.10 (V2.0) Interface function modules for SAP R/3 versions 6.10 and later.

- The BC-XBP 7.00 (V3.0) Interface function modules for SAP R/3 versions 7.00, Support Package 16, in addition to the BC-XBP 6.10 (V2.0) function modules.

To avoid conflicts with other vendors, the IBM Workload Scheduler ABAP modules now belong to the IBM Workload Scheduler partner namespace J_1O1_*xxx* and /IBMTWS. After you have completed the imports as described in "Importing ABAP/4 function modules into SAP R/3" on page 200, the RFC J_1O1_*xxx* function modules and the /IBMTWS function modules are installed on your system.

If you had a previous installation of IBM Workload Scheduler extended agent for SAP R/3 on your system, you can delete the following function modules from your SAP R/3 system:

```
Z_MAE2_BDC_STATUS
Z_MAE2_DATE_TIME
Z_MAE2_JOB_COPY
Z_MAE2_JOB_DELETE
Z_MAE2_JOB_FIND
Z_MAE2_JOB_FINDALL
Z_MAE2_JOB_LOG
Z_MAE2_JOB_OPEN
Z_MAE2_JOB_START
Z_MAE2_JOB_STATUS
Z_MAE2_JOB_STOP
```

These are old versions of the ABAP functions, which belong to the customer name space. You can also delete the function group YMA3. It is not necessary to delete the function modules and the function group, but delete them if you want to clean up your system.

Configuring the SAP R/3 access method

This section provides detailed information about the SAP options file creation.

The files for the SAP access method are located in *TWS_home*/methods. If r3batch finds the local configuration file for an extended agent or dynamic agent, it ignores the duplicate information contained in r3batch.opts. If instead it does not find a local configuration file then it will use r3batch.opts global options file.

To successfully use the SAP R/3 access method, you must first install the SAP RFC libraries, as described in the System Requirements Document in the SAP R/3 Access Method Requirements section.

Dynamic agents

r3batch.opts
A common configuration file for the r3batch access method, whose settings affect all the r3batch instances. It functions as a "global" configuration file.

DYNAMIC_AGENT_FILE_r3batch.opts
One or more configuration files that are specific to each dynamic agent workstation within a particular installation of a r3batch access method. The *DYNAMIC_AGENT_FILE_r3batch*.opts is the name of the options file, where *DYNAMIC_AGENT* is not necessarily the name of the dynamic agent workstation, because the dynamic agent can have more than one.opts file associated. If you do not create a local options file, the global options file is used. Every

dynamic agent workstation must have one or more local options file with its own configuration options.

Note: The value for *DYNAMIC_AGENT* must be written in uppercase alphanumeric characters. Double-byte character set (DBCS), Single-byte character set (SBCS), and Bidirectional text are not supported.

Note: If you have a **pool** or **dynamic pool** containing *n* agents, you must create an options file for the dynamic pool and copy it in the *TWA_DIR*/TWS/methods of each agent of the pool so that all members of the pool have a local options file with the same name. Then you must create another options file for the specific agent in the same directory.
For example, if the SAP R/3 access method is installed for **AGENT1** and **AGENT2** that belong to the dynamic pool ***DYN_POOL***, you need to create the following options files in the path *TWA_DIR*/TWS/methods on each agent:

AGENT 1

- FILE_AGENT1_r3batch.opts
- FILE_DYN_POOL_r3batch.opts

AGENT2

- FILE_AGENT2_r3batch.opts
- FILE_DYN_POOL_r3batch.opts

On dynamic workstations, you can create a new options file or edit an existing options files from an Option Editor, a graphical user interface panel available on the General tab of the SAP job definition panels in the Dynamic Workload Console.

Extended agents

r3batch.opts
A common configuration file for the r3batch access method, whose settings affect all the r3batch instances. It functions as a "global" configuration file.

***XANAME*_r3batch.opts**
A configuration file that is specific to each IBM Workload Scheduler extended agent workstation that uses the r3batch access method. Its options affect only the r3batch instance that is used by that particular workstation. It functions as a "local" configuration file.

Note: *XANAME* is the name of the extended agent workstation and must be written in uppercase characters.

For example, to define two extended agents named wkst1 and wkst2 that access two SAP systems, SAP1 and SAP2, with the r3batch access method, you must define the following three configuration files:

- Global r3batch.opts
- Local file WKST1_r3batch.opts
- Local file WKST2_r3batch.opts

Defining the configuration options

This section describes the options you can configure in `r3batch.opts` and in *XANAME*`_r3batch.opts`.

Defining the global options

Table 48 lists the options that can be specified only in the *global* configuration file `r3batch.opts`.

Table 48. r3batch global configuration options

Option	Description	Default
dep_sem_proj	(Optional) The project ID for the external dependency semaphore used for handling SAP R/3 background processing events as external follows dependencies.	`d`
icp_sem_proj	(Optional) The project ID for the job interception semaphore.	`c`
job_sem_proj	(Optional) The project ID for the job semaphore.	`a`
primm_enable	(Optional) Enables (`ON`) the SAP print parameter PRIMM (Print Immediately) for all jobs.	`OFF`
prnew_enable	(Optional) Enables (`ON`) the SAP print parameter PRNEW (New Spool Request) for all jobs.	`OFF`
prrel_enable	(Optional) Enables (`ON`) the SAP print parameter PRREL (Immediately delete the spool output after printing) for all jobs.	`OFF`
prsap_enable	(Optional) Enables (`ON`) the SAP print parameter PRSAP (Print SAP Cover Page) for all jobs. The default value is OFF.	`OFF`
prunx_enable	(Optional) Enables (`ON`) the SAP print parameter PRUNX (Print Operating System Cover Page) for all jobs.	`OFF`
var_sem_proj	(Optional) The project ID for the variant semaphore.	`b`

Modifying the default values of the semaphore options is particularly useful when the IDs that are generated would be the same as the IDs already used by other applications.

On UNIX and Linux, to resolve the problem of duplicated IDs, IBM Workload Scheduler for SAP uses system-5 semaphores to synchronize critical ABAP function module calls. It uses one semaphore for job-related tasks and another one for tasks related to variant maintenance.

To synchronize on the same semaphore, the communication partners must use the same identifier. There are several ways to choose this identifier. IBM Workload Scheduler for SAP uses two parameters: a path name and a project ID (which is a character value). The path name parameter is the fully qualified path to the options file. The project ID is taken from the options described in Table 48. If these options are omitted, IBM Workload Scheduler for SAP uses default values, which work for most installations.

Note:

1. The semaphore options must be edited directly in the global options file using a text editor; you cannot use the options editor to modify these values.

2. If two semaphore options are assigned the same value, all the semaphore values are reset according to the following rule:

   job_sem_proj
   It keeps the value assigned, or its default value.

   var_sem_proj
   It is reset to the first character that, in the ASCII table, follows the value assigned to `var_sem_proj`.

   icp_sem_proj
   It is reset to the second character that, in the ASCII table, follows the value assigned to `var_sem_proj`.

   dep_sem_proj
   It is reset to the third character that, in the ASCII table, follows the value assigned to `var_sem_proj`.

Defining the local options

Table 49 lists the options that you can specify only in the *local* configuration files.

Table 49. r3batch local configuration options

Option	Description
bapi_sync_level	(Optional) Specifies the synchronization level between the SAP function modules BAPI_XBP_JOB_COPY and BAPI_XBP_JOB_START_ASAP. Allowed values are: **high** All RFC calls between BAPI_XBP_JOB_START_ASAP and BAPI_XBP_JOB_COPY are synchronized. This is the default. **medium** The RFC calls to BAPI_XBP_JOB_START_ASAP are synchronized. **low** The RFC calls are not synchronized.
blank_libpath	(Optional) Clears (`ON`) the operating system variables LD_LIBRARY_PATH and LIBPATH. The default value is `OFF`.
fn_cache_enabled	(Optional) Enables or disables the file cache on the agent. Can be ON or OFF (default value).
fn_cache_purge_interval	(Optional) Specifies the time of validity (in days) of the cached files. If it is left unspecified or set equal to or less than 0, the files are valid indefinitely.
get_job_status_retry	(Optional) Sets the number of times a Remote Function Call must be attempted to retrieve the actual status of an SAP Job. Allowed values are in the range from 1 to 9999. The default value is 5.
get_job_status_retry_delay	(Optional) Sets the number of seconds between two consecutive calls of a Remote Function Call. Allowed values are in the range from 1 to 9999.

Table 49. r3batch local configuration options (continued)

Option	Description
job_duration	(Optional) Enables (ON) that the CPU time value in the production plan report that is run from the Dynamic Workload Console is set to the actual duration of the SAP job. Default value is OFF. To retrieve the job duration from the SAP system, ensure that the authorization profile contains the following authorization objects: • S_DEVELOP • S_TCODE with parameter SE38 (only for SAP 6.40 and 7.00) For details about the authorization profile, see "Creating the authorization profile for the IBM Workload Scheduler user" on page 197.
primm_enable	(Optional) Enables (ON) the SAP print parameter PRIMM (Print Immediately) for all jobs. The default value is OFF.
prnew_enable	(Optional) Enables (ON) the SAP print parameter PRNEW (New Spool Request) for all jobs. The default value is OFF.
prrel_enable	(Optional) Enables (ON) the SAP print parameter PRREL (Print Release) for all jobs. The default value is OFF.
prsap_enable	(Optional) Enables (ON) the SAP print parameter PRSAP (Print SAP Cover Page) for all jobs. The default value is OFF.
prunx_enable	(Optional) Enables (ON) the SAP print parameter PRUNX (Print Operating System Cover Page) for all jobs. The default value is OFF.
r3client	(Mandatory) The SAP client number.
r3gateway	(Optional) The host name of the SAP gateway.
r3group	(Optional) The name of the SAP logon group.
r3gwservice	(Optional) The service number of the SAP gateway.
r3host	(Mandatory) The host name of the SAP message server when using logon groups, or the host name of the application server in all other cases. If this server can be reached through one or more SAP gateways, use a string in the format /H/gateway/H/ for each of them.
r3instance	(Mandatory) The SAP instance number. If **r3group** is set, this option is ignored.
r3password	(Mandatory) The password for the **r3user**. Ensure that you enter the same password when creating this user in the SAP system. It can be a maximum of eight characters and is stored in encrypted format. The value is case sensitive. For information about how to encrypt the password see "Encrypting SAP R/3 user passwords" on page 219.
r3sid	(Mandatory) The SAP system ID.
r3snclib	(Optional) Specifies the path and file name of the SNC library. This option becomes mandatory if **r3sncmode** is activated (1).

Table 49. r3batch local configuration options (continued)

Option	Description
r3sncmode	(Optional) Enables (1), or disables (0), secure network communication (SNC) between r3batch and the SAP R3 system. The default setting is (0). Refer to the SAP documentation for more information about using the SAP cryptographic Library for SNC.
r3sncmyname	(Optional) Specifies the name of the user sending the RFC for secure network communication (SNC).
r3sncpartnername	(Optional) Specifies the SNC name of the SAP R3 communication partner (application server). This option becomes mandatory if **r3sncmode** is activated (1).
r3sncqop	(Optional) Specifies the secure network communication (SNC) protection level.
r3user	(Mandatory) The name of the SAP user with which the access method connects to the SAP system. It must have the appropriate privileges for running background jobs. It is sometimes also called the Maestro User ID.
report_list_max_limit	(Optional) Sets the maximum number of ABAP reports which can be loaded. The default value is -1, which means no limit.

Defining the common options

Table 50 lists additional options that you can specify in either configuration file.

Table 50. r3batch common configuration options

Option	Description	Default
bdc_job_status_failed	(Optional) How IBM Workload Scheduler sets the completion status of a job running BDC sessions, according to a possible BDC processing failure. The allowed values are: *n* If at least *n* BDC sessions failed (where *n* is an integer greater than 0), IBM Workload Scheduler sets the job completion status as failed. **all** If all the BDC sessions failed, IBM Workload Scheduler sets the job completion status as failed. **ignore** When all the BDC sessions complete, regardless of their status, IBM Workload Scheduler sets the job completion status as successful. This is the default. **Note:** This option is ignored if you defined the job by setting the **nobdc** or **nobdcwait** option. For details about these options, see "Task string to define SAP jobs" on page 233.	ignore
ccms_alert_history	(Optional) Enables (ON) or disables (OFF) the product to retrieve all the matching CCMS alerts, included those that were generated before the monitoring process started. The default value is OFF, meaning that the product retrieves only the CCMS alerts that are generated after the monitoring process started. **Note:** This option takes effect the first time you start the CCMS alert monitoring. If you initially set it to OFF and later you want to retrieve the alerts generated before the monitoring process started, stop the monitoring and delete the *XAname*_r3xalmon.cfg file located in *TWS_home*/methods/r3evmon_cfg. In the options file, set ccms_alert_history=on and start the monitoring process again.	OFF

Table 50. r3batch common configuration options (continued)

Option	Description	Default
commit_dependency	(Optional) Enables (ON) or disables (OFF) the product to commit internetwork dependencies after processing. If you enable this option, internetwork dependencies are committed immediately by default. If you disable or delete this option, the **-commit** parameter set in the internetwork dependency definition is applied. For details about the **-commit** parameter, see Table 60 on page 302.	OFF
enable_appl_rc	(Optional) Enables (ON) or disables (OFF) the mapping of the application return code to the IBM Workload Scheduler return code. **Note:** This feature does not modify the exit code of the access method. For more details, refer to the **rccondsucc** keyword in the job definition documented in *IBM Workload Scheduler: User's Guide and Reference*.	OFF
evmon_interval	(Optional) The polling rate (in seconds) that the r3evmon process applies to monitor the list of events.	60
ifuser	(Optional) The ID of the user who runs the access method to retrieve job information.	None
idoc_no_history	(Optional) Enables (ON) or disables (OFF) the product to retrieve only IDoc data that is generated after the monitoring process started. If you specify OFF, all matching IDocs are retrieved, including those that were generated before the monitoring process started. When processing this option, r3evmon uses the *XAname*_r3idocmon.cfg file to retrieve the date and time for the next monitoring loop.	ON
idoc_shallow_result	(Optional) Enables (ON) or disables (OFF) the product to retrieve only the most recent matching IDocs. For example, suppose you set idoc_shallow_result=ON. If the status of an IDoc changes several times during the monitoring interval and the same status, matching an event rule condition, occurs more than once in the sequence of statuses, only the most recent matching IDoc is retrieved. If you specify OFF, all matching IDocs are retrieved.	ON
jobdef	(Optional) If enabled, you can use the Dynamic Workload Console to define jobs, in addition to the command line. Specify r3batch to enable the option, and any other value to disable it.	r3batch
job_interceptable	(Optional) Enables (ON) or disables (OFF) the job launched by r3batch to be intercepted by SAP. If enabled, when r3batch launches a job and the SAP job interception feature is enabled, the job can be intercepted if it matches previously defined criteria. If disabled, the job launched by r3batch cannot be intercepted by SAP.	OFF
ljuser	(Optional) The ID of the user who runs the access method to launch jobs (LJ tasks) and manage jobs (MJ tasks).	None
log_r3syslog	(Optional) Enables (ON) or disables (OFF) the access method to write the latest entries from the SAP syslog to its trace file when an RFC returns with a general error.	OFF
long_interval	(Optional) The maximum interval, in seconds, between status checks. It cannot be greater than 3600 seconds. See also *short_interval*.	3600

Table 50. r3batch common configuration options (continued)

Option	Description	Default
max_n0_counter	(Optional) The maximum value of the N0 counter. If the N0 counter reaches the specified value, it starts again from 0.	2^15 - 1
max_name_counter	(Optional) The maximum value of the variant name counter. If the name counter reaches the specified value, it starts again from 0.	40
n0_counter_policy	(Optional) The N0 counter policy: **step** The N0 counter is increased once for every step. **job** The N0 counter is increased once for every job.	job
name_counter_policy	(Optional) The name counter policy: **step** The name counter is increased once for every step. **job** The name counter is increased once for every job.	job
nojobdefs	(Optional) Disables (1) or enables (0) the definition of new SAP jobs using the Dynamic Workload Console. If this option is set to 1, you must create the job definitions in the SAP job before creating the IBM Workload Scheduler job that is going to schedule them.	0
oldcopy	(Optional) Enables (1) or disables (0) the access method to use the old way of copying jobs, even though the function module BAPI_XBP_JOB_COPY is present on the SAP system.	0
pchain_recover	(Optional) The action taken by IBM Workload Scheduler when you rerun a job that submits a process chain. The allowed values are: **rerun** IBM Workload Scheduler creates another process chain instance and submits it to be run again. **restart** IBM Workload Scheduler restarts the original process chain from the failing processes to the end. For details about rerunning a process chain job, refer to "Rerunning a process chain job" on page 286.	rerun
pchain_details	(Optional) Enables (ON) or disables (OFF) the display of details about an SAP process chain that you scheduled as an IBM Workload Scheduler job.	OFF
pchainlog_bapi_msg	(Optional) Enables (ON) or disables (OFF) the product to retrieve additional messages from the BAPI calls from the SAP Business Warehouse process chains and appends them to the stdlist of IBM Workload Scheduler.	ON
pchainlog_level	(Optional) Supplements the option **retrieve_pchainlog**. Specifies which level of process chain logs you want to retrieve. Allowed values are: **1** Only the first level of process chain is logged. *level_number* Process chains are logged down to the level of chain you indicate here. For example, if you indicate 2 only the first two levels are logged. **all** All process chains are logged.	If you omit this option, and leave **retrieve_pchainlog** set to ON, the default is level 1.

Table 50. r3batch common configuration options (continued)

Option	Description	Default
pchainlog_verbosity	(Optional) Supplements the option **retrieve_pchainlog**. Specifies which type of process chain logs you want to retrieve. Allowed values are: **chains_only** Logs only the process chains. **chains_and_failed_proc** In addition to the process chains, logs all failed processes. **complete** Logs all process chains and processes. **Note:** This option affects the entire process chain; verbosity cannot be reduced for individual processes.	If you omit this option, and leave **retrieve_pchainlog** set to ON, the default is complete.
pc_launch_child	(Optional) Enables (ON) or disables (OFF) the product to launch child jobs that are in scheduled state. **Note:** You can use this option only if you activated the parent-child feature on the SAP system. On the XBP 2.0 or later SAP system, you can activate this feature by using the INITXBP2 ABAP report.	OFF
placeholder_abap_step	(Optional) If XBP version 2.0 is used, the name of the ABAP report used as the dummy step in the SAP placeholder job that is created to monitor an SAP event defined as external dependency.	If this option is not specified, either as global or local option, the default BTCTEST is used.
qos_disable	(Optional) Enables (ON) or disables (OFF) the creation of the environment variable QOS_DISABLE on Microsoft Windows systems that use the Quality of Service (QoS) feature, before r3batch opens an RFC connection. Without this option, because of problems in the implementation of the QoS service, the connection between r3batch and the SAP RFC library does not work.	OFF
r3auditlevel	(Optional) The audit level for the XBP. A number from 0 (low) to 3 (high).	3
rcmap	(Optional) Enables (ON) or disables (OFF) the return code mapping capabilities of Access method for SAP.	ON
retrieve_applinfo	(Optional) Enables (ON) or disables (OFF) the retrieval and appending of the SAP application log to the stdlist of IBM Workload Scheduler.	OFF
retrieve_ipaklog	(Optional) Enables (ON) or disables (OFF) the retrieval and appending of the SAP BW InfoPackage logs to the stdlist of IBM Workload Scheduler. **Note:** The retrieval and appending of SAP BW InfoPackage job logs to the stdlist might be time-consuming for jobs that produce large logs.	ON

Table 50. r3batch common configuration options (continued)

Option	Description	Default
retrieve_joblog	(Optional) Enables (ON) or disables (OFF) the retrieval and appending of the SAP job logs to the stdlist of IBM Workload Scheduler. **Note:** 1. The retrieval and appending of job logs to the stdlist might be time-consuming for jobs that produce large logs. 2. If you disable the retrieval of the job logs, you also disable the return code mapping function for the log entries. 3. This option does not affect the BDC Wait feature.	ON
retrieve_pchainlog	(Optional) Enables (ON) or disables (OFF) the retrieval and appending of the SAP BW process chain logs to the stdlist of IBM Workload Scheduler. **Note:** 1. The retrieval and appending of SAP BW process chain logs to the stdlist might be time-consuming for jobs that produce large logs. 2. If you disable the retrieval of the SAP BW process chain logs, you also disable the return code mapping function for the log entries. 3. This option on its own retrieves the log of only the first level of a process chain. To retrieve more complete logs, use this option with the **pchainlog_level** and **pchainlog_verbosity** options.	ON
retrieve_spoollist	(Optional) Enables (ON) or disables (OFF) the retrieval and appending of the SAP job spool lists to the stdlist of IBM Workload Scheduler. **Note:** 1. The retrieval and appending of SAP job spool lists to the stdlist might be time-consuming for jobs that produce large spool lists. 2. If you disable the retrieval of the SAP job spool lists, you also disable the return code mapping function for the spool list entries.	ON
retry	(Optional) The retry count for SAP function module calls. Specify an integer greater than 0.	5
rfc_interval	(Optional) The polling rate (in milliseconds) with which r3batch listens for results of RFC requests. The rate cannot exceed 1,000 milliseconds. Consider that the lower the value of the rfc_interval option, the higher the frequency with which RFC request results are collected and, as a consequence, CPU consumption on the r3batch system is high.	10
rfc_open_delay	(Optional) The maximum number of seconds to wait between two consecutive calls before opening an RFC connection.	1800
rfc_open_retry	(Optional) The retry count for opening an RFC connection to the SAP system. Specify an integer greater than 0 to limit the number of retries, or -1 for an unlimited number of retries.	5
rfc_timeout	(Optional) The time (in seconds) that r3batch waits before canceling a non-responding RFC communication. Allowed values are in the range from 0 to 9999; 0 means no timeout.	600

Table 50. r3batch common configuration options (continued)

Option	Description	Default
short_interval	(Optional) The minimum interval, in seconds, between status checks. It cannot be less than 2 seconds. Setting this option to low values makes the notification of status changes faster, but increases the load on the hosting machine. See also *long_interval*.	10
throttling_enable_ job_class_inheritance	(Optional) Enables (ON) or disables (OFF) the inheritance of priority class. ON means that the intercepted job inherits the priority class of its progenitor job, if it is higher than its own class; otherwise it keeps its own class. OFF means that the intercepted job keeps its own class, regardless of its progenitor's class. **Note:** By setting this option, the parent-child feature is automatically enabled on the SAP system.	ON
throttling_enable_ job_interception	(Optional) Enables (ON) the job interception feature at job throttler startup, or keeps the current setting (OFF). ON means that when the job throttler starts, it enables the job interception feature on the SAP system. When the job throttler is stopped, the job interception feature is also automatically restored to the setting that was previously configured on the SAP system. OFF means that the job interception feature is kept as it is currently set in the SAP system.	ON
throttling_job_ interception_ version	Specifies the BC-XBP interface version to be used when the job throttler starts. Valid values are: • 2 • 3 The default BC-XBP interface version that is used is 2 (version 2.0).	2
throttling_interval	(Optional) The interval (in seconds) between each job throttling run.	5
throttling_max_ connections	(Optional) The maximum number of connections (connection pool size) that the job throttler can open to communicate with the SAP system. The minimum value is 3.	5
throttling_release_all_ on_exit	(Optional) Enables (ON) or disables (OFF) the release of all intercepted jobs. ON means that when the job throttler is stopped, it releases all the intercepted jobs. OFF means that when the job throttler is stopped, it does not release the intercepted jobs therefore the jobs remain intercepted, in scheduled state.	ON
throttling_send_ ccms_data	(Optional) Enables (ON) or disables (OFF) the sending of data from job throttling to the SAP CCMS Monitoring Architecture. ON means that the job throttler sends its status data to CCMS continuously. OFF means that the job throttler does not send its status to CCMS.	OFF
throttling_send_ ccms_rate	(Optional) Rate (in number of runs) at which the job throttler sends its status data to the SAP CCMS monitoring architecture. The minimum value is 1, meaning that the job throttler sends the data at every run.	1

Table 50. r3batch common configuration options (continued)

Option	Description	Default
twsmeth_cp	(Optional) The code page that `r3batch` uses to write its output. This option must be consistent with **twsmeth_lang**. It can be any of the existing TIS codepages.	The code page used by the IBM Workload Scheduler workstation that hosts the `r3batch` access method.
twsmeth_lang	(Optional) The language used to report messages. This option must be consistent with **twsmeth_cp**.	The language of the locale of the workstation that hosts the `r3batch` access method.
twsxa_cp	(Optional) The encoding used by `r3batch` to establish RFC connections with SAP systems. Use this option if `r3batch` is not Unicode-enabled. Possible values are: • 1100 • 1103 • 8000 • 8300 • 8400	`1100`
twsxa_lang	(Optional) The language used to log in to SAP systems. Specify one of the following (DE, EN, and JA can be set from the Option Editor. The other languages can be set using any text editor): **DE** German **EN** English **ES** Spanish **FR** French **IT** Italian **JA** Japanese **KO** Korean **pt_BR** Brazilian Portuguese **zh_CN** Simplified Chinese **zh_TW** Traditional Chinese **Note:** If you are working with InfoPackages and process chains on operating systems that do not support Unicode, this option must be set.	`EN`
use_fips	(Optional) Enables (ON) or disables (OFF) the FIPS mode of operation for IBM Workload Scheduler.	`OFF`
utf8cmdline	(Optional) Enables (`1`) or disables (`0`) the encoding of extended parameters in UTF-8 format. The default value is `0`.	**Note:** If you have both global and local options files and you want to change the default value for **utf8cmdline**, modify the local options file because this overrides the global options.

Table 50. r3batch common configuration options (continued)

Option	Description	Default
variant_delay	(Optional) The time, in seconds, that r3batch allows the SAP system to clean up the structures used for communication between r3batch and the SAP system. This option is valid when you launch a job that uses extended variants and requires a copy of a job template. Use this option only when you want to reduce r3batch response time, because it increases the load on the hosting machine. Higher values of **variant_delay** increase the response time and decrease the load. Allowed values are in the range from 0 to 3600.	10
variant_selection_ screen	(Optional) Specifies the functional interface used to read report selection screens. Specify one of the following: **Custom** To communicate with the SAP system using the IBM Workload Scheduler custom function module. **SAP** To communicate with the SAP system using the XBP 3.0 function module.	Custom
xbpversion	(Optional) The XBP version used on the target SAP system. Specify an integer value. This value overwrites the XBP version automatically determined during RFC logon. **Note:** For details about XBP 3.0 and SAP NetWeaver 2004s with SP9, refer to the SAP Note 977462.	The XBP version determined by r3batch during RFC logon from the SAP system.

SAP R/3 option file example

Below is an example of an options file for SAP. It can help you determine your specific site requirements, although your options file might be different.

```
r3client=100
r3host=/H/tiraix64.lab.rome.abc.com
r3instance=00
r3password={3des}Hchwu6IsF5o=
r3sid=GS7
r3user=twstest
long_interval=120
r3auditlevel=3
short_interval=10
twsxa_lang=EN
```

Encrypting SAP R/3 user passwords

When you add your entries in the options file with the Option Editor or from the Dynamic Workload Console, the password value is automatically encrypted before it is written in the file. If you modify the file with a text editor, you must run the **enigma** program to encrypt the password before writing it in the file. To run the encryption program, enter the following command:

```
enigma [password]
```

You can include the password on the command line or enter it in response to a prompt. The program returns an encrypted version that you can then enter in the options file.

Configuration options usage

The format of the configuration file is the following:

```
option1=value1
option2=value2
option3=value3
...
```

with no blanks before the option, after the value, or before or after the equals (=) character.

You can put all the common information, such as the `LJuser`, `IFuser`, `JobDef`, and `LogFileName` options in `r3batch.opts`, while you can put tailored data for the target SAP system of the extended agent or dynamic agent (for example, `SAP1`) in a local configuration file (for example, `XA1_r3batch.opts`).

You can put a local option in the global configuration file if you want to give the same option to all the `r3batch` instances. For example, if the SAP user name is the same in all your SAP systems, you can place the `r3user` option in the global file without duplicating that information in all the local configuration files.

A global option, such as `job_sem_proj`, only has effect in the global configuration file. If you put global options in a local file they have no effect.

`r3batch` reads the global configuration file first and then the local file. Every option (except the global options) contained in the local configuration file will override those in the global file. For example, if both the global and the local configuration files contain the `r3user` option, `r3batch` uses the one in the local file.

There are six mandatory options that `r3batch` requires:

- `r3client`
- `r3host`
- `r3instance`
- `r3password`
- `r3sid`
- `r3user`

You can put them all in the local configuration file or you can spread them between the global and the local files. For example, you could put `r3user` and `r3password` in the global configuration file and `r3sid`, `r3instance`, `r3client`, and `r3host` in the local one.

The `r3user` option is both local and mandatory. It must be put either in the global configuration file or the local configuration file.

Note: These configuration files are not created during the installation process.

Connecting to the SAP system

The Access method for SAP uses the SAP remote connection call (RFC) library to connect to the SAP system. The connection address for an SAP system is denoted as a `connection string`.

To successfully use the SAP R/3 access method, you must first install the SAP RFC libraries, as described in the System Requirements Document in the SAP R/3 Access Method Requirements section.

Connecting to a specific application server

To connect to a specific application server, you enter strings which, according to the complexity of the networks, might be more or less complex and contain passwords to secure the routers.

In its basic form, a connection string consists of the host name (or IP name) of an SAP application server; for example:

```
/H/hemlock.romlab.rome.abc.com
```

This type of connection string works only in very simple network environments, where all application servers can be reached directly through TCP/IP. Usually, modern companies use more complex network topologies, with a number of small subnetworks, which cannot communicate directly through TCP/IP. To support this type of network, the SAP RFC library supports SAP routers, which are placed at the boundaries of the subnetworks and act as proxies. For this type of network, the connection string is a composite of basic connection strings for each SAP router, followed by the basic connection string for the target SAP system; for example:

```
/H/litespeed/H/amsaix33/H/hemlock.romlab.rome.abc.com
```

Moreover, you can secure the SAP routers with passwords, to prevent unauthorized access. In this case, the basic connection string for the SAP router is followed by `/P/` and the password of the router.

Note: The SAP RFC library limits the length of the connection string to a maximum of 128 characters. This is a real limitation in complex network environments. As a workaround, it is recommended to use simple host names, without the domain name whenever possible. Alternatively, you can use the IP address, but this is not recommended, because it is difficult to maintain.

IBM Workload Scheduler for SAP supports both types of connection strings, basic and composite, where:

r3host The connection string.

r3instance
The SAP instance number.

r3sid The SAP system ID.

For example:

```
r3host=/H/litespeed/H/amsaix33/H/hemlock.romlab.rome.abc.com
r3instance=00
r3sid=TV1
```

Connecting to a logon group

About this task

In large SAP installations, the application servers are usually configured in logon groups for load balancing and fault-tolerance purposes. Load balancing is done by a dedicated server, called the `message server`. The message server automatically assigns users to the application server with the least workload of the logon group it controls.

Ensure that the file services (on UNIX: `/etc/services` on Windows: `C:\Windows\system32\drivers\etc\services`) contain an entry for the message server port of the SAP system to which `r3batch` connects. The entry has the following format:

sapms*SID* 36*system_number*/tcp

where *SID* is the SAP system ID, and *system_number* is the SAP system number.

Set the following options to configure r3batch to connect to a logon group:

r3host The hostname of the message server.

r3group
The name of the logon group.

r3sid The SAP system ID.

For example:

```
r3host=pwdf0647.wdf.sap-ag.de
r3group=PUBLIC
r3sid=QB6
```

Configuring SAP event monitoring

This section provides detailed information about how to configure your system to monitor SAP events:

- "Prerequisite to defining event rules based on SAP events"
- "Monitoring SAP events"

Prerequisite to defining event rules based on SAP events

About this task

To be able to define event rules based on one or more SAP events, stop the IBM Workload Scheduler WebSphere Application Server and copy the following file (located on the system where you installed IBM Workload Scheduler:

TWS_home/methods/SAPPlugin/SapMonitorPlugIn.jar

to the following directory of the master domain manager and of its backup nodes:

TWS_home/eventPlugIn

For the changes to take effect, stop and restart the IBM Workload Scheduler WebSphere Application Server. If the master domain manager is connected to the Dynamic Workload Console, stop and restart also the Dynamic Workload Console Application Server.

Monitoring SAP events

Whenever you define an event rule based on an SAP event in your IBM Workload Scheduler plan, that event is monitored by IBM Workload Scheduler. Monitoring SAP events is allowed only if you use XPB version 3.0, or later.

IBM Workload Scheduler monitors two types of SAP event:

Events defined by the SAP system
The events that are triggered automatically by system changes, for example when a new operation mode is activated. This type of event cannot be modified by the user.

Events defined by the user
The events that are triggered by ABAP or external processes, for example when a process triggers an SAP event to signal that external data has arrived and must be read by the SAP system. For details about how to trigger events by external processes, refer to "Raising an SAP event" on page 246.

If you modify the r3batch option files, to make the changes effective you must stop and restart the extended agent monitoring processes with the following command. For UNIX only, this command must be entered by the owner of the IBM Workload Scheduler installation:

Command syntax

Where:

start | stop
The action to perform:

start Starts monitoring SAP events.

stop Stops monitoring SAP events.

Defining SAP jobs

You must define some jobs to be able to run jobs on an SAP workstation from IBM Workload Scheduler.

To define and manage jobs on an SAP workstation from IBM Workload Scheduler, you must define the following:

Jobs in SAP that you want to run under IBM Workload Scheduler control
You can define these jobs using standard SAP tools or using the Dynamic Workload Console.

Jobs in IBM Workload Scheduler that correspond to the jobs in SAP
The IBM Workload Scheduler job definitions are used in scheduling and defining dependencies, but the SAP jobs are actually run.

You can define SAP job definitions from the Dynamic Workload Console and then have IBM Workload Scheduler launch the jobs in SAP R/3 using jobs defined on the following workstations that support the r3batch access method:

- An 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.

You can manage your SAP environment from both:

- An IBM Workload Scheduler distributed environment
- An IBM Workload Scheduler for z/OS environment.

The SAP job definitions can reference the following types of SAP jobs:

- Standard R/3
- Business Warehouse Process Chains
- Business Warehouse InfoPackages

For information about Business Warehouse Process Chains and Business Warehouse InfoPackages, see “Using Business Information Warehouse” on page 278.

Creating SAP Standard R/3 jobs from the Dynamic Workload Console

How to create and manage an SAP job that is associated to an IBM Workload Scheduler job that manages it.

About this task

You can easily create and manage Standard R/3 jobs on a remote SAP system entirely from the Dynamic Workload Console, and then continue to manage the remote SAP job from IBM Workload Scheduler.

The IBM Workload Scheduler job definition, available for both distributed and z/OS environments, maps to the newly created job on the SAP system. The SAP job can run on extended agent workstations, dynamic agent workstations, pools, dynamic pools, and workstations depending on the type of job definition you choose to create.

Note: Using this procedure to create a new IBM Workload Scheduler for z/OS Agent SAP Standard R/3 job, you cannot manage variants. To manage variants, use the SAP graphical user interface or use the **List Jobs on SAP** entry from the navigation tree of the Dynamic Workload Console.

To create a new SAP Standard R/3 job on a remote SAP system that maps to an IBM Workload Scheduler job definition, you have to associate your SAP Standard R/3 jobs to IBM Workload Scheduler jobs and you can do it in either of the following ways:

- Starting from an SAP job: “Create an SAP job and associate it to an IBM Workload Scheduler job” or
- Starting from an IBM Workload Scheduler job (“Create an IBM Workload Scheduler job and associate it to an SAP job” on page 226)
- Alternatively, you can simply create an SAP job on a remote SAP system, without having it managed by IBM Workload Scheduler: “Creating an SAP job from the Dynamic Workload Console” on page 228.

When performing operations that require a connection to a remote SAP system, you must configure the SAP connection data. The connection is made through an IBM Workload Scheduler workstation with the r3batch access method installed. Each workstation can have one or more options files that can be used to customize the behavior of the r3batch access method, except for extended agent workstations, where only one options file can be defined and therefore a selection is not required. For information about setting the SAP connection data, see “Setting the SAP data connection” on page 228.

Create an SAP job and associate it to an IBM Workload Scheduler job

How to create a new SAP job that is associated to an IBM Workload Scheduler job that manages it.

Before you begin

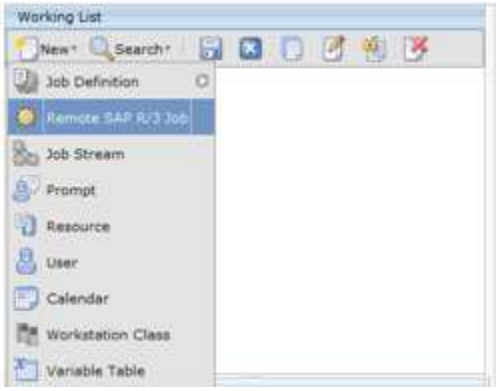
To be able to save your SAP job on a remote SAP system, you must specify the connection details. See "Setting the SAP data connection" on page 228.

About this task

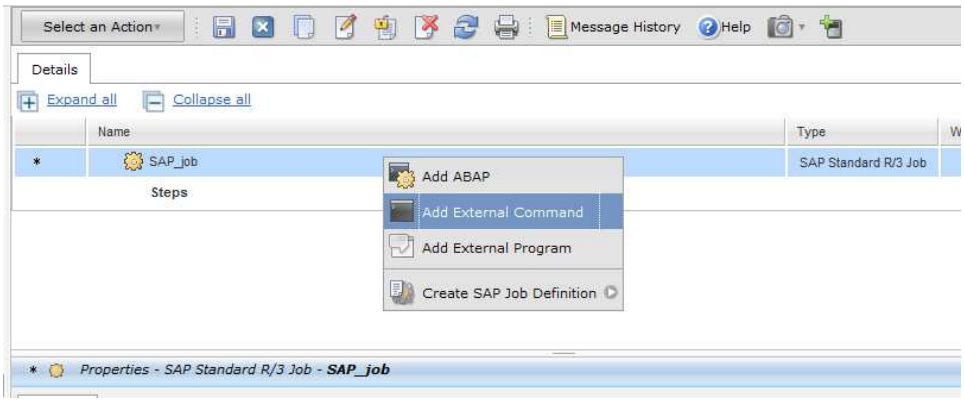
To create a new SAP job and then associate it to a new IBM Workload Scheduler job, perform the following steps:

Procedure

1. Click **Administration** > **Workload Design** > **Manage Workload Definitions**.
2. Select an engine. The Workload Designer window is displayed.
3. From the Working List pane, click **New** > **Remote SAP R/3 Job**:



4. In the Properties pane, specify the properties for the SAP job definition you are creating using the tabs available. The tabs for each type of SAP job definition are similar, but there are some differences depending on the type of engine you selected and the type of workstation on which the job runs. For more detailed information about the UI elements on each tab, see the Dynamic Workload Console online help.
5. In the Details view, right-click the new job to add ABAP, External command or External program steps to it. It is mandatory to add at least one job step to the job before you can save the job:



6. Right-click the SAP job and click **Create SAP Job Definition** to create a new IBM Workload Scheduler job associated to the new job on SAP. Select the job definition in accordance with the engine and type of agent on which the job runs.

SAP For z/OS systems only. This job definition references an existing job on the SAP system and can run on dynamic agent workstations, dynamic pools, and IBM Workload Scheduler for z/OS Agent.

SAP Job on Dynamic Workstations
For distributed systems only. This job definition can run on dynamic agent workstations, dynamic pools, and IBM Workload Scheduler for z/OS Agent workstations.

SAP Job on XA Workstations
This job definition can run on extended agent workstations, which are workstations hosted by fault-tolerant agents or master workstations.

7. Right-click the steps to move them and change their sequence.
8. The IBM Workload Scheduler job definition opens in Workload Designer. Some fields in the Properties pane already contain information relating to the associated SAP job. Specify the remaining properties using the tabs available. The tabs for each type of SAP job definition are similar, but there are some differences depending on the type of engine you selected and the type of workstation on which the job runs. For more detailed information about the UI elements on each tab, see the Dynamic Workload Console online help.
9. Click  to save the SAP job definition in the IBM Workload Scheduler database.

Create an IBM Workload Scheduler job and associate it to an SAP job

Create an IBM Workload Scheduler job definition and map it to a new or existing SAP job to manage it.

About this task

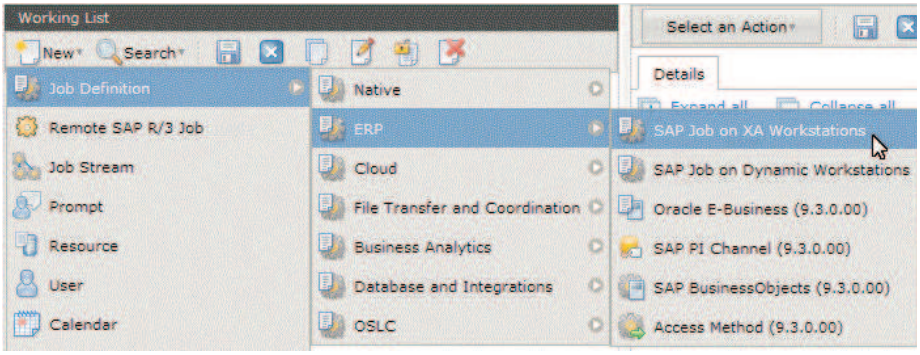
To create a new IBM Workload Scheduler job and then associate it to a new SAP job, follow these steps:

Procedure

1. Click **Administration** > **Workload Design** > **Manage Workload Definitions**.
2. Select an engine. The Workload Designer window is displayed.
3. From the Working List pane,
   - Distributed Click: **New >Job Definition > ERP > SAP Job on....**, choosing the type of workstation on which it is going to run:

     SAP Job on Dynamic Workstations
     For distributed systems only. This job definition can run on dynamic agent workstations, dynamic pools, and IBM Workload Scheduler for z/OS Agent workstations.

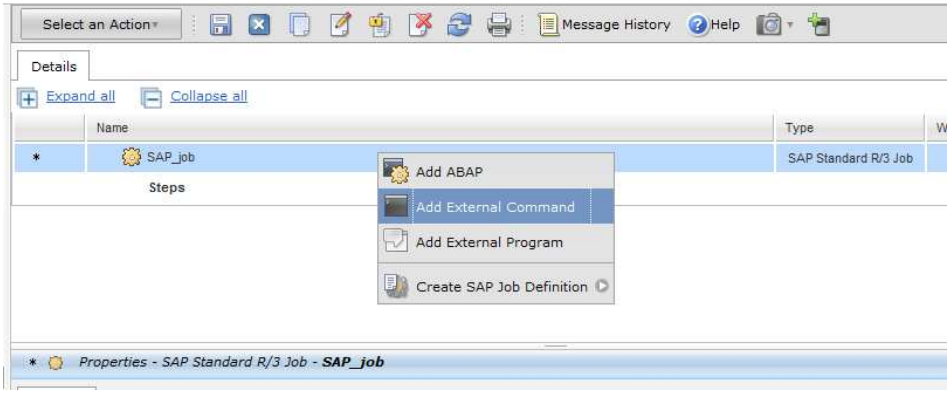
     SAP Job on XA Workstations
     This job definition can run on extended agent workstations, which are workstations hosted by fault-tolerant agents or master workstations.



- z/OS Click: **New > ERP > SAP**

  SAP For z/OS systems only. This job definition references an existing job on the SAP system and can run on dynamic agent workstations, dynamic pools, and IBM Workload Scheduler for z/OS Agent.

4. In the Properties pane, specify the properties for the SAP job definition you are creating using the tabs available. The tabs for each type of SAP job definition are similar, but there are some differences depending on the type of engine you selected and the type of workstation on which the job runs. For more detailed information about the UI elements on each tab, see the Dynamic Workload Console online help.
5. In the Task tab, specify the IBM Workload Scheduler job that you want to associate to the SAP job. If this job already exists, specify it in the Job name field, otherwise, click **New** to create it from new and specify its properties in the Properties pane.
6. In the Details view, right-click the new job to add ABAP, External command or External program steps to it. It is mandatory to add at least one job step to the job before you can save the job:



7. Save the job.
8. After you have saved the SAP job, close the SAP job definition view or select the IBM Workload Scheduler job definition to assign the SAP job to it.
9. In the Task pane, enter the details of the SAP job created before or use the picklist to retrieve the SAP job details from SAP
10. Click  to save the SAP job definition in the IBM Workload Scheduler database.

Creating an SAP job from the Dynamic Workload Console

How to create an SAP job definition on a remote SAP system from the Dynamic Workload Console.

About this task

You can also create and save SAP Standard R/3 jobs directly on the remote SAP system from IBM Workload Scheduler, as you would from the SAP graphical user interface. To create Standard R/3 jobs on the SAP system from the Dynamic Workload Console, perform the following steps:

Procedure

1. Click **Administration** > **Workload Design** > **Manage Jobs on SAP**.
2. In the Filter, select **Standard R/3 Job** and specify the workstation name. This parameter is mandatory because it identifies the remote SAP system.
3. Specify the workstation where the SAP job runs. This is the workstation with the r3batch access method that communicates with the remote SAP system.
4. If the workstation is not an extended agent workstation, you must also specify the options file to be used.
5. Click **Display** to view a list of the Standard R/3 jobs for the specified workstation.
6. Click **New** to create a new Standard R/3 job and enter the required information in the **R/3 Job Definition** and **R/3 steps** tabs.
7. Click **OK** to save the job on the SAP system.

What to do next

After creating the new SAP job on the SAP from the Dynamic Workload Console, you must reference it in an IBM Workload Scheduler SAP Standard R/3 job if you want to manage the job from within IBM Workload Scheduler as explained in "Create an IBM Workload Scheduler job and associate it to an SAP job" on page 226.

Setting the SAP data connection

You can configure a default connection to be used when performing actions that access the remote SAP system.

About this task

There are several operations you can perform which require connection details to establish a link to a remote SAP system. The connection is made through an IBM Workload Scheduler workstation with the r3batch access method installed used to communicate with the SAP system. Each workstation can have one or more options files that can be used to customize the behavior of the r3batch access method, except for extended agent workstations, where only one options file can be defined and therefore a selection is not required.

For example, you can use Workload Designer to create IBM Workload Scheduler job definitions that reference remote SAP jobs, or you can create a SAP job on a remote SAP system. You can also search for SAP jobs on the remote system from the **Working List** and **Quick Open** panes.

Workload Designer enables you to configure a default connection that is automatically referenced when performing these types of operations. You can

change the default configuration at any time, or you can overwrite the default configuration when performing these operations.

To configure a default SAP data connection to be used when creating objects with Workload Design that require a SAP connection, perform the following steps:

Procedure

1. In the Workload Designer window, click  from the toolbar of the Details view.
2. In **Workstation**, enter the name of the workstation that communicates with the SAP system or use the pick tool to search for and select one.
3. In **Options file**, enter the options file to be used or use the pick tool to search for options files that reside on the specified workstation and select one.
4. Click **OK**.

Results

A default SAP connection is now configured. It will be used each time an object that requires access to a SAP system is defined.

Managing SAP variants using the Dynamic Workload Console

Managing variants using the Dynamic Workload Console.

About this task

This section describes how to manage variants using the Dynamic Workload Console:

Procedure

1. Click **Administration** > **Workload Design** > **Manage Jobs on SAP** from the portfolio.
2. Specify an engine connection.
3. In **Workstation name**, type the name of the workstation where the SAP job runs. This is the workstation with the r3batch access method that communicates with the remote SAP system. If you do not know the name of the workstation, click (...) browse to enter your filter criteria and click **Search**. If you enter a string representing part of the workstation name, it must be followed by the asterisk (*) wildcard character. Both the question mark (?) and asterisk (*) are supported as wildcards. You can also simply use the asterisk wildcard character (*) to display all workstations. Optionally, specify any of the other search criteria available and click **Search**. From the results displayed, select the workstation and click **OK**.
4. In **Options file**, specify an options file that resides on the specified workstation. Each workstation can have one or more options files that can be used to customize the behavior of the r3batch access method, except for extended agent workstations, where only one options file can exist and therefore does not need to be specified. For the workstation specified, enter the file name of the options file or click the browse (...) button to search for options files that reside on the specified workstation and select one.
5. Click **Display**. The list of available jobs on the remote SAP system for the specified engine is displayed.
6. A list of SAP jobs on the remote SAP system are displayed.

7. Select a SAP job from the list and click **Edit**.
8. On the **R/3 Steps** page, select a program of type ABAP from the list and click **Edit**. The properties for the ABAP program are displayed.
9. In the **Variant** field, click the ellipsis (**...**) icon to display the Variant List panel. This panel lists all the variants associated with the ABAP specified in the **Name** field.

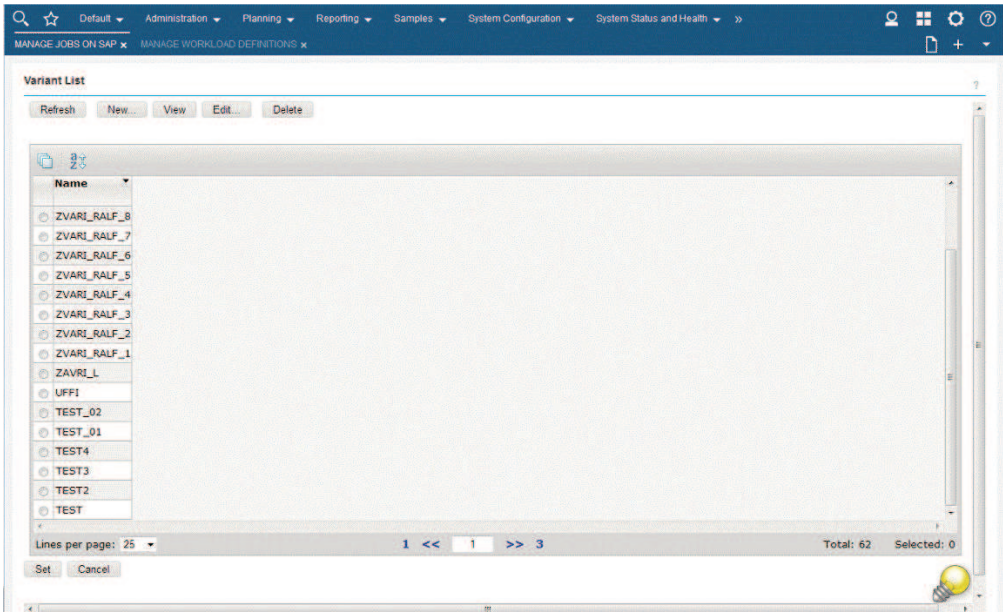


Figure 4. The Variant List panel

10. From this panel, you can take the following actions:

    Refresh
    To refresh the content of the variant list with the information contained in the SAP database.

    New To create a new variant as described in "Creating or editing a variant."

    View To display information on an existing variant.

    Edit To modify information on an existing variant as described in "Creating or editing a variant."

    Delete To delete a variant.

    Set To associate the value chosen from the list to the ABAP.

Creating or editing a variant

About this task

You can create or edit a variant from the **Variant List** panel. To display the **Variant List** panel, see "Managing SAP variants using the Dynamic Workload Console" on page 229.

Procedure

1. In the Variant List panel, click **New** or **Edit**. The Variant Information page is displayed by default. If you are editing an existing variant, the fields and

selections are not empty.

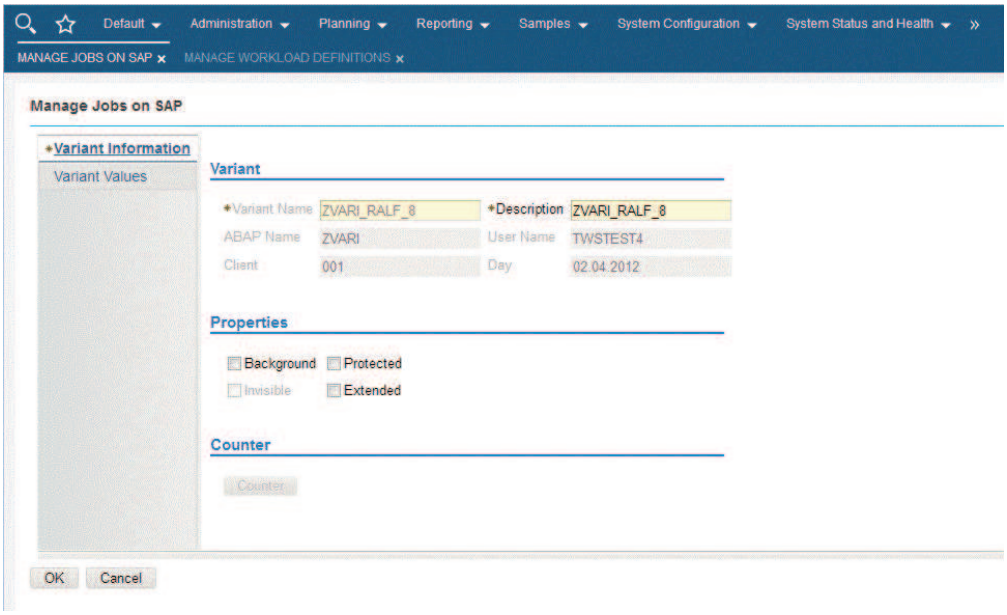


Figure 5. The Variant Information page of the Variant List panel

2. The panel consists of the following pages:
   - Variant Information:
     a. Enter or modify the variant name and description.
     b. Optionally, check a **Properties** box:

        Background
        The variant can only be used in background processing.

        Protected
        The variant is protected against being changed by other users.

        Invisible
        The variant will not be displayed in the F4 value list on the SAP GUI. Not available for the BC-XBP 3.0 interface.

        Extended
        Allows for the use of placeholders and counters as variant values. If you check this box, **Counter** becomes available.

        For extended variants, you can use placeholders and counters that eliminate the error-prone task of adjusting values and therefore minimize the effort for variant maintenance. Placeholders and counters are preprocessed by IBM Workload Scheduler and the values are automatically adjusted when the job is launched. Supported placeholders and counters are:

Table 51. Placeholders and counters for extended variants

Symbol	Meaning	Syntax
$S	Timestamp	YYYYMMDDHHMM
$D	Day of the month	DD
$_D	Date	YYYYMMDD
$M	Month	MM

Table 51. Placeholders and counters for extended variants (continued)

Symbol	Meaning	Syntax
$Y	Year	YY
$_Y	Year	YYYY
$H	Hour	HH
$T	Minute	MM
$_T	Time	HHMMSS
$N*x*	Counters	10 counters: $N0 - $N9 ($N = $N0)
$(*date expression*)	Date expression	Like the `datecalc` command. Enclosed within $(and).
$[*arithmetic expression*]	Arithmetic expression	Arithmetic expressions allowing for +, -, *, and / operations between integers and counters.

- Variant Values:

  In the Variant Values page, the fields and values are dynamically built through `r3batch` depending on the characteristics of the variant or step and are identical to the ones in the equivalent SAP panel.

Editing a standard SAP job

Before you begin

You can edit SAP Standard R/3 jobs in two different ways in IBM Workload Scheduler.

- The Dynamic Workload Console contains the **Manage Jobs on SAP** entry in the portfolio for creating and editing SAP Standard R/3 jobs on remote SAP systems.
- The Workload Designerwindow in the Dynamic Workload Console allows you to create and edit remote SAP jobs. See "Creating SAP Standard R/3 jobs from the Dynamic Workload Console" on page 224.

About this task

To edit a SAP standard R/3 job, follow these steps:

Procedure

1. Click **Administration** > **Workload Design** > **Manage Jobs on SAP**.
2. Select the name of the engine connection from which you want to work with SAP jobs.
3. Leave the default setting in the **SAP Job Type** section to **Standard R/3 Job**.
4. In **Workstation name**, type the name of the workstation where the SAP job runs. This is the workstation with the r3batch access method that communicates with the remote SAP system. If you do not know the name of the workstation, click (...) browse to enter your filter criteria and click **Search**. If you enter a string representing part of the workstation name, it must be followed by the asterisk (*) wildcard character. Both the question mark (?) and asterisk (*) are supported as wildcards. You can also simply use the asterisk wildcard character (*) to display all workstations. Optionally, specify any of the other search criteria available and click **Search**. From the results displayed, select the workstation and click **OK**.

5. In **Options file**, specify an options file that resides on the specified workstation. Each workstation can have one or more options files that can be used to customize the behavior of the r3batch access method, except for extended agent workstations, where only one options file can exist and therefore does not need to be specified. For the workstation specified, enter the file name of the options file or click the browse (...) button to search for options files that reside on the specified workstation and select one.
6. Click **Display**. The list of available jobs on the remote SAP system for the specified engine is displayed.
7. Select the job you want to modify in the list and click **Edit**. The List Jobs on SAP panel is displayed.
8. Edit the properties on the **R/3 Job Definition** and **R/3 Steps** pages as appropriate. Refer to the contextual online help available for more detailed information about the UI elements available on each page.

   Note:

   - On the **R/3 Job Definition** page, when you modify the **Job Class**, **Target Host**, or **Server Group** and click **OK**, the **Job ID** is maintained and remains synchronized with the one associated to the current job. Instead, when you modify the **Job Name** and click **OK**, the **Job ID** is automatically replaced with the one associated to the new job name.
   - On the **R/3 Steps** page, for each step you modify, the new step information is saved in the SAP database. For each step you add or delete, the **Job ID** is maintained and remains synchronized with the one associated to the modified step.
9. Click **OK** to save your changes.

Task string to define SAP jobs

This section describes the task string parameters that define and control the running of SAP jobs. You can specify them in the following places when you define their associated IBM Workload Scheduler jobs:

- In the **R/3 Command Line** section of the Task page of the Submit Ad Hoc Jobs action from the Dynamic Workload Console.
- In the **R3 Command Line** field of the More Options page of the SAP job definition, if you use the Dynamic Workload Console and selected a **SAP** job definition.
- As arguments of the `scriptname` keyword in the job definition statement, if you use the IBM Workload Scheduler command line.
- As arguments of the `JOBCMD` keyword in the `JOBREC` statement in the `SCRIPTLIB` of IBM Workload Scheduler for z/OS, if you are scheduling in an end-to-end environment. The following is an example of a `JOBREC` statement:

```
JOBREC
  JOBCMD('/-job job_name -user user_name -i job_ID -c class_value')
  JOBUSR(TWS_user_name)
```

where:

class_value
: The priority with which the job runs in the SAP system. For details, see Table 52 on page 236.

job_ID The unique SAP job ID. For details, see Table 52 on page 236.

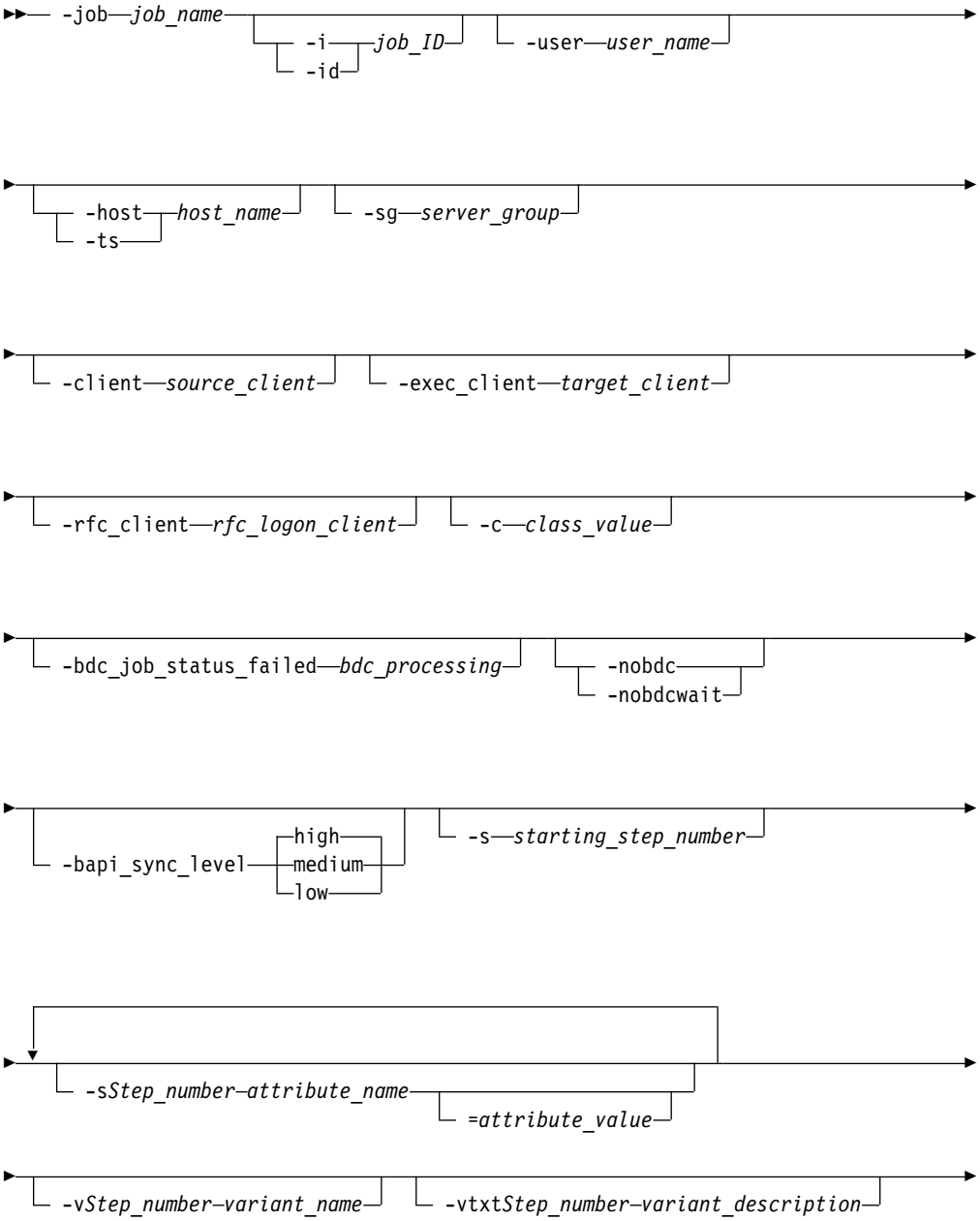
job_name
: The name of the SAP job to run. For details, see Table 52 on page 236.

user_name
The SAP user who owns the target job. For details, see Table 52 on page 236.

TWS_user_name
The IBM Workload Scheduler for z/OS user who runs the `r3batch` access method from the end-to-end scheduling environment.

The string syntax is the following:

Job definition syntax



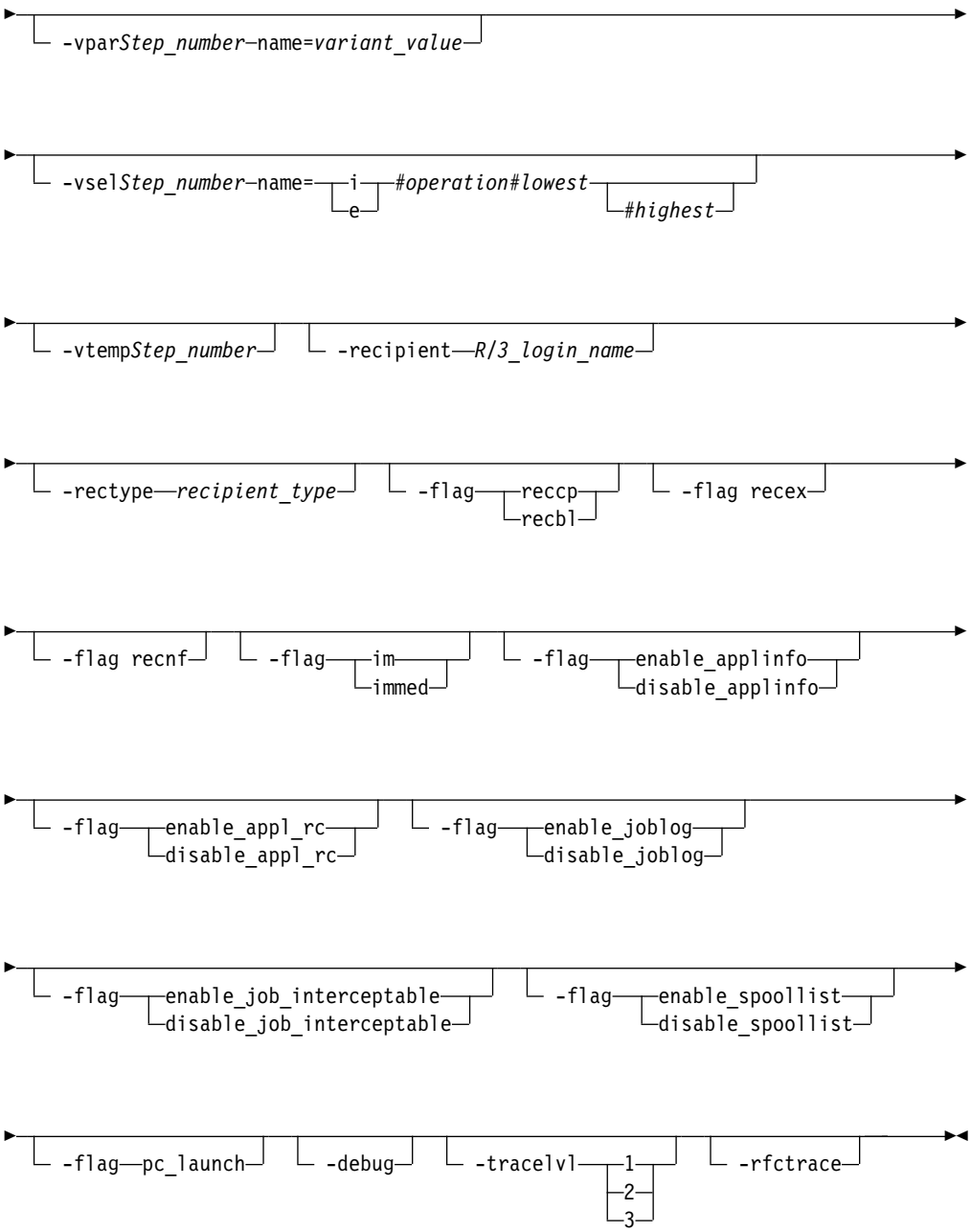


Table 52 on page 236 describes the parameters for the task string to define SAP jobs.

Note:

1. You can specify both `-i` or `-id` and `-user` in the same job definition, but the user name is ignored.
2. When you specify the job ID, both `-client` and `-exec_client` are ignored because the ID is unique for the entire SAP system.
3. Typically, the `-debug` and `-trace` options are for debugging the extended agent and should not be used in standard production.

Table 52. Task string parameters for SAP jobs. The following are the task string parameters for the SAP jobs

Section	Parameters	Description	GUI Support
JOB	-job *job_name*	The name of the job to run. This parameter is mandatory.	✔
	-i *job_ID* -id *job_ID*	The unique SAP job ID. Specify this parameter if you are submitting a job that refers to a predefined job template stored in the SAP database for which you want to change a parameter.	✔
	-user *user_name*	The SAP user who owns the target job. Use this parameter when the target SAP system has only one job with the specified name for the specified user. This parameter has no effect if a job ID is specified in the job definition.	✔
	-host *host_name* -ts *host_name*	The name of the SAP workstation where the job is to be run. *host_name* has the format *hostname_SAPsystemname_SAPsystemnumber*. For example, the name of a host might be amss80a0_gs7_90 These parameters are mutually exclusive with -sg.	✔
	-sg *server_group*	The name of the SAP server group where the job is to be run. Use this parameter to run the job on an application server that belongs to the group. The server group must exist on the SAP system, otherwise an error code is returned and the job is not launched. This parameter is case-sensitive and can be up to 20 characters. It is mutually exclusive with -host and -ts.	✔

Table 52. Task string parameters for SAP jobs (continued). The following are the task string parameters for the SAP jobs

Section	Parameters	Description	GUI Support
JOB	-client *source_client*	The number that identifies the SAP client where the job definition is to be found, regardless of the client number defined by the `r3client` keyword in the options file. This parameter has no effect if a job ID is specified in the job definition.	
	-exec_client *target_client*	The number that identifies the SAP client where the job is to be run, regardless of the client number defined by the r3client keyword in the options file. This parameter has no effect if a job ID is specified in the job definition.	
	-rfc_client *rfc_logon_client*	The number that identifies the SAP client to be used for RFC logon. This value overwrites the value specified by the r3client keyword in the corresponding r3batch options file.	
	-c *class_value*	The priority with which the job runs in the SAP system. Possible values are: **A** High priority **B** Medium priority **C** Low priority. This is the default value.	✓
	-bdc_job_status_failed *bdc_processing*	How IBM Workload Scheduler sets the completion status of a job running BDC sessions, according to a possible BDC processing failure. The allowed values are: *n* If at least *n* BDC sessions failed (where *n* is an integer greater than 0), IBM Workload Scheduler sets the job completion status as failed. **all** If all the BDC sessions failed, IBM Workload Scheduler sets the job completion status as failed. **ignore** When all the BDC sessions complete, regardless of their status, IBM Workload Scheduler sets the job completion status as successful. This is the default. If **-nobdc** or **-nobdcwait** is set, this option is ignored.	✓
	-nobdc -nobdcwait	Disables the BDC Wait option (enabled by default) to have the job considered as completed even if not all its BDC sessions have ended.	✓
	-bapi_sync_level	Specifies the synchronization level between the SAP function modules BAPI_XBP_JOB_COPY and BAPI_XBP_JOB_START_ASAP. Allowed values are: **high** All RFC calls between BAPI_XBP_JOB_START_ASAP and BAPI_XBP_JOB_COPY are synchronized. This is the default. **medium** The RFC calls to BAPI_XBP_JOB_START_ASAP are synchronized. **low** The RFC calls are not synchronized.	

Table 52. Task string parameters for SAP jobs (continued). The following are the task string parameters for the SAP jobs

Section	Parameters	Description	GUI Support
STEP	-s *starting_step_number*	The number of the starting step.	✔

	-s*Step_number attribute_name=attribute_value*	The step number and its attributes, where:
		step_number
		The number of the step being defined. Each step is identified by a sequential number (1, 2, 3, ...*n*) using the *step number*
		attribute_name
		The name of the attribute.
		attribute_value
		The value of the attribute. It is optional for some attributes.
		Attributes can be defined in any order, but cannot be repeated for the same step. Attribute validation is performed before the job is created in the SAP system. If the validation fails, the IBM Workload Scheduler job goes into the ABEND state. For a detailed description of each attribute and its value, see "Defining attributes for ABAP steps" on page 258 and "Defining attributes for external programs and external commands steps" on page 260.
		For example, the following step (step 8) is an ABAP module running the report MYPGM and has two attributes, only one of which has a value.
		`-s8 type=A -s8 program=MYPGM`
		`-s8 pr_cover="My title" -s8 pr_immed`
			✔

Table 52. Task string parameters for SAP jobs (continued). The following are the task string parameters for the SAP jobs

Section	Parameters	Description	GUI Support
VARIANT	-v*step_number* name	The variant name for the specified step number.	✓
	-vtxt*step_number variant_description*	The textual description of the variant, in the IBM Workload Scheduler logon language (customizable with the `TWSXA_LANG` option of `r3batch`). The maximum length is 30 characters.	✓
	-vpar*step_number* name=*value*	For ABAP modules only. The value for a variant parameter for the specified step number. This parameter is mandatory when creating a new variant. See "Defining attributes for ABAP steps" on page 258 for a complete list of the supported attributes for ABAP steps.	✓
	-vsel*step_number* name=*sign*#*operation*#*lowest*[#*highest*]	For ABAP modules only. The value for a variant selection option for the specified step number. **sign** Sign of the operation. Possible values are: **I** Include **E** Exclude **operation** Possible values are: **EQ** Equals **NE** Not equal to **BT** Between **NB** Not between **LT** Less than **LE** Less than or equal to **GT** Greater than **GE** Greater than or equal to **CP** Contains pattern **NP** Does not contain pattern **lowest** Low value of the selection. You can use up to 45 characters. **highest** High value of the selection. You can use up to 45 characters. This attribute is optional. For a complete list of the supported attributes for ABAP steps, see"Defining attributes for ABAP steps" on page 258.	✓
	-vtemp*step_number*	For ABAP modules only. Specifies to assign a temporary variant to the specified step number. Temporary variants are created ad-hoc by the SAP system and assigned to the job instance when it is run. The lifecycle of the temporary variant is determined by the SAP system. If the job is deleted by SAP, then the temporary variant is deleted. See "Examples: Dynamically defining and updating SAP jobs" on page 262 to refer to examples that demonstrate the behavior of temporary variants.	

Table 52. Task string parameters for SAP jobs (continued). The following are the task string parameters for the SAP jobs

Section	Parameters	Description	GUI Support
SPOOL	-recipient *name*	The login name of an SAP user.	
	-flag {reccp | recbl}	Specifies how the spool list is sent to the recipient. Possible values are: **reccp** The spool list is sent as a copy. **recbl** The spool list is sent as a blind copy.	
	-flag recex	Specifies that the spool list is sent as an express message to the recipient.	
	-flag recnf	Specifies that the recipient is not allowed to forward the spool list.	
	-rectype type	Specifies the recipient type. Possible values are: **' '** SAP user (default value) **'B'** SAP user **'C'** Shared distribution list **'D'** X.500 address **'G'** Organization object/ID **'H'** Organization unit **'I'** SAP object **'L'** Telex number **'O'** SAPoffice user **'P'** Private distribution list **'R'** SAP user in another SAP system **'U'** Internet address **'1'** Other recipient type	
FLAGS	-flag im -flag immed	Specifies to launch job immediately, meaning that if there are no spare work processes, the job fails.	✔
	-flag enable_applinfo -flag disable_applinfo	Enables or disables the retrieval and appending of the SAP application log to the stdlist of IBM Workload Scheduler.	✔
	-flag enable_appl_rc -flag disable_appl_rc	Enables or disables the mapping of the SAP application return code to the IBM Workload Scheduler return code. The SAP application return code is mapped only if **-flag enable_applinfo** is set and the application log contains the application return code.	
	-flag enable_joblog -flag disable_joblog	Enables or disables retrieval of the joblog.	✔
	-flag enable_job_interceptable -flag disable_job_interceptable	Enables or disables the job launched by r3batch to be intercepted by SAP. If enabled, when r3batch launches a job and the SAP job interception feature is enabled, the job can be intercepted if it matches previously defined criteria. If disabled, the job launched by r3batch cannot be intercepted by SAP. This setting overwrites the setting in the common options file.	✔
	-flag enable_spoollist -flag disable_spoollist	Enables or disables retrieval of the spool lists of the job.	✔

Table 52. Task string parameters for SAP jobs (continued). The following are the task string parameters for the SAP jobs

Section	Parameters	Description	GUI Support
-flag pc_launch	Specifies to launch child jobs that are in scheduled state. **ON** The product launches child jobs that are in scheduled state. **OFF** The product does not launch child jobs that are in scheduled state. This is the default value. **Note:** You can use this option only if you activated the parent-child feature on the SAP system. On the XBP 2.0 (or later)SAP system you can activate this feature using the INITXBP2 ABAP report		
TRACING	-debug	Enables maximum trace level.	✓
	-tracelvl 1|2|3	Specifies the trace setting for the job. Possible values are: **1** Only error messages are written in the trace file. This is the default. **2** Informational messages and warnings are also written in the trace file. **3** A most verbose debug output is written in the trace file. For detailed information, refer to "Configuring the tracing utility" on page 184.	✓
	-rfctrace -trace	Enables RFC trace.	

The following is an example for an SAP job named `BVTTEST` with ID `03102401` and user `myuser`:

```
-job BVTTEST –i 03102401 -user myuser -debug
```

Managing SAP jobs

This section describes how to manage SAP jobs.

Displaying details about a standard SAP job

About this task

Perform the following steps to display details for standard jobs on specific workstations.

For information about how to display details about a job that submits an SAP process chain, refer to "Displaying details about a process chain job" on page 284.

Procedure

1. Click **Administration** > **Workload Design** > **Manage Jobs on SAP**.
2. In **Engine name**, select the name of the IBM Workload Scheduler engine connection from which you want to view SAP job details.

3. In **Workstation name**, type the name of the workstation where the SAP job runs. This is the workstation with the r3batch access method that communicates with the remote SAP system. If you do not know the name of the workstation, click (...) browse to enter your filter criteria and click **Search**. If you enter a string representing part of the workstation name, it must be followed by the asterisk (*) wildcard character. Both the question mark (?) and asterisk (*) are supported as wildcards. You can also simply use the asterisk wildcard character (*) to display all workstations. Optionally, specify any of the other search criteria available and click **Search**. From the results displayed, select the workstation and click **OK**.
4. In **Options file**, specify an options file that resides on the specified workstation. Each workstation can have one or more options files that can be used to customize the behavior of the r3batch access method, except for extended agent workstations, where only one options file can exist and therefore does not need to be specified. For the workstation specified, enter the file name of the options file or click the browse (...) button to search for options files that reside on the specified workstation and select one.
5. Click **Display**. The list of available jobs for the specified engine is displayed.
6. Select the job for which you want to display the details and click **Details**. The List Jobs on SAP panel is displayed containing job and time information.
7. When you have finished viewing the details for the job, click **OK** to return to the list of SAP jobs on the workstation specified.

Verifying the status of a standard SAP job

About this task

To verify the status of a standard SAP job, perform the following steps:

Procedure

1. Click **Administration** > **Workload Design** > **Manage Jobs on SAP**.
2. In **Engine name**, select the name of the IBM Workload Scheduler engine connection from which you want to verify the status of an SAP job.
3. In **Workstation name**, type the name of the workstation where the SAP job runs. This is the workstation with the r3batch access method that communicates with the remote SAP system. If you do not know the name of the workstation, click (...) browse to enter your filter criteria and click **Search**. If you enter a string representing part of the workstation name, it must be followed by the asterisk (*) wildcard character. Both the question mark (?) and asterisk (*) are supported as wildcards. You can also simply use the asterisk wildcard character (*) to display all workstations. Optionally, specify any of the other search criteria available and click **Search**. From the results displayed, select the workstation and click **OK**.
4. In **Options file**, specify an options file that resides on the specified workstation. Each workstation can have one or more options files that can be used to customize the behavior of the r3batch access method, except for extended agent workstations, where only one options file can exist and therefore does not need to be specified. For the workstation specified, enter the file name of the options file or click the browse (...) button to search for options files that reside on the specified workstation and select one.
5. Click **Display**. The list of available jobs for the specified engine is displayed.
6. Select the job for which you want to verify the status and click **Status**. The current status for the SAP job is displayed, as well as the database name where the job is installed.

7. When you have finished verifying the status for the job, click **OK** to return to the list of SAP jobs on the workstation specified.

Deleting a standard SAP job from the SAP database

About this task

To delete a standard SAP job from the SAP database, perform the following steps:

Procedure

1. Click **Administration** > **Workload Design** > **Manage Jobs on SAP**.
2. In **Engine name**, select the name of the IBM Workload Scheduler engine connection from which you want to delete the SAP job.
3. In **Workstation name**, type the name of the workstation where the SAP job runs. This is the workstation with the r3batch access method that communicates with the remote SAP system. If you do not know the name of the workstation, click (...) browse to enter your filter criteria and click **Search**. If you enter a string representing part of the workstation name, it must be followed by the asterisk (*) wildcard character. Both the question mark (?) and asterisk (*) are supported as wildcards. You can also simply use the asterisk wildcard character (*) to display all workstations. Optionally, specify any of the other search criteria available and click **Search**. From the results displayed, select the workstation and click **OK**.
4. In **Options file**, specify an options file that resides on the specified workstation. Each workstation can have one or more options files that can be used to customize the behavior of the r3batch access method, except for extended agent workstations, where only one options file can exist and therefore does not need to be specified. For the workstation specified, enter the file name of the options file or click the browse (...) button to search for options files that reside on the specified workstation and select one.
5. Click **Display**. The list of available jobs for the specified engine is displayed.
6. Select the job or jobs you want to delete and click **Delete**. A confirmation message prompts you to confirm the delete action.
7. When the delete action is complete, click **OK** to return to the list of SAP jobs on the workstation specified.

Balancing SAP workload using server groups

SAP jobs run on application servers that host work processes of type *batch*. Critical batch jobs are run in specific time frames, on specific application servers. With SAP Basis version 6.10 and later, application servers can be assigned to server groups. With IBM Workload Scheduler you can assign a server group to a job. In this way, when a job is launched, the SAP system runs it on an application server that belongs to that group, balancing the workload among the various application servers in the group.

If the application servers defined in a group are modified in the SAP system, the job defined as belonging to that server group is not affected and does not need to be modified. The batch execution targets are reorganized in the SAP system without having to change job definitions in IBM Workload Scheduler.

This function is supported with the following versions of SAP:

- SAP Basis 6.10, with Service Pack 40
- SAP Basis 6.20, with Service Pack 41

- SAP Basis 6.40, with Service Pack 04
- SAP Basis 7.00, and later

Mapping between IBM Workload Scheduler and SAP job states

When an SAP job is launched by IBM Workload Scheduler, you can monitor its progress. The status transitions in IBM Workload Scheduler (internal status) and the corresponding SAP status are listed in Table 53.

Table 53. Status transitions in IBM Workload Scheduler (internal status) and the corresponding SAP R/3 status

IBM Workload Scheduler Job State	SAP Job State
INTRO	Not Available
WAIT	Ready, Release
EXEC	Active
SUCC	Finished
ABEND	Canceled

The INTRO state indicates that IBM Workload Scheduler is in the process of introducing the job, but in SAP, the job has not yet entered the ready state. Because it takes some time to get a job queued and into the ready column, the INTRO state might last a few minutes if the SAP system is particularly busy.

Even if a job is finished in SAP, IBM Workload Scheduler keeps it in the EXEC state if its BDC sessions are not complete and you have not selected the **Disable BDC Wait** option. For details about this option, see "Using the BDC Wait option" on page 267.

Managing spools

Browse spool lists on request without having to download the entire spool which can occupy significant space on the file system.

Spool lists can be very large so rather than download them as part of a job run, you can request to browse the spool list, chunks at a time, even if you have disabled the option, `retrieve_spoollist`, to append the spool list to the IBM Workload Scheduler joblog.

From the Dynamic Workload Console, you can list the spool data available for SAP Standard R/3 jobs that have run. Each spool is identified by the following information:

- The spool number.
- The related step number.
- The name of the spool request.
- The title of the spool request.
- The total number of pages for the spool information.
- The user who executed the SAP job related to the spool.
- The date the spool was created based on the Coordinated Universal Time (UTC) time standard.
- The client for which the spool was created.

Browsing spool data

You can list the spool data available for SAP Standard R/3 jobs that have run and browse the contents of the spool.

About this task

To browse spool data for a specific job that has run:

Procedure

1. In the navigation bar at the top, click **System Status and Health** > **Workload Monitoring** > **Monitor Workload**.
2. In the **Monitor Workload** input fields enter the engine name, the plan, and any filtering data that helps you filter the selection of jobs (you can also select **Edit** for a guided selection of filtering criteria) and select **Run**.
3. In the output table select an SAP Standard R/3 job and click **More Actions** > **Show Spool List**. The list of spool data available for the selected job is displayed.
4. Select a spool and click **Spool**.

Results

By default, the first ten pages of the spool are made available. You can change this default by editing the number of pages specified in **Pages for screen**. Use the page functions to jump to a specific page number, jump to the last page of the spool, jump to the first page of the spool, or move forward or back through the number of pages indicated by **Pages for screen**.

Killing an SAP job instance

About this task

This section describes how to kill an IBM Workload Scheduler job that submits either a standard SAP job or an SAP process chain.

To kill an SAP job instance, do the following:

The IBM Workload Scheduler job status is set to ABEND. The SAP job or process chain is set to canceled in the SAP system.

Note: If you kill a process chain job, the SAP system stops as soon as the process that is currently running completes.

Procedure

1. Use the **Monitor Workload** query of the Dynamic Workload Console to display a list of defined job instances containing the job you want to kill. In the navigation bar at the top, click **System Status and Health** > **Workload Monitoring** > **Monitor Workload**.
2. In the **Monitor Workload** input fields enter the engine name, the plan, and any filtering data that helps you filter the selection of jobs (you can also select **Edit** for a guided selection of filtering criteria) and select **Run**.
3. The **Monitor Jobs** panel is displayed. Select the job instance you want to kill and click **More Actions** > **Kill**.

Raising an SAP event

About this task

You can raise events on XBP 2.0 (or later) SAP jobs in the IBM Workload Scheduler database in one of the following ways:

Using the Monitor Workload in the Dynamic Workload Console

Perform the following steps:

1. On the SAP system, create a job that has as start condition a SAP event. When you create this job, its status is released.
2. Check that this job was not intercepted by the interception function.
3. Log in to the Dynamic Workload Console.
4. In the navigation bar at the top, click **System Status and Health** > **Workload Monitoring** > **Monitor Workload**.
5. In the Monitor Workload window select the engine, enter **Workstation** in the Object Type field, and select the plan to display the list of workstations you want to monitor. Click **Run**.

   A list of workstations is displayed.
6. Select a workstation that has been defined to connect to a remote SAP system.
7. From the toolbar, select **More Actions** > **Raise Event**. The Raise Event panel opens.

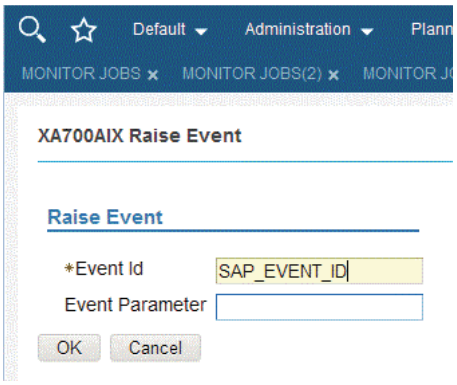


Figure 6. The Raise Event panel

8. The panel consists of the following:

   Event ID
   The identifier of the event that is to be raised.

   SAP Event Parameter
   The parameter of the event that is to be raised.
9. Click **OK**. The event is raised.

Creating a job that launches a Windows or UNIX command that raises an event

Do the following:

1. In the Dynamic Workload Console, select **Administration** > **Workload Design** > **Manage Workload Definitions**.
2. Specify an engine name, either distributed or z/OS. The Workload Designer window 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 **Native** category and then either **Windows** or **UNIX**.
5. Use the **General** page to provide general information about the new job definition.
6. Use the **Task** page to provide task information for the job.
7. In the **Task** page, select **Command** and in the command string type the following command that raises the event:

   ```
   TWS_home/methods/r3event -c workstation_name -u user_name
   -e SAP_event_ID -p parameter
   ```

   where:

   workstation_name
   The name of the workstation where the SAP R/3 job is defined.

   user_name
   The name of the SAP user with which the access method connects to the SAP system. This is the name specified in the r3user option.

   SAP_event_ID
   The identifier of the event.

   parameter
   The parameter defined for the event.
8. Save the job definition.

What to do next

See "Defining conditions and criteria" on page 263 for information about how to define criteria that manages which raised events to log.

Rerunning a standard SAP job

You can rerun a standard SAP job from the start, or from a specific numeric step of the SAP instruction.

About this task

To rerun a standard SAP job, you can use one of the following user interfaces:

conman
For details, refer to the *IBM Workload Scheduler: User's Guide and Reference*.

Dynamic Workload Console
Dynamic Workload Console

For details about how to rerun a job that submits an SAP process chain, refer to "Rerunning a process chain job" on page 286.

For an SAP extended agent, a `step` is the numeric step of the SAP instruction from which a job can be restarted. Before you rerun an SAP job with IBM Workload Scheduler, you have the option of providing a step name for the job. This affects `r3batch` in the following ways:

- If you use a step name that is up to 9 digits (or 8 digits preceded by a character) in length, this name is used as the starting step number for the rerunning job.
- If you use any different format, the name is ignored and the job is rerun starting from the first step.

For example, to rerun a job from the third step, you can use: `A03`, `3`, `00003`, or `H3`.

z/OS In z/OS environments, you need to set the status of the job to **Ready** before you can rerun the job.

Note: By default, if you specify a job step to rerun, the new job is assigned the name of the step you indicated. To keep the original job name, set the IBM Workload Scheduler global option **enRetainNameOnRerunFrom** to `yes`. This option works only when used with the following arguments: `rr` *`jobselect`*`;from=[`*`wkstat#`*`]`*`job`*. For details about these arguments, see *IBM Workload Scheduler: User's Guide and Reference, Managing objects in the plan - conman, Conman commands, rerun*. For details about this option, see *IBM Workload Scheduler: Planning and Installation*.

When `r3batch` reruns a job from its first step, either because you specified it as the starting step or because no starting step was specified, it uses the `new copy` feature, if applicable. If the starting step is greater than one, `r3batch` uses the `old copy` to rerun the job. For a description about the difference between the new and old copy of a rerunning job, refer to "Old copy and new copy of a rerunning job" on page 249.

To rerun a SAP Standard R/3 job from the Dynamic Workload Console, perform the following steps:

Procedure

1. In the Dynamic Workload Console select **System status and Health** > **Workload Monitoring** > **Monitor Workload**.
2. In the Monitor Workload input fields select **Job** as the Object Type, the engine name, the plan, and any filtering data that helps you filter the selection of jobs (you can also select **Edit** for a guided selection of filtering criteria) and select **Run**.
3. A list of jobs is displayed. Select an SAP Standard R/3 job.
4. Rerun the job.

   Distributed **Distributed environment**

   a. Click **Rerun...**. The General properties for the rerun operation are displayed.
   b. Optionally, you can choose to not rerun the same job but instead, substitute the selected SAP job with a different job definition and run it. Type the job definition name in the **From Job Definition** field, or use the browse button to search for it and select it.
   c. Optionally, type the workstation name of the workstation on which you want to rerun the job in the **Workstation Name** field.
   d. Optionally, in **Step**, enter a specific numeric step of the SAP instruction from which you want to rerun the job rather than rerunning the whole job.
   e. Optionally, specify the start and finish time for the job.
   f. Click **Rerun**.

   The job reruns immediately or at the specified start time.

z/OS **z/OS environment**

In a z/OS environment, an alias for the job name is not required so the job reruns with the same name. The list of jobs always reports the latest action performed on the job.

a. Before you can rerun a job, you must change the status of the job to **Ready**. Select a job and click **Set Status**.
b. In **Change Status**, select **Ready**.
c. Click **OK** to return to the list of jobs.

The job reruns immediately and the internal status reports **Started**.

Old copy and new copy of a rerunning job

When the access method for SAP launches a job, it makes a copy of a template job and runs it.

The `new copy` feature is available for SAP versions 3.1i, and later. It copies an entire job, preserving steps, job class, and all print and archive parameters. It is performed by using a new SAP function module that is part of the SAP Support Package as stated in the SAP Notes 399449 and 430087.

The `old copy` feature, instead, is based on standard SAP function modules, and creates a new SAP job and adds the steps with a loop that starts from the step name or number you specified. Be aware that, unless you have XBP 2.0 or later:

- The `old copy` does not preserve all the print and archive parameters.
- The job class of the copy is always set to class `C`.

Refer to "Print parameter and job class issues" on page 205 to learn how to resolve the problem of lost job class and print and archive parameters.

SAP Note 758829 is required to ensure correct operation of the `new copy` and `old copy` features. See also Table 77 on page 329.

Defining SAP jobs dynamically

This section describes how to create and submit SAP jobs dynamically without creating or referencing predefined job templates.

When you launch a job created as described in "Creating SAP Standard R/3 jobs from the Dynamic Workload Console" on page 224 and "Task string to define SAP jobs" on page 233, IBM Workload Scheduler makes a copy of the predefined job (also known as a template job) and runs the copy. If you want to run the job on several SAP systems, you must manually create the template job on each system.

To create and submit SAP jobs dynamically, without creating or referencing predefined job templates, submit:

- In the SAP system, a job that does not reference an existing template in the SAP R/3 database.
- A job that references a predefined job template stored in the SAP R/3 database for which you want to change a parameter.

To take full advantage of this feature, make sure that you have XBP version 2.0 or later installed, because earlier versions of XBP do not support the full set of print and archive parameters, or provide a way to set the job class or the spool list recipient.

Task string to define SAP jobs dynamically

This section describes the task string that controls the running of SAP jobs. You can build an entire job definition by using the six main sections concerning SAP job parameters. These sections are grouped in Table 54 on page 252 and are related to the:

- Job
- Job steps
- Variants associated with the steps (for ABAP modules only)
- Spool list recipients associated with the job
- Flags associated with the job
- Tracing specifications for the job

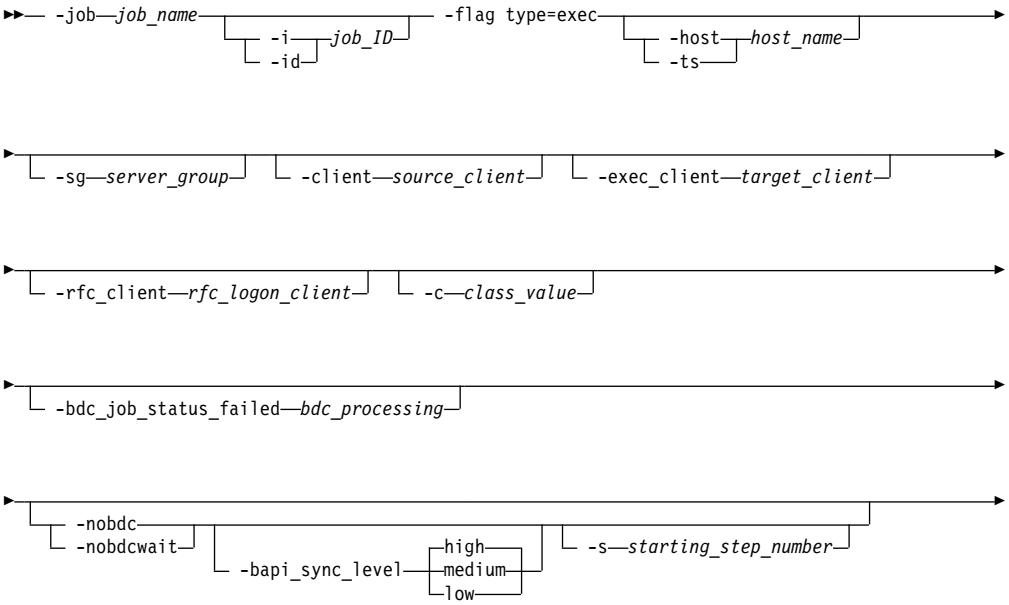
You can specify them in the following places when you define their associated IBM Workload Scheduler jobs:

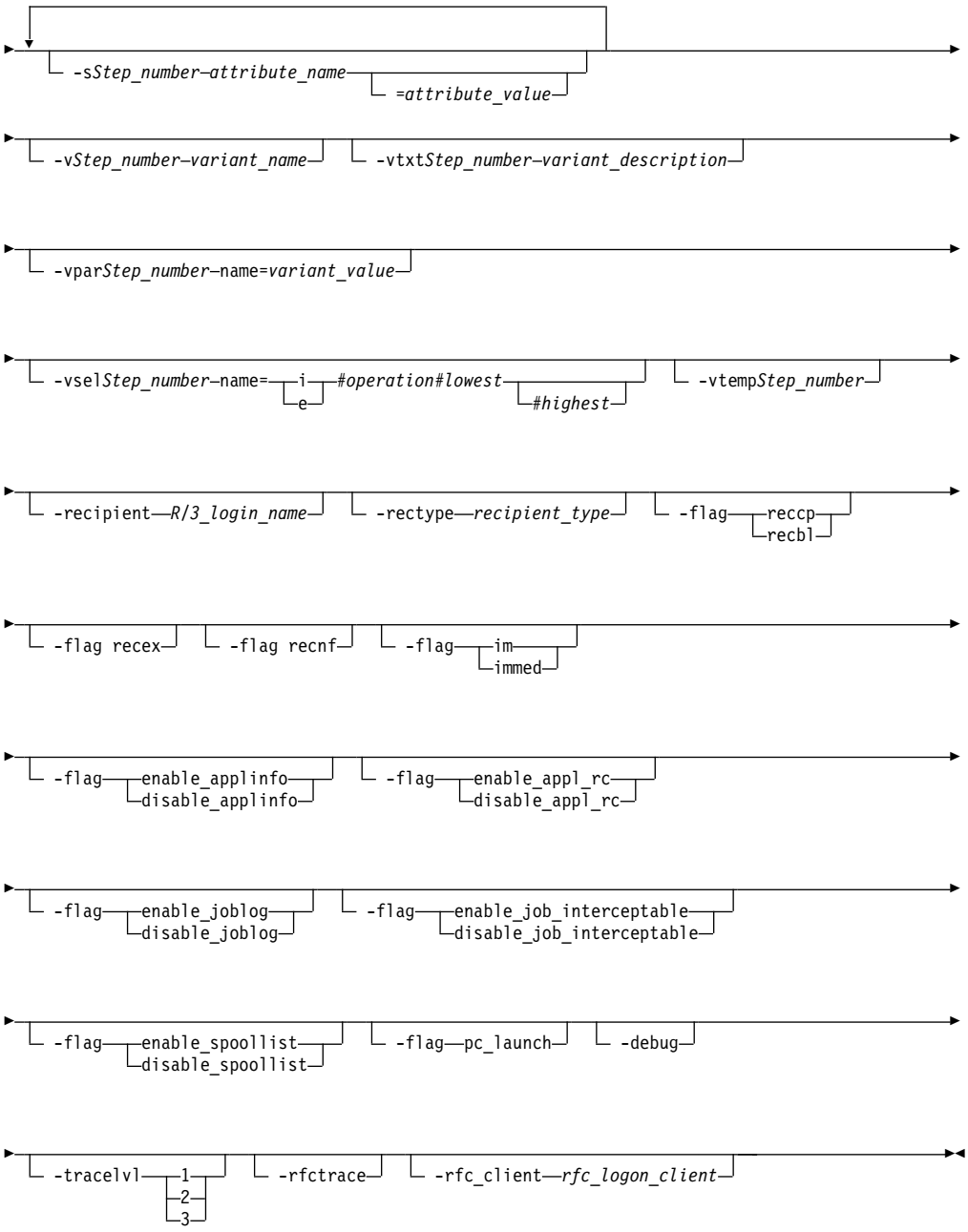
- In the **R/3 Command Line** section of the Task page of the Submit Ad Hoc Jobs action from the Dynamic Workload Console.
- In the **R3 Command Line** field of the More Options page of the SAP job definition, if you use the Dynamic Workload Console and selected a **SAP** job definition.
- As arguments of the `scriptname` keyword in the job definition statement, if you use the IBM Workload Scheduler command line.
- As arguments of the `JOBCMD` keyword in the `JOBREC` statement in the `SCRIPTLIB` of IBM Workload Scheduler for z/OS, if you are scheduling in an end-to-end environment. The following is an example of a `JOBREC` statement:

```
JOBREC
  JOBCMD('/-job job_name -user user_name -i job_ID -c class_value')
  JOBUSR(TWS_user_name)
```

To define and submit an SAP R/3 job dynamically, use the following syntax:

Job definition syntax





The following is an example of a definition for the SAPTEST job:

```
-job SAPTEST -C A -s1 program=BTCTEST -s1 type=A -s1 pr_release
-s2 report=BTCTEST -s2 variant=BVT –s2 type=A -flag type=exec
-vpar2 TESTNAME=test -vtxt2 Test
```

Table 54 on page 252 describes the parameters for the task string to define SAP jobs dynamically.

Note: The parameter values are case sensitive.

Table 54. Task string parameters for SAP jobs (dynamic definition). This table shows Task string parameters for Sap jobs

Section	Parameters	Description
JOB	-job *job_name*	The name of the job to be run. This parameter is mandatory.
	-i *job_ID* -id *job_ID*	The unique SAP job ID. Specify this parameter if you are submitting a job that refers to a predefined job template stored in the SAP database for which you want to change a parameter.
	-host *host_name* -ts *host_name*	The name of the SAP workstation where the job is to be run. *host_name* has the format *hostname_SAPsystemname_SAPsystemnumber*. For example, the name of a host might be amss80a0_gs7_90 These parameters are mutually exclusive with -sg.
	-sg *server_group*	The name of the SAP server group where the job is to be run. Use this parameter to run the job on an application server that belongs to the group. The server group must exist on the SAP system, otherwise an error code is returned and the job is not launched. This parameter is case-sensitive and can be up to 20 characters. It is mutually exclusive with -host and -ts.
	-client *source_client*	The number that identifies the SAP client where the job definition is to be found, regardless of the client number defined by the **r3client** key in the options file. This parameter has no effect if a job ID is specified in the job definition.
	-exec_client *target_client*	The number that identifies the SAP client where the job is to be run, regardless of the client number defined by the `r3client` key in the options file. This parameter requires that the client-dependent data (such as the user name and report variants) exists on both the source and target clients. This parameter has no effect if a job ID is specified in the job definition.
	-rfc_client *rfc_logon_client*	The number that identifies the SAP client to be used for RFC logon. This value overwrites the value specified by the r3client keyword in the corresponding r3batch options file.
	-c *class_value*	The priority with which the job runs in the SAP system. Possible values are: **A** High priority **B** Medium priority **C** Low priority. This is the default value.
	-flag type=exec	Specify this parameter to enable the dynamic definition of the SAP job. This parameter is mandatory.

Table 54. Task string parameters for SAP jobs (dynamic definition) (continued). This table shows Task string parameters for Sap jobs

Section	Parameters	Description
JOB	-bdc_job_status_failed *bdc_processing*	How IBM Workload Scheduler sets the completion status of a job running BDC sessions, according to a possible BDC processing failure. The allowed values are: *n* If at least *n* BDC sessions failed (where *n* is an integer greater than 0), IBM Workload Scheduler sets the job completion status as failed. **all** If all the BDC sessions failed, IBM Workload Scheduler sets the job completion status as failed. **ignore** When all the BDC sessions complete, regardless of their status, IBM Workload Scheduler sets the job completion status as successful. This is the default value. If **-nobdc** or **-nobdcwait** is set, this option is ignored.
	-nobdc -nobdcwait	Disables the BDC Wait option (enabled by default) to have the job considered as completed even if not all its BDC sessions have ended.
	-bapi_sync_level	Specifies the synchronization level between the SAP function modules BAPI_XBP_JOB_COPY and BAPI_XBP_JOB_START_ASAP. Allowed values are: **high** All RFC calls between BAPI_XBP_JOB_START_ASAP and BAPI_XBP_JOB_COPY are synchronized. This is the default. **medium** The RFC calls to BAPI_XBP_JOB_START_ASAP are synchronized. **low** The RFC calls are not synchronized.

Table 54. Task string parameters for SAP jobs (dynamic definition) (continued). This table shows Task string parameters for Sap jobs

Section	Parameters	Description
STEP	-s *starting_step_number*	The number of the starting step.

	-s*step_number attribute_name=attribute_value*	The step number and its attributes, where:
		step_number
		The number of the step being defined. Each step is identified by a sequential number (1, 2, 3, ...*n*) using the *step number*.
		attribute_name
		The name of the attribute.
		attribute_value
		The value of the attribute. It is optional for some attributes.
		Attributes can be defined in any order, but cannot be repeated for the same step. Attribute validation is performed before the job is created in the SAP system. If the validation fails, the IBM Workload Scheduler job goes into the ABEND state. For a detailed description of each attribute and its values, see “Defining attributes for ABAP steps” on page 258 and “Defining attributes for external programs and external commands steps” on page 260.
		For example, the following step (step 8) is an ABAP module running the report "MYPGM" and has two attributes, only one of which has a value.
		`-s8 type=A -s8 program=MYPGM`
		`-s8 pr_cover="My title" -s8 pr_immed`

Table 54. Task string parameters for SAP jobs (dynamic definition) (continued). This table shows Task string parameters for Sap jobs

Section	Parameters	Description
VARIANT[1]	-v*step_number* name	The variant name for the specified step number.
	-vtxt*step_number variant_description*	The textual description of the variant, in the IBM Workload Scheduler logon language (customizable with the `TWSXA_LANG` option of `r3batch`). The maximum length is 30 characters. Not valid for temporary variants.
	-vpar*step_number* name=*value*	For ABAP modules only. The value for a variant parameter for the specified step number. This parameter is mandatory when creating a new variant. For a complete list of the supported attributes for ABAP steps, see "Defining attributes for ABAP steps" on page 258.
	-vsel*step_number* name=*sign#operation#lowest*[*#highest*]	For ABAP modules only. The value for a variant selection option for the specified step number. **sign** Sign of the operation. Possible values are: **I** Include **E** Exclude **operation** Possible values are: **EQ** Equals **NE** Not equal to **BT** Between **NB** Not between **LT** Less than **LE** Less than or equal to **GT** Greater than **GE** Greater than or equal to **CP** Contains pattern **NP** Does not contain pattern **lowest** Low value of the selection. You can use up to 45 characters. **highest** High value of the selection. You can use up to 45 characters. This attribute is optional. For a complete list of the supported attributes for ABAP steps, see "Defining attributes for ABAP steps" on page 258.
	-vtemp*step_number*	For ABAP modules only. Specifies to assign a temporary variant to the specified step number. Temporary variants are created ad-hoc by the SAP system and assigned to the job instance when it is run. The lifecycle of the temporary variant is determined by the SAP system. If the job is deleted by SAP, then the temporary variant is deleted. See "Examples: Dynamically defining and updating SAP jobs" on page 262 to refer to examples that demonstrate the behavior of temporary variants.

Table 54. Task string parameters for SAP jobs (dynamic definition) (continued). This table shows Task string parameters for Sap jobs

Section	Parameters	Description
SPOOL	-recipient *name*	The login name of an SAP user.
	-flag {reccp | recbl}	Specifies how the spool list is sent to the recipient. Possible values are: **reccp** The spool list is sent as a copy. **recbl** The spool list is sent as a blind copy.
	-flag recex	Specifies that the spool list is sent as an express message to the recipient.
	-flag recnf	Specifies that the recipient is not allowed to forward the spool list.
	-rectype *type*	Specifies the recipient type. Possible values are: **blank** SAP user (default value) **B** SAP user **C** Shared distribution list **D** X.500 address **G** Organization object/ID **H** Organization unit **I** SAP object **L** Telex number **O** SAPoffice user **P** Private distribution list **R** SAP user in another SAP system **U** Internet address **1** Other recipient type
FLAGS	-flag im -flag immed	Specifies to launch the job immediately, meaning that if there are no spare work processes, the job fails.
	-flag enable_applinfo -flag disable_applinfo	Enables or disables the retrieval and appending of the SAP application log to the stdlist of IBM Workload Scheduler.
	-flag enable_appl_rc -flag disable_appl_rc	Enables or disables the mapping of the SAP application return code to the IBM Workload Scheduler return code. The SAP application return code is mapped only if **-flag enable_applinfo** is set and the application log contains the application return code.
	-flag enable_joblog -flag disable_joblog	Enables or disables retrieval of the joblog.
	-flag enable_joblog -flag disable_joblog	Enables or disables retrieval of the joblog.
	-flag enable_job_interceptable -flag disable_job_interceptable	Enables or disables the job launched by r3batch to be intercepted by SAP. If enabled, when r3batch launches a job and the SAP job interception feature is enabled, the job can be intercepted if it matches previously defined criteria. If disabled, the job launched by r3batch cannot be intercepted by SAP. This setting overwrites the setting in the common options file.

Table 54. Task string parameters for SAP jobs (dynamic definition) (continued). This table shows Task string parameters for Sap jobs

Section	Parameters	Description
-flag pc_launch	Specifies to launch child jobs that are in scheduled state. **ON** The product launches child jobs that are in scheduled state. **OFF** The product does not launch child jobs that are in scheduled state. This is the default value. **Note:** You can use this option only if you activated the parent-child feature on the SAP system. On the XBP 2.0 (or later) SAP system, you activate this feature by using the INITXBP2 ABAP report.	
TRACING	-debug	Enables maximum trace level.
	-tracelvl 1|2|3	Specifies the trace setting for the job. Possible values are: **1** Only error messages are written in the trace file. This is the default. **2** Informational messages and warnings are also written in the trace file. **3** A most verbose debug output is written in the trace file. For more details, refer to "Configuring the tracing utility" on page 184.
	-rfctrace -trace	Enables RFC trace.

Note: See "Examples: Dynamically defining and updating SAP jobs" on page 262 to refer to examples that demonstrate the behavior of variants and temporary variants.

1. The following rules apply when you create or update SAP jobs dynamically:
   - To create or reference a variant within an ABAP step, you can use one of the following equivalent syntaxes:
     - -s1 Variant=Var1
     - -s1 Parameter=Var1
     - -v1 Var1
   - If a variant does not exist, it is created with the parameters specified in the job definition statement. In this case, all the required attributes of the variant must be given a value. You cannot create empty variants. For example, if you specify **-vtemp1**, with no value assigned, an empty temporary variant is erroneously created.
   - If a variant is already present in the SAP system, its values are modified according to the command line parameters. If the existing variant is an extended one, a new instance of it is created with resolved placeholders and updated counters. This new variant instance is then updated using the values from the command line. Finally, the job step is run using this variant instance.
   - All changes to the variant values are permanent. That is, IBM Workload Scheduler neither restores the old values of the variants, nor deletes the variants created after the job is run. IBM Workload Scheduler does not change the case of the variant values.

Defining attributes for ABAP steps

To create and submit SAP jobs dynamically, look at the table and define the attributes for ABAP steps.

Table 55 shows a complete list of the supported attributes for ABAP step module definition:

Table 55. Supported attributes for ABAP step definition

Attribute name	Synonym	Description	Required
type	typ	Specify the step type. Possible values are: • A • ABAP The product performs a check for correct attribute values prior to launching the job.	✓
program		Specify the ABAP program name.	✓
parameter		Specify the ABAP variant name.	✓
user	authcknam	Specify the user of the step.	✓
language	lang	Specify the step language. This attribute accepts language names in either the ISO format (two characters, for example DE, EN) or the R/3 format (one character, for example D, E). If this attribute is not specified, the login language of the access method is used (customize using the option **twsxa_lang** in the r3batch options files). The product performs a check for a valid language prior to launching the job.	✓
pr_dest	printer pdest	Print Parameter: Specify the printer for the output.	
pr_copies	prcop	Print Parameter: Specify the number of copies. The value of this attribute must be numeric. A corresponding check is performed prior to launching the job.	
pr_lines	linct	Print Parameter: Specify the page length. The value of this attribute must be numeric. A corresponding check is performed prior to launching the job.	
pr_columns	linsz	Print Parameter: Specify the page width. The value of this attribute must be numeric. A corresponding check is performed prior to launching the job.	
pr_auth	prber	Print Parameter: Authorization	
pr_arcmode	armod	Print Parameter: Archiving mode	
pr_sapbanner	prsap	Print Parameter: SAP cover page	

Table 55. Supported attributes for ABAP step definition (continued)

Attribute name	Synonym	Description	Required
pr_exp	pexpi	Print Parameter: Spool retention period The value of this attribute must be a single digit. A corresponding check is performed prior to launching the job.	
pr_recip	prrec	Print Parameter: Recipient	
pr_spoolname	plist	Print Parameter: Name of spool request [1]	
pr_format	paart	Print Parameter: Print formatting [1]	
pr_dep	prabt	Print Parameter: Department on cover page [1]	
pr_spoolds	prdsn	Print Parameter: Name of spool data set [1]	
pr_spoolprio	priot	Print Parameter: Spool request priority [1]	
pr_immed	primm	Print Parameter: Print immediately [2]	
pr_release	prrel	Print Parameter: Delete after printing [2]	
pr_banner	prbig	Print Parameter: Selection cover page [2]	
pr_newspool	prnew	Print Parameter: New spool request [1] [2]	
pr_cover	prtxt	Print Parameter: Text for cover page [1]. If the string contains spaces it must be enclosed between single quotes.	
pr_hostcover	prunx	Print Parameter: Host spool cover page [1] . Possible values are: **' '** Blank. Does not use any cover page. **'X'** Prints the host cover page. **'D'** Prints the default host cover page.	
al_sapobject	sap_object	SAP ArchiveLink: Object type of business object	
al_object	object	SAP ArchiveLink: Document type	
al_info	info	SAP ArchiveLink: Info field	
al_id	archiv_id	SAP ArchiveLink: Target storage system [1]	
al_doctype	doc_type	SAP ArchiveLink: Document class [1]	
al_rpchost	rpc_host	SAP ArchiveLink: PRC host [1]	
al_rpcserv	rpc_servic	SAP ArchiveLink: RPC service / RFC destination [1]	
al_iface	interface	SAP ArchiveLink: Name of communication connection component [1]	
al_client	mandant	SAP ArchiveLink: Client [1]	
al_report		SAP ArchiveLink: Report name [1]	
al_text	arctext	SAP ArchiveLink: Text information field [1]	
al_date	datum	SAP ArchiveLink: Archiving date [1]	
al_user	arcuser	SAP ArchiveLink: Data element for user [1]	
al_printer		SAP ArchiveLink: Target printer [1]	
al_format	formular	SAP ArchiveLink: Output format [1]	
al_path	archivpath	SAP ArchiveLink: Standard archive path [1]	
al_protocol	protokoll	SAP ArchiveLink: Storage connection protocol [1]	

Table 55. Supported attributes for ABAP step definition (continued)

Attribute name	Synonym	Description	Required
al_version		SAP ArchiveLink: Version number [1]	

Note:
1. This attribute is available for BC-XBP 2.0 and later.
2. This attribute is a flag, that is, it does not have a value, for example: `–s2 pr_release`.

IBM Workload Scheduler performs the following syntax validation on job attributes:

- Only valid attributes are allowed.
- Checks if a particular attribute requires a value.
- The values of the following attributes are checked:
  - type
  - language
  - pr_copies
  - pr_lines
  - pr_colums

Validation is performed before the job is created in the SAP system. If the validation fails, the IBM Workload Scheduler job goes into the ABEND state.

Defining attributes for external programs and external commands steps

Table 56 shows a complete list of the supported attributes for external programs and external commands step definition.

Table 56. Supported attributes for external programs and external commands step definition

Attribute name	Synonym	Description	Required
type	typ	The step type can assume one of the following values: **For external programs** • X • EXTPRG **For external commands** • C • EXTCMD Before launching the job, the product performs a check for correct attribute values.	✔
report		ABAP program name or name of the external program or command.	✔
parameter		Parameters for the external program or command.	
user	authcknam	User of the step.	

Table 56. Supported attributes for external programs and external commands step definition (continued)

Attribute name	Synonym	Description	Required
language	lang	Step language. This attribute accepts language names in either the ISO format (two characters, for example DE, EN) or the R/3 format (one character, for example D, E). If this attribute is not specified, the login language of the access method is used (customize using the **twsxa_lang** option in the `r3batch` option files). The product performs a check for a valid language prior to launching the job.	
targethost	xpgtgtsys	Target host for the external program or command. This name must be exactly the same as the name shown in the External Operating System Commands table in the SAP system (transaction `sm69`).	
os	opsystem	Operating system for the external command. This name must be exactly the same as the name shown in the External Operating System Commands table in the SAP system (transaction `sm69`).	
termcntl	waitforterm	Control flag: if an external command or program is to be run synchronously. [2]	
tracecntl		Control flag: if SAP tracing level 3 is activated for tracing SAPXPG, the program that starts an external command or program. [1] [2]	
stdoutcntl		Control flag: indicates if standard output from an external command or program is to be written to the job log. [1] [2]	
stderrcntl		Control flag: indicates if standard error from an external command or program is to be written to the job log. [1] [2]	

Note:

1. This attribute is available for BC-XBP 2.0 and later.
2. This attribute is a flag, that is, it does not have a value, for example: `–s2 pr_release`.

IBM Workload Scheduler performs the following syntax validation on job attributes:

- Only valid attributes are allowed.
- Checks if a particular attribute requires a value.
- The values of the following attributes are checked:
  - type
  - language
  - pr_copies

– pr_lines
– pr_colums

Validation is performed before the job is created in the SAP system. If the validation fails, the IBM Workload Scheduler job goes into the ABEND state.

Specifying job parameters using variable substitution

Parameters can be provided at run time using the variable substitution feature. For example, the value appears as:

```
-s1 report=&VARNAME
```

The variable substitution process occurs while IBM Workload Scheduler is creating the symphony file.

Examples: Dynamically defining and updating SAP jobs

This section describes some usage examples of this feature:

Job definition and run scenario using the -flag type=exec parameter

The following example creates and runs a 3-step job. The first step runs the ABAP MYPROG1 using variant VAR01 and associated variant parameter. Step 2 has a step user defined. Step 3 uses the same ABAP as step 1 with no associated variant.

The only requirement is that the elements referred to are known in the SAP system (user, program). If the variant does not exist, there should be a set of values to define the content of the variant for its creation (pairs of –vpar*N* -vsel*N* parameters for the parameters and selections of the ABAP program).

```
-job TESTJOB01 –c A
-s1 type=A –s1 program=MYPROG1
–v1 VAR01 –vpar1 TESTNAME=TST
-s2 report=SPOOLX1 –s2 user=PRTUSER
–s3 type=A –s3 program=MYPROG1 –flag type=exec
```

The job returns job ID 12345678

Job copy and overwrite the job created in the previous step

The following job statement references the job created in the previous example. A new copy of the job is made and the parameters specified in the invocation are used to update the definition. In this case the variant for step 1 is modified and a new external program step (Step 4) is added.

```
-job TESTJOB01 –i 12345678
–s1 variant=VAR01A
–vpar1 TESTNAME=TST2
–s4 type=X -s4 report=niping –s4 parameter=-t
-flag type=exec
```

Copy and overwrite a job referencing an existing job template

The following example shows a job creation referencing a job template (previously created without using this feature). A template job called TEMPLAJOB already exists on the SAP system with an ID of 56780123. It is a single ABAP step job to which we now add some print parameters.

```
-job TEMPLAJOB
–I 56780123 -s1 pr_immed
-flag type=exec
```

A temporary variant is created using the information indicated in the expression

The following is the syntax to be used:

```
-vpar1 <parameter_name>=<parameter_value> ...
-vsel1 <selection_option_name>
... -vtemp1
```

The following example shows how you can submit a job that creates a temporary variant that is assigned to step number 1, and assigns a value to a variant parameter for step number 1:

```
-job TESTJOB01 -C A -flag type=exec -user R3USER
-s1 type=A -s1 program=MYPROG1
-vtemp1 -vpar1 TESTNAME=TST
```

The following example shows how you can submit a job that creates a temporary variant that is assigned to step number 1, assigns a value to a variant parameter for step number 1, and assigns a value to a variant selection option (date) for step number 1:

```
-job TESTJOB01 -C A -flag type=exec -user R3USER
-s1 type=A -s1 program=MYPROG1
-vtemp1 -vpar1 FILENAME=FLN
-vsel1 date=E#BT#20110101#20110412
```

Assign a temporary variant to the specified step number

The following is the syntax to be used:

```
-v1 <temporary_variant_name> -vtemp1
```

The following is an example of how you can submit a job to assign a temporary variant, which has already been created (as in the previous example), and assign a value to step number 1:

```
-job TESTJOB01 -C A -flag type=exec -user R3USER
-s1 type=A -s1 program=MYPROG1
-vtemp1 -v1 &000000000001
```

The value for a temporary variant that already exists is substituted with the value indicated in the expression

The following is the syntax to be used:

```
-v1 <temporary_variant_name> -vpar1 <parameter_name>=<parameter_value> ...
-vsel1 <selection_option_name> ... -vtemp1
```

The following is an example of how you can submit a job that substitutes the value of a temporary variant, which must already exist, with a new value. The temporary variant must exist, otherwise, the expression returns an error.

```
-job TESTJOB01 -C A -flag type=exec -user R3USER
-s1 type=A -s1 program=MYPROG1
-vtemp1 -v1 &000000000001 -vpar1 TESTNAME=TST2
```

Defining conditions and criteria

IBM Workload Scheduler accesses the Computer Center Management System (CCMS) Background Processing components of SAP systems through the BC-XBP interface to provide additional capabilities from the Dynamic Workload Console, one of those being the Criteria Manager.

IBM Workload Scheduler supports the BC-XBP 3.0 interface which provides functions to control R/3 batch jobs.

The Criteria Manager is a tool that enables you to define conditions and criteria that, when combined, form complex dependencies that you can use in the following contexts:

- Managing raised events in the SAP event history.
- Managing reorganization tasks against the SAP event history.
- Intercepting jobs.

If you have other types of criteria defined on your SAP system, then you can perform other actions in addition to those listed in this section.

The criteria profile

The Criteria Manager enables you to define a criteria profile which is a container for a combination of criteria. The criteria profile can be of various types and each criteria type has a standard set of selection criterion. For each criteria, you can specify a single value, a range of values by indicating a lower and upper limit, and multiple values. The following is the standard set of selection criterion for each criteria profile type. In addition to these, you can also see any other types of criteria profiles you have defined on your SAP system:

Event History

EVENTID
The identifier of the event defined in the SAP system.

EVENTPARM
The parameter of the event defined in the SAP system.

PARMID
The identifier of the parameter of the event defined in the SAP system.

Event History Reorg

Event State
The state of the event.

Event Timestamp
The timestamp for the event.

Interception

Job Name
A name identifying the job.

Job Class
The class assigned to the job that represents the priority with which the job runs in the SAP system.

The criteria hierarchy

You create and combine criteria in a criteria hierarchy. The criteria hierarchy is a set of all the criteria that must be fulfilled for a specific action to take place in the specific context. For example, you can define a criteria hierarchy to log all raised events in the SAP event history with an event name that begins with "CRITICAL_EVENT" and with an event argument equal to 150.

The criteria in the hierarchy is grouped in nodes and relationships between the nodes are determined by the logical operators AND or OR. You can nest nodes in other nodes.

To have the criteria profile begin processing, the criteria profile must be activated. Only one criteria profile of the same type can be active at one time.

An example

See “Example: Defining which raised events to log” for an example that demonstrates how to build a criteria hierarchy to manage the logging of raised events in the SAP event history.

Example: Defining which raised events to log

The event history stores all events that are raised by the system. You can define specific criteria so that only raised events that match certain criteria are logged.

The event history enables IBM Workload Scheduler to consume events that are raised by the SAP system.

Checking the log of raised events gives you access to the following information:

- Verify that an event was raised in the system.
- Verify if the event was processed.

In the example that follows, an event history criteria profile is created that contains the definition of the criteria, the criteria hierarchy, that events must fulfill to be logged in the event history. The criteria profile must then be activated so that it can begin processing events according to the criteria.

The criteria profile, `Event profile 1`, contains a criteria hierarchy that logs only those events in the event history with event name that begins with `CRITICAL_EVENT` and event argument equal to "789".

Create the criteria profile

A criteria profile contains the definition of the criteria you want to set for logging raised events.

About this task

Create a criteria profile, `Event profile 1`, of type, Event History, to contain the criteria hierarchy.

Procedure

1. In the portfolio, click **Administration** > **Workload Design** > **Manage SAP Criteria Profiles**.
2. In **Engine name**, select the name of the IBM Workload Scheduler engine connection from which you want to work with SAP jobs.
3. In **Workstation name**, type the name of the workstation where the SAP job runs. This is the workstation with the r3batch access method that communicates with the remote SAP system. If you do not know the name of the workstation, click the **Lookup Workstations** icon to enter your filter criteria and click **Search**. If you enter a string representing part of the workstation name, it must be followed by the asterisk (*) wildcard character. Both the question mark (?) and asterisk (*) are supported as wildcards. You can also simply use the asterisk wildcard character (*) to display all workstations. Optionally, specify any of the other search criteria available and click **Search**. From the results displayed, select the workstation and click **OK**.

4. In **Options file**, specify an options file that resides on the specified workstation. Each workstation can have one or more options files that can be used to customize the behavior of the r3batch access method, except for extended agent workstations, where only one options file can exist and therefore does not need to be specified. For the workstation specified, enter the file name of the options file or click pick icon to search for options files that reside on the specified workstation and select one.
5. Click **Go**.
6. From the Criteria Manager main view, click **New** to create a criteria profile.
7. Select **Event History** as the type of criteria profile you want to create.
8. Enter descriptive text that enables you to easily identify the criteria profile in the table of criteria profiles. Type `Event profile 1`. Avoid using special characters such as, < (less than), > (greater than), or the ' (apostrophe) in this field.
9. Click **Save**.

Results

The criteria profile is displayed in the list of criteria profiles and it is not yet active.

What to do next

Next, begin building the criteria hierarchy. The criteria profile is the container for the criteria hierarchy.

Build the criteria hierarchy

The criteria hierarchy is stored in the criteria profile and is made up of criteria. A group of criteria is contained in a node.

Before you begin

The criteria hierarchy is made up of a combination of nodes and criteria. A node contains a group of criteria where the relationship between the criteria is determined by an AND or an OR relation. You can nest nodes in other nodes. By default, a top level AND node is created in the criteria hierarchy. You can create other AND or OR nodes nested in this parent node. You can also add one or more criterion to the nodes. Add an AND node when all of the criteria defined in the node must be fulfilled. Add an OR node when at least one of the criteria defined in the node must be fulfilled.

About this task

In this example, define a criterion that logs all events whose name begins with `CRITICAL_EVENT` and with event argument equal to `789`.

Procedure

1. Click  to create a new criterion in the default AND node.
2. In **Description**, type `Criterion 1`.
3. In **EVENTID**, click  to specify the value for the EVENTID field.
4. Leave the default value **Select** to indicate to use the selection criterion specified when processing events.

5. In **Options**, select **Pattern** and in **Single Value or Lower Limit**, type `CRITICAL_EVENT*`. This sets the condition for the event name.
6. In **EVENTPARM**, click  to specify the value for the EVENTPARM field.
7. Leave the default value **Select** to indicate to use the selection criterion specified when processing events.
8. In **Options**, select **Equal to** and in **Single Value or Lower Limit**, type `789`. This sets the condition for the event argument.
9. Click **Save** to save the criterion definition.

Results

The criteria profile now contains a criterion that specifies which raised events must be logged. You can continue to create another criteria in the same parent node or you can nest either an AND or an OR node in the parent node to determine the logical relation between the criteria that the nested node will contain. Add an AND node within which you can create one or more criteria where all the criteria specified in the node must be fulfilled, or add an OR node within which you can create one or more criteria where at least one of the criteria specified must be fulfilled.

What to do next

To apply this criteria profile so that it begins processing events according to the criteria defined, you must activate the criteria profile.

Activate the criteria profile

To apply the `Event profile 1` criteria profile so that it begins processing raised events according to the criteria specified in the criteria hierarchy, you must activate the criteria profile.

About this task

A criteria profile can either be active or not active. For a criteria profile to take effect, the profile must be activated. Only one criteria profile of the same type can be active at one time. Criteria profiles cannot be edited if they are in the active state. Follow the procedure to activate the `Event profile 1` criteria profile.

Procedure

1. Select the `Event profile 1` criteria profile from the table of criteria profiles.
2. Select **Activate** from the toolbar. 

Results

The status of the criteria profile is updated to show that it is now active. The criteria profile can now begin to process raised events according to the specifications of the criteria hierarchy and log them to the event history. If another criteria profile of the same criteria type was active, its status changes to inactive.

Using the BDC Wait option

By using the Batch Data Collector (BDC) Wait option, you can specify that an R/3 job launched by IBM Workload Scheduler is not to be considered complete until all of its BDC sessions have completed.

About this task

The Batch Data Collector (BDC) Wait option prevents other IBM Workload Scheduler jobs that are dependent on the R/3 job from being launched until all of the related BDC sessions for the R/3 job have ended.

To use the option, an R/3 job must write informational messages in its job log. This can be done by modifying the SAP function module BDC_OPEN_GROUP as follows:

```
FUNCTION BDC_OPEN_GROUP.
...
CALL 'BDC_OPEN_GROUP' ID 'CLIENT'      FIELD CLIENT
                      ID 'GROUP'       FIELD GROUP
                      ID 'USER'        FIELD USER
                      ID 'KEEP'        FIELD KEEP
                      ID 'HOLDDATE'    FIELD HOLDDATE
                 ID 'DESTINATION' FIELD DEST
                 ID 'QID'         FIELD QID
                 ID 'RECORD'      FIELD RECORD
                 ID 'PROG'        FIELD PROG.
*
IF SY-SUBRC EQ 0.
  BQID   = QID.
  BUSER  = SY-MSGV1.
  BGROUP = GROUP.
* CALL FUNCTION 'DB_COMMIT'.
  CALL FUNCTION 'ENQUEUE_BDC_QID'
  EXPORTING   DATATYP   = 'BDC '
  GROUPID    = BGROUP
  QID              = BQID
  EXCEPTIONS  FOREIGN_LOCK  = 98
  SYSTEM_FAILURE   = 99.

  IF SY-SUBRC EQ 0.
     message i368(00) with 'BDCWAIT: ' qid.
  ENDIF.

ENDIF.
*
PERFORM FEHLER_BEHANDLUNG USING SY-SUBRC.
*
*
ENDFUNCTION.
```

Note: The actual parameters of the call of the C function (`CALL 'BDC_OPEN_GROUP' ID ...`) might vary depending on the SAP release. With this approach, you obtain a global change in your R/3 system.

The completion status of an R/3 job launched by IBM Workload Scheduler is based on the value you set for the **bdc_job_status_failed** option. By default, this option is set to `ignore`, meaning that the job is considered successfully completed when the BDC sessions are finished, regardless of their success or failure. For details about the **bdc_job_status_failed** option, refer to Table 52 on page 236.

Job interception and parent-child features

This section describes how the job interception and parent-child features of BC-XBP 2.0 and 3.0 are supported by IBM Workload Scheduler.

Note: Distributed The process of defining relaunch criteria and collecting and relaunching intercepted jobs is supported only in distributed environments and not in z/OS environments.

Implementing job interception

The high-level steps required to implement job interception.

About this task

Job interception is a feature of both the BC-XBP 2.0 and BC-XBP 3.0 interfaces. It enables IBM Workload Scheduler to have a very sophisticated control over the jobs launched by SAP R/3 users from the SAP graphical interface.

The job interception mechanism becomes active when the SAP R/3 job scheduler is about to start an SAP R/3 job (that is, when the `start` conditions of an SAP R/3 job are fulfilled). It checks the job parameters (`job name`, `creator`, `client`) against the entries in the SAP R/3 table `TBCICPT1`, and when the job parameters match the criteria, the SAP R/3 job is set back to the `scheduled` status and is marked with a special flag, denoting that the job has been intercepted. The criteria defined in the criteria table establishes which job are intercepted.

If IBM Workload Scheduler has been set up to handle job interception, it periodically runs its own job to retrieve a list of intercepted jobs and reschedules them to be relaunched. This job can be referred to as the *interception collector* job.

Job interception with the BC-XBP 2.0 interface is based on the single extended agent workstation, whereas with the BC-XBP 3.0 interface, job interception is based on the currently active job interception criteria profile.

Note:

- Jobs launched by IBM Workload Scheduler, or by any other external scheduler using the BC-XBP interface, can be intercepted provided the **`job_interceptable`** option in the common options file is set to `ON`, and the **`-flag enable_job_interceptable`** keyword is included in the job definition.
- Ensure that the job interception and job throttling features are not running at the same time. The interception collector jobs fail if a job throttler instance is running. To stop the job throttler, refer to “Step 5. Starting and stopping the job throttling feature” on page 295.

The following are the high-level steps required to implement job interception for both the BC-XBP 2.0 and 3.0 interfaces.

Job interception and the BC-XBP 2.0 interface

About this task

To set up IBM Workload Scheduler to handle job interception in an SAP R/3 environment with the BC-XBP 2.0 interface, implement the following steps:

Procedure

1. Install the BC-XBP 2.0 interface. Refer to SAP Note 604496 to know if your SAP R/3 system already has the BC-XBP 2.0 interface, or which SAP R/3 support package you need to install to enable it.
2. Define an IBM Workload Scheduler job to periodically collect the intercepted SAP R/3 jobs.

3. Specify interception criteria in the SAP R/3 system.
4. Specify interception criteria in IBM Workload Scheduler from the Monitor Workstations portlet on the Dynamic Workload Console. The criteria is set at workstation level.
5. Activate the job interception feature of the BC-XBP 2.0 interface.

Job interception and the BC-XBP 3.0 interface

About this task

To set up IBM Workload Scheduler to handle job interception in an SAP R/3 environment with the BC-XBP 3.0 interface, implement the following steps:

Procedure

1. Verify if the BC-XBP 3.0 interface is already installed on the SAP R/3 system.
2. Define an IBM Workload Scheduler job to periodically collect the intercepted SAP R/3 jobs.
3. Specify interception criteria in the SAP R/3 system.
4. Specify interception criteria in IBM Workload Scheduler from the Manage SAP Criteria Profiles portlet on the Dynamic Workload Console.
5. Activate the job interception feature of the BC-XBP 3.0 interface.

Collecting intercepted jobs periodically for BC-XBP 2.0

With the BC-XBP 2.0 interface, you can configure the job interception collector using an IBM Workload Scheduler job that periodically retrieves intercepted jobs and relaunches them.

About this task

Define an IBM Workload Scheduler job that uses the SAP R/3 interception collector task to collect intercepted jobs and restart them.

To define an IBM Workload Scheduler job that collects intercepted job and relaunches them, use the following syntax:

```
XANAME#JOBNAME
  SCRIPTNAME "TWS_home/methods/r3batch -t HIJ -c XANAME"
  DESCRIPTION "Collects intercepted jobs on SAP XA XANAME"
  STREAMLOGON TWSuser
  RECOVERY STOP
```

Where:

XANAME
: Name of the extended agent workstation.

JOBNAME
: Name of the IBM Workload Scheduler job.

TWS_home
: Fully qualified path to your IBM Workload Scheduler installation.

–t HIJ
: This is the SAP R/3 task type to run the job interception collector. HIJ stands for `Handle Intercepted Jobs`.

TWSuser
: Name of the IBM Workload Scheduler user that launches the access method.

The interception collector job runs at periodical intervals; for example, every 10 minutes. It retrieves all the jobs that have been intercepted since the last run of the interception collector, and launches them again according to a template.

Collecting intercepted jobs periodically for BC-XBP 3.0

With the BC-XBP 3.0 interface, you can configure the job interception collector using an IBM Workload Scheduler job that periodically retrieves intercepted jobs and relaunches them.

About this task

Because intercepted jobs remain in the `Released` and then `Intercepted` status until they are relaunched, you need to use the SAP R/3 interception collector task to collect and relaunch them.

To define an IBM Workload Scheduler job that collects and relaunches jobs use the following syntax:

```
ENGINE_NAME_HOSTING_XA#JOBNAME
DOCOMMAND "TWS_home/methods/r3batch -t HIJ -c ENGINE_NAME_HOSTING_XA -- \
   "-profile_id <profile_ID_number>\""
STREAMLOGON TWSuser
DESCRIPTION "Collects intercepted jobs on SAP ENGINE_NAME_HOSTING_XA"
TASKTYPE UNIX
RECOVERY STOP
```

where,

ENGINE_NAME_HOSTING_XA
: The name of the engine workstation hosting the XA workstation with the r3batch access method that communicates with the SAP system.

JOBNAME
: Name of the IBM Workload Scheduler job.

TWS_home
: Fully qualified path to your IBM Workload Scheduler installation.

–t HIJ
: This is the SAP R/3 task type to run the job interception collector. HIJ stands for `Handle Intercepted Jobs`.

- profile_id <*profile_ID_number*>
: Specifies the identification number of the interception criteria profile on the SAP system for XBP 3.0.

TWSuser
: Name of the IBM Workload Scheduler user that launches the access method.

The interception collector job runs at periodical intervals; for example, every 10 minutes. It retrieves all the jobs that have been intercepted since the last run of the interception collector, and launches them again according to a template.

Note: If the interception collector is configured for XBP 3.0 job interception, but the XBP 2.0 interface is configured on the SAP system, the collector fails. Ensure the XBP interface versions are synchronized.

Setting interception criteria on the SAP R/3 system
About this task

In SAP R/3, the interception criteria are held in table `TBCICPT1`. Only jobs that match the criteria of this table are intercepted, when their `start` conditions are fulfilled. All the other jobs are run normally.

You can maintain the entries in this table by using transaction `se16` and setting the following:
- Client number
- Job mask
- User mask

Setting interception criteria on IBM Workload Scheduler
About this task

In IBM Workload Scheduler, interception criteria are defined and used by setting:

Table criteria

For BC-XBP 2.0
You use the **Monitor Workload** of Dynamic Workload Console to set table criteria.

For details about how you set table criteria, see "Setting SAP R/3 table criteria on the extended agent workstation."

For BC-XBP 3.0
You set table criteria from the **Administration** > **Workload Design** > **Manage SAP Criteria Profiles** portlet from the Dynamic Workload Console.

For details about how you set table criteria, see "Setting SAP R/3 criteria in the job interception criteria profile" on page 273.

Template files (optional)
For details about how you create template files, see "Using template files" on page 275.

Setting SAP R/3 table criteria on the extended agent workstation:
About this task

To set table criteria with the BC-XBP 2.0 interface on an SAP R/3 job using the **Monitor Workload** of the Dynamic Workload Console, follow these steps:

Procedure

1. Log in to the Dynamic Workload Console.
2. In the navigation bar at the top, click **System Status and Health** > **Workload Monitoring** > **Monitor Workload**.
3. In the **Monitor Workload** window select the engine, enter **Workstation** in the **Object Type** field, and select the plan to display the list of workstations you want to monitor. Click **Run**.
4. Select an extended agent workstation in the table of displayed workstations, and click **More Actions** > **Table Criteria...** from the toolbar.
5. The **Table Criteria** panel displays. From this panel you can add, delete, edit, or refresh criteria.

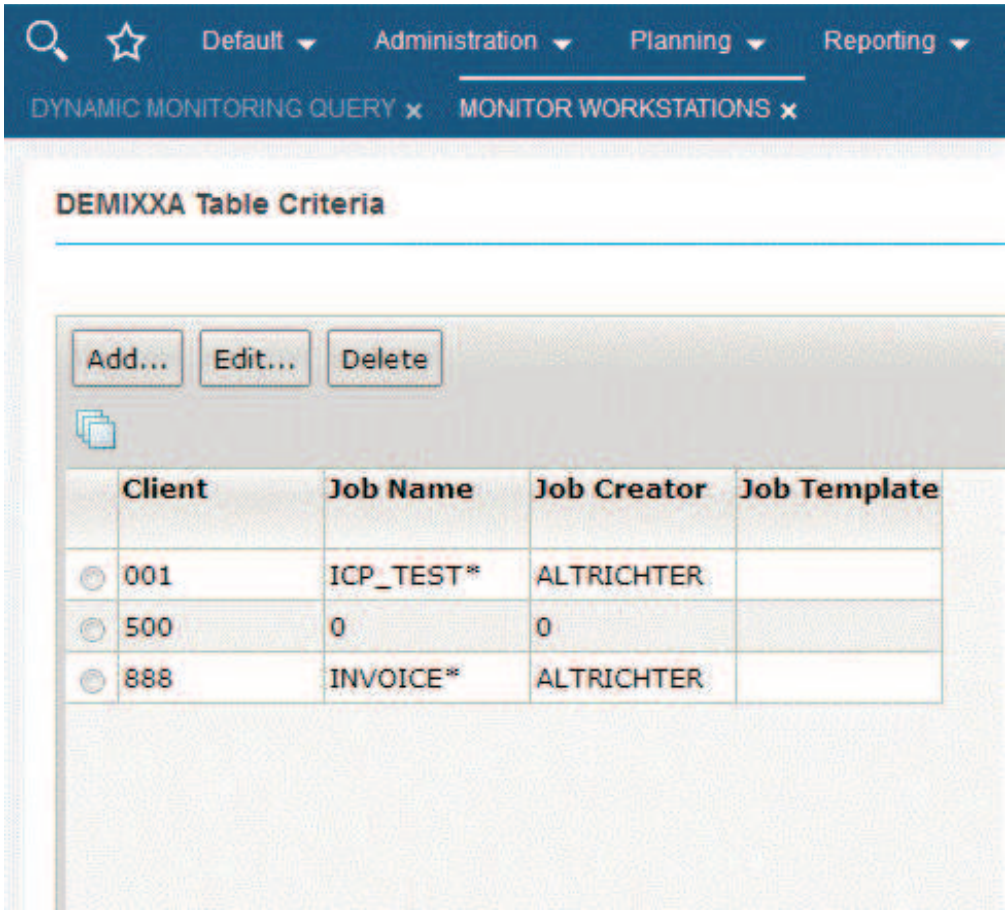


Figure 7. The Table Criteria panel

6. Specify the criteria:
   a. In **Client**, specify the client workstation of the SAP R/3 job.
   b. In **Job Name**, specify a filter to match a set of SAP R/3 jobs. Use the asterisk (*) wildcard character to match a set of jobs.
   c. In **Job Creator**, specify a filter to match a set of SAP R/3 job creator. Use the asterisk (*) wildcard character to match a set of jobs.
   d. Optionally, in **Job Template**, specify the template file that contains instructions for the interception collector about how to run the intercepted SAP R/3 job under control of IBM Workload Scheduler. For more information about template files, see "Using template files" on page 275.
   e. In **Job Class**, specify the class assigned to the job that represents the priority with which the job runs on the SAP system.
7. Click **OK**.

Setting SAP R/3 criteria in the job interception criteria profile:

Setting criteria to intercept jobs and relaunch them.

About this task

To set the criteria that defines which SAP R/3 jobs to intercept and relaunch with the BC-XBP 3.0 interface using the Dynamic Workload Console, perform the following steps:

Procedure

1. In the portfolio, click **Administration** > **Workload Design** > **Manage SAP Criteria Profiles**.
2. In **Workstation name**, type the name of the workstation where the SAP job runs. This is the workstation with the r3batch access method that communicates with the remote SAP system. If you do not know the name of the workstation, click the **Lookup Workstations** icon to enter your filter criteria and click **Search**. If you enter a string representing part of the workstation name, it must be followed by the asterisk (*) wildcard character. Both the question mark (?) and asterisk (*) are supported as wildcards. You can also simply use the asterisk wildcard character (*) to display all workstations. Optionally, specify any of the other search criteria available and click **Search**. From the results displayed, select the workstation and click **OK**.
3. From the Criteria Manager main view, click **New** to create a criteria profile.
4. Select **Interception** as the type of criteria profile you want to create.
5. Enter descriptive text that enables you to easily identify the criteria profile in the table of criteria profiles. Avoid using special characters such as, < (less than), > (greater than), or the ' (apostrophe) in this field.
6. Click **Save**. The criteria profile is displayed in the list of criteria profiles and it is not yet active.
7. On the **Details** tab in the upper-right pane, define the criteria that intercepted jobs must match. For example, to intercept jobs with a job name beginning with "ICP", specify the following criteria:
   a. Click  to define a new criterion.
   b. In **Description**, type `Criterion 1`.
   c. In **JOB NAME**, click  to specify the value for the JOB NAME field.
   d. Leave the default value **Select** to indicate to use the selection criterion specified when intercepting jobs.
   e. In **Options**, select **Pattern** and in **Single Value or Lower Limit**, type `ICP*`. This sets the condition for the job name.
   f. Click **Save** to save the criterion definition.
8. Define the criteria that must be matched to relaunch intercepted jobs. Click the **Job Relaunch Criteria** tab.
   a. Click  to define a new criteria that determines which jobs are relaunched.
   b. In **Client**, specify the client workstation of the SAP R/3 job.
   c. In **Job Name**, specify a filter to match a set of SAP R/3 jobs. Use the asterisk (*) wildcard character to match a set of jobs.
   d. In **Job Creator**, specify a filter to match a set of SAP R/3 job creator. Use the asterisk (*) wildcard character to match a set of jobs.
   e. Optionally, in **Job Template**, specify the template file that contains instructions for the interception collector about how to run the intercepted SAP R/3 job under control of IBM Workload Scheduler. For more information about template files, see “Using template files” on page 275.
   f. In **Job Class**, specify the class assigned to the job that represents the priority with which the job runs on the SAP system.
9. Click **OK**.

10. You can continue to define more criteria and then save the criteria profile.
11. When you are done defining the criteria, save the criteria profile.
12. Select the criteria profile and then click **Activate** from the toolbar. 

Results

The status of the criteria profile is updated to show that it is now active. The criteria profile can now begin to intercept jobs according to the specifications of the criteria hierarchy and relaunch them as defined in the IBM Workload Scheduler job. If another criteria profile of the same criteria type was active, its status changes to inactive.

Using template files:
About this task

A template is a file with extension `.jdf` located in the same directory as the interception criteria file (*TWS_home*`/methods/r3batch_icp`). The template file contains instructions for the interception collector about how to run the intercepted SAP R/3 job under control of IBM Workload Scheduler. Its syntax corresponds to the syntax of `docommand` in conman. You can use any text editor to maintain this file. Ensure that the user, LJUser, is able to read and write to this file.

If the user template file is empty, a template file named `default.jdf` is used. If `default.jdf` does not exist, the following instructions are used:

```
alias=SAP_$RUN_$JOBNAME_$JOBCOUNT
```

This means that the intercepted SAP R/3 jobs are to be restarted immediately, because of the absence of the `at=` job option. Their IBM Workload Scheduler names are composed of the string `SAP_`, the current run number of the interception collector, and the name and ID of the SAP R/3 job.

The instruction set for restarting an intercepted SAP R/3 job is retrieved in the following order:

1. From the template file, if an existing template is specified in the interception criteria file.
2. From the default template file, if the template is specified in the interception criteria file but does not exist, or if the template is not specified in the interception criteria file.
3. From the default instruction set, if the default template file does not exist.

Job interception example:
The following example demonstrates how different template files can be used to determine when an intercepted SAP R/3 job is restarted. The interception criteria table contains the following entries:

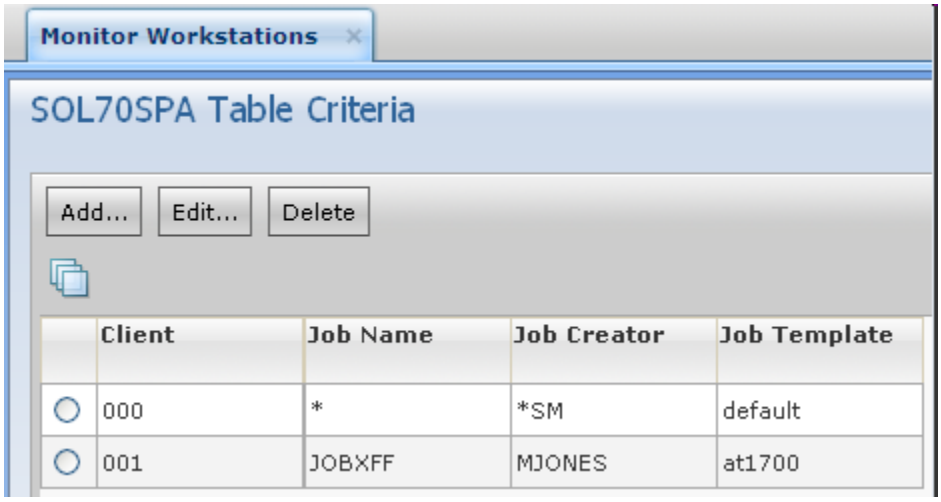


Figure 8. The Table Criteria panel

The table criteria specified, implies the following:

Client 000

All jobs started in client `000` by SAP R/3 users whose user name begins with `sm`, will be intercepted. The interception collector restarts the jobs using the instructions from the default template file `default.jdf`. If the default template file does not exist, then the SAP R/3 jobs are restarted immediately as specified in the default instruction set:

```
alias=SAP_$RUN_$JOBNAME_$JOBCOUNT
```

Client 001

The job named, JOBXFF, started in client `001` by SAP R/3 user named, MJONES, will be intercepted. The interception collector restarts the jobs using the instructions from the template file `at1700.jdf`. The SAP R/3 jobs are restarted at 17:00 with a random name, because of the `alias` command. The template file `at1700.jdf` contains the following entry:

```
alias;at=1700
```

Using placeholders: In the template files you can use a number of placeholders that are replaced by the interception collector at run time. They are listed in Table 57.

Table 57. Placeholders for job interception template files

Placeholder	Description
$CPU	Name of the extended agent workstation where the interception collector runs.
$CLIENT	Client number of the intercepted SAP R/3 job.
$JOBNAME	Name of the intercepted SAP R/3 job.
$JOBCOUNT	Job ID of the intercepted SAP R/3 job.
$USER	Name of the user who launched the SAP R/3 job.
$JOBNUM	Job number of the interception collector.
$RUN	Current run number of the interception collector.
$SCHED	Schedule name of the interception collector.
$RAND	Random number.

The template:

```
alias=ICP_$RAND_$JOBNAME_$JOBCOUNT_$CLIENT;at=1000
```

instructs the interception collector to restart the SAP R/3 job named `DEMO_JOB` with job ID `12345678` on client `100` at `10:00` as IBM Workload Scheduler job `ICP_1432_DEMO_JOB_12345678_100.`

Activating the job interception feature

Activate the job interception feature for the appropriate BC-XBP interface.

About this task

To enable the job interception feature: .

Procedure

1. Run ABAP report `INITXBP2`. This report shows you the current status of the job interception and parent-child features, and allows you to toggle the status of both features.
2. Select the BC-XBP interface version as appropriate:
   - **Activate 3.0**
   - **Activate 2.0**
3. Save the changes.

The parent-child feature

In some situations, an SAP R/3 job dynamically spawns a number of other jobs; for example, to distribute the workload to the free application servers. Prominent examples are the mass activity jobs of the SAP R/3 `FI-CA` component. Before BC-XBP 2.0, it was difficult for external schedulers to handle this situation, because the business process does not usually end with the end of the initial job (parent job), but with the end of all subjobs (child jobs).

The BC-XBP 2.0 interface allows you to determine if a job has launched subjobs, together with their names and IDs, and so it is now possible to track them.

To activate this feature, use the `INITXBP2` ABAP report, which you can also use to toggle the status of job interception.

When the parent-child feature is active, IBM Workload Scheduler considers an SAP R/3 job as finished only after all its child jobs have ended. The status of the IBM Workload Scheduler job remains as `EXEC` while the parent job or any of its child jobs are running.

The status of the IBM Workload Scheduler job becomes `SUCC` if the parent job and all child jobs end successfully. If any of the jobs ended with an error, the status of the IBM Workload Scheduler job becomes `ABEND`.

Note: The parent-child feature can interfere with job interception because, although the parent job cannot be intercepted, any of its child jobs can be intercepted if they match the interception criteria. In this case, the IBM Workload Scheduler job remains in the `EXEC` status until the intercepted child job has been relaunched and has ended.

The joblogs of the child jobs are appended in the IBM Workload Scheduler `stdlist` after the joblog of the parent job.

Using Business Information Warehouse

Business Information Warehouse (BIW) is a data warehouse solution tailored to SAP R/3.

Business Information Warehouse (BIW) allows business reporting and decision support.

To use the InfoPackages component, you must have the SAP Business Warehouse Systems, version 2.0B or later installed.

To use the Process Chains component, you must have the SAP Business Warehouse Systems, version 3.0B or later installed.

The Support Package 9 (SAPKW31009) for SAP Business Warehouse version 3.1 is required so that `r3batch` can launch process chains.

Business Warehouse components

SAP R/3 supports two main Business Warehouse components, InfoPackages and Process Chains.

An InfoPackage is the entry point for the loading process from a specific **InfoSource** (a logical container of data source, generically named **InfoObject**). Technically, an InfoPackage is an SAP R/3 job whose aim is to load data. Like any other SAP R/3 job, it contains job-pecific parameters such as start time, and dependencies.

A Process Chain is a complex chain of different processes and their relationships. The processes within a process chain are not limited to data load processes, or InfoPackages, but also include:

- Attribute/Hierarchy Change run
- Aggregate rollup
- ABAP program
- Another process chain
- Customer build process

Defining user authorizations to manage SAP R/3 Business Warehouse InfoPackages and process chains

What you need to use SAP R/3 Business Warehouse InfoPackages and process chains.

Access method for SAP can manage SAP R/3 Business Warehouse InfoPackages and process chains. To use the SAP R/3 Business Warehouse functions, you must define an IBM Workload Scheduler user within SAP R/3 with full authorization for the ABAP Workbench object S_DEVELOP.

The user must also belong to the following profiles:

- S_BI-WHM_RFC (for Business Information Warehouse version 7.0, or later)
- S_RS_ALL
- Z_MAESTRO

Managing SAP R/3 Business Warehouse InfoPackages and process chains

You can manage existing InfoPackages and process chains on SAP systems from SAP.

Business Warehouse InfoPackages and process chains can only be created from the SAP R/3 environment. However, the Dynamic Workload Console supports pick lists of InfoPackages and process chains, so that you can also define IBM Workload Scheduler jobs for these existing objects.

You can create IBM Workload Scheduler job definitions that map to SAP jobs that already exist on SAP systems in the following environments:

- Distributed Distributed
- z/OS z/OS

The SAP jobs can run on extended agent workstations, dynamic agent workstations, dynamic pools, and z-centric workstations depending on the type of job definition you choose to create.

This section describes how to perform tasks such as creating the IBM Workload Scheduler job definitions that map to SAP jobs, how to display the details of these jobs, and how to rerun a process chain job.

Creating an IBM Workload Scheduler job that contains InfoPackages or process chains

Creating a job with InfoPackages or process chains.

About this task

This section describes how to create an IBM Workload Scheduler SAP job definition that references a Business Warehouse InfoPackage or Process Chain SAP job.

SAP job definitions can be created using both a distributed or z/OS engine and they can be scheduled to run on the following workstations with the r3batch access method:

- An 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.

Refer to the Dynamic Workload Console online help for a complete description of all UI elements for both engine types and all supported workstation types.

Take into consideration that:

- To be able to schedule InfoPackages using IBM Workload Scheduler, the scheduling options of the InfoPackage must have:
  - Start type set to **Start later in background process**.
  - Start time set to **Immediate**.
- To be able to control process chains using IBM Workload Scheduler, the scheduling options of the process chain must be **Start Using Meta Chain or API**.

If the process chain is set to **Direct Scheduling**, it starts immediately when activated in the SAP system or transported to another SAP system.

- If you are using an operating system that does **not** support Unicode, set the **TWSXA_LANG** option. For details about the operating systems that support Unicode, see "Unicode support on r3batch" on page 206. For details about the **TWSXA_LANG** option, see "Setting National Language support options" on page 327.

You can create a SAP job definition to reference an InfoPackage or process chain using the Dynamic Workload Console.

The following procedure creates an IBM Workload Scheduler SAP job definition and references an InfoPackage or process chain in the IBM Workload Scheduler database:

Procedure

1. Click **IBM Workload Scheduler** > **Workload** > **Design** > **Create Workload Definitions**.
2. Select a an engine. The **Workload Designer** is displayed.
3. From the Working List pane, click:
   - z/OS engine: **New** > **ERP**
   - Distributed engine: **New** > **Job Definition** > **ERP**
4. Select the SAP job definition in accordance with the engine and type of agent on which the job runs.

   z/OS engine

   SAP This job definition references an existing job on the SAP system and can run on dynamic agent workstations, dynamic pools, and z-centric workstations.

   Distributed engine

   SAP Job on Dynamic Workstations
   This job definition can run on dynamic agent workstations, dynamic pools, and z-centric workstations.

   SAP Job on XA Workstations
   This job definition can run on extended agent workstations. A workstation that is hosted by a fault-tolerant agent or master workstation.
5. In the Workspace pane, specify the properties for the job definition you are creating using the tabs available. The tabs for each type of SAP job definition are similar, but there are some differences depending on the type of engine you selected and the type of workstation on which the job runs. For more detailed information about the UI elements on each tab, see the Dynamic Workload Console online help.

   The **General** page requires information regarding the workstation that connects to the remote SAP system. If a default SAP connection is already configured, then these fields are alreaday prefilled, otherwise, you can specify the required information on the General page or you can configure a default connection to be used each time it is required in a definition, see "Setting the SAP data connection" on page 228 for more information.

   On the **Task** page, in **Subtype**, specify either **BW Process Chain** or **BW InfoPackage**.

6. Click **Save** to add the SAP job definition to the IBM Workload Scheduler database.

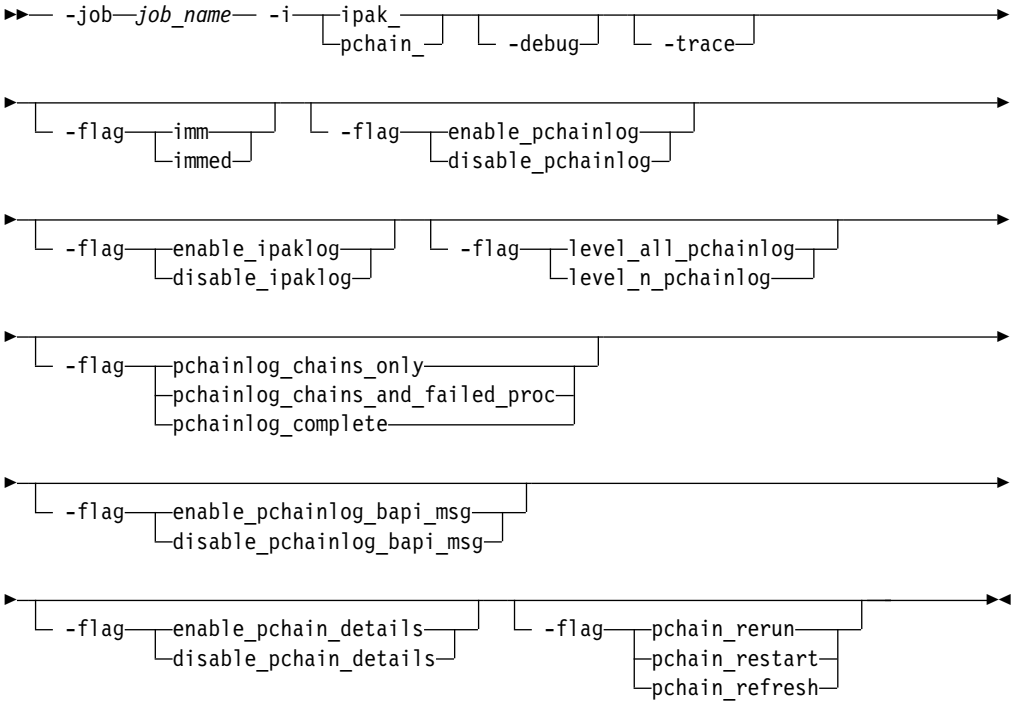
Task string to define Business Warehouse InfoPackages and process chain jobs

This section describes the task string parameters that control the running of the Business Warehouse InfoPackages and process chain jobs. You must specify them in the following places when you define their associated IBM Workload Scheduler jobs:

- If you use the Dynamic Workload Console, in the **R/3 command line** field of the Task page of the SAP job definition panel.
- As arguments of the `scriptname` keyword in the job definition statement, if you use the IBM Workload Scheduler command line.
- As arguments of the `JOBCMD` keyword in the `JOBREC` statement in the `SCRIPTLIB` of IBM Workload Scheduler for z/OS, if you are scheduling in an end-to-end environment.

The string syntax is the following:

Job definition syntax



The parameters are described in Table 52 on page 236.

Table 58. Task string parameters for SAP R/3 jobs

Parameter	Description	GUI Support
-job *job_name*	The name of the task to be run. It is either an InfoPackage technical field name, or a process chain name. This parameter is mandatory.	✔

Table 58. Task string parameters for SAP R/3 jobs (continued)

Parameter	Description	GUI Support
-i {ipak_ | pchain_}	One of the following: **ipak_** Target job is an InfoPackage **pchain_** Target job is a process chain	✓
-debug	Turns on the most verbose `r3batch` trace. This option is for debugging the extended agent and should not be used in standard production.	✓
-trace	Turns on the `SAP RFC` trace. When you use this option, a trace file is created in the IBM Workload Scheduler `methods` directory. In UNIX, this trace file is called `dev_rfc`. In Windows, the file is called `rfc`*xxxxx*`_`*xxxxx*`.trc`. This option is for debugging the extended agent and should not be used in standard production. Ensure that you delete the trace option from the job after you have performed debug procedures. The trace file can become very large and unmanageable.	✓
-flag {imm | immed}	Specifies to launch the job immediately, meaning that if there are no spare work processes, the job fails.	✓
-flag {enable_pchainlog | disable_pchainlog}	Enables or disables retrieval and appending of the process chain job log in the IBM Workload Scheduler `stdlist`. Disable if the size of the log affects performance. A related configuration option can be set for this purpose at a more general level. See Table 50 on page 212.	✓
-flag {enable_ipaklog | disable_ipaklog}	Enables or disables retrieval and appending of the InfoPackage job log in the IBM Workload Scheduler `stdlist`. Disable if the size of the log affects performance. A related configuration option can be set for this purpose at a more general level. See Table 50 on page 212.	
-flag {level_*n*_pchainlog | level_all_pchainlog}	Allows for retrieval of process chain logs down to the process chain level you specify. **level_*n*_pchainlog** Specifies that the process chains are logged down to, and including, the level represented by number *n*. **level_all_pchainlog** Specifies that all the process chains are logged. The default is `level_1_pchainlog`. A related configuration option can be set for this purpose at a more general level. See Table 50 on page 212.	

Table 58. Task string parameters for SAP R/3 jobs (continued)

Parameter	Description	GUI Support
-flag {pchainlog_chains_only | pchainlog_chains_and_failed_proc | pchainlog_complete}	Specifies what type of process chain-related logs will be retrieved. **pchainlog_chains_only** Only the process chains are logged. **pchainlog_chains_and_failed_proc** In addition to the process chains, all the processes that failed are also logged. **pchainlog_complete** The process chains and all processes are logged. The default is **pchainlog_complete**. A related configuration option can be set for this purpose at a more general level. See Table 50 on page 212.	
-flag {enable_pchainlog_bapi_msg | disable_pchainlog_bapi_msg}	Enables or disables retrieval of additional messages from the BAPI calls from the SAP Business Warehouse process chains and appends them to the IBM Workload Scheduler `stdlist`.	
-flag {enable_pchain_details | disable_pchain_details}	Enables or disables the display of details about the process chain job. A related configuration option can be set for this purpose at a more general level. See Table 50 on page 212.	✓
-flag {pchain_rerun | pchain_restart | pchain_refresh}	Determines the action that IBM Workload Scheduler performs when you rerun a job that submits a process chain. **pchain_rerun** IBM Workload Scheduler creates another process chain instance and submits it to be run again. **pchain_restart** IBM Workload Scheduler restarts the original process chain from the failing processes to the end. **pchain_refresh** IBM Workload Scheduler updates the status and details of the original process chain. For more details about rerunning a process chain, refer to "Rerunning a process chain job" on page 286.	✓

Note: Typically, the `-debug` and `-trace` options are for debugging the extended agent and should not be used in standard production.

The following is an example for an InfoPackage job whose technical field name is `ZPAK_3LZ3JRF29AJDQM65ZJBJF5OMY`:

```
-job ZPAK_3LZ3JRF29AJDQM65ZJBJF5OMY -i ipak_
```

Displaying details about Business Warehouse InfoPackages

About this task

To display details about a Business Warehouse InfoPackage, perform the following steps:

Procedure

1. Open the **Workload Designer**, from the portfolio, click **IBMWorkload Scheduler** > **Workload** > **Design** > **List Jobs on SAP**.
2. In **Engine name**, select the name of the IBM Workload Scheduler engine connection from which you want to view SAP job details.
3. In **SAP Job Type**, select **Business Warehouse InfoPackage**.
4. In **Workstation name**, specify the workstation where the SAP job runs. If you do not know the object name, click the **...** (Browse) button. In the **Name** and **Location** panel, enter some characters of the object name (asterisk is supported as a wildcard) and click **Start**. From the displayed list, select the workstation you want to use, and click **OK**.
5. Click **Display**. The list of available jobs of type Business Warehouse InfoPackage for the specified engine is displayed.
6. Select the job for which you want to display the details and click **Details**.
7. When you have finished viewing the details for the job, click **OK** to return to the list of SAP jobs on the workstation specified.

Displaying details about a process chain job

You can view the details for a process chain job including any local subchains contained in the process chain.

Before you begin

Ensure you have performed the following steps before running this procedure:

- Set the **pchain_details** option to `ON` in the common options file. For more information about this option, refer to "Defining the common options" on page 212.
- Distributed In a distributed environment, customize the Browse Jobs tasks that you created *before* installing IBM Workload Scheduler 8.4 Fix Pack 1 to show the **Job Type** column. For details about how to customize the task properties, refer to the Dynamic Workload Console online help.
- In a z/OS environment, you must customize the task properties to display the **Advanced Job Type** column that indicates the job type. For details about how to customize the task properties, refer to the Dynamic Workload Console online help.

About this task

To display details about an SAP Process Chain that you scheduled as an IBM Workload Scheduler job, perform the following steps from the Dynamic Workload Console.

Procedure

1. Click **Workload** > **Monitor Jobs**.
2. The list of defined tasks or queries for monitoring jobs is displayed. Select the hyperlink of a task to display the related list of jobs. If you have a predefined task to display SAP jobs or process chain jobs, click that task.

3. In **Engine name**, select the name of the IBM Workload Scheduler engine connection from where you want to work with SAP jobs and click **OK**.
4. The table of results for the task is displayed:

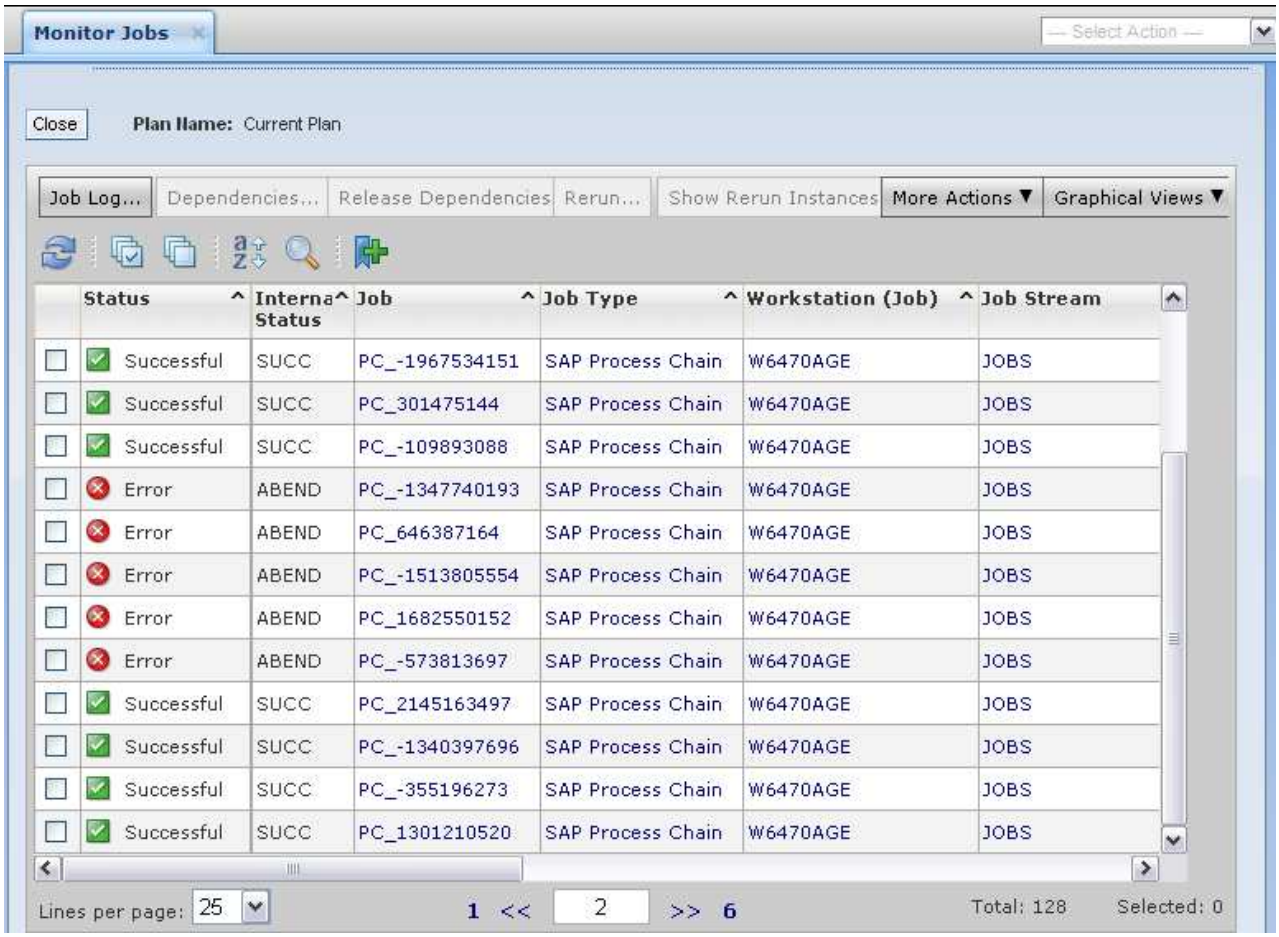


Figure 9. Dynamic Workload Console - Table of results

5. Select a process chain job. For each process chain job, a hyperlink named **SAP Process Chain** is displayed. Distributed

   Distributed environment
   The **Job Type** column displays **SAP Process Chain** to help you identify SAP process chain jobs.

   z/OS

   z/OS environment
   The **Advanced Job Type** column displays **SAP Process Chain** to help you identify SAP process chain jobs.

   Click the hyperlink for the job whose details you want to display.
6. The details for the process chain are displayed:

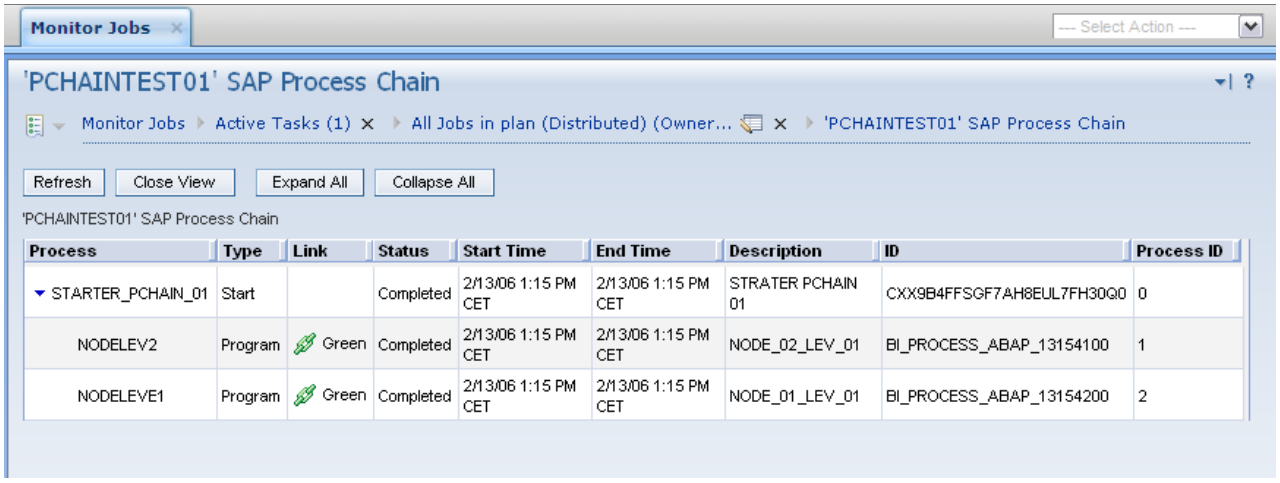


Figure 10. Dynamic Workload Console - Details of a process chain job

IBM Workload Scheduler monitors the process chain job until the job completes. The details shown reflect the last monitoring process performed. Perform a restart of the process chain indicating a refresh operation to synchronize the details with those on the remote SAP system to have the most updated information possible. If the process chain contains local subchains, a hyperlink is displayed for each one. Click the hyperlink you want, to display details about the corresponding subchain job. Alternatively, you can display the process chain details by clicking the hyperlink for the job and display the job properties panel. Click the hyperlink shown under **SAP Job Details**. The details for the process chain are displayed.

Rerunning a process chain job

Process chain jobs can be rerun from the start, rerunning the entire process chain, or they can be restarted from a specific process. Restarting a process enables you to restart without rerunning the whole process chain again. You can choose to either restart from the failed processes in a process chain, or restart a specific process indicating the related process ID.

To rerun an SAP job that submits a process chain, you can use one of the following user interfaces:

conman
For details, refer to the *IBM Workload Scheduler User's Guide and Reference*.

Dynamic Workload Console
See "Procedure for rerunning a process chain job" on page 290 for information about performing this task from the console.

For information about rerunning an SAP Standard R/3 job, see "Rerunning a standard SAP job" on page 247.

In general, when you rerun a process chain job, the new job is assigned the name of the alias you specify. To keep the original job name, set the IBM Workload Scheduler global option **enRetainNameOnRerunFrom** to `yes`. For details about this option, see *IBM Workload Scheduler Administration Guide*.

On extended agents, an alias is mandatory for each action you perform on the process chain job and the action itself, is the prefix of the alias name. For example,

if you choose to restart a process chain from the failed processes, and assign PCHAIN1 as the alias for the process chain job, then the new job name is `Restart_PCHAIN1`.

z/OS In a z/OS environment, the process chain job maintains the same name and the Monitor Jobs view always displays the status for the last action performed on the job. Every time a rerun is performed on a process chain job, a new instance is generated each with a different ID.

Note:

1. By default, if you do not specify any setting, rerunning a process chain job corresponds to submitting a new process chain instance.
2. If you kill an IBM Workload Scheduler job that submits a process chain, the process chain is removed from schedule in the SAP Business Information Warehouse system. To restart the same process chain instance with r3batch, you require at least the following SAP Business Information Warehouse versions:
   - 3.0 with SP25
   - 3.1 with SP19
   - 3.5 with SP10
   - 7.0

   If your version of SAP Business Information Warehouse is earlier, you can restart the process chain only manually, through the SAP graphical interface.

   Table 59 shows the action performed when you rerun an IBM Workload Scheduler job that submits a process chain, depending on the settings you specify. These are the actions performed when you submit the rerun operation using the Rerun button from the Monitor Jobs view.

Table 59. Actions performed when you rerun a process chain job

Action performed	Description and setting
A new process chain instance is submitted	IBM Workload Scheduler creates another process chain instance and submits it to be run again. This action occurs when: • On extended agents, you specify `RERUN`*`value`* as the step to rerun, where *`value`* is any value you want. This setting overrides the settings in the job definition and options file, if any. In an end-to-end environment, you can perform this action on a centralized job by adding the following parameter to the script file: `-flag pchain_rerun` • In the job definition, you set `-flag pchain_rerun`. This setting overrides the setting in the options file, if any. For a description of this parameter, see Table 58 on page 281. • In the options file, you set the **pchain_recover** option to `rerun`. For a description of this option, refer to Table 50 on page 212.

Table 59. Actions performed when you rerun a process chain job (continued)

Action performed	Description and setting
The original process chain is rerun from the failed processes	IBM Workload Scheduler restarts the original process chain from the failed processes to the end. In this way, after you detected the error that caused the failure and performed the recovery action, you can rerun the process chain job from the failed processes and have its run completed. This action is performed only if at least one process in the process chain did not complete successfully. It occurs when: • On extended agents, you specify `RESTART`*`value`* as the step to rerun, where *`value`* is any value you want. This setting overrides the settings in the job definition and options file, if any. In an end-to-end environment, you can perform this action on a centralized job by adding the following parameter to the script file: `-flag pchain_restart` • In the job definition, you set `-flag pchain_restart`. This setting overrides the setting in the options file, if any. For a description of this parameter, see Table 58 on page 281. • In the options file, you set the **pchain_recover** option to `restart`. For a description of this option, refer to Table 50 on page 212.

Table 59. Actions performed when you rerun a process chain job (continued)

Action performed	Description and setting

The process that you specify is restarted	IBM Workload Scheduler restarts the process of the original process chain that you specify, and monitors the process chain run until its final state.
	
	On extended agents, this action occurs when you specify PROCESS*processID* as the step to rerun, where *processID* is the identifier of the process you want. For example, if the process ID is 3, you must specify PROCESS3 as the step.
	
	You can view the process IDs in the following ways:
	• Dynamic Workload Console, version 8.5 or later. From the panel where the details about the process chain are displayed, see the column named Process ID. For details about how to display the process chain details, refer to "Displaying details about a process chain job" on page 284.
	• IBM Workload Scheduler job log, as follows:
	`+++ EEWO1071I Start of process chain PCHAIN1`
	`Process Chain PCHAIN1 (Log ID:D3C0ZWAYESD58PXOYPEOGNZK7).`
	`------------------------`
	`Process Type: TRIGGER.`
	`Process Variant: PCHAIN1_STARTER.`
	`Actual State: F.`
	`...`
	`>> **Process ID: 3.**`
	`Process Type: ABAP.`
	`Process Variant: Z_PCHAIN1_NODE3.`
	`Actual State: F.`
	`Instance: D3C0ZXL3IJ8LR5O9Q1D9A4Y4N.`
	
	`>> **Process ID: 4.**`
	`Process Type: ABAP.`
	`Process Variant: Z_PCHAIN1_NODE1.`
	`Actual State: .`
	`Instance: D3C0ZZKS0RR88DKRJQ09Z1WW7.`
	
	`+++ EEWO1072I End of process chain PCHAIN1`
	
	The following list shows the meaning of the alphabetic value used as the actual state in the job log:
	Actual state
	Meaning
	A Active
	F Completed
	G Successfully completed
	P Planned
	Q Released
	R Ended with errors
	S Skipped
	X Canceled
	Y Ready
	blank Undefined
	
	In an end-to-end environment, you can perform this action on a centralized job by adding the following parameter to the script file:
	`-pchain_pid *processID*`

Table 59. Actions performed when you rerun a process chain job (continued)

Action performed	Description and setting
The status and details of the original process chain are updated	IBM Workload Scheduler monitors the original process chain until its final status. This action occurs when: • On extended agents, you specify `REFRESH`*`value`* as the step to rerun, where *`value`* is any value you want. This setting overrides the setting in the job definition, if any. In an end-to-end environment, you can perform this action on a centralized job by adding the following parameter to the script file: `-flag pchain_refresh` • In the job definition, you set `-flag pchain_refresh`. For a description of this parameter, see Table 58 on page 281.

Procedure for rerunning a process chain job:

You can rerun all of the processes in the process chain from the Dynamic Workload Console or you can rerun at a process level.

Before you begin

z/OS In z/OS environments, you need to set the status of the job to **Ready** before you can rerun the job.

1. Select a job and click **Set Status**.
2. In **Change Status**, select **Ready**.
3. Click **OK** to return to the list of jobs.

About this task

To rerun a process chain SAP job, perform the following steps:

Procedure

1. Click **Workload** > **Monitor Jobs**.
2. The list of defined tasks or queries for monitoring jobs is displayed. Select the hyperlink of a task to display the related list of jobs. If you have a predefined task to display SAP jobs or process chain jobs, click that task.
3. In **Engine name**, select the name of the IBM Workload Scheduler engine connection from where you want to work with SAP jobs and click **OK**.
4. A list of jobs is displayed. Select a process chain job. Distributed

   Distributed **Distributed environment**
   The **Job Type** column displays **SAP Process Chain** to help you identify SAP process chain jobs.

   z/OS

   z/OS environment
   The **Advanced Job Type** column displays **SAP Process Chain** to help you identify SAP process chain jobs. To display the **Advanced Job Type** column in the table, edit the **Task Properties** and in **Column Definition**, add the **Advanced Job Type** column to the **Selected Columns** list. Move the column up to define the order of the column in the table and make it more visible.
5. Rerun the job.

a. Click **More Actions** > **Restart Process Chain**.
b. Select the action you want to perform on the selected process chain:

Rerun Reruns the entire process chain. The process chain ID on the SAP system remains the same, as well as the job identifier on z/OS systems.

Distributed Specify an alias to identify the new job. In distributed systems the rerun process chain is identified with this alias name prefixed by `RERUN`.

Refresh
Refreshes the Dynamic Workload Console view with the latest updates on the remote SAP system so that the two views are synchronized.

Distributed Specify an alias to identify the new job. In distributed systems the refreshed process chain is identified with this alias name prefixed by `REFRESH`.

Restart from the failed processes
Action available only for process chains in error state. Rerun only some steps of the process chain, starting from the failed processes.

Distributed Specify an alias to identify the new job. In distributed systems the restarted process chain is identified with this alias name prefixed by `RESTART`.

Restart from a specific process
Action available only for process chains in error state. Rerun only some steps of the process chain, starting from the process specified in the **SAP Process ID** field. You can find the process ID by opening the job log or viewing the job type details from the table of results of your monitor job task.

Distributed In distributed systems the restarted process chain is identified with this alias prefixed by `PROCESS`.

6. Click **OK** to perform the selected action on the process chain.

Results

The job reruns immediately.

Business scenario: rerunning the original process chain job from the failed process: As a scheduling administrator, you are responsible for managing batch jobs in both SAP and non-SAP systems. The workflow is one or more job streams in IBM Workload Scheduler. A job stream contains jobs that collect and prepare data for month-end closing over all sales channels. The month-end closing report requires data to be collected from several sales and distribution systems. Data is collected using local and remote process chains in the SAP Business Intelligence system. The process chains include a set of Infopackages, ABAP reports, and operating system jobs to sort the report data by a logical hierarchy.

To administer from a single point of control, you link the SAP process chains to IBM Workload Scheduler through IBM Workload Scheduler.

During batch processing, an IBM Workload Scheduler job comprising a process chain, failed. Optionally, you can see which processes failed either from the Dynamic Workload Console (for details, see "Displaying details about a process chain job" on page 284) or in the job log. You ask the SAP administrator to fix the

cause of the error, then, on an extended agent, you rerun the IBM Workload Scheduler job by setting the step as RESTART*value*. In this way, the original process chain is restarted from the failed processes and continues until the ending step.

Alternatively, you can select the process chain job from the Monitor Jobs view on the Dynamic Workload Console and then select **More Actions** > **Restart Process Chain** and then select the **Restart from the failed processes** option.

Business scenario: restarting a specific process of the process chain: You might decide to restart a single process as a preparation step before restarting the failed processes of a process chain. A failed process might have corrupted some data, so you run the single process to restore the data and set up the required system state before you rerun the other processes in the process chain.

Suppose you are using InfoPackages and process chains to extract data from one or several sources and you want to transform this data into managerial reports, for example by using aggregate functions. If the process that transforms this data fails, it might corrupt the data that the preceding InfoPacakge process had successfully extracted. After fixing the problem with the transformation process, you must restart the InfoPackage extraction process to reload the data, even though this extraction process had completed successfully before. Restart the failed transformation process only after the data has been reloaded, either by restarting the failed processes of the process chain or by restarting just the failed transformation process.

On an extended agent, from the Monitor Jobs view on the Dynamic Workload Console, select the process chain and click Rerun, then specify PROCESS*processID* as the step to rerun, where *processID* is the identifier of the process you want to restart.

To restart a specific process of the process chain, from the Monitor Jobs view on the Dynamic Workload Console, select the process chain and click **More Actions** > **Restart Process Chain** and then select the **Restart from a specific process** option, specifying the process ID in the **SAP Process ID** field.

Job throttling feature

Learn how the job throttling feature helps you to improve the efficiency of your scheduling on SAP systems and reduce the batch window for your SAP jobs to a minimum.

Using advanced XBP 2.0 and 3.0 functions, such as the job interception and parent-child, the job throttler ensures that the SAP system is not overloaded and the number of released jobs does not exceed the total number of SAP background work processes in the system.

You can also configure the job throttler to send data related to its activity to the SAP Computing Center Monitoring System (CCMS) for monitoring purposes.

Business scenario

You manage your Internet sales through an application software that verifies that data is correct, checks the availability of the item, and validates the order. To process all the orders received, you scheduled an IBM Workload Scheduler job to run every 12 hours, connect to SAP, and generate a child job for every order to process. Child jobs are in charge of creating shipping bills, checking destination

address, and forwarding the orders to the appropriate carrier, thus optimizing the delivery process. A potential overload of the system might occur during peak times, for example over Christmas, and could risk the late delivery of orders, damaging your business. To manage the submission of jobs and activate an advanced management of their priority class (for both parent and child jobs), enable the job throttling feature.

Additionally, you might want to set a policy so that an SAP CCMS alert is raised each time the number of jobs to be released under the control of the job throttler exceeds a certain threshold. To do this, you enable the job throttler to send data to the SAP CCMS monitoring architecture. At job throttler startup, an MTE that monitors the number of jobs to be released by the job throttler is created. By including the MTE in a monitoring set and specifying the related threshold, you are alerted each time the threshold is exceeded.

Software prerequisites

To use job throttling, you must have the SAP JCo 3.0.2 libraries or later (`dll` and `jar` files) installed in the *TWS_home*`/methods/throttling/lib` directory. To download JCo 3.0.x, visit the SAP Service Marketplace web site.

Setting and using job throttling

The job throttler enqueues intercepted jobs and releases them when the background work processes that they need on the SAP server or SAP server group are available. The queue of intercepted jobs is sorted by scheduling time and priority of SAP jobs. When the SAP parent-child feature is enabled, child jobs inherit their progenitor's priority so that new urgent jobs are run before other planned jobs.

The following sections describe the steps to operate job throttling.

Step 1. Setting the options in the options file

About this task

To define the behavior of the job throttling feature, set the following options in the options file. For detailed information about the options, see Table 50 on page 212.

- `throttling_enable_job_class_inheritance`
- `throttling_enable_job_interception`
- `throttling_interval`
- `throttling_max_connections`
- `throttling_release_all_on_exit`

Step 2. Enabling and configuring the job interception feature

About this task

As a prerequisite, the job throttler requires that the job interception feature is enabled in the SAP system. To enable and configure job interception, follow these steps.

Note: Ensure that the job throttling and job interception features are not running at the same time. The job throttler cannot start if interception collector jobs are running.

1. Enable job interception, either automatically or manually, as follows:

Automatic activation (meaning that the job throttler enables the job interception on SAP system)

In the options file of the workstation with the r3batch access method you are using, set `throttling_enable_job_interception=on` (this is the default).

Manual activation

a. In the SAP system, run the INITXBP2 ABAP program in the transaction `se38` and enable job interception.
b. In the options file of the workstation with the r3batch access method you are using, set `throttling_enable_job_interception=off`.

Note: When you stop the job throttler, the setting for the job interception feature that was previously configured on the SAP system is restored.

2. In the SAP system, configure the job interception criteria as follows:
   a. Launch the transaction `se16` to access the table TBCICPT1, where the interception settings are maintained.
   b. Set the job name, creator, and client related to the jobs you want to intercept. To intercept all SAP jobs, specify the wildcard * (asterisk) for the job name, creator, and client.
   c. Save your settings and close the dialog.

SAP will intercept all the jobs matching the selection criteria, and the job throttling will release all the jobs that were intercepted.

Step 3. Enabling job class inheritance

About this task

You can configure the job throttler to have the intercepted job inherit the priority class from its progenitor (the top-level job in the hierarchy), if the progenitor class is higher than the intercepted job class. To do this, in the options file set `throttling_enable_job_class_inheritance=on`; this setting automatically enables the parent-child feature on the SAP system.

Note: When you stop the job throttler, the setting for the parent-child feature that was previously configured on the SAP system is restored.

Step 4. Configuring the logging properties

About this task

You can configure the trace properties of the job throttler by editing the logging configuration file `jobthrottling.properties` located in *`TWS_home`*`/methods/throttling/properties`.

To configure the trace level, follow the procedure.

Procedure

1. Set the trace level property. The supported trace levels are: `DEBUG_MIN`, `DEBUG_MID`, and`DEBUG_MAX`, where `DEBUG_MAX` is the most verbose trace level.
2. Save the changes.

Results

When making changes to the trace level setting, the changes are effective immediately after saving the .properties file. Other changes might require a restart to make them effective.

What to do next

You can also configure the name, number, and size of the trace file. By default, the job throttler generates a maximum of 3 files of 5 MB in the *TWS_home*/methods/traces directory.

Note: The job throttler creates the *TWS_home*/methods/traces directory as soon as it is started.

Step 5. Starting and stopping the job throttling feature

About this task

To start job throttling, run the jobthrottling executable file related to the operating system you are using. Optionally, you can create an IBM Workload Scheduler job that starts the job throttler.

Note: On Windows systems using a single-byte character language, to start job throttling from a command prompt ensure that the DOS shell font is *not* Lucida Console. Ensure also that you set the IBM Workload Scheduler environment by entering the following command:

TWS_home\tws_env.cmd

From a command prompt, enter:

UNIX operating systems

TWS_home/methods/jobthrottling.sh {*XAname*|*base_options_filename*} [-scratch]

Windows operating systems

TWS_home\methods\jobthrottling.bat {*XAname*|*base_options_filename*} [-scratch]

Where:

XAname

The name of the extended agent you are using.

base_options_filename

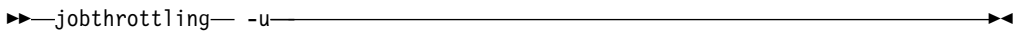
For dynamic and z-centric agents, the file name of the options file without the extension, defined on the engine workstation hosting the workstation with the r3batch access method.

-scratch

If you enabled the job throttler to send data to CCMS (for details, see "Sending data from job throttling to the CCMS Monitoring Architecture" on page 296), the job throttler starts and resets the attribute MTE named JT total released jobs to 0. If you do not specify **-scratch**, the job throttler starts and increments the JT total released jobs.

This parameter is optional, and has effect only if the job throttler sent its data to CCMS at least once before.

To know the syntax for the jobthrottling command, run the command as follows:



To stop the job throttler, enter the following command (optionally, you can create an IBM Workload Scheduler job that stops the job throttler):

UNIX operating systems

TWS_home/methods/stop-jobthrottling.sh
{*XAname*|*base_options_filename*}

Windows operating systems

TWS_home\methods\stop-jobthrottling.bat
{*XAname*|*base_options_filename*}

Alternatively, you can enter the following command (you must be connected as *TWSUser* and have read and write permissions on the `txt` file):

```
echo shutdown > TWS_home/methods/{XAname|base_options_filename}_jobthrottling_cmd.txt
```

The job throttler stops:

- When the timestamp of {*XAname*|*base_options_filename*}_jobthrottling_cmd.txt is later than the time when the job throttler started.
- Within the time interval you specified in the `throttling_interval` option.

Sending data from job throttling to the CCMS Monitoring Architecture

About this task

You can configure the job throttler to send data related to its activity to the SAP Computing Center Monitoring System (CCMS) for monitoring purposes. Sending data from the job throttler to CCMS is supported if you have at least the SAP Web Application Server 6.20, Support Package 12 installed.

In the options file, set the following options (for details, see Table 50 on page 212):

```
throttling_send_ccms_data
throttling_send_ccms_rate
```

In this way, at job throttler startup the following monitoring tree elements (MTE) are created:

- A context MTE named **ITWS for Apps**.
- An object MTE with the same name as the IBM Workload Scheduler extended agent where the job throttler is running. This object MTE belongs to the context MTE **ITWS for Apps**.
- The following attribute MTEs:

  JT total released jobs
  : The total number of jobs that the job throttler has released since startup. This value depends on the `-scratch` option you set at job throttler startup; for details, see "Step 5. Starting and stopping the job throttling feature" on page 295.

  JT queue
  : The number of enqueued intercepted jobs to be released.

  JT released jobs per cycle
  : The number of released jobs in the latest run. This value depends on the `throttling_send_ccms_rate` setting; for details, see Table 50 on page 212.

Note: By default `throttling_release_all_on_exit` is set to `ON`, meaning that when you stop the job throttler, all the intercepted jobs are released. However, these jobs are not considered when updating the **JT total released jobs**, **JT queue**, and **JT released jobs per cycle** MTEs.

To begin monitoring, include the MTEs in the monitoring set you want, and set the thresholds to generate an alert.

You can define an IBM Workload Scheduler event rule based on the CCMS alerts; for detailed information, refer to "Defining event rules based on CCMS Monitoring Architecture alerts" on page 316.

For example, to define an event that monitors the attribute MTE **JT total released jobs**, on the extended agent workstation named `SAP_XA`, connected to the SAP system ID `T01`, specify the following information:

XA Workstation
`SAP_XA`

MTE SAP System ID
`T01`

MTE Monitoring Context Name
`ITWS for Apps`

MTE Monitoring Object Name
`SAP_XA`

MTE Monitoring Attribute Name:
`JT total released jobs`

Deleting the monitoring tree elements
About this task

After you stopped the job throttling feature, if you configured it to send its status data to CCMS, you can delete one or more MTEs that were created. To do this:

1. From the SAP GUI, invoke the transaction `rz20` to display a list of monitor sets.
2. Locate the monitor set named SAP CCMS Technical Expert Monitors, and expand it.
3. Locate the monitor named All Monitor Contexts, and double-click it to open it.
4. From the action menu, select **Extras -> Activate Maintenance Functions**.
5. Locate the MTE named **ITWS for Apps** and select it.
6. Right-click the MTE and select **Delete**. You are prompted to choose one of the delete options.
7. Select the option you want. The MTE is deleted accordingly.

Note: Deleting **ITWS for Apps** from the All Monitor Contexts monitor, deletes also all the copies that you might have created in other monitors.

Exporting SAP R/3 factory calendars

This section describes how to export SAP R/3 factory calendars into a file format that can be processed by the IBM Workload Scheduler **composer** command line, to add the exported calendar definitions to the IBM Workload Scheduler database.

Business scenario

About this task

You might want to configure your IBM Workload Scheduler scheduling activities based on the schedule calendar in your SAP R/3 system. To do this, use the `r3batch` export function to export the SAP R/3 calendar definitions into a file whose format is compatible with the IBM Workload Scheduler **composer** command line. Based on the parameters you specify, you create a file that contains only the SAP R/3 calendar definitions that meet your scheduling requirements. Use this file as input for the **composer add** command, to import the calendar definitions into the IBM Workload Scheduler database. Your IBM Workload Scheduler and SAP R/3 calendars are now synchronized.

To keep the IBM Workload Scheduler and SAP R/3 calendar definitions synchronized and avoid duplicating data maintenance in the two environments, you can schedule to export the calendar definitions from SAP R/3 and import them to IBM Workload Scheduler on a regular basis using a dedicated job.

Exporting and importing SAP R/3 factory calendars

Refer to the following sections:

- "Exporting factory calendars" for an explanation about how you use the **r3batch** export function to access and download factory calendars available in an SAP R/3 system. The main purpose of this function is to create an output file that can be used by the **composer** to synchronize IBM Workload Scheduler calendars with existing SAP R/3 factory calendars, integrating the calendar definitions from SAP R/3 into IBM Workload Scheduler.
- "Importing factory calendars" on page 300 for an explanation about how you import the exported calendar definitions into the IBM Workload Scheduler database.

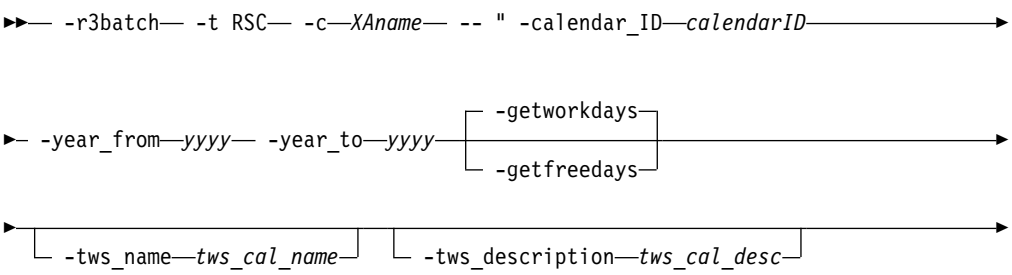
For details about the IBM Workload Scheduler calendar definitions, see *User's Guide and Reference*.

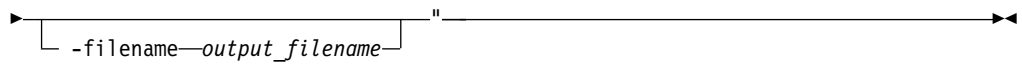
Exporting factory calendars

About this task

To export an SAP R/3 calendar, from *TWS_home*/`methods` (where *TWS_home* is the complete path where you installed IBM Workload Scheduler) enter the following command:

Command syntax





Where:

-t RSC
The identifier of the task to be performed, in this case RSC (Retrieve SAP R/3 Calendars). This parameter is required.

-c *XAname*
The extended agent workstation connected to the SAP R/3 system where the calendar data to export is located. The SAP R/3 system must be configured as a workstation to IBM Workload Scheduler. This parameter is required.

-calendar_id *calendarID*
The identifier of the SAP R/3 calendar to be exported, which consists of two alphanumeric characters. This parameter is required.

-year_from *yyyy*
The year of the calendar from when to start exporting dates, in the format *yyyy*. This parameter is required.

-year_to *yyyy*
The year of the calendar when to stop exporting dates, in the format *yyyy*. This parameter is required.

-getworkdays | -getfreedays
Specify getworkdays to create the IBM Workload Scheduler calendar definition based on the working days of the SAP R/3 calendar. In this way, each date of a working day is stored in the output file.

Specify getfreedays to create the IBM Workload Scheduler calendar definition based on the holidays of the SAP R/3 calendar. Each date of a non-working day is stored in the output file.

These parameters are optional and mutually exclusive. If you do not specify either, the default is getworkdays.

-tws_name *tws_cal_name*
The IBM Workload Scheduler name for the exported SAP R/3 factory calendar. It is stored in the output file.

You can specify up to eight alphanumeric characters. This parameter is optional, the default is SAP*XX_calendarID*, where:

XX Corresponds to WK if the calendar includes only working days or FR if the calendar includes only non-working days.

calendarID
The identifier of the SAP R/3 calendar.

For example, the default IBM Workload Scheduler name for an exported calendar, whose identifier is 04, that includes only working days, is SAPWK_04.

-tws_description *tws_cal_desc*
The description of the IBM Workload Scheduler calendar. It is stored in the output file. You can specify up to 120 alphanumeric characters. If the description contains blanks, it must be enclosed between single quotes. This parameter is optional.

-filename *output_filename*

The name of the output file that is to contain the calendar definitions. This file is written in a scheduling language that can be processed by the **composer** when you add the calendar data to the IBM Workload Scheduler database.

You can specify a file name with its complete or partial path; if you do not specify any path, the file is created in the current directory. If the path you specify does not exist, it is created, provided that you have the appropriate access rights. Otherwise, the command returns an error message and is not performed.

You can specify up to the maximum number of characters allowed by your operating system. If the name of the file contains blanks, it must be enclosed between single quotes. If another file with the same name exists, it is overwritten.

This parameter is optional. The default value is *tws_name*.txt, where *tws_name* is the value you set for the tws_name parameter.

The following is an example of an SAP R/3 factory calendar export command:

```
r3batch -t RSC -c horse10 -- " -calendar_id 01 -year_from 2007
-year_to 2010 -tws_name CAL1 -tws_description 'SAP Calendar 01'
-getworkdays -filename 'my dir/calendar_01.dat' "
```

This command exports the SAP R/3 calendar named 01, located on the SAP R/3 system named horse10. The dates exported begin from year 2007, until year 2010, considering only working days. The IBM Workload Scheduler name used for the calendar is CAL1, and the description written in the output file is SAP Calendar 01. The output file is named `calendar_01.dat`, stored in *`TWS_home`*`/methods/my dir`, and its content looks like the following

```
$CALENDAR
    CAL1
    "SAP Calendar 01"
    01/02/2007 01/03/2007 01/04/2007 01/05/2007 01/08/2007 01/09/2007 01/10/2007
    01/11/2007 01/12/2007 01/15/2007 01/16/2007 01/17/2007 01/18/2007 01/19/2007
    01/22/2007 01/23/2007 01/24/2007 01/25/2007 01/26/2007 01/29/2007 01/30/2007
    01/31/2007 02/01/2007 02/02/2007 02/05/2007 02/06/2007 02/07/2007 02/08/2007
     .......
    11/24/2010 11/25/2010 11/26/2010 11/29/2010 11/30/2010 12/01/2010 12/02/2010
    12/03/2010 12/06/2010 12/07/2010 12/08/2010 12/09/2010 12/10/2010 12/13/2010
    12/14/2010 12/15/2010 12/16/2010 12/17/2010 12/20/2010 12/21/2010 12/22/2010
    12/23/2010 12/24/2010 12/27/2010 12/28/2010 12/29/2010 12/30/2010 12/31/2010
```

Importing factory calendars

About this task

To import the exported calendar definitions into the IBM Workload Scheduler database, copy the output file from the extended agent for SAP R/3 to the master workstation and from the **composer** command line on the master workstation, enter the following command:

```
-add output_filename
```

where *`ouput_filename`* is the name of the exported file, with its complete path.

For example, to import the `tws_calendar_01.dat` file exported in the previous example, copy the file to the master workstation. From the **composer** command line on the master workstation, enter:

```
-add TWS_home/methods/my dir/tws_calendar_01.dat
```

where *TWS_home* is the complete path where you installed IBM Workload Scheduler.

Defining internetwork dependencies and event rules based on SAP R/3 background events

This section describes how to define internetwork dependencies and event rules for IBM Workload Scheduler based on SAP background events.

Note: To be able to define and monitor event rules, you must configure your environment as described in "Configuring SAP event monitoring" on page 222.

Defining internetwork dependencies based on SAP background events

Dependencies are prerequisites that must be satisfied before a job or job stream can start. Internetwork dependencies are dependencies checked by the extended agent workstation to which they belong. In response to an internetwork dependency, the SAP extended agent checks for the occurrence of the SAP background event specified in the dependency. As soon as the SAP event is raised, the SAP extended agent commits the event and instructs IBM Workload Scheduler to resolve the corresponding internetwork dependency.

For more details about internetwork dependencies, refer to the *IBM Workload Scheduler: User's Guide and Reference*. For more details about how to raise SAP events, see "Raising an SAP event" on page 246.

To define SAP background events as internetwork dependencies, XBP versions 2.0 and 3.0 are supported, with the following differences:

XBP version 2.0
SAP background events can release IBM Workload Scheduler internetwork dependencies only if the dependencies are created or checked *before* the SAP event is raised. An event history is ignored, therefore an SAP event raised before the internetwork dependency is created, is not considered.

Note: Because an SAP event history is ignored, for each SAP background event to be checked, a placeholder SAP job is created. This is a dummy job whose running depends on the SAP background event, therefore an SAP event is considered raised as soon as the corresponding placeholder job has completed.

XBP version 3.0 (supported by SAP NetWeaver 7.0 with SP 9, or later)
Only the SAP background events stored in the SAP event history table are considered by IBM Workload Scheduler to check for internetwork dependencies resolution. As a prerequisite, the SAP administrator must create the appropriate event history profiles and criteria on the target SAP system.

To avoid performance reduction, run reorganization tasks against the SAP event history.

Note: Some SAP systems providing XBP version 3.0 still return XBP version as 2.0. To check if your SAP system provides XBP 3.0, invoke the transaction `se37` and search for the function module `BAPI_XBP_BTC_EVTHISTORY_GET`. If your system contains the module, set the

`xbpversion` option to 3. In this way, **r3batch** will ignore the XBP value returned by the SAP system. For details about the `xbpversion` option, refer to Table 50 on page 212.

To define an SAP background event as an internetwork dependency, use the following parameters:

Table 60. Parameters to define an SAP internetwork dependency

Parameter	Description	GUI support
-evtid *sap_event_name*	The name of the SAP background event, up to 32 characters. If the name contains blanks, enclose it between single quotes. This parameter is required.	✓
-evtpar *sap_event_parm*	The SAP event parameter, up to 64 characters. If the parameter contains blanks, enclose it between single quotes. This parameter is optional.	✓
-commit	Defines that the SAP background event is committed immediately after the internetwork dependency has been resolved. If you do not specify `-commit`, the event must be committed by running the `r3batch` task PI. The default is that `-commit` is not specified. For details about the PI task, refer to "Committing SAP background events by an external task" on page 303. In addition to this parameter, you can set as default that the system commits internetwork dependencies immediately by specifying `commit_dependency=on` in the options file. For details about the commit_dependency option, see Table 50 on page 212. **Note:** With XBP version 2.0, defining two internetwork dependencies on the same SAP event might lead to an error, if `-commit` is specified. For example, suppose you define an internetwork dependency for the SAP event `SAPEVT`, with or without setting `-commit`. After this definition, the SAP event `SAPEVT` is raised. Then you define a second internetwork dependency based on `SAPEVT`, specifying `-commit`. The second dependency immediately commits the SAP event, with the consequence that the first dependency becomes impossible to resolve. Therefore, when the first job checks for the internetwork dependency, an error is issued.	✓

The following example shows how to define an internetwork dependency based on the SAP background event named `SAP_TEST` with the parameter `12345678`. After its processing, the event is not immediately committed.

```
-evtid SAP_TEST -evtpar 12345678
```

The resulting internetwork dependency looks like the following, where `SAPWS` is the name of the extended agent workstation that connects to the SAP background processing system where the event runs:

```
follows SAPWS::"-evtid SAP_TEST -evtpar 12345678"
```

The following example shows how to define an internetwork dependency based on the SAP background event named `SAP_TEST`, without parameter. As soon as the internetwork dependency is resolved, the event is committed.

```
-evtid SAP_TEST -commit
```

The resulting internetwork dependency looks like the following, where `SAPWS` is the name of the extended agent workstation that connects to the SAP background processing system where the event runs:

```
follows SAPWS::"-evtid SAP_TEST -evtpar 12345678"
```

Table 61 shows the correspondence between the definition and possible resolution of an internetwork dependency that depends on an SAP event, with or without parameters assigned. In this table, `SAP_TEST` is used as the event name and `12345678` or `ABCDEFG` as the event parameter.

Table 61. Internetwork dependency definition and possible resolution

IBM Workload Scheduler internetwork dependency specified	**SAP event raised in SAP system**	**SAP event parameter**	**IBM Workload Scheduler internetwork dependency resolved**
-evtid SAP_TEST	none	none	No
-evtid SAP_TEST	END_OF_JOB	none	No
-evtid SAP_TEST	SAP_TEST	none	Yes
-evtid SAP_TEST	SAP_TEST	12345678	Yes
-evtid SAP_TEST -evtpar 12345678	SAP_TEST	none	No
-evtid SAP_TEST -evtpar 12345678	SAP_TEST	12345678	Yes
-evtid SAP_TEST -evtpar 12345678	SAP_TEST	ABCDEFG	No

Committing SAP background events by an external task

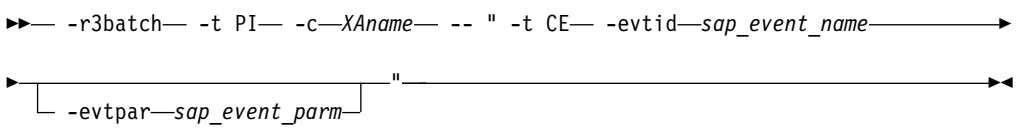
About this task

SAP events defined as IBM Workload Scheduler internetwork dependencies, by default are not automatically committed after their processing. You can modify this default by specifying the `-commit` parameter. Otherwise, if you leave the default, you must commit the processed event by using the external task Put Information (PI).

The PI task commits all the processed events that meet the given criteria. For this reason, it is recommended that you run this task at the end of the working day. By doing so, internetwork dependencies that are already resolved are not reset and the objects depending on them are not blocked until they are resolved again.

From a command line, enter the following command:

Command syntax



Where:

-t PI The identifier of the task to be performed, in this case PI (Put Information). This parameter is required.

-c *XAname*
The extended agent workstation connected to the SAP background processing system where the event is run. This parameter is required.

-t CE The identifier of the task to be performed, in this case CE (Commit Event). This parameter is required.

-evtid *sap_event_name*
The name of the SAP R/3 event running on the background processing system. If the name contains blanks, enclose it between single quotes. This parameter is required.

-evtpar *sap_event_parm*
The parameter of the SAP event running on the background processing system. If the parameter contains blanks, enclose it between single quotes. This parameter is optional. If you do not specify it, all the SAP events with the name you specified, with or without a parameter, are committed on the target system.

The following is an example of how to commit the SAP event named `SAP_TEST`, with parameter `1234567`, running on the background processing system named `horse10`:

```
r3batch -t PI -c horse10 -- " -t CE -evtid SAP_TEST -evtpar 1234567"
```

Defining internetwork dependencies based on SAP background events with the Dynamic Workload Console

About this task

To define an SAP background event as an internetwork dependency with the Dynamic Workload Console, perform the following steps:

Procedure

1. Launch Workload Designer from the Dynamic Workload Console portfolio. Click **Workload** > **Design** > **Create Workload Definitions**.
2. Search for and open the job stream you want to manage.
   a. In the **Working List** pane, click **Search** > **Job Stream**.
   b. Type the job stream name or simply click **Search** to display all job streams.
   c. Select the job stream and click **Edit**. The job stream and its contents are displayed in the **Details** view.
3. Type the job stream name or simply click **Search** to display all job streams.
4. From the **Details** view, select the job or the job stream to which you want to add the dependency.
5. From the toolbar, click **Select an Action** > **Add Dependencies** > **Internetwork**.
6. Specify the properties for the internetwork dependency.
   a. In the **Network Agent** field, enter the name of the agent workstation connected to the SAP background processing system where the event runs.
   b. In the **Dependency** field, enter the parameters to define the internetwork dependency. For a description of the parameters allowed, refer to Table 60 on page 302.
7. Click **Save** to save the changes to the job stream.

Results

The local job or job stream now has a dependency on a SAP background event. You can also perform this procedure from the graphical view available from the **Workload Designer**. For more information about adding dependencies and editing objects in the Graphical View, refer to the Dynamic Workload Console User's Guide.

Defining event rules based on SAP background events

A scheduling event rule defines a set of actions to run when specific event conditions occur. The definition of an event rule correlates events and triggers actions.

An event rule is identified by a rule name and by a set of attributes that specify if the rule is active, the time frame of its validity, and other information required to decide when actions are triggered. It includes information related to the specific events (`eventCondition`) that the rule must detect and the specific actions it is to trigger upon their detection or timeout (`ruleAction`). Complex rules might include multiple events and multiple actions.

If you are using XBP 3.0, only the SAP background events that are stored in the event history table are considered by IBM Workload Scheduler.

To define event rules, you can use either of the following:

The composer command line
: You edit the rules with an XML editor of your choice. For details about how to use the composer to define event rules, see the *IBM Workload Scheduler User's Guide and Reference*.

The Dynamic Workload Console

: For information about creating an event rule, see the section about creating an event rule in *Dynamic Workload Console User's Guide*.For more details about the properties used to define the SAP event rule, see the following table available only in html format in the online information center: SAP Event Raised.

The SAP background event is identified by the following information:

SAP Event ID
: The name identifying the SAP event. Wildcards are not allowed.

  If you are using the Dynamic Workload Console, you can type the event name in the SAP Event ID field. This field does not support wildcard characters (* and %), nor the following special characters: asterisk (*), question mark (?), and backslash (\). Note that for supported special characters, the escape character (\) must not be used.

  Alternatively, you can use the lookup function to search for and select the event name. When specifying the string to search for that represents the SAP Event ID, wildcard characters are supported, (* and %). For example, if you specify "myevent*", then results can include events such as "myevent", "myevent%", and "myevents".

Event parameter
: The parameter associated with the SAP event, if any. Wildcards are not allowed.

If you are using the Dynamic Workload Console, the following special characters are not supported when specifying the event parameter: asterisk (*), question mark (?), and backslash (\).

Extended or dynamic agent workstation
The name of the extended or dynamic agent workstation running event monitoring.

Note:

1. If you specify a pattern with the wildcard asterisk (*), all the agents whose name matches the pattern will monitor the specified event.
2. As a best practice, define that an event belonging to an SAP system is monitored by one agent workstation only. If the same SAP event is monitored by more than one agent, you might either be notified multiple times for the same event occurrence or the first agent that notifies the event occurrence makes that event unavailable to the other agents.
3. If you modify the extended agent configuration in the `r3batch` option files, to make the changes effective you must stop and restart the agent.
4. For dynamic agents you can specify the name of a local options file. In the Properties section of the Create Event Rules window of the Dynamic Workload Console a lookup button provides a list of all the local options files associated with that agent. If you do not specify the name of a local options file, the global options file is used by default in the rule definition.

SAP events matching criteria

The SAP background events specified in the event rule are matched with the events raised in the SAP system, according to the following criteria. Depending on the parameters you set:

The SAP event ID and parameter are specified in the event rule
To match, the SAP event ID and parameter must be the same as the event ID and event parameter raised in the SAP system. Also, the event state must be N (New). SAP events with a different parameter or without any parameter are ignored.

The information collected about the matching SAP event is sent by the `r3evmon` process to IBM Workload Scheduler. If the notification is successfully sent, the event is committed on the SAP system and its state changed to C (Confirmed).

For example, you define an event rule in your IBM Workload Scheduler plan based on the following SAP event:

SAP event ID
SAP_TEST

SAP event parameter
ABCDEF

Workstation
An extended agent named GENIUS

According to these settings, a file named `GENIUS_r3evmon.cfg` is created on `GENIUS`. It contains the following `!R3EVENT` keyword:

```
!R3EVENT 0008SAP_TEST0006ABCDEF
```

Monitoring of the SAP_TEST event with parameter ABCDEF is automatically started. Suppose that the following SAP events were raised on the SAP system:

Table 62. History table of the SAP events raised

EVENT GUID	SAP EVENT ID	EVENT PARM	EVENT SERVER	EVENT TIMESTAMP	EVENT STATE	PROCESS STATE	COUNT OF JOBS
1234	SAP_TEST	ABC123	...	20070925 13:00	C	OK	1
2345	SAP_TEST	ABCD	...	20070925 14:00	N	OK	2
3456	SAP_TEST		...	20070925 15:00	N	OK	3
4567	SAP_TEST	ABCDEF	...	20070925 16:00	N	OK	4

Only the following SAP event is notified to IBM Workload Scheduler:

Table 63. SAP event matching with the event rule defined

EVENT GUID	SAP EVENT ID	EVENT PARM	EVENT SERVER	EVENT TIMESTAMP	EVENT STATE	PROCESS STATE	COUNT OF JOBS
4567	SAP_TEST	ABCDEF	...	20070925 16:00	N	OK	4

If the notification is successfully sent, the event is committed on the SAP system and its state changed to C (Confirmed).

Only the SAP event ID is specified in the event rule

To match, the SAP event ID must be the same as the ID of the events raised in the SAP system whose state is N (New). The parameters of the SAP events, whether specified or not, are not taken into account.

The information collected about all the matching SAP events is sent by the r3evmon process to IBM Workload Scheduler. Each event successfully notified is committed on the SAP system and its status changed to C (Confirmed).

For example, you define an event rule in your IBM Workload Scheduler plan based on the following SAP event:

SAP event ID
SAP_TEST

Workstation
GENIUS

According to these settings, a file named GENIUS_r3evmon.cfg is created on GENIUS. It contains the following !R3EVENT keyword:

```
!R3EVENT 0008SAP_TEST
```

Monitoring of the SAP_TEST event is automatically started. Suppose that the following SAP events were raised on the SAP system:

Table 64. History table of the SAP events raised

EVENT GUID	SAP EVENT ID	EVENT PARM	EVENT SERVER	EVENT TIMESTAMP	EVENT STATE	PROCESS STATE	COUNT OF JOBS
1234	SAP_TEST	ABC123	...	20070925 13:00	C	OK	1
2345	SAP_TEST	ABCD	...	20070925 14:00	N	OK	2
3456	SAP_TEST		...	20070925 15:00	N	OK	3
4567	SAP_TEST	ABCDEF	...	20070925 16:00	N	OK	4

Only the following SAP events are notified to IBM Workload Scheduler:

Table 65. SAP events matching with the event rule defined

EVENT GUID	SAP EVENT ID	EVENT PARM	EVENT SERVER	EVENT TIMESTAMP	EVENT STATE	PROCESS STATE	COUNT OF JOBS
2345	SAP_TEST	ABCD	...	20070925 14:00	N	OK	2
3456	SAP_TEST		...	20070925 15:00	N	OK	3
4567	SAP_TEST	ABCDEF	...	20070925 16:00	N	OK	4

Each event whose notification is successfully sent is committed on the SAP system and its state changed to C (Confirmed).

Setting a filter for SAP background events in the security file

In the security file, you can filter the SAP background events that can be used to define event rules. By doing this, you restrict the use of certain SAP events to specific users. For example, assume that you want your USA department to manage only the SAP events whose ID begins with `SAP_USA`, and your Italy department to manage all events except those beginning with `SAP_USA`. In the security file that defines the user access for the USA department, define the `CUSTOM` keyword for the `EVENT` object as follows:

```
EVENT      PROVIDER=@ +CUSTOM=SAP_USA@  ACCESS=USE
```

where:

PROVIDER=@
Specifies that the user can use the events coming from any provider.

+CUSTOM=SAP_USA@
Specifies that the user can use only the SAP events whose ID begins with `SAP_USA`.

This keyword applies only to the SAP provider (SapMonitor).

ACCESS=USE
Sets the user access to the object to `USE`.

In the security file that defines the user access for the Italy department, define the `CUSTOM` keyword for the `EVENT` object as follows:

```
EVENT      PROVIDER=@ ~CUSTOM=SAP_USA@  ACCESS=USE
```

where:

PROVIDER=@
Specifies that the user can use the events coming from any provider.

~CUSTOM=SAP_USA@
Specifies that the user can use all SAP events, except those whose ID begins with `SAP_USA`.

This keyword applies only to the SAP provider (SapMonitor).

ACCESS=USE
Sets the user access to the object to `USE`.

For more details about the security file and how to set up user authorizations, see the *IBM Workload Scheduler: Administration Guide*.

Defining event rules based on IDoc records

You can use IBM Workload Scheduler to monitor Intermediate Document (IDoc) records in SAP systems and forward events to the IBM Workload Scheduler event integration framework.

To do this, you define an event condition that contains the criteria that the IDocs must match to be forwarded to IBM Workload Scheduler. When the event condition occurs, the action that you associated with it (for example, running a job) is performed.

Business scenario

You connected your Internet sales application to your SAP Customer Relationship Management (CRM) system, which receives the orders as incoming IDocs. The orders are classified as emergency and ordinary, and therefore have different IDoc message types. You want the emergency orders to be imported into the CRM system directly, and the ordinary orders to be processed in batch mode. To do this, in IBM Workload Scheduler, you define an event rule that monitors the IDoc message types corresponding to emergency orders and sends an event to IBM Workload Scheduler. In IBM Workload Scheduler, you define a job to be released when this type of event is received and is linked to an SAP job that runs an import ABAP report for these specific types of IDocs.

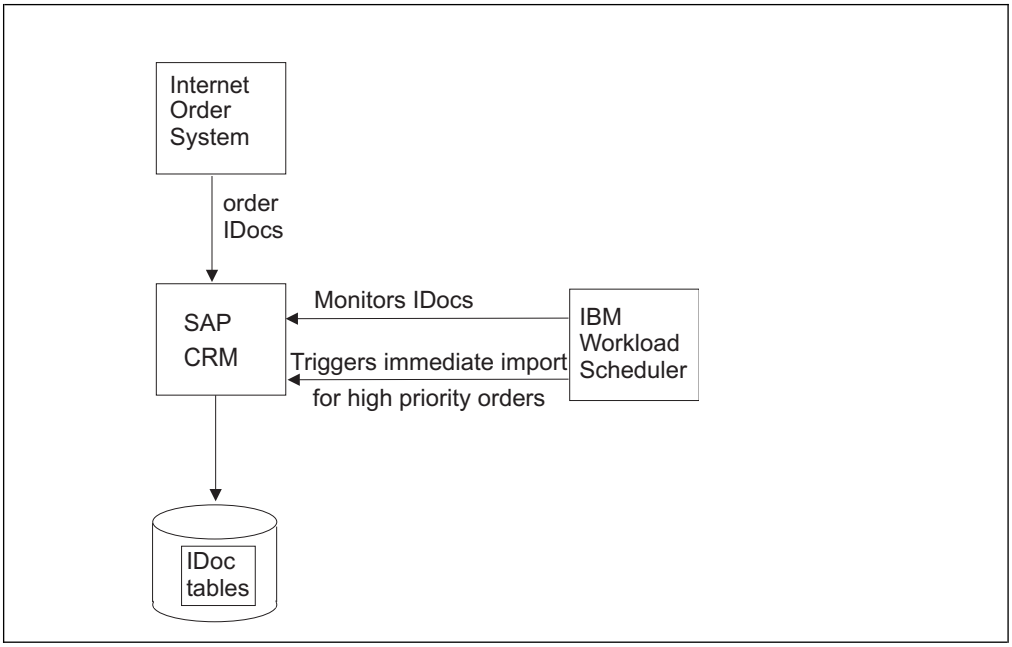


Figure 11. Managing high priority IDocs overview

Creating event rules based on IDocs

About this task

To define event rules based on IDocs, specify the fields to be used as matching criteria during IDoc monitoring. For details about these fields, refer to "Events matching criteria" on page 310. To create the event rules, you can use either of the following:

The composer command line

You edit the rules with an XML editor of your choice. For a general

explanation about how to use the composer to define event rules, see the *IBM Workload Scheduler: User's Guide and Reference*. The event condition requires:

- `SAPMonitor` as event monitor provider.
- `IDOCEventGenerated` as event type.

For a list of the values that you can specify in the **attributeFilter** name when defining the event condition, refer to Table 68 on page 312.

The Dynamic Workload Console

For information about creating an event rule, see the section about creating an event rule in *Dynamic Workload Console User's Guide*.For more details about the properties used to define the IDoc event rule, see the following table available only in html format in the online information center: Event Raised.

Note:

1. To be able to define and monitor event rules, ensure that you configured your environment as described in "Configuring SAP event monitoring" on page 222.
2. To configure how IBM Workload Scheduler retrieves the IDoc monitors, set **idoc_no_history** and **idoc_shallow_result** in the options file. For details about these options, refer to "Defining the common options" on page 212.

Events matching criteria

Table 66 lists the IBM Workload Scheduler fields corresponding to the fields in the IDoc record that you want to search. During monitoring, each IDoc matching the search criteria generates an event that is sent to IBM Workload Scheduler.

Table 66. IBM Workload Scheduler fields used to define event rules based on IDocs

Composer property	Console property	IDoc field
SAPClient	SAP client	MANDT
SAPIDocStatus	Status	STATUS
SAPDirectionIDocTransmission	Direction	DIRECT
SAPReceiverPort	Receiver port	RCVPOR
SAPReceiverPartnerFunction	Receiver partner function	RCVPFC
SAPReceiverPartnerType	Receiver partner type	RCVPRT
SAPReceiverPartnerNumber	Receiver partner number	RCVPRN
SAPSenderPort	Sender port	SNDPOR
SAPSenderPartnerType	Sender partner type	SNDPRT
SAPSenderPartnerFunction	Sender partner function	SNDPFC
SAPSenderPartnerNumber	Sender partner number	SNDPRN
SAPLogicalMessageType	Logical message type	MESTYP
SAPNameOfBasicType	Name of basic type	IDOCTP
SAPLogicalMessageCode	Logical message code	MESCOD
SAPLogicalMessageFunction	Logical message function	MESFCT
SAPTestFlag	Test flag	TEST
SAPOutputMode	Output mode	OUTMOD

Optionally, you can define also correlation rules by using the fields listed in Table 67. Date and time values are specified in GMT time zone.

Table 67. IBM Workload Scheduler fields used to define correlation rules for IDoc events

Composer property	Console property	IDoc field
SAPIDocNumber	IDoc number	DOCNUM
SAPReleaseForIDoc	IDoc SAP release	DOCREL
SAPIDocType	IDoc type	DOCTYP
SAPReceiverAddress	Receiver SADR address	RCVSAD
SAPReceiverSADRClient	Receiver SADR client	RCVSMN
SAPFlagForInternationalReceiverAddress	Receiver SADR flag	RCVSNA
SAPReceiverCommunicationType	Receiver SADR communication type	RCVSCA
SAPDefaultFlagForReceiverAddress	Receiver SADR default flag	RCVSDF
SAPReceiverAddressSequentialNumber	Receiver SADR sequential number	RCVSLF
SAPReceiverLogicalAddress	Receiver logical address	RCVLAD
SAPEDIStandard	EDI Standard	STD
SAPEDIStandardVersion	EDI standard version	STDVRS
SAPEDIMessageType	EDI message type	STDMES
SAPSenderAddress	Sender SADR address	SNDSAD
SAPSenderSADRClient	Sender SADR client	SNDSMN
SAPFlagForInternationalSenderAddress	Sender SADR flag	SNDSNA
SAPSenderCommunicationType	Sender SADR communication type	SNDSCA
SAPDefaultFlagForSenderAddress	Sender SADR default flag	SNDSDF
SAPSenderAddressSequentialNumber	Sender SADR sequential number	SNDSLF
SAPSenderLogicalAddress	Sender logical address	SNDLAD
SAPReferenceToInterchangeFile	Interchange file reference	REFINT
SAPReferenceToMessageGroup	Message group reference	REFGRP
SAPReferenceToMessage	Message reference	REFMES
SAPEDIArchiveKey	EDI archive key	ARCKEY
SAPIDocCreationDate	IDoc creation date	CREDAT
SAPIDocCreationTime	IDoc creation time	CRETIM
SAPExtension	Extension	CIMTYP
SAPEDIALESerializationField	EDI/ALE Serialization field	SERIAL
SAPOverridingInInboundProcessing	Overriding in inbound processing	EXPRSS
SAPIDocChangeDate	IDoc last update date	UPDDAT
SAPIDocChangeTime	IDoc last update time	UPDTIM

Based on the defined rule, the `r3evmon` process of IBM Workload Scheduler monitors the events related to IDoc records according to a polling rate. To

customize this polling rate, use the **evmon_interval** option; for details, see "Defining the common options" on page 212.

Table 68 lists the values that you can specify as attribute filter name when defining the event condition.

Table 68. Parameters of IDOCEventGenerated event type

Property name	Description	Type	Filtering allowed	Required	Multiple values allowed	Wildcard allowed	Length (min-max)	
SAPClient	SAP client number	numeric (0-9)	✓	✓		✓	1	3
SAPIDocStatus	IDoc status information For a list of allowed values, refer to Table 69 on page 313 and Table 70 on page 314.	numeric	✓	✓	✓		1	2
SAPDirectionIDocTransmission	IDoc direction	numeric Value can be 1 (outbound) or 2 (inbound).	✓	✓			1	1
SAPReceiverPort	Receiver port. SAP system, EDI subsystem	string	✓				1	10
SAPReceiverPartnerFunction	Partner function of receiver	string	✓				1	2
SAPReceiverPartnerType	Partner type of receiver	string	✓				1	2
SAPReceiverPartnerNumber	Partner number of receiver	string	✓				1	10
SAPSenderPort	Sender port. SAP system, EDI subsystem	string	✓				1	10
SAPSenderPartnerType	Partner type of sender	string	✓				1	2
SAPSenderPartnerFunction	Partner function of sender	string	✓				1	2
SAPSenderPartnerNumber	Partner number of sender	string	✓				1	10
SAPLogicalMessageType	Logical message type	string	✓			✓	1	30
SAPNameOfBasicType	Name of basic type	string	✓			✓	1	30
SAPLogicalMessageCode	Logical message code	string	✓				1	3
SAPLogicalMessageFunction	Logical message function	string	✓				1	3
SAPTestFlag	Test flag	string	✓				1	1
SAPOutputMode	Output Mode	string Value can be 2 (immediate sending) or 4 (collected sending).	✓				1	1

Table 69 on page 313 lists the standard outbound IDoc statuses and Table 70 on page 314 lists the standard inbound IDoc statuses. Optionally, you can activate a check to prevent event rule definitions with inconsistent IDoc status list and direction. If you activate the check and specify inconsistent values when defining a rule (for example, 02 as status and 2 as direction), you receive an error message and you cannot save the rule definition. To activate the check, perform the following steps:

1. In the `TWS_home/eventPlugIn` directory, create the `SapMonitorPlugIn.properties` file.
2. Edit `SapMonitorPlugIn.properties` to set the following configuration property:
   `TWSPlugIn.event.idoc.consistency.check = true`
3. From conman, stop and restart the event processing server by using, respectively, the **stopeventprocessor** and **starteventprocessor** commands.

The default value is `false`.

To have predictable event action results, when defining event rules consider using only non-transitory statuses that allow user checks.

Table 69. Standard outbound IDoc statuses

Status	Description
01	IDoc generated
02	Error passing data to port
03	Data passed to port
04	Error within control information of EDI subsystem
05	Error during translation
06	Translation
07	Error during syntax check
08	Syntax check
09	Error during interchange
10	Interchange handling
11	Error during dispatch
12	Dispatch OK
13	Retransmission OK
14	Interchange acknowledgement positive
15	Interchange acknowledgement negative
16	Functional acknowledgement positive
17	Functional acknowledgement negative
18	Triggering EDI subsystem OK
19	Data transfer for test OK
20	Error triggering EDI subsystem
22	Dispatch OK, acknowledgement still due
23	Error during retransmission
24	Control information of EDI subsystem OK
25	Processing despite syntax error
26	Error during syntax check of IDoc
27	Error in dispatch level (ALE service)
29	Error in ALE service
30	IDoc ready for dispatch (ALE service)
31	Error no further processing
32	IDoc was edited
33	Original of an IDoc which was edited

Table 69. Standard outbound IDoc statuses (continued)

Status	Description
34	Error in control record of IDoc
36	Electronic signature not performed (timeout)
37	IDoc added incorrectly
38	IDoc archived
39	IDoc is in the target system (ALE service)
40	Application document not created in target system
41	Application document created in target system
42	IDoc was created by test transaction

Table 70. Standard inbound IDoc statuses

Status	Description
50	IDoc added
51	Application document not posted
52	Application document not fully posted
53	Application document posted
54	Error during formal application check
55	Formal application check OK
56	IDoc with errors added
57	Error during application check
58	IDoc copy from R/2 connection
60	Error during syntax check of IDoc
61	Processing despite syntax error
62	IDoc passed to application
63	Error passing IDoc to application
64	IDoc ready to be transferred to application
65	Error in ALE service
66	IDoc is waiting for predecessor IDoc (serialization)
68	Error - no further processing
69	IDoc was edited
70	Original of an IDoc which was edited
71	IDoc reloaded from archive
73	IDoc archived
74	IDoc was created by test transaction

For example, you define a rule with the following attributes:

Workstation
A dynamic agent named SAPCPU

SAP client number
001

IDoc status list
56,60

IDoc direction
2 (inbound)

After saving the rule according to these settings, when the rule becomes active a file named SAPCPU_r3evmon.cfg is created on SAPCPU. It contains the following !IDOC keyword:

```
!IDOC 0003001000556,60000120000000000000000000000000000000000000000000000000000000000000000000
```

IDoc monitoring is automatically started. When the event condition is verified, the action defined in the rule is triggered

For an explanation of the !IDOC keyword format, refer to Table 77 on page 329.

Examples of event rules based on IDocs

The following example applies to the scenario described in "Business scenario" on page 309. It shows an event rule that triggers an import ABAP report when an IDoc is added with a message type corresponding to emergency orders.

```
<?xml version="1.0" encoding="UTF-8"?>
<eventRuleSet xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
              xmlns="http://www.abc.com/xmlns/prod/tws/1.0/event-management/rules"
              xsi:schemaLocation="http://www.abc.com/xmlns/prod/tws/1.0/
                  event-management/rules EventRules.xsd">
        <eventRule name="scenario1_IDoc" ruleType="filter" isDraft="no">
          <eventCondition name="IDocEventRaised1" eventProvider="SapMonitor"
                          eventType="IDocEventGenerated">
             <scope>
                   001 ON SAPCU WITH 2
             <scope>
             <filteringPredicate> <attributeFilter name="Workstation" operator="eq">
                    <value>SAPCPU</value>
                </attributeFilter>
                <attributeFilter name="SAPClient" operator="eq">
                    <value>001</value>
                </attributeFilter>
                <attributeFilter name="SAPIDocStatus" operator="eq">
                    <value>50</value>
                </attributeFilter>
                <attributeFilter name="SAPDirectionIDocTransmission" operator="eq">
                    <value>2</value>
                </attributeFilter>
                <attributeFilter name="SAPLogicalMessageType" operator="eq">
                    value>EORD1</value>
                </attributeFilter>
             </filteringPredicate>
          </eventCondition>
          <action actionProvider="TWSaction" actionType="sbj"
                  responseType="onDetection">
            <description>Trigger immediate report for high priority orders
            </description>
            <parameter name="JobDefinitionWorkstationName">
              <value>MASTER84</value>
            </parameter>
            <parameter name="JobDefinitionName">
              <value>triggerimport</value>
            </parameter>
          </action>
        </eventRule>
</eventRuleSet>
```

The following example shows an event rule defined to create a ticket for failing IDocs in the SAP Solution Manager or any other problem management system: when an IDoc with a syntax error is detected, the engine submits a job to create a ticket for the failing IDoc.

```
<?xml version="1.0" encoding="UTF-8"?>
<eventRuleSet xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
              xmlns="http://www.abc.com/xmlns/prod/tws/1.0/event-management/rules"
              xsi:schemaLocation="http://www.abc.com/xmlns/prod/tws/1.0/
                  event-management/rules EventRules.xsd">
        <eventRule name="scenario1_IDoc" ruleType="filter" isDraft="no">
          <eventCondition name="IDocEventRaised1" eventProvider="SapMonitor"
                          eventType="IDocEventGenerated">
             <filteringPredicate> <attributeFilter name="Workstation" operator="eq">
                   <value>SAPCPU</value>
                </attributeFilter>
                <attributeFilter name="SAPClient" operator="eq">
                    <value>001</value>
                </attributeFilter>
                <attributeFilter name="SAPIDocStatus" operator="eq">
                    <value>60</value>
                <attributeFilter name="SAPDirectionIDocTransmission" operator="eq">
                    <value>2</value>
                </attributeFilter>
                </attributeFilter>
                <attributeFilter name="SAPLogicalMessageType" operator="eq">
                    value>MYORD1</value>
                </attributeFilter>
            </filteringPredicate>
          </eventCondition>
          <action actionProvider="TWSaction" actionType="sbj"
                  responseType="onDetection">
            <description>Create a ticket for failing IDocs
            </description>
            <parameter name="JobDefinitionWorkstationName">
              <value>MASTER84</value>
            </parameter>
            <parameter name="JobDefinitionName">
              <value>createticket</value>
            </parameter>
          </action>
        </eventRule>
</eventRuleSet>
```

Defining event rules based on CCMS Monitoring Architecture alerts

Use CCMS functions to check the performance of the various SAP system components, diagnose potential problems, and be alerted about error and warning conditions.

The SAP Computing Center Monitoring System (CCMS) is a centralized monitoring architecture that provides a set of monitors for monitoring the SAP environment. Using the CCMS functions you can check the performance of the various SAP system components, diagnose potential problems, and be alerted about error and warning conditions. The monitors provide you with the information you require to fine tune the SAP system and the operating modes, and hence optimize system performance.

With IBM Workload Scheduler, you can integrate the CCMS monitoring functions into your management infrastructure by defining event rules based on the alerts raised in the SAP system.

Business scenarios

The following sections describe:

- "Business scenario: defining an event rule to process alerts related to IDocs"
- "Business scenario: defining an event rule to process alerts related to operating system"

Business scenario: defining an event rule to process alerts related to IDocs

You connected your Internet sales application to your SAP Customer Relationship Management (CRM) system, which receives the orders as incoming IDocs. You want to import the orders into the CRM system when their number exceeds a specified threshold, therefore you configured your SAP CCMS monitoring architecture to generate an alert when the number of incoming IDocs exceeds a certain value. To automatically start a task that imports the orders:

1. In your SAP CCMS monitoring architecture, identify the element related to the alert that you configured for the incoming order IDocs.
2. In IBM Workload Scheduler, define an event rule, to be active during the timeframe when inbound order traffic is heavy, which monitors the element identified in step 1. As soon as an alert is generated for the element, a CCMS event is sent to IBM Workload Scheduler.
3. In IBM Workload Scheduler, define a job to be submitted when the CCMS event is received, to run an SAP job that runs an import ABAP report for the order IDocs.

Business scenario: defining an event rule to process alerts related to operating system

As an IBM Workload Scheduler administrator, you are in charge of taking the appropriate action in the IBM Workload Scheduler plan when a critical situation occurs in the SAP system. You have an SAP extended agent workstation dedicated to submit Business Intelligence tasks, whose activity you want to suspend every time the SAP BI system faces a critical situation (for example, the SAP system is running out of space). To do this:

1. In your SAP CCMS monitoring architecture, identify the element related to the SAP system you want to monitor.
2. In IBM Workload Scheduler, define an event rule that monitors the element and sends an event to IBM Workload Scheduler when an alert is generated for it. Associate with this event an action that sets the limit of the agent workstation to 0, and sends a mail to the SAP administrator to notify the details of the critical situation.
3. As soon as the SAP administrator resolves the problem, you set the limit of the agent workstation back to its original value to resume the scheduling activities.

Creating event rules based on CCMS alerts

About this task

SAP systems are shipped with a predefined set of monitors, grouped in *monitor sets*. A monitor set contains a list of monitors, each monitor contains a set of *monitoring trees*. A monitor is a set of *monitoring tree elements* (MTEs) that are arranged in a hierarchical structure, named *alert monitoring tree*. You can define event rules based on the alert generated for a specific MTE.

Note: To be able to define and monitor event rules, ensure that you configured your environment as described in "Configuring SAP event monitoring" on page 222.

Figure 12 shows the monitor named **BW Monitor** (belonging to the monitor set **SAP BW Monitor**) and its associated monitor tree elements (MTEs).

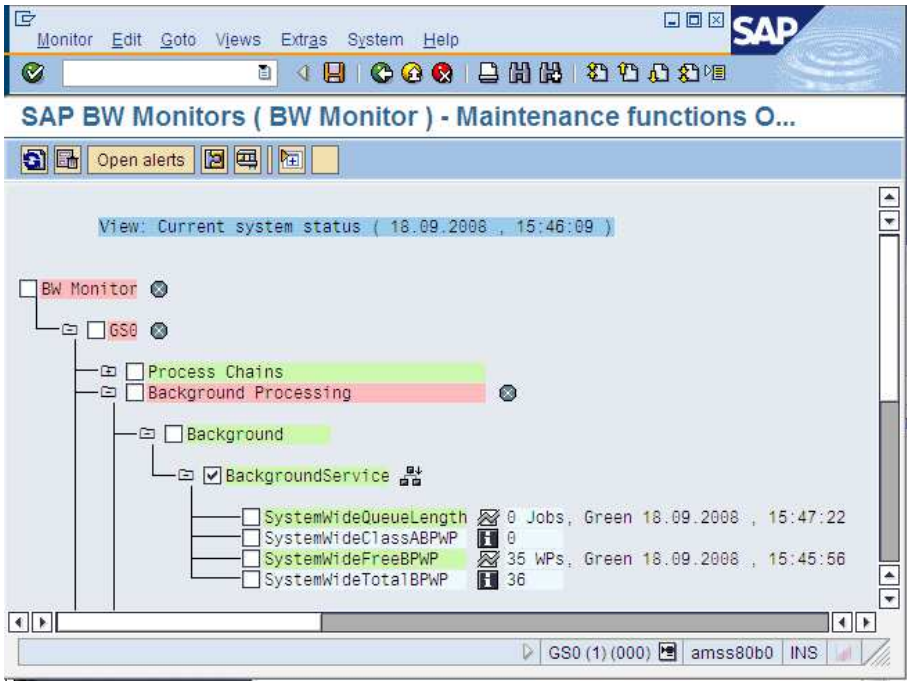


Figure 12. A monitor and its MTEs - © SAP AG 2009. All rights reserved.

To configure how IBM Workload Scheduler retrieves the CCMS alerts, set **ccms_alert_history** in the options file. For details about this option, refer to "Defining the common options" on page 212.

To create event rules, you can use either of the following:

The composer command line

You edit the rules with an XML editor of your choice. For a general explanation about how to use the composer to define event rules, see the *User's Guide and Reference*.

The Dynamic Workload Console

For information about creating an event rule, see the section about creating an event rule in *Dynamic Workload Console User's Guide*.For more details about the properties used to define the CCMS event rule, see the following table available only in html format in the online information center: SAP Event Raised.

To define the CCMS event for your rule, specify the following information. For more details about how you separate the MTE name into the individual IBM Workload Scheduler fields, see "Mapping between the MTE name and IBM Workload Scheduler fields" on page 320.

Extended or dynamic agent workstation

The name of the extended or dynamic agent workstation running event monitoring.

Note:

1. If you specify a pattern with the wildcard asterisk (*), all the agents whose name matches the pattern will monitor the specified event.
2. As a best practice, define that an event belonging to an SAP system is monitored by one agent workstation only. If the same SAP event is monitored by more than one agent, you might either be notified multiple times for the same event occurrence or the first agent that notifies the event occurrence makes that event unavailable to the other agents.
3. If you modify the extended agent configuration in the `r3batch` option files, to make the changes effective you must stop and restart the agent.
4. For dynamic agents you can specify the name of a local options file. In the Properties section of the Create Event Rules window of the Dynamic Workload Console a lookup button provides a list of all the local options files associated with that agent. If you do not specify the name of a local options file, the global options file is used by default in the rule definition.

MTE SAP System ID
Name of the SAP system where the MTE is located (for example, `GS0` in Figure 12 on page 318). This field is required. Wildcards are not allowed, you can specify up to eight characters.

MTE Monitoring Context Name
Name of the monitoring context to which the MTE belongs. This field is required. A monitoring context is a logically connected group of monitoring objects that are ordered together under one summary in the monitoring tree (for example, `Background` in Figure 12 on page 318).

Wildcards are not allowed, you can specify up to 40 characters.

MTE Monitoring Object Name
Name of the monitoring object in the alert monitor. This field is required. A monitoring object is a component or property of the system that is to be monitored (for example, `BackgroundService` in Figure 12 on page 318). If you choose not to specify a value, you must leave the value NULL, which is the default.

Wildcards are not allowed, you can specify up to 40 characters.

MTE Monitoring Attribute Name
Name of the monitoring attribute in the alert monitor. In the monitoring tree, a monitoring attribute is always an end node in the hierarchy (for example, `SystemWideFreeBPWP` in Figure 12 on page 318). This field is required. If you choose not to specify a value, you must leave the value NULL, which is the default.

Wildcards are not allowed, you can specify up to 40 characters.

Alert Value
Numeric value that indicates the color of the alert generated for the MTE. This field is optional. You can specify one or a combination of the following values:

1 Green, meaning Everything OK.
2 Yellow, meaning Warning.
3 Red, meaning Problem or error.

If you do not specify any value, all the alerts generated for the MTE are considered.

Alert Severity
Severity of the alert. It can be a number between 0 (lowest) and 255 (highest), or a range among these values. This field is optional. Alert severity is assigned during alert configuration; the SAP standard configuration is 50.

Mapping between the MTE name and IBM Workload Scheduler fields

About this task

Within SAP, MTEs are identified by a name made up of several tokens, separated by backslashes (\). To display the complete MTE name, select the MTE and click **Properties** or press **F1**:

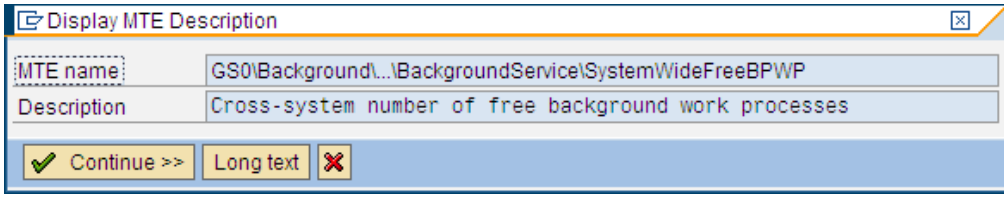


Figure 13. Name and description of an MTE - © SAP AG 2009. All rights reserved.

According to the type of MTE that you want to monitor, you must fill in each IBM Workload Scheduler field with a specific token of the MTE name (to know your MTE type, select the MTE and click **Legend**):

If you are using Dynamic Workload Console V8.5.1, or later

1. In the **Event Rule Editor** panel, from the **Properties** section, click **Autofill MTE Tokens**. The **MTE Name** window opens.
2. In the **MTE Name** field, write the name of the MTE to monitor and click **OK**. You are returned to the **Event Rule Editor** panel, where the IBM Workload Scheduler fields are filled in accordingly.

If you are using Dynamic Workload Console prior to V8.5.1

Refer to the instructions provided in the following sections:

- "Context MTE"
- "Object MTE" on page 321
- "Attribute MTE" on page 322

Note: Virtual MTEs cannot be monitored.

Context MTE: A context MTE is the uppermost node of a monitoring tree; it contains all the associated object MTEs and attribute MTEs. Context nodes can be either of the following types:

Root Belongs only to the All Monitoring Contexts monitor. According to the SAP version you are using, a root context MTE name can have either of the following formats:

*tokenA**tokenB*\...
- OR -
*tokenA**tokenB*

For example:

```
T10\SystemConfiguration\...
```

Refer to Table 71 for an explanation about how you report this type of MTE in the IBM Workload Scheduler fields:

Table 71. Mapping between root context MTE name and IBM Workload Scheduler fields

IBM Workload Scheduler field	Token of MTE name	In this example...
MTE SAP System ID	*tokenA*	`T10`
MTE Monitoring Context Name	*tokenB*	`SystemConfiguration`
MTE Monitoring Object Name	N/A	`NULL`
MTE Monitoring Attribute Name	N/A	`NULL`

Summary

According to the SAP version you are using, a summary context MTE name can have either of the following formats:

tokenA`\`*tokenB*`\...\`*tokenC*`\...`
`- OR -`
tokenA`\`*tokenB*`\`*tokenC*

For example:

`T10\SystemConfiguration\...\InstalledSupportPackages\...`

Refer to Table 72 for an explanation about how you report this type of MTE in the IBM Workload Scheduler fields:

Table 72. Mapping between summary context MTE name and IBM Workload Scheduler fields

IBM Workload Scheduler field	Token of MTE name	In this example...
MTE SAP System ID	*tokenA*	`T10`
MTE Monitoring Context Name	*tokenB*	`SystemConfiguration`
MTE Monitoring Object Name	*tokenC*	`InstalledSupportPackages`
MTE Monitoring Attribute Name	N/A	`NULL`

Object MTE: According to the SAP version you are using, an object MTE name can have either of the following formats:

tokenA`\`*tokenB*`\`*tokenC*`\`*tokenD*
`- OR -`
tokenA`\`*tokenB*`\...\`*tokenD*

For example:

`PR0\amsp53_PR0_11\R3Services\Background\`

Refer to Table 73 for an explanation about how you report this type of MTE in the IBM Workload Scheduler fields:

Table 73. Mapping between object MTE name and IBM Workload Scheduler fields

IBM Workload Scheduler field	Token of MTE name	In this example...
MTE SAP System ID	*tokenA*	`PR0`
MTE Monitoring Context Name	*tokenB*	`amsp53_PR0_11`
MTE Monitoring Object Name	*tokenD*	`Background`
MTE Monitoring Attribute Name	N/A	`NULL`

Attribute MTE: According to the SAP version you are using, an attribute MTE name can have either of the following formats:

*tokenA**tokenB**tokenC**tokenD**tokenE*
- OR -
*tokenA**tokenB*\...*tokenD**tokenE*

For example:

```
PR0\amsp53_PR0_11\R3Services\Background\AbortedJobs
```

Refer to Table 74 for an explanation about how you report this type of MTE in the IBM Workload Scheduler fields:

Table 74. Mapping between attribute MTE name and IBM Workload Scheduler fields

IBM Workload Scheduler field	Token of MTE name	In this example...
MTE SAP System ID	*tokenA*	`PR0`
MTE Monitoring Context Name	*tokenB*	`amsp53_PR0_11`
MTE Monitoring Object Name	*tokenD*	`Background`
MTE Monitoring Attribute Name	*tokenE*	`AbortedJobs`

Setting correlation rules and action parameters

Optionally, you can use the alert properties listed in Table 75 to:

- Define correlation rules between CCMS events.
- Specify additional parameters for the action that is associated with the event rule.

Date and time values are specified in GMT time zone.

Table 75. Alert properties for correlations

CCMS alert property	Console property	Composer property
MTSYSID for event definition	MTE SAP System ID	InputSAPSystemID
MTMCNAME for event definition	MTE Monitoring Context Name	InputMonitoringContextName
OBJECTNAME for event definition	MTE Monitoring Object Name	InputMonObjectName
FIELDNAME for event definition	MTE Monitoring Attribute Name	InputMonFieldName
ALERTDATE	Alert Date	AlertDate
ALERTTIME	Alert Time	AlertTime
ALINDEX	Alert Index	AlertIndex
ALSYSID	Alert SAP System ID	AlertSAPSystemID
ALUNIQNUM	Alert UID	AlertUID
EXTINDEX	Alert MT Ext Index	AlertMTExtIndex
FIELDNAME	Alert Monitoring Attribute Name	AlertMonFieldName
MANDT	Client	Client
MSCGLID	Alert Msg Container ID	AlertMsgContainerID
MSEGNAME	Alert MTE Segment	AlertMTESegment
MSG	Alert Message	AlertMessage

Table 75. Alert properties for correlations (continued)

CCMS alert property	Console property	Composer property
MSGCLASS	XMI Ext Company Name	XMIExtCompanyName
MSGID	XMI Log Msg ID	XMILogMsgID
MTCLASS	Alert MT Class	AlertMTClass
MTINDEX	Alert MT Index	AlertMTIndex
MTMCNAME	Alert Monitoring Context Name	AlertMTEContext
MTNUMRANGE	Alert MTE Range	AlertMTERange
MTSYSID	Alert MTE System	AlertMTESys
MTUID	Alert MT Type ID	AlertMTTypeID
OBJECTNAME	Alert Monitoring Object Name	AlertMonObjName
RC	Alert Return Code	AlertReturnCode
REPORTEDBY	Alert Reported By	AlertReportedBy
SEVERITY	Alert Severity	AlertSeverity
STATCHGBY	Alert Changed By	AlertChangedBy
STATCHGDAT	Alert Change Date	AlertChangeDate
STATCHGTIM	Alert Change Time	AlertChangeTime
STATUS	Alert Status	AlertStatus
USERID	User ID	UserID
VALUE	Alert Value	AlertValue

Getting alert status and committing alerts by an external task

Learn how to get CCMS alert status and commit CCMS alerts.

Refer to the following sections for details about:

- "Getting CCMS alert status"
- "Committing CCMS alerts" on page 324

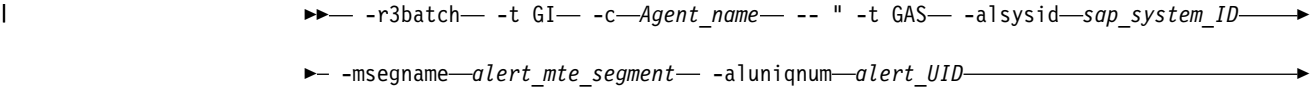
Getting CCMS alert status

About this task

To get the current status of a CCMS alert from IBM Workload Scheduler, use the external task Get Information (GI). To replace the command arguments with the actual values, refer to the output returned by the event rule you defined. For details about the correspondence between the CCMS properties and the Console and composer properties, see Table 75 on page 322.

From a command line, enter the following command:

Command syntax



```
►– -alindex—alert_index— -alertdate—alert_date— -alerttime—alert_time—"———►◄
```

Where:

-t GI Identifier of the task to be performed, in this case GI (Get Information).

-c *Agent_name*
The name of the dynamic or extended agent workstation connected to the SAP system where the MTE for which the alert was raised is located.

-t GAS
Identifier of the task to be performed, in this case GAS (Get Alert Status).

-alsysid *sap_system_ID*
Identifier of the SAP system where the MTE for which the alert was raised is located. If the name contains blanks, enclose it between single quotes.

-msegname *alert_monitoring_segment*
Name of the alert monitoring segment. You can specify from 1 to 40 characters.

-aluniqnum *alert_UID*
Unique identifier of the alert, made up of 10 characters.

-alindex *alert_index*
Alert index, made up of 10 characters.

-alertdate *alert_date*
Date of the alert, in the format *yyyymmdd*.

-alerttime *alert_time*
Time of the alert, in the format *hhmmss*.

The following is an example of how to retrieve the current status of a CCMS alert:

```
r3batch -t GI -c horse10 -- " -t GAS -alsysid T10
        -msegname SAP_CCMS_horse10_T10_00 -aluniqnum 0017780869
        -alindex 0000000104 -alertdate 20081007 -alerttime 040356"
```

You are returned the current status of the alert.

Committing CCMS alerts

About this task

The CCMS alerts that you defined as IBM Workload Scheduler events are not automatically committed after their processing. To commit an alert that was processed by IBM Workload Scheduler, use the external task Put Information (PI).

To replace the command arguments with the actual values, refer to the output returned by the event rule you defined. For details about the correspondence between the CCMS properties and the Console and composer properties, see Table 75 on page 322.

From a command line, enter the following command:

Command syntax

```
►►— -r3batch— -t PI— -c—Agent_name— -- " -t CA— -alsysid—sap_system_ID———►

►– -msegname—alert_mte_segment— -aluniqnum—alert_UID———————————————————►
```

```
►— -alindex—alert_index— -alertdate—alert_date— -alerttime—alert_time—"———►◄
```

Where:

-t PI Identifier of the task to be performed, in this case PI (Put Information).

-c *Agent_name*
Name of the dynamic or extended agent workstation connected to the SAP system where the MTE for which the alert was raised is located.

-t CA Identifier of the task to be performed, in this case CA (Commit Alert).

-alsysid *sap_system_ID*
Identifier of the SAP system where the MTE for which the alert was raised is located. If the name contains blanks, enclose it between single quotes.

-msegname *alert_monitoring_segment*
Name of the alert monitoring segment. You can specify from 1 to 40 characters.

-aluniqnum *alert_UID*
Unique identifier of the alert, made up of 10 characters.

-alindex *alert_index*
Alert index, made up of 10 characters.

-alertdate *alert_date*
Date of the alert, in the format *yyyymmdd*.

-alerttime *alert_time*
Time of the alert, in the format *hhmmss*.

The following is an example of how to commit a CCMS alert:

```
r3batch -t PI -c horse10 -- " -t CA -alsysid T10
        -msegname SAP_CCMS_horse10_T10_00 -aluniqnum 0017780869
        -alindex 0000000104 -alertdate 20081007 -alerttime 040356"
```

You are returned with the message `The CCMS alert was successfully confirmed`.

Example of an event rule based on CCMS alerts

The following example shows an event rule defined to monitor the yellow alerts raised on the MTE named `GS0\ALE/EDI GS0(000) Log.sys TVALE\Inbound IDoc ORDER_IDOC\Inbound: IDoc generated`. The MTE is configured to generate a yellow alert when the number of IDocs representing orders ready to process exceeds a specified threshold. If this condition occurs, the following actions are triggered:

- An IBM Workload Scheduler job is submitted to process the order IDocs.
- An IBM Workload Scheduler job, with priority 10, is submitted to confirm the alert.

```
<?xml version="1.0" encoding="UTF-8"?>
<eventRuleSet xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns="http://www.abc.com/xmlns/prod/tws/1.0/event-management/rules"
  xsi:schemaLocation="http://www.abc.com/xmlns/prod/tws/1.0/event-management/rules
      http://www.abc.com/xmlns/prod/tws/1.0/event-management/rules/EventRules.xsd">
     <eventRule name="SCENARIO1_XAL" ruleType="filter" isDraft="yes">
     <eventCondition name="MTEEventRaised1" eventProvider="SapMonitor"
                    eventType="CCMSEventGenerated">
         <filteringPredicate>
              <attributeFilter name="Workstation" operator="eq"
                    <value>SAP_XA</value>
              </attributeFilter>
              <attributeFilter name="InputSAPSystemID" operator="eq"
                    <value>GS0</value>
```

```
                </attributeFilter>
                <attributeFilter name="InputMonitoringContextName" operator="eq"
                      <value>ALE/EDI GS0(000) Log.sys TVALE</value>
                </attributeFilter>
                <attributeFilter name="InputMonObjectName" operator="eq"
                      <value>Inbound IDoc ORDER_IDOC</value>
                </attributeFilter>
                <attributeFilter name="InputMonFieldName" operator="eq"
                      <value>Inbound: IDoc generated</value>
                </attributeFilter>
            </filteringPredicate>
        </eventCondition>
        <action actionProvider="TWSAction" actionType="sbj" responseType="onDetection">
                <parameter name="JobUseUniqueAlias">
                      <value>false</value>
                </parameter>
                <parameter name="JobDefinitionWorkstationName">
                      <value>SAP_XA</value>
                </parameter>
                <parameter name="JobAlias">
                      <value>IDOC_%{MTEEventRaised1.AlertUID}</value>
                </parameter>
                <parameter name="JobDefinitionName">
                      <value>PROCESS_ORDER</value>
                </parameter>
        </action>
        <action actionProvider="TWSAction" actionType="sbd" responseType="onDetection">
                <parameter name="JobUseUniqueAlias">
                      <value>false</value>
                </parameter>
                <parameter name="JobWorkstationName">
                      <value>TWS_HOST_FTA</value>
                </parameter>
                <parameter name="JobTask">
                      <value>C:\TWS_home\methods\r3batch -t PI
                            -c %{MTEEventRaised1.Workstation} -- "
                            -t CA -ALSYSID %{MTEEventRaised1.AlertSAPSystemID}
                            -MSEGNAME %{MTEEventRaised1.AlertMTESegment}
                            -ALUNIQNUM %{MTEEventRaised1.AlertUID}
                            -ALINDEX %{MTEEventRaised1.AlertIndex}
                            -ALERTDATE %{MTEEventRaised1.AlertDate}
                            -ALERTTIME %{MTEEventRaised1.AlertTime} "
                      </value>
                 </parameter>
                <parameter name="JobPriority">
                      <value>10</value>
                </parameter>
                <parameter name="JobType">
                      <value>Command</value>
                </parameter>
                <parameter name="JobAlias">
                      <value>CONFIRM_%{MTEEventRaised1.AlertUID}</value>
                </parameter>
                <parameter name="JobStreamName">
                      <value>CONFIRM_STREAM</value>
                </parameter>
                <parameter name="JobLogin">
                      <value>twsuser</value>
                </parameter>
        </action>
        </eventRule>
    </eventRuleSet>
```

National Language support

The National Language support feature allows you to install r3batch on a localized IBM Workload Scheduler workstation and use localized characters for IBM Workload Scheduler job names, job streams, and R/3 variants.

Using the local and global configuration files, you can set up r3batch to use different code pages and languages for both its output and its connection with a remote R/3 system.

As described in "Unicode support" on page 205, this version of Access method for SAP features Unicode, which is widely supported by R/3 systems since version 4.7. However, if either the workstation running r3batch or the target R/3 systems do not support Unicode, this section describes how you configure code pages and national languages for r3batch.

Setting National Language support options

The following options control the code page and national language used by Access method for SAP, when Unicode support is not used:

TWSXA_CP
The code page used to establish the connection between r3batch and the target SAP R/3 system.

If you are running a non-Unicode version of r3batch, set this option to the code page installed on the SAP R/3 system (for a list of the valid code pages, refer to "SAP R/3 supported code pages" on page 328). The default value is the SAP R/3 code page 1100, similar to the standard ISO8859-1. In all other cases, this option is ignored.

TWSXA_LANG
The language that r3batch uses to log in. It can be one of the following (DE, EN, and JA can be set from the Option Editor. The other languages can be set using any text editor):

- Brazilian Portuguese (pt_BR)
- English (EN, the default value)
- French (FR)
- German (DE)
- Italian (IT)
- Japanese (JA)
- Korean (KO)
- Simplified Chinese (zh_CN)
- Spanish (ES)
- Traditional Chinese (zh_TW)

Note: If you are working with InfoPackages and process chains on operating systems that do not support Unicode, this option must be set.

TWSMETH_CP
The code page that r3batch uses for its output. The default is the code page used by the IBM Workload Scheduler workstation that hosts r3batch.

Ensure that the TWSMETH_CP and TWSMETH_LANG options are consistent.

TWSMETH_LANG
The catalog language used by `r3batch`. The default is the language used by the IBM Workload Scheduler workstation that hosts `r3batch`.

Ensure that the `TWSMETH_CP` and `TWSMETH_LANG` options are consistent.

SAP R/3 supported code pages

To communicate with SAP R/3 systems, Access method for SAP uses the following code pages. Use these values to set option `TWSXA_CP`, only when `r3batch` does not support Unicode.

Table 76. SAP R/3 supported code pages

SAP R/3 code pages	Description
1100	8859-1, this is the default value
1103	MS 850
8000	SJIS: Shift JIS
8300	BIG5: Traditional Chinese
8400	GBK: Simplified Chinese

Troubleshooting

Learn what to do if you get any problems while installing or using IBM Workload Scheduler access methods or plug-ins.

Troubleshooting the SAP R/3 connection

If you are unable to submit SAP R/3 jobs using IBM Workload Scheduler after the R/3 configuration, perform the following tests:

- Ensure that you can ping the SAP R/3 system from the IBM Workload Scheduler system. This shows basic network connectivity.
- Note that using the SAP R/3 routers to access the R/3 system could exceed the size of internal buffers of the RFC library used to store the hostname of the SAP R/3 system. When this occurs, the hostname gets truncated, causing the connection to the R/3 system to fail. To work around this problem, do not fully qualify the name of the SAP R/3 routers or alternatively use the IP addresses.
- Run the following **telnet** command to verify connectivity:

  `telnet` *`systemname`* `33`*`xx`*

  where *systemname* is the system name or IP address of the SAP R/3 server and *xx* is the SAP R/3 instance.

  If the command fails to complete, this means that communication between `r3batch` and the SAP R/3 application server is down.
- Log on to the SAP R/3 system as an administrator and verify that the IBM Workload Scheduler RFC user (created in the "Creating the IBM Workload Scheduler RFC user" on page 197) exists.
- If the SAP R/3 gateway truncates the connection string, replace the host name with the IP address.
- If `r3batch` runs on an AIX system that does not use U.S. English, make sure that the U.S. Language Environment® is installed on both the IBM Workload Scheduler workstation and the SAP R/3 database workstation. Otherwise the error `BAD TEXTENV` (or a similar error message) might appear in the `dev_rfc` trace file and connections to SAP R/3 fail.

Other known problems

Table 77 lists miscellaneous troubleshooting problems.

Table 77. Miscellaneous troubleshooting items. In this table you find a miscellaneous of troubleshooting items

Area	Item
r3batch and r3event: output contains unreadable characters	**Symptom**: When you enter the r3batch and r3event commands interactively (for example, to export an SAP calendar) the output is returned in UTF-8 format.
	Solution: To resolve this problem, you can either use a shell that supports the UTF-8 code page or redirect the output to a file and open it with a text editor that supports the UTF-8 format.
r3batch: SAP jobs contain quotation marks (") or reverse quotes (`)	**Symptoms**: SAP jobs whose names contain quotation marks or reverse quotes are not displayed in the pick list of the Dynamic Workload Console. -OR- You have an IBM Workload Scheduler job that tries to submit an SAP job whose name contains quotation marks, but it abends with an error. The following message might be displayed: `EEWO0439E The required options are not specified either in the global or in the local options file.`
	Solution: In your SAP system, make a copy of the SAP job and assign it a name that does not contain quotation marks or reverse quotes.
r3batch: SAP job containing Arabic characters.	**Symptom**: An SAP job abends when the job contains Arabic characters.
	Solution: If you run an SAP job that contains Arabic characters, you must set the local codepage of the agent workstation hosting the r3batch access method to the Arabic codepage. Refer to the **twsmeth_cp** keyword in the common options file, "Defining the common options" on page 212.

r3batch: error messages submitting a job on dynamic agents.	**Symptom**: When working with dynamic workstations and performing actions such as: displaying a process chain, restarting a process chain, or retrieving the spool list, the following messages might be displayed from the Dynamic Workload Console:
	`EEWO0439E The required options are not specified either in the global or in the local options file.`
	`EEWO1065W The environment variable UNISON_JOB is not set. The process chain cannot be restarted.`

	Solution: These messages might indicate that the requested action is not supported on dynamic workstations. Refer to the *IBM Workload Scheduler Release Notes* for more information about IBM Workload Scheduler features and minimum required versions for compatibility.
r3batch: r3batch hangs when performing actions from the Dynamic Workload Console.	**Symptoms**: r3batch hangs when performing actions from the Dynamic Workload Console such selecting from a pick list, submitting a job, or similar actions that require connection to the SAP system. The IBM Workload Scheduler joblog might also contain multiple "Timer expired" messages.
	Solution: This problem is caused by the IBM Workload Scheduler logging and tracing component. There are two possible solutions: • Deactivate the tracing utility as described in the following technote: http://www.ibm.com/support/docview.wss?uid=swg21503284. OR • Modify the r3batch.properties files. Locate the**r3batch.trace.handlers.traceFile.MPFileSemKeyproperties** setting, and then either comment this property setting out or use a different value. Choose any numeric value and retry the operation.

Table 77. Miscellaneous troubleshooting items (continued). In this table you find a miscellaneous of troubleshooting items

Area	Item
r3batch: Submit same process chain in parallel fails.	**Symptom**: The SAP system returns an error message RFC_ERROR_SYSTEM_FAILURE when starting an SAP process chain.
	Solution: Verify if the corrections stated in SAP note 1723482 are applied to your SAP Business Warehouse system or avoid running the same process chain more than once simultaneously.
r3batch: When you restart the process of a subchain, the status of the original process chain is not changed to active	**Symptom**: When you restart the process of a subchain, the status of the original process chain is not changed to active.
	Solution: Refer to SAP Note 1075876.
r3batch: Refresh an SAP process chain after a kill action on a running job instance.	**Symptom**: If you perform a kill action on an IBM Workload Scheduler job instance running on a dynamic workstation which monitors an SAP process chain, and then subsequently perform a Refresh operation on this job, the job fails.
	Solution: You cannot perform a Refresh operation after having performed a kill action on an IBM Workload Scheduler job instance running on a dynamic workstation which monitors an SAP process chain. Verify the status of the SAP process chain on the SAP system, and then set the IBM Workload Scheduler job status accordingly.
r3batch: Wrong characters are displayed in the Criteria Manager profile description.	**Symptom**: Special characters such as, < (less than), > (greater than), or the ' (apostrophe) specified in the **Description** field of the **Create criteria profile** dialog are displayed incorrectly.
	Solution: Avoid using special characters in the **Description** field when creating a new criteria profile.
r3evmon: monitoring events is not started, stopped, or performed	**Symptom**: You cannot start or stop event monitoring, or event monitoring is not performed.
	Solution: Ensure that *TWSuser* is the owner of the following files, and that the user has read and write permissions: • */TWS_home*/pids/*XAname*_r3evmon.pid • */TWS_home*/EIF/*XAname*_r3evmoncache.dat • */TWS_home*/EIF/*XAname*_r3evmoneif.conf • */TWS_home*/methods/r3evmon_cfg/*XAname*_r3evmon.cfg • */TWS_home*/methods/r3evmon_cfg/*XAname*_r3idocmon.cfg • */TWS_home*/methods/r3evmon_cfg/*XAname*_r3xalmon.cfg • */TWS_home*/methods/r3evmon_cfg/*XAname*_r3evmon.lck
r3batch: monitoring SAP events is not performed	**Symptom**: The SAP event on which the event rule is based is neither monitored nor committed.
	Solution: Ensure that the extended agent workstation you specified in the SAP event definition exists. When you define an SAP event within an event rule, no check on the extended agent workstation is made: if the workstation does not exist, the event rule is saved and activated but it will never be resolved.
r3batch: monitoring SAP events is not performed	**Symptom**: With XBP 3.0, the SAP event is raised but IBM Workload Scheduler is not notified and therefore does not act as expected.
	Solution: Ensure that the SAP event was not excluded from logging in the SAP event history table.

Table 77. Miscellaneous troubleshooting items (continued). In this table you find a miscellaneous of troubleshooting items

Area	Item
r3batch: monitoring SAP events is not performed	**Symptom**: The SAP events on which the event rule is based are not monitored nor committed.
	Solution: The SAP events being monitored are listed in the following file: *TWS_home*/monconf/*XAname*_r3evmon.cfg where *XAname* is the name of the SAP extended agent workstation. Check that the file is updated and contains the current monitoring plan. The SAP events are indicated by the following keyword (one for each SAP event on the same extended agent): !R3EVENT *SAP_event_name_lengthSAP_event_name*[*SAP_event_parm_lengthSAP_event_parm*] where: *SAP_event_name_length* The length of the SAP event name to monitor, in the format *nnnn*. For example, 0008, if the event name is SAP_TEST. *SAP_event_name* The name of the SAP event to monitor. *SAP_event_parm_length* The length of the parameter associated with the SAP event to monitor, if any. The format is *nnnn*. For example, 0007, if the event name is SAP_PAR. *SAP_event_parm* The parameter associated with the SAP event to monitor, if any. This value is optional, but omitting it identifies an SAP event with no parameter associated. For details about how the events are matched between r3evmon.cfg and the SAP system, see "SAP events matching criteria" on page 306. For each configuration file, an r3evmon process is started to monitor the SAP events listed. To start an r3evmon monitoring process for a specific extended agent workstation, enter the following command. **Note:** 1. For UNIX only, r3evmon must be entered by the owner of the IBM Workload Scheduler installation: 2. If you run r3evmon from a Windows DOS shell, the command prompt is not returned until the process completes. r3evmon -t SEM -c *XAname* -- "[-EIFSRV *EIF_server* -EIFPORT *EIF_port*]" where: *XAname* The name of the extended agent workstation. *EIF_server* The host name or IP address of the master domain manager. *EIF_port* The port that the master domain manager uses to receive the event notification.

Table 77. Miscellaneous troubleshooting items (continued). In this table you find a miscellaneous of troubleshooting items

Area	Item
r3batch:IDoc monitoring is not performed	**Symptom**: The events on which the event rule is based are not monitored or no event is generated during IDoc monitoring.
	Solution: The events being monitored are listed in the following file: *TWS_home*/monconf/*XAname*_r3evmon.cfg where *XAname* is the name of the SAP extended agent workstation. It is the same file that is used to monitor SAP events in general. Check that the file is updated and contains the current monitoring plan. The events corresponding to the IDOCEventGenerated event type are indicated by the following keyword (one for each event on the same extended agent): !IDOC *nnnn<Client Number>nnnn<IDoc Status List>nnnn<Direction>nnnn<Receiver Port>* *nnnn<Receiver Partner Type>nnnn<Partner Function of Receiver>* *nnnn<Partner Number of Receiver>nnnn<Sender Port>nnnn<Sender Partner Type>* *nnnn<Partner Function of Sender>nnnn<Partner Number of Sender>* *nnnn<Message Type>nnnn<IDoc Type>nnnn<Logical Message Variant>* *nnnn<Logical Message Function>nnnn<Test Flag>nnnn<Output Mode>* where: *nnnn* The length of the IDoc field. For example, 0005 indicates the value of an IDoc status list corresponding to 56,60. < > Contains the value of the field associated with the IDoc to be monitored. For a list of the supported IDoc fields, refer to Table 66 on page 310. For each configuration file, an r3evmon process is started to monitor the events listed. Make sure that an r3evmon monitoring process is started for the involved extended agent workstation.
r3evmon: monitoring SAP and IDoc events increases memory consumption	**Symptom**: Memory consumption increases continuously during monitoring of IDoc and standard SAP events.
	Solution: Refer to SAP Notes 1021071 and 1109413.

Table 77. Miscellaneous troubleshooting items (continued). In this table you find a miscellaneous of troubleshooting items

Area	Item
r3batch: Duplicated events generated during IDoc monitoring	**Symptom**: The action defined in an event rule with IDOCEventGenerated event type is unexpectedly repeated.
	Solution: Reset the start date and time for the next monitoring loop. These values are stored in the following file: *TWS_home*/methods/r3evmon_cfg/*XAname*_r3idocmon.cfg where *XAname* is the name of the SAP extended agent workstation. Therefore you can either: • Stop r3evmon, delete the *XAname*_r3idocmon.cfg file and then start r3evmon again. - OR - • Stop r3evmon, set the date and time in the *XAname*_r3idocmon.cfg file to the values you want, and startr3evmon again. Use the following format for the start date and time: start_date=YYYYMMDD start_time=HHMMSS For example: start_date=20080307 start_time=115749 Check the value of the **idoc_no_history** option: • If it is set to OFF and no *XAname*_r3idocmon.cfg file exists, then all matching IDocs are retrieved, not only the current ones. • If it is set to ON (default value), check the date and time in the *XAname*_r3idocmon.cfg file.
r3batch: No event is generated during IDoc monitoring	**Symptom**: The expected event actions are not triggered.
	Solution: Check the value of the **idoc_no_history** option; if it is set to ON (default value), check the date and time in the *XAname*_r3idocmon.cfg file.
Error defining an internetwork dependency based on SAP event	**Symptom**: If you work with XBP 2.0, when you try to define an internetwork dependency based on an SAP event, the following error message is displayed: *** ERROR 778 *** EEW00778E An internal error has occurred. The program could not modify the following job: Job name: Job ID: %CJ ERROR
	Solution: Perform the following steps: 1. Check if the BCTEST report is defined in your SAP system by invoking either one of the following transactions: **sa38** Enter BTC* and click the picklist button. In the panel that opens, click the picklist button and check if BTCTEST is shown in the list that is displayed. **se38** Enter BTC* and click the picklist button. Check if BTCTEST is shown in the list that is displayed. 2. If report BTCTEST is not found in the list, you can either: • Choose another existing report, and, in the local options file, set the placeholder_abap_step option to the name you chose. Because the report assigned to the placeholder job is run when the corresponding event is raised, ensure that you choose a dummy report. For details about the placeholder_abap_step option, see Table 50 on page 212. - OR - • Set the placeholder_abap_step option to a custom developed ABAP code of your choice.

Table 77. Miscellaneous troubleshooting items (continued). In this table you find a miscellaneous of troubleshooting items

Area	Item

r3batch: error message when scheduling SAP jobs	**Symptom**: When creating an SAP job, the following message is displayed while trying to view the details of an ABAP's variant:
	`AWSO0101E`
	`Missing ABAP routine.`
	`J_101_REPORT_ALL_SELECTIONS please install the latest ABAP routine for Maestro!!`

	Solution: This defect is caused by an error in an SAP function module. SAP describes this problem and possible solutions in the SAP Notes 0351293 and 0116354.
r3batch: modify job step error	You change print parameters with the `BAPI_XBP_MODIFY_JOB_STEP` function module, and subsequently, they are incorrect. As a consequence, `r3batch` gets error 221: `MSG_CANNOT_GET_PRIARC_PARAMS: "Retrieving new print and archive parameters failed"` The problem is solved by installing SAP Note 758829.
r3batch: modify job step error	The BAPI_XBP_MODIFY_JOB_STEP function module always uses the name of the logged-on user as the name for the step user. In this case, when submitting a job with the `-vX` options, `r3batch` creates a job by copying all the data from the original template, except the variant name of the first step (which is provided as the option parameter). This procedure is usually referred to as the "old copy". However, when adding a step to a new job, the XBP 2.0 interface ignores the user parameter passed by `r3batch`. The problem is solved by installing SAP note 758829.

r3batch: does not start after installation on Windows	**Symptom**: After installing or upgrading the SAP R/3 access method to version 8.5 on a Windows operating system, you try to start `r3batch` but nothing happens. The following message is displayed:
	`The application failed to initialize properly.`
	`Click on OK to terminate the application.`

	Solution: Ensure that you applied the SAP Note 684106 to install the required Microsoft DLLs.
r3batch: IBM Workload Scheduler environment variables are not resolved when specified in the task string for an R/3 batch job.	**Symptom**: When IBM Workload Scheduler environment variables are used in the task string for an R/3 batch job and the job is launched, the environment variables are not resolved. The exact string used to specify the variable is used instead.

	Solution: To leverage IBM Workload Scheduler environment variables, you must modify the access method as follows:
	1. In the *TWS_home*`/methods` directory, create a file named, r3batch.cmd (on Windows) or r3batch.sh (on UNIX) as required, containing the following content:
	`@echo off`
	`set METHODSPATH=%~dp0`
	`call "%METHODSPATH:"=%r3batch.exe" %*`
	2. Modify the CPU XAGENT definition from r3batch to r3batch.cmd. An example follows:
	`CPUNAME NW1`
	`DESCRIPTION "r3batch"`
	`OS OTHER`
	`NODE none TCPADDR 31111`
	`FOR MAESTRO HOST STROMBOLI ACCESS "r3batch.cmd"`
	`TYPE X-AGENT`
	`AUTOLINK OFF`
	`BEHINDFIREWALL OFF`
	`FULLSTATUS OFF`
	`END`
	3. To modify the CPU access method in the Symphony® file, run JnextPlan as follows:
	`JnextPlan -for 0000`

Table 77. Miscellaneous troubleshooting items (continued). In this table you find a miscellaneous of troubleshooting items

Area	Item
@longlink file present in installation directory	**Symptom**: After installing IBM Workload Scheduler on a computer with an AIX operating system where a master domain manager is already installed, a @longlink file containing the following is present in the installation directory: `methods/_tools/_jvm_64/lib/desktop/icons/HighContrastInverse/48x48/mimetypes/ gnome-mime-text-x-java.png`
	Solution: The file can be ignored. It does not present any problems for the proper functioning of the product.
Job throttling does not start on HP-UX	**Symptom**: You try to start the job throttler and the following error message is displayed: `Error occurred during initialization of VM java.lang.NoSuchMethodError: java.lang.Thread.start()V Abort`

	Cause and Solution: Java version 1.5 does not start because there are symbolic links of Java version 1.4 libraries used by third party products. For example, you might have `/usr/lib/pa20_64/libjava.sl` linked to `/opt/java1.4/jre/lib/PA_RISC2.0W/libjava.sl`
	
	Before starting the job throttling again, change the PATH and SHLIB_PATH environment variables as follows:
	`PATH=`*`TWS_home`*`/methods/_tools/_jvm_64/lib/PA_RISC2.0W:$PATH`
	`export PATH`
	`SHLIB_PATH=`*`TWS_home`*`/methods/_tools/_jvm_64/lib/PA_RISC2.0W:$SHLIB_PATH`
	`export SHLIB_PATH`
	
	To apply this change definitively, edit the `jobthrottling.sh` file by adding the environment settings after the following line:
	`#!/bin/sh`

Job throttling does not start	**Symptom**: When you start the job throttling feature, nothing happens and the following error message is displayed: `EEWOJTR0207E Error, another job throttler instance is already running against the same SAP system. Foreign job throttler registration is: Client ID="`*`clientID`*`", Name="TWS4APPS_JOBTHROTTLER",Host="`*`hostname`*`", UID "`*`UniqueID`*`"`
	Cause and Solution: Possible causes are: • You are running job interception collector jobs, but the job interception and job throttling features cannot run at the same time. Choose which feature to start. For detailed information, refer to "Job interception and parent-child features" on page 268 and "Job throttling feature" on page 292. • Another job throttler instance is running against the same SAP system. You can start only one job throttler instance. • A previous job throttler instance created an exclusive lock object on the SAP system that could have become permanent. To verify it, use transaction `sm12` and query for the lock object named `TWS4APPS_JOBTHROTTLER`. If the lock object exists, and you are not running any job throttler or job interception instance, remove the lock manually and restart the job throttler.
Job throttling does not start	**Symptom**: When you start the job throttling feature, nothing happens and the following error message is displayed: `EEWOJT0209E Error, the password format is not valid.`
	Cause and Solution: Your password is encrypted in old format. To encrypt the password with the correct encryption version, use the **enigma** or **pwdcrypt** programs, or the Option Editor. For details about how to encrypt the password, see "Encrypting SAP R/3 user passwords" on page 219.

Table 77. Miscellaneous troubleshooting items (continued). In this table you find a miscellaneous of troubleshooting items

Area	Item
Job throttling does not stop	**Symptom**: When you stop the job throttling feature, nothing happens.
	Cause and Solution: You are connected as a *TWSUser* who does not have write permission on the *XAname*_jobthrottling_cmd.txt file. To solve this problem, delete the *XAname*_jobthrottling_cmd.txt file and enter the command again. For detailed information about stopping the job throttler, refer to "Step 5. Starting and stopping the job throttling feature" on page 295.
Job throttling: alerts for MTEs are not generated according to the threshold values set	**Symptom**: Alerts for the MTEs created by the job throttler are generated without respecting the threshold values that are set.
	Cause and Solution: You started a new job throttler instance, which, being enabled to send data to CCMS, created the related MTEs. When you include the MTEs in your monitoring set, the threshold values are automatically set according to the existing MTE class. Nevertheless, alerts are generated without respecting these values. To solve this problem, edit the MTE properties and save them again, even if you do not change anything.
Job throttling: saving MTE properties generates an informational message	**Symptom**: When you edit and save the properties of MTEs generated by the job throttler, the following informational message is displayed: `Message does not exist.`
	Cause and Solution: In the pop-up window that displays the message, click **Continue** and close the Properties window. Your settings are saved.
Job throttling: error message displayed when creating trace file on HP operating systems	**Symptom**: While the job throttler is stopping, there are intercepted jobs to release on exit. The following error message is displayed: `CJL0006E Handler jobthrottling.trace.handlers.file is unable to write a log event.`
	Cause and Solution: The message does not report any real error, and can be ignored.
The system cannot intercept jobs	**Symptom**: Although the job interception feature is active on the SAP system, the intercepted jobs are kept in scheduled state.
	Cause and Solution: The job throttler feature or the Java Virtual Machine used by the job throttler might still be active. On each extended agent where the job throttler was started at least once, ensure that: 1. You stopped the feature. For details, see "Step 5. Starting and stopping the job throttling feature" on page 295. 2. The Java Virtual Machine used by the job throttler was stopped by the process. To search for Java processes, use: **On Windows** The Process Explorer **On UNIX** The command `ps -ef | grep throttling` If a Java Virtual Machine instance related to the job throttler is found, kill it.
`access method executables: r3batch, r3event, psagent`: permission denied messages in the job log.	**Symptom**: The job log reports multiple "Permission denied" messages.

	Cause and Solution: The root cause might be that the access method executable, for example, r3batch, is submitted by the `root` user and not the `twsuser`. This creates directories and files with the wrong ownership and file permissions. Verify the ownership of the following directories and files if you are running the product on UNIX platforms. Ensure that the `twsuser` is the owner of the files and that the user has both read and write permissions on the files, and execute permission on the directories.
	`<TWShome>/methods/traces`
	`<TWShome>/methods/traces/*.log`

Table 77. Miscellaneous troubleshooting items (continued). In this table you find a miscellaneous of troubleshooting items

Area	Item
psagent: misleading message displayed if the local options file has no right permissions	**Symptom**: The job log shows the following message: `EEW00439E You did not specify the required options either in the global or in the local options file.` but all the mandatory options were correctly set in the options file.
	Solution: Check that the options file has `read` and `write` permissions available to the user who is trying to launch the job.
No messages written in the job log	**Symptom**: IBM Workload Scheduler does not write any messages in the job log if the file system for tracing is full or the ljuser does not have the correct permission to write in the trace directory.

The submission of a PeopleSoft job fails	**Symptom**: The submission of a PeopleSoft job fails and the IBM Workload Scheduler job log contains a Java exception similar to the following:
	`Exception in thread "3194" java.lang.ExceptionInInitializerError`
	`at bea.jolt.JoltSessionAttributes.<clinit>(JoltSessionAttributes.java:183)`
	`at psft.pt8.net.JoltSessionPool.createConnection(JoltSessionPool.java:363)`
	`at psft.pt8.net.JoltSessionPool.getJoltSession(JoltSessionPool.java:220)`

	Cause and Solution: The `psjoa.jar` path contains special characters. Define a path without special characters.

The submission of an Oracle job fails	**Symptom**: The submission of an Oracle job fails and the IBM Workload Scheduler job log shows the following information:
	`EEWP0017 Child MCMLJ exited normally.`
	`Exit code: 1.EEWP0027 Error - Launch job failed`

	Solution: Submitting an Oracle job might fail because there is a connection problem to the Oracle database. Verify that your Oracle naming methods are set correctly. For details about how to configure naming methods, refer to the *Oracle Net Services Administrator's Guide*.
mvsjes: RACF authorization problem on z/OS version 1.7	**Symptom**: An `S047` abend is returned if the `EEWSERVE` started task does not have an associated RACF owner ID.
	Solution: In the RACF database, associate an authorized RACF ID with the `EEWSERVE` started task as specified in "Setting RACF authorizations on z/OS" on page 159.

Chapter 28. SAP job plug-ins to extend workload scheduling capabilities

IBM Workload Scheduler provides job plug-ins that extend its job scheduling capabilities to your SAP business.

IBM Workload Scheduler provides the following job plug-ins to extend its job scheduling capabilities to your SAP business:

- "SAP Process Integration (PI) Channel jobs"
- "SAP BusinessObjects BI jobs" on page 344

Extending the concept of jobs and workload scheduling to other applications means you can continue to define jobs for your business process, add them to job streams, submit them to run according to schedule, and then monitor exceptions, if any, all from a single entry point. The job plug-ins require an IBM Workload Scheduler dynamic agent, IBM Workload Scheduler for z/OS Agent (z-centric), or both. See Chapter 1, "Supported agent workstations," on page 3 for more information.

For information about the supported versions of the job plug-ins, run the Data Integration report on the IBM Software Product Compatibility Reports site, and select the **Supported Software** tab.

SAP Process Integration (PI) Channel jobs

Define SAP Process Integration (PI) Channel jobs to control communication channels between the Process Integrator and a backend SAP R/3 system.

In an SAP environment, communication channels are used to convert documents. A sender communication channel can be opened and closed and a receiver channel can be stopped and reactivated as needed. You can control these communication channels by using the IBM Workload Scheduler SAP PI Channel plug-in and defining SAP PI Channel jobs.

You then schedule SAP PI Channel jobs with IBM Workload Scheduler to take full advantage of the IBM Workload Scheduler scheduling and automation functions to manage jobs.

You can manage these jobs both in a distributed and in a z/OS environment, by selecting the appropriate engine.

For information about the supported versions of the job plug-ins, generate a dynamic Data Integration report from the IBM Software Product Compatibility Reports web site, and select the **Supported Software** tab: Data Integration.

Business scenario

A practical business scenario demonstrating how SAP PI Channel jobs can be used to manage communication channels.

A large, multinational manufacturer interacts with business partners, clients, and suppliers in different geographic locations. The computers used by each party differs in hardware, operating system, and more often than not, both. Part of the

interactions between these parties include secure data exchange to transmit critical business information. Given the differences in hardware and operating systems, the information is converted to the SAP Intermediate Document (IDoc) format for transferring data related to business transactions. The IDocs are generated in the sending database and are transmitted to the receiver, which in this case, is a SAP R/3 system.

In this scenario, only if files arrive with specific file names, such as `ABC.txt`, `DEF.txt`, and `GHI.txt`, should they be transformed by the process integrator into a single IDoc. To achieve this, the company leverages Event Driven Workload Automation in which an event rule is created that monitors the arrival of files. The action associated with the event rule is to open the sender communication channel. After the conversion to IDoc is complete, the process integrator removes the original source files. The removal of the files is detected by IBM Workload Scheduler and a job is submitted to close the sender channel until the next iteration of this same process.

There are several advantages to using the IBM Workload Scheduler plug-in for SAP PI Channel to control communication channels. For example, they can also be used when the backend SAP R/3 system is under maintenance. A job can be submitted into a job stream to stop the receiving channel and then reactivate it once the maintenance is complete.

Prerequisites

Prerequisites for using the IBM Workload Scheduler plug-in for SAP PI Channel.

For information about the supported versions of the job plug-ins, generate a dynamic Data Integration report from the IBM Software Product Compatibility Reports web site, and select the **Supported Software** tab: Data Integration.

The following are the requirements necessary to implement an IBM Workload Scheduler plug-in for SAP PI Channel:

- Assign J2EE roles. The user that starts, stops, and verifies the status of SAP PI Channel channels must have the following required J2EE roles:
  - **`xi_af_channel_admin_display`**: to verify the status of communication channels.
  - **`xi_af_channel_admin_modify`**: to perform start and stop actions on communication channels.

  Assign the required roles to the user that controls the channel using the J2EE Engine Visual Administrator graphical user interface.
  1. Log on to the J2EE Visual Administrator.
  2. Click **Server0** > **Services** > **Security Provider**.
  3. In the right pane, click **sap.com/com.sap.aii.af.app*AdapterFramework**. Select the **Security Roles** page.
  4. Assign the user the following roles:**`xi_af_channel_admin_displayxi_af_channel_admin_modify`**.
- Configure external control. To perform actions on SAP PI Channel communication channels such as starting, stopping, and verifying the status of channels, external control must be enabled for the channels to accept HTTP requests. You can enable external control for communication channels by setting **Control Data** to **External** in the Runtime Workbench Communication Channel Monitoring.

Defining an IBM Workload Scheduler job that runs an SAP PI Channel job

Define IBM Workload Scheduler jobs that run SAP PI Channel jobs by using either the Dynamic Workload Console, the composer command line, or Application Lab.

In a distributed environment, you define an IBM Workload Scheduler job that runs an SAP PI Channel job by using the Dynamic Workload Console connected to a distributed engine, Application Lab or the **composer** command line. In a z/OS environment, you define jobs by using the Dynamic Workload Console connected to a z/OS engine.

See Chapter 2, "Defining a job," on page 7 for more information about creating jobs using the various interfaces available. Some samples of SAP PI Channel report job definitions are contained in the sections that follow.

Job definition for SAP PI Channel jobs

IBM Workload Scheduler job definition properties and JSDL examples for running SAP PI Channel jobs.

A description of the job properties and valid values are detailed in the context-sensitive help in the Dynamic Workload Console by clicking the question mark (?) icon in the top-right corner of the properties pane.

Table 78 describes the required and optional attributes for SAP PI Channel jobs, together with a description of each attribute.

Table 78. Required and optional attributes for the job definition of SAP PI Channel jobs.

Attribute	Description/value	Required
Host name	Use this section to specify the options for the SAP Process Integration server.	✓
Server connection port	The port number of the SAP Process Integration instance.	✓
Service	Identifies the service of the channel to be administered. You can specify an asterisk (*) to administer more than one channel simultaneously.	
Party	Identifies the party of the channel to be administered. You can specify an asterisk (*) to administer more than one channel simultaneously.	
Channel	Identifies the name of the channel to be administered. You can specify an asterisk (*) to administer more than one channel simultaneously.	✓
User name	The user that controls the channels. This user requires the **xi_af_channel_admin_display** and **xi_af_channel_admin_modify** roles.	✓

Table 78. Required and optional attributes for the job definition of SAP PI Channel jobs. (continued)

Attribute	Description/value	Required
Password	The password of the user. The password is encrypted when the job is created.	✓
Action	Start, stop, verify status.	

The following example shows the job definition of an SAP PI Channel job with all the attributes specified:

```
TWSAGENT#CHANNELTEST
 TASK
    <?xml version="1.0" encoding="UTF-8"?>
<jsdl:jobDefinition xmlns:jsdl="http://www.abc.com/xmlns/prod/scheduling/1.0/
   jsdl" xmlns:jsdlpichannel="http://www.abc.com/xmlns/prod/scheduling/1.0/
   jsdlpichannel" name="PICHANNEL">
  <jsdl:application name="pichannel">
    <jsdlpichannel:pichannel>
                        <jsdlpichannel:PIChannelParameters>
                               <jsdlpichannel:PIChannelParms>
                                       <jsdlpichannel:ServerInfo>
                                            <jsdlpichannel:HostName>pihost</jsdlpichannel:HostName>
                                            <jsdlpichannel:PortNumber>50000</jsdlpichannel:PortNumber>
                                       </jsdlpichannel:ServerInfo>
                                       <jsdlpichannel:ChannelInfo>
                                            <jsdlpichannel:ServiceName>*</jsdlpichannel:ServiceName>
                                            <jsdlpichannel:PartyName>*</jsdlpichannel:PartyName>
                                            <jsdlpichannel:ChannelName>TESTCHANNEL1</jsdlpichannel:ChannelName>
                                       </jsdlpichannel:ChannelInfo>
                                       <jsdlpichannel:UserInfo>
                                            <jsdlpichannel:UserName>TWSADMIN</jsdlpichannel:UserName>
                                            <jsdlpichannel:password>
    {aes}VlHkyc5ufaC6nMRepctNUbZ1exnDF5zUl+9baDGWgos=</jsdlpichannel:password>
                                       </jsdlpichannel:UserInfo>
                                       <jsdlpichannel:ActionInfo>
                                              <jsdlpichannel:StartAction/>
                                       </jsdlpichannel:ActionInfo>
                               </jsdlpichannel:PIChannelParms>
                        </jsdlpichannel:PIChannelParameters>
                </jsdlpichannel:pichannel>
  </jsdl:application>
</jsdl:jobDefinition>
 RECOVERY STOP
```

Defining IBM Workload Scheduler jobs to run SAP PI Channel jobs by using the Dynamic Workload Console

You can define jobs by using the Dynamic Workload Console when you are working in either a distributed environment or in a z/OS environment.

About this task

See Chapter 2, "Defining a job," on page 7 for information about creating job definitions using other supported product interfaces. To define a job that runs an SAP PI Channel job by using the Dynamic Workload Console, perform the following procedure.

Procedure

1. In the console navigation tree, expand **Administration** > **Workload Design** and click **Manage Workload Definitions**
2. Specify an engine name, either distributed or z/OS. The Workload Designer opens.
3. In the Working List panel, select the SAP PI Channel job definition.

   z/OS **z/OS Environment**
   New > **ERP** > **SAP PI Channel**

Distributed **Distributed Environment**
New > Job Definition > ERP > SAP PI Channel

The properties of the job are displayed in the right-hand panel for editing.

4. In the properties panel, specify the attributes for the job definition you are creating. You can find detailed information about all the attributes in the contextual help available on each panel.
5. Click **Save** to save the job definition in the database.

What to do next

You can now proceed to adding the job to a job stream and submitting it to run.

Submitting IBM Workload Scheduler job streams for SAP PI Channel jobs

After you define an IBM Workload Scheduler for SAP PI Channel job, you add it to a job stream with all the necessary scheduling arguments and submit it.

After submission you can kill the IBM Workload Scheduler for SAP PI Channel job if necessary, this action is converted in a **Stop** action for the SAP PI Channel job.

If the IBM Workload Scheduler agent is not available when you submit the IBM Workload Scheduler for SAP PI Channel job or when the job is running, IBM Workload Scheduler collects the job log when the agent restarts and assigns the **Error** or **ABEND** status to the IBM Workload Scheduler for SAP PI Channel job independently of the status of the SAP PI Channel job.

Mapping between IBM Workload Scheduler and SAP PI Channel job statuses

Map IBM Workload Scheduler job status to SAP PI Channel job status to understand their processing.

The table shows how you can map the IBM Workload Scheduler job status to the SAP PI Channel job status based on the return code you find in the job log output.

Table 79. Mapping between IBM Workload Scheduler and SAP PI Channel job statuses

SAP PI Channel Communication Status	Dynamic Workload Console Job Status	IBM Workload Scheduler Job Status	IBM Workload Scheduler for z/OS Job Status
Green	Running	EXEC	Executing
Green	Successful	SUCC	Completed
Red	Error	ABEND	Error
Yellow	Error	ABEND	Error
Grey	Error	ABEND	Error
Not Available	Error	FAILED	Error

Job log output

The IBM Workload Scheduler for SAP PI Channel job log and its content.

Purpose

More information about how to analyze the job log using the supported product interfaces can be found in Chapter 5, "Analyzing the job log," on page 13.The output of an IBM Workload Scheduler for SAP PI Channel job relays valuable information to perform problem determination such as:

- If the user has the required roles.
- If the communication channels are enabled for external control.
- If the user name or password are valid.
- If the hostname is resolvable.
- If the hostname is resolvable but not listening on the indicated port.
- If the channel exists.
- If the hostname and port are working correctly, but there is no process integration running.

Sample

This example shows the output of a job where the hostname was resolved successfully, the port is listening, the process integration is running, the channel exists and is enabled for external control, and the start action is being performed:

```
<?xml version="1.0" encoding="UTF-8" ?>
<ChannelAdminResult xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://pihost:50000/AdapterFramework/channelAdmin/
      ChannelAdmin.xsd">
        <Channels>
                <Channel>
                        <Party></Party>
                        <Service></Service>
                        <ChannelName>TESTCHANNEL1</ChannelName>
                        <ChannelID>f750195443af39b2be83dd5c3686983d</ChannelID>
                        <ActivationState>STARTED</ActivationState>
                        <ChannelState>OK</ChannelState>
                </Channel>
        </Channels>
</ChannelAdminResult>

Exit Status  : 0
```

SAP BusinessObjects BI jobs

Schedule and automate SAP BusinessObjects BI reports with IBM Workload Scheduler plug-in for SAP BusinessObjects BI.

Prerequisites

For information about the supported versions of the job plug-ins, generate a dynamic Data Integration report from the IBM Software Product Compatibility Reports web site, and select the **Supported Software** tab: Data Integration.

To create an 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 who is 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=SecEnterprise
pollingPeriod=10
pollingTimeout=7200
csvTextQualifier="
csvColumnDelimiter=,
csvCharset=UTF-8
csvOnePerDataProvider=false
```

   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 that is supported by SAP BusinessObjects BI.

   Can be:

   - secEnterprise (default)
   - 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.

   csvTextQualifier
   Text delimiter in case of .CSV report format type. It can be one of the following: " '

   csvColumnDelimiter
   Column delimiter in case of .CSV report format type. It can be one of the following: , ; tab

   csvCharset
   Report character set in case of .CSV report format type.

csvOnePerDataProvider
It indicates that a different .CSV report is generated for each of the data providers present in the report. It can be *true* or *false*.

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.

The properties file is automatically generated either when you perform a "Test Connection" from the Dynamic Workload Console in the job definition panels, or when you submit the job to run the first time. Once the file has been created, you can customize it. This is especially useful when you need to schedule several jobs of the same type. You can specify the values in the properties file and avoid having to provide information such as credentials and other information, for each job. You can override the values in the properties files by defining different values at job definition time.

SAP BusinessObjects BI job definition

An SAP BusinessObjects Business Intelligence (BI) job enables automation, monitor, and control of workflows containing SAP BusinessObjects BI reports (Crystal and Webi reports).

A description of the job properties and valid values are detailed in the context-sensitive help in the Dynamic Workload Console by clicking the question mark (?) icon in the top-right corner of the properties pane.

For more information about creating jobs by using the various supported product interfaces, see Chapter 2, “Defining a job,” on page 7.

The following table lists the required and optional attributes for SAP BusinessObjects BI jobs:

Table 80. Required and optional attributes for the definition of a SAP BusinessObjects BI job

Attribute	Description and value	Required
server	The SAP BusinessObjects BI access URL defined in the SAP BusinessObjects BI RESTful Web Service application.	If not specified in the plug-in properties file.
username	The name of the user authorized to access the SAP BusinessObjects BI server.	If not specified in the plug-in properties file.
password	The password that is associated with the user authorized to access the SAP BusinessObjects BI server.	If not specified in the plug-in properties file.
authType	The type of authentication that is supported by SAP BusinessObjects BI. Can be: **Enterprise** **LDAP** **Windows AD** **SAP** Default value is the type of authentication that is specified in the plug-in properties file.	If not specified in the plug-in properties file.
BOObject	The SAP BusinessObjects BI resource to be scheduled. You can use asterisks (*) or question marks (?) as wildcard characters.	✔

Table 80. Required and optional attributes for the definition of a SAP BusinessObjects BI job (continued)

Attribute	Description and value	Required
timeout	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. Default value set in the plug-in properties file is 7200.	
pollingPeriod	The monitoring frequency. It determines how often the job is monitored. It is expressed in seconds. Default value set in the plug-in properties file is 10.	
formatType	The type of your SAP BusinessObjects BI report. Can be: **Web Intelligence** **Adobe Acrobat** **Microsoft Excel** **Command Separated Values (CSV)** Default value is the default format type that is defined on your SAP BusinessObjects BI server.	
emailFrom	Email **From** field. If the email parameters are not specified, the report is sent to the SAP BusinessObjects BI server (default destination).	If you choose to send your report by email.
emailTo	Email **To** field.	If you choose to send your report by email.
emailCc	Email **Cc** field.	If you choose to send your report by email.
emailBcc	Email **Bcc** field.	If you choose to send your report by email.
emailSubject	Email **Subject** field.	If you choose to send your report by email.
emailMessage	Email **Message** text.	If you choose to send your report by email.
emailUseSpecificFileName	The name of the file to be attached to your email.	If you choose to send your report by email.
serverGroupId	The identification of a group of servers created on your SAP BusinessObjects BI server. The group of servers includes the server to be used to create your report. If the parameter is not specified, the first available server is used (default value).	
Custom parameters for Webi Reports	Custom parameters for the SAP BusinessObjects BI Webi Report that you want to run.	

Scheduling and stopping the job in IBM Workload Scheduler

You schedule IBM Workload Scheduler SAP BusinessObjects BI jobs by defining them in job streams. Add the job to a job stream with all the necessary scheduling arguments and submit the job stream.

You can submit jobs by using the Dynamic Workload Console, Application Lab or the **conman** command line. See Chapter 3, "Scheduling and submitting jobs and job

streams," on page 9 for information about how to schedule and submit jobs and job streams by using the various interfaces.

After submission, when the job is running and is reported in **EXEC** status in IBM Workload Scheduler, you can stop it if necessary, by using the **kill** command. However, this action is effective only for the Request/Response scenario, therefore the IBM Workload Scheduler processes do not wait to receive a response from the SAP BusinessObjects BI job.

Monitoring the job

If the IBM Workload Scheduler agent stops when you submit the IBM Workload Scheduler SAP BusinessObjects BI job or while the job is running, as soon as the agent restarts in the Request/Response scenario, IBM Workload Scheduler begins monitoring the job from where it stopped and waits for the Response phase. For information about how to monitor jobs by using the different product interfaces available, see Chapter 4, "Monitoring IBM Workload Scheduler jobs," on page 11.

Job properties

While the job is running, you can track the status of the job and analyze the properties of the job. In particular, in the Extra Information section, if the job contains variables, you can verify the value that is passed to the variable from the remote system. Some job streams use the variable passing feature, for example, the value of a variable specified in job 1, contained in job stream A, is required by job 2 in order to run in the same job stream.

For information about how to display the job properties from the various supported interfaces, see Chapter 5, "Analyzing the job log," on page 13.

For example, from the **conman** command line, you can see the job properties by running

```
conman sj <SAP BusinessObjects_job_name>;props
```

where, *<SAP BusinessObjects_job_name>* is the SAP BusinessObjects BI job name.

For a SAP BusinessObjects BI job in the `Extra Information` section of the output command, you see the following properties:

```
Extra Information
  Authorization Type = secEnterprise
  SAP BusinessObjects resource instance ID = 9547
  SAP BusinessObjects resource instance status = Completed(1)
  SAP BusinessObjects resource = World Sales Report (rid:5376)
  Server address = http://hostname:6405/biprws
  User name = userabc@xyz.com
```

where

Authorization Type
The type of authentication that is supported by SAP BusinessObjects BI Server.

SAP BusinessObjects resource instance ID
The ID of the report instance that is created by the SAP BusinessObjects BI job.

SAP BusinessObjects resource instance status
The status of the report instance that is created by the SAP BusinessObjects BI job.

SAP BusinessObjects resource
The name and the ID of the report that is scheduled by the SAP BusinessObjects BI job.

Server address
The SAP BusinessObjects BI server that you specify in the `Server` field.

User name
The name of the user authorized to access the SAP BusinessObjects BI server that you specify in the `User name` field.

You can export the SAP BusinessObjects BI job properties that you can see in the `Extra Information` section, to a successive job in the same job stream instance. For more information about the list of job properties that you can export, see the table about properties for SAP BusinessObjects BI in *User's Guide and Reference*.

The following example shows the job definition for a SAP BusinessObjects BI job :

```
$JOBS
PHOENIX_1#REPORT1
 TASK
    <?xml version="1.0" encoding="UTF-8"?>
<jsdl:jobDefinition xmlns:jsdl="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdl"
xmlns:jsdlsapbusinessobjects=
"http://www.abc.com/xmlns/prod/scheduling/1.0/jsdlsapbusinessobjects"
name="SAPBUSINESSOBJECTS">
<jsdl:application name="sapbusinessobjects">
<jsdlsapbusinessobjects:sapbusinessobjects>
<jsdlsapbusinessobjects:SAPBusinessObjectsParameters>
<jsdlsapbusinessobjects:Webi>
<jsdlsapbusinessobjects:PromptsTableValues>
<jsdlsapbusinessobjects:PromptsTableValue key=
"Compare 2005 data with the following Year:(dpId:DP1, type:Text)">2004
</jsdlsapbusinessobjects:PromptsTableValue>
</jsdlsapbusinessobjects:PromptsTableValues>
<jsdlsapbusinessobjects:formatType>webi</jsdlsapbusinessobjects:formatType>
<jsdlsapbusinessobjects:destinationRadioGroup>
<jsdlsapbusinessobjects:emailDestinationRadioButton>
<jsdlsapbusinessobjects:emailFrom>john.smith1@aaa.bbb.com
   </jsdlsapbusinessobjects:emailFrom>
<jsdlsapbusinessobjects:emailTo>john.smith2@aaa.bbb.com
  </jsdlsapbusinessobjects:emailTo>
<jsdlsapbusinessobjects:emailCc/>
<jsdlsapbusinessobjects:emailBcc/>
<jsdlsapbusinessobjects:emailSubject>attach</jsdlsapbusinessobjects:emailSubject>
<jsdlsapbusinessobjects:emailMessage>abcdefgh</jsdlsapbusinessobjects:emailMessage>
<jsdlsapbusinessobjects:emailAttachment/>
<jsdlsapbusinessobjects:emailUseSpecificFileName>myname
</jsdlsapbusinessobjects:emailUseSpecificFileName>
<jsdlsapbusinessobjects:emailAddFileExtensionCheckbox/>
</jsdlsapbusinessobjects:emailDestinationRadioButton>
</jsdlsapbusinessobjects:destinationRadioGroup>
<jsdlsapbusinessobjects:serverGroupRadioGroup>
<jsdlsapbusinessobjects:serverGroupRadioButton>
<jsdlsapbusinessobjects:serverGroupId>185084</jsdlsapbusinessobjects:serverGroupId>
<jsdlsapbusinessobjects:onlyUseGroupCheckbox/>
</jsdlsapbusinessobjects:serverGroupRadioButton>
</jsdlsapbusinessobjects:serverGroupRadioGroup>
</jsdlsapbusinessobjects:Webi>
<jsdlsapbusinessobjects:SAPBusinessObjectsParms>
<jsdlsapbusinessobjects:serverConnection>
<jsdlsapbusinessobjects:server>
http://nc005090:6405/biprws</jsdlsapbusinessobjects:server>
<jsdlsapbusinessobjects:username>administrator</jsdlsapbusinessobjects:username>
<jsdlsapbusinessobjects:password>{aes}gphpOW4YKMVFXpmFpm7gGymVVBrEUIWydZeQ6x0uLHA=
</jsdlsapbusinessobjects:password>
<jsdlsapbusinessobjects:authType>secEnterprise</jsdlsapbusinessobjects:authType>
</jsdlsapbusinessobjects:serverConnection>
<jsdlsapbusinessobjects:resourceDetails>
<jsdlsapbusinessobjects:BOObject>Track Data Changes (rid:12248)
 </jsdlsapbusinessobjects:BOObject>
<jsdlsapbusinessobjects:timeout>7200</jsdlsapbusinessobjects:timeout>
<jsdlsapbusinessobjects:pollingPeriod>10</jsdlsapbusinessobjects:pollingPeriod>
</jsdlsapbusinessobjects:resourceDetails>
</jsdlsapbusinessobjects:SAPBusinessObjectsParms>
</jsdlsapbusinessobjects:SAPBusinessObjectsParameters>
```

```
</jsdlsapbusinessobjects:sapbusinessobjects>
</jsdl:application>
</jsdl:jobDefinition>
RECOVERY STOP
```

Job log content

You can see the job log content by running the command `conman sj <SAP BusinessObjects_job_name>;stdlist`, where *<SAP BusinessObjects_job_name>* is the SAP BusinessObjects BI job name.

For a SAP BusinessObjects BI job log, you see the following information:

```
================================================================
= JOB       : PHOENIX_1#JOBS[(0000 06/12/14),(JOBS)].SAP1456274126
= TASK      :
<jsdl:jobDefinition xmlns:jsdl="http://www.abc.com/xmlns/prod/scheduling/1.0/jsdl"
 xmlns:jsdlsapbusinessobjects=
 "http://www.abc.com/xmlns/prod/scheduling/1.0/jsdlsapbusinessobjects"
 name="SAPBUSINESSOBJECTS">
<jsdl:variables>
<jsdl:stringVariable name="tws.jobstream.name">JOBS
</jsdl:stringVariable>
<jsdl:stringVariable name="tws.jobstream.id">JOBS
</jsdl:stringVariable>
<jsdl:stringVariable name="tws.job.name">SAP1456274126
</jsdl:stringVariable>
<jsdl:stringVariable name="tws.job.workstation">PHOENIX_1
</jsdl:stringVariable>
<jsdl:stringVariable name="tws.job.iawstz">201406120000
</jsdl:stringVariable>
<jsdl:stringVariable name="tws.job.promoted">NO
</jsdl:stringVariable>
<jsdl:stringVariable name="tws.job.resourcesForPromoted">10
</jsdl:stringVariable>
<jsdl:stringVariable name="tws.job.num">262401960
</jsdl:stringVariable>
</jsdl:variables>
<jsdl:application name="sapbusinessobjects">
<jsdlsapbusinessobjects:sapbusinessobjects>
<jsdlsapbusinessobjects:SAPBusinessObjectsParameters>
<jsdlsapbusinessobjects:SAPBusinessObjectsParms>
<jsdlsapbusinessobjects:serverConnection>
<jsdlsapbusinessobjects:server>http://hostname:6405/biprws
</jsdlsapbusinessobjects:server>
<jsdlsapbusinessobjects:username>twsuser
</jsdlsapbusinessobjects:username>
<jsdlsapbusinessobjects:password>{aes}Vd6bVhRQZp0J6J7iyWpI+rWVFzejU0aU5Tr+FyH55dE=
</jsdlsapbusinessobjects:password>
<jsdlsapbusinessobjects:authType>secEnterprise
</jsdlsapbusinessobjects:authType>
</jsdlsapbusinessobjects:serverConnection>
<jsdlsapbusinessobjects:resourceDetails>
<jsdlsapbusinessobjects:BOObject>World Sales Report (rid:5376)
</jsdlsapbusinessobjects:BOObject>
</jsdlsapbusinessobjects:resourceDetails>
</jsdlsapbusinessobjects:SAPBusinessObjectsParms>
</jsdlsapbusinessobjects:SAPBusinessObjectsParameters>
</jsdlsapbusinessobjects:sapbusinessobjects>
</jsdl:application>
<jsdl:resources>
<jsdl:orderedCandidatedWorkstations>
<jsdl:workstation>D84867CC01834629A3C23CCDCF2B5014
</jsdl:workstation>
</jsdl:orderedCandidatedWorkstations>
</jsdl:resources>
</jsdl:jobDefinition>
= TWSRCMAP  :
= AGENT     : PHOENIX_1
= Job Number: 262401960
= Thu Jun 12 14:56:46 CEST 2014
================================================================
Scheduling BO object: World Sales Report (rid:5376)
BO object instance created with ID: 9547
Monitoring BO object World Sales Report (rid:5376) - Instance id:9547
BO monitoring iteration 0 Status: Pending
BO monitoring iteration 1 Status: Pending
BO monitoring iteration 2 Status: Running
BO monitoring iteration 3 Status: Running
BO monitoring iteration 4 Status: Running
BO monitoring iteration 5 Status: Completed
BO Report completed with success

================================================================
= Exit Status           : 0
```

```
= Elapsed Time (Minutes) : 2
= Thu Jun 12 14:57:47 CEST 2014
================================================================
```

See also

From the Dynamic Workload Console you can perform the same task as described in

the *Dynamic Workload Console User's Guide*, section about Creating job definitions.

For more information about how to create and edit scheduling objects, see

the *Dynamic Workload Console User's Guide*, section about Designing your Workload.

Chapter 29. Scheduling jobs on IBM Workload Scheduler from SAP Solution Manager

IBM Workload Scheduler and SAP Solution Manager are integrated to allow the IBM Workload Scheduler engine to run the job scheduling tasks available from the Solution Manager user interface.

The integration is provided by the SMSE Adapter, which runs on the master domain manager. The SMSE Adapter uses the SAP Solution Manager Scheduling Enabler (SMSE) interface provided by SAP to enable *external schedulers* to run the scheduling for Solution Manager.

With this integration, when you schedule a job from the `Scheduling` panel of Solution Manager, IBM Workload Scheduler takes charge of the job scheduling, monitoring, and management tasks, as well as of job triggering and notification.

Under these conditions IBM Workload Scheduler acts as an RFC-Server with a common interface for scheduling jobs. It is identified through an RFC-Destination, registered in the SMSE. The interaction between Solution Manager and IBM Workload Scheduler is based on a PUSH mechanism implemented by the SMSE interface, whereby the master domain manager responds to requests solicited by the Solution Manager job scheduling functions.

Qualified as *external scheduler* by Solution Manager, the registered masters, identified by their RFC destination names, can be called or administered from the `Process Scheduling Adapter` menu item in the Solution Manager GUI.

The jobs scheduled from Solution Manager on IBM Workload Scheduler must have been previously defined in the IBM Workload Scheduler database.

A job scheduled from the `Schedule Jobs` or `Job Documentation` panels in Solution Manager to be run by IBM Workload Scheduler, is automatically mapped in a job stream that is expressly created to include the job.

Registering the master domain manager on SAP Solution Manager

The first step to run the integration is to register the master domain manager on the SAP Solution Manager system.

To register master domain manager on the SAP Solution Manager system, you must:

1. Have established a connection based on RFC or Web Services between the master and the Solution Manager system.
2. Have the SAP JCo 3.0.2 libraries (`dll` and `jar` files) installed in the *TWS_home*`/methods/smseadapter/lib` directory on the master. To download JCo 3.0.2, visit the Sap Service Marketplace.

   Attention: The libraries require the Microsoft Visual C++ Redistributable Package (vcredist) installed.
3. Configure the `smseadapter.properties` file located in the *TWS_home*`/methods/smseadapter/lib` directory on the master.

The file contains a SMSE_ADAPTER_CONNECTION_*n* section that can be duplicated depending on the number of connections that you want to define. You can in fact set more connection definitions for the same master, where, for example, the following can vary:

- The SAP Solution Manager system.
- The agent that is to run the workload.
- The SAP user name.

Note, however, that a master domain manager can have only one active connection at a time via the smseadpter. If the adapter finds more that one section with the startAdapter property set to true (or not set to false), it uses the first section of properties and ignores the others.

```
[SMSE_ADAPTER_CONNECTION_1]
startAdapter =
ashost =
sysnr =
client =
sid =
user =
passwd =
lang =
destination =
setDestinationAsDefault =
jobStreamNamePrefix =
agentName =
notificationThreadCheckInterval =
adminConsoleHost =
adminConsolePort =
adminConsoleUser =
adminConsoleUserPassword =
```

This section can be repeated as many times as needed in the smseadapter.properties file.

The properties are:

Table 81. Properties for the smseadapter.properties file.

Property	Description	Required	Notes
SMSE_ADAPTER_CONNECTION_1	This is the section header. If you have more sections the last digit should differ from one section and another. If two sections contain identical property values, only the first section read is considered, the other is ignored.	✓	
startAdapter	Specifies whether to connect or not to SAP Solution Manager. Can be true or false. Must be set to true to make the connection work. Set to false to temporarily suspend the connection.	✓	The default is true.
ashost	The host name of the SAP Solution Manager server on which the master domain manager registers. For example, /H/7.142.153.8/H/ 7.142.154.114.	✓	The master domain manager can connect to one Solution Manager system at a time.

Table 81. Properties for the `smseadapter.properties` file. (continued)

Property	Description	Required	Notes
sysnr	The SAP system number of the system that the master registers on. This value must have two digits. For example, 00.	✓	
client	The SAP client number. For example, 001.	✓	
sid	The SAP system identifier (SID) that the master registers on. For example, SM1.	✓	
user	The SAP user name that will be used during the notification process to log into SAP Solution Manager. For example, twsadmin.	✓	
passwd	The SAP password that will be used during the notification process to log into SAP Solution Manager. You can enter it in clear or in encrypted forms.	✓	To encrypt the password use the `enigma` program located in the `methods` folder on the master.
lang	The SAP logon language. For example, EN.	✓	
destination	A name entered here to identify the RFC Destination that will be used to connect to SAP Solution Manager. For example, IWSM2.	✓	This name defines the logical connection between the Solution Manager system and the master domain manager, referred to in Solution Manager as the `external scheduler`. The complete destination name will then be formed by: *`destination@mdm_name`* For example: IWSM2@MAS93WIN
setDestinationAsDefault	Set to `true` to make this destination the default one. The default is `false`.		Use this property in a context where a Solution Manager system has more than one active destination defined (that is, more registered masters), to set the default external scheduler. If you do not set a default, and you have more external schedulers registered on an SM system, you will have to specify the destination at scheduling time.
jobStreamNamePrefix	A prefix of at least four letters that is to be added to the names of the job streams created when jobs are submitted. The first character must be a letter while the remaining characters can be alphanumeric.		The default prefix is SOLMAN.
agentName	The name of the IWS agent that will run the jobs. When you search for the job definition in the Scheduling dialog, the Search utility returns the names of the jobs defined to run on this agent.		If no agent name is specified, the Search utility returns the names of the jobs defined to run on all the agents attached to the master domain manager (unless you use filtering).

Table 81. Properties for the smseadapter.properties file. (continued)

Property	Description	Required	Notes
notificationThreadCheckInterval	The time interval, in seconds, between checks made by the notification thread on the status changes of a job. The default is 5 seconds.		The thread notifies Solution Manager with the status changes of a job.
adminConsoleURL	The protocol used (http or https) and the host name and port of the Dynamic Workload Console attached to the master. For example, `https://mydwc:port_number/abc/console`.		The next four properties, all related to the Dynamic Workload Console, are optional, but if you specify one, you must specify all.
adminConsoleUser	The username that logs onto the Dynamic Workload Console attached to the master.		
adminConsoleUserPassword	The password of the username that logs onto the Dynamic Workload Console attached to the master.		

Note that if the language configured for the master domain manager is different from the language configured for the Solution Manager system, the messages issued in the Solution Manager user interface may be displayed in mixed languages.

Scheduling

The `Job Management Work Center` panel of Solution Manager has two entry points for scheduling jobs:

- The `Schedule Jobs` item in `Common Tasks`, a direct way of scheduling, where you pick the job from the IBM Workload Scheduler database and you set the scheduling options and time definitions.
- The `Job Documentation` object, where you can create and edit job documentation, schedule, monitor, and manage jobs.

The jobs scheduled from Solution Manager on IBM Workload Scheduler must have been previously defined in the IBM Workload Scheduler database.

A job scheduled from the `Schedule Jobs` or `Job Documentation` panels in Solution Manager to be run by IBM Workload Scheduler, is automatically mapped in a job stream that is expressly created to include the job. The job stream is (automatically) defined in the IBM Workload Scheduler database with a specific prefix defined in the smseadapter.properties file.

Scheduling jobs directly

In the Scheduling panel, before you can proceed to enter the job name and the scheduling details, you are asked to specify the identity of the scheduling system and the scheduler type, which must be SMSE. You can then specify the name of the job definition, and the job type, which can be any of the job types supported by IBM Workload Scheduler. The job is qualified by Solution Manager as an `external` job.

Select the `Status message` check box to enable monitoring tasks for the job.

In the Start Conditions section select when and how frequently the job will run and optionally make selections in the Repeat every and Time Period groups. Your selections are then mapped to matching run cycles, valid from and valid to dates, working days or non- working days, and time dependencies on IBM Workload Scheduler.

Note: The Extended Window start condition is not supported. All other start conditions are supported.

Use the tabs available on the uppermost part of the panel to manage jobs; for example, to copy, reschedule, hold, release, kill, or cancel a job, and to subscribe or unsubscribe for status/change notification.

If a scheduled job has not been started, you can change its start conditions or parameters and click **Schedule/Change Externally** again. Alternatively, you can change the start conditions and select **Reschedule** to reset the job to a new start time. In either case, IBM Workload Scheduler deletes the current job instance (that has not been started) and creates another one with the new characteristics.

On the other hand, you can click **Cancel** on a non-completed job that was already started. In this case, IBM Workload Scheduler deletes the running instance as expected.

As soon as the job is scheduled with success, the external job ID and the status are updated and you can view the job instance on the Dynamic Workload Console.

Scheduling from job documentation

With the Job Documentation option of the Job Management Work Center you can also create job documentation for jobs defined in IBM Workload Scheduler and scheduled from Solution Manager. From the Job Documentation menu you can view and edit job details, including job steps, basic business information, and scheduling information.

To create job documentation:

1. In the Job Documentation view, create job documentation without template.
2. In the General pane of the new job documentation creation page, enter a job documentation name and select SMSE for its interface.
3. Add a step in the Step Overview table.
4. Select a job definition type from a list of job types available from IBM Workload Scheduler.
5. Click **Save** on top of the job documentation creation page.
6. Select the **Systems** tab in the job documentation creation page and add a solution for the new job documentation in the Logical Components and solutions table. Click **Save**.
7. Select **Scheduling** in the Systems table and click the check box in the Leading Role column to set up scheduling definitions for the job associated with the new job documentation.

   This action displays the same Scheduling panel described in "Scheduling jobs directly" on page 356.

   You can also select **Monitoring** in the Systems table to set up monitoring specifications for the job.

Monitoring

Job status retrieval and job monitoring tasks are run by IBM Workload Scheduler, but you can configure and view them from the Solution Manager Job Documentation and Monitoring views. In Solution Manager to monitor a job you must configure a Business project monitoring object (BPmon). When monitoring data is requested for a job, Solution Manager through the SMSE adapter requests IBM Workload Scheduler for updates on the job status, logs, alerts.

To view the status of a job in the Solution Manager Job Documentation view, provided you selected the Status message check box in the Scheduling page, follow these steps:

1. Open the job documentation view for the job.
2. Select the Systems and the Scheduling tabs.
3. In the Scheduling page select the External Log button.

   The job log is displayed in a pop-up window.
4. Select the Refresh button of the External Job Status field in the Scheduling page.

   The current status of the job is displayed in the field.

To configure monitoring for a scheduled job with the Status message check box selected, go to the Job Management Work Center panel of Solution Manager and open the Job Documentation view related to the job. There, select the Systems tab and in the ensuing page select Monitoring.

1. In the Job Identification section of the Monitoring Configuration window, input all mandatory fields and check the SMSE Push option.
2. Select the Alert Configuration tab and configure alerts to your convenience.
3. Fill in the mandatory fields in the Notification and Monitoring Activities tabs.
4. Select the Generate and Activate buttons on top to save and activate the monitoring object.

With the Push mechanism IBM Workload Scheduler forwards to Solution Manager the status changes that a job instance undergoes until it reaches a final status such as complete, canceled, error, or killed. IBM Workload Scheduler also forwards the following scheduling time information for the job instance:

- Estimated duration
- Actual start
- Actual completion

On the basis of this information, and according to the alert configuration you specified in the Alert Configuration pane, Solution Manager triggers these alerts when any of the thresholds you specified are reached or exceeded. This grants you the means to keep the execution of your workload under control.

To view the alerts for a monitored job, select the Monitoring view in the Job Management Work Center:

1. Select the monitoring object for the job in the Job Monitoring Standard view.
2. Refresh the alert list table after some monitoring period.

Setting up to log traces on WebSphere Application Server

By default, the SMSE adapter is traced only at start up, and only errors due to the incorrect configuration of the adapter (in the `smseadapter.properties` file) or that happen during the startup process are logged in the `SystemOut.log` file of WebSphere Application Server (located in `<WAS_profile_path>/logs/server1/SystemOut.log` or `<WAS_profile_path>\logs\server1\SystemOut.log` in the master domain manager).

If you want the complete logging of the SMSE adapter, you must activate the `tws_smseadapter` trace on WebSphere Application Server.

To do so, run the following procedure on the master domain manager:

1. Access the `<TWA_home>/wastools` directory.
2. Run the script:

   UNIX

   ```
   ./changeTraceProperties.sh [-user <TWS_user>
                               -password <TWS_user_password>]
                               -mode tws_smsadapter
   ```

   Windows

   ```
   changeTraceProperties.bat [-user <TWS_user>
                             -password <TWS_user_password>]
                             -mode tws_smsadapter
   ```

   where:

   [-user <*TWS_user*> **-password** <*TWS_user_password*>**]**
   The user and password are optional. By default, the script looks for the credentials in the `soap.client.props` file located in the properties directory of the WebSphere Application Server profile.

   -mode <*tws_smsadapter*> **is one of the following values:**

   active_correlation
   All communications involving the event correlator are traced.

   tws_all_jni
   All communications involving the jni code are traced. The jni code refers to code in shared C libraries invoked from Java™. This option is used by, or under the guidance of, IBM Software Support.

   tws_all
   All IBM Workload Scheduler communications are traced.

   tws_alldefault
   Resets the trace level to the default level imposed at installation.

   tws_bridge
   Only the messages issued by the workload broker workstation are traced.

   tws_broker_all
   All dynamic workload broker communications are traced.

tws_broker_rest
Only the communication between dynamic workload broker and the agents is traced.

tws_cli
All IBM Workload Scheduler command line communications are traced.

tws_conn
All IBM Workload Scheduler connector communications are traced.

tws_db
All IBM Workload Scheduler database communications are traced.

tws_info
Only information messages are traced. The default value.

tws_planner
All IBM Workload Scheduler planner communications are traced.

tws_secjni
All IBM Workload Scheduler jni code auditing and security communications are traced. The jni code refers to code in shared C libraries invoked from Java. Only use this option under the guidance of, IBMHCL Software Support.

tws_smseadapter
All the activities of the Solution Manager External (SMSE) adapter on the master domain manager are logged in the trace.log file. The only exceptions apply to errors due to missing libraries or errors incurred during the startup process, which are recorded in the SystemOut.log file

tws_utils
All IBM Workload Scheduler utility communications are traced.

3. Stop and restart the application server.

All the SMSE adapter actions will now be logged in the *<WAS_profile_path>*/logs/server1/trace.log or *<WAS_profile_path>*\logs\server1\trace.log file.

To disable complete logging, run the command again to change the tracing level from `all` to `info`.

See the section about setting the traces on the application server for the major IBM Workload Scheduler processes in *Troubleshooting Guide* for more information.

Part 5. Appendixes

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