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Preface

This manual provides information on how to install, configure, and use the Tivoli® Scheduling Agent for R/3 in conjunction with Tivoli Workload Scheduler for z/OS.

Who Should Read This Guide

This guide is for system administrators who will install and configure the Scheduler tracker agents and who will monitor job execution on the R/3 system from the Scheduler interface.

Users of the guide should have some knowledge of the following:
- Tivoli Operations Planning and Control
- R/3 operating environment
- UNIX™ and Windows NT™ operating systems

What This Guide Contains

This guide contains the following chapters:
- Chapter 1. “Introduction” on page 1
  Provides an introduction to the product.
- Chapter 2. “Installation” on page 3
  Provides installation instructions for UNIX and Windows NT.
- Chapter 3. “R/3 Configuration” on page 9
  Describes how to install R3batch.
- Chapter 4. “Scheduling R/3 Jobs” on page 15
  Describes how to define the scheduling agent workstation, job streams (applications), and jobs (operations).

Publications

This section lists publications in the Tivoli Workload Scheduler for z/OS library and any other related documents. It also describes how to access Tivoli publications online, how to order Tivoli publications, and how to make comments on Tivoli publications.

Publications for Tivoli Workload Scheduler for z/OS

The following table lists the publications in the Tivoli Workload Scheduler for z/OS library.

<table>
<thead>
<tr>
<th>Task</th>
<th>Publication</th>
<th>Order number</th>
</tr>
</thead>
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<td>Licensed Program Specifications</td>
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</tr>
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<td>Using the Java GUI</td>
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<td>Interpreting messages and codes</td>
<td>Messages and Codes</td>
<td>SH19-4548</td>
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Table 1. List of Publications (continued)

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<thead>
<tr>
<th>Task</th>
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<td>Diagnosing failures</td>
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Online Books for Tivoli Workload Scheduler for z/OS

All the books in the Tivoli Workload Scheduler for z/OS library, except the licensed publications, are available in displayable softcopy form on CD-ROM in the following Softcopy Collection Kit:
- OS/390®, SK2T-6951

You can read the softcopy books on CD-ROMs using these IBM® licensed programs:
- BookManager® READ/2
- BookManager READ/DOS
- BookManager READ/6000

All the BookManager programs need a personal computer equipped with a CD-ROM disk drive (capable of reading disks formatted in the ISO 9660 standard) and a matching adapter and cable. For additional hardware and software information, refer to the documentation for the specific BookManager product you are using.

Updates to books between releases are provided in softcopy only.

Accessing Publications Online

You can access many Tivoli publications online at the Tivoli Customer Support Web site:

http://www.tivoli.com/support/documents/

These publications are available in PDF or HTML format, or both. Translated documents are also available for some products.

Ordering Publications

You can order many Tivoli publications online at the following Web site:

http://www.ibm.com/shop/publications/order

You can also order by telephone by calling one of these numbers:
- In the United States: 800-879-2755
- In Canada: 800-426-4968
- In other countries, for a list of telephone numbers, see the following Web site:
  http://www.tivoli.com/inside/store/lit_order.html
Providing Feedback about Publications

We are very interested in hearing about your experience with Tivoli products and documentation, and we welcome your suggestions for improvements. If you have comments or suggestions about our products and documentation, contact us in one of the following ways:

- Send an e-mail to pubs@tivoli.com.
- Complete our customer feedback survey at the following Web site: http://www.tivoli.com/support/survey/

Contacting Customer Support

If you have a problem with any Tivoli product, you can contact Tivoli Customer Support. See the Tivoli Customer Support Handbook at the following Web site:

http://www.tivoli.com/support/handbook/

The handbook provides information about how to contact Tivoli Customer Support, depending on the severity of your problem, and the following information:

- Registration and eligibility
- Telephone numbers and e-mail addresses, depending on the country you are in
- What information you should gather before contacting support

Prerequisite and Related Documents

The following documents contain information related to the installation and operation of the Scheduler tracker agents:

- Tivoli Operations Planning and Control: Tracker Agents for OS/2 and Windows NT** Platforms Installation and Operation (SH19-4483)

Conventions Used in This Guide

The following conventions are used in this guide to describe the special terms or commands. These conventions have the following meanings:

- **Bold** Commands, keywords, file names, or other information that you must use literally appear **bold**. Names of windows, dialogs, and other controls also appear **bold**.

- *Italics* Variables and values that you must provide appear in *italics*.

- **Bold Italic** New terms appear in **bold italic** the first time they are used.

- **Monospace** Code examples appear in monospace font.
Supported Platforms

The following are the supported platforms for the Tivoli Scheduling Agent for R/3:

- AIX® 4.3
- HP-UX 11.x
- Sun Solaris 2.6
- Digital UNIX 4.0
- Windows 2000®

Supported R/3 Versions

The Tivoli Scheduling Agent for R/3 supports the following versions of R/3:

- 4.0B
- 4.5A, 4.5B
- 4.6
Introduction

The Tivoli Scheduling Agent for R/3 gives you the ability to schedule and control R/3 jobs using the job scheduling features of Tivoli Workload Scheduler for z/OS or those of Tivoli Workload Scheduler.

With the Tivoli Workload Scheduler for z/OS, the submission and tracking of a R/3 job is done from the scheduler controller through a tracker agent connection.

The scheduler controller running on OS/390 submits the R/3 job to a scheduler tracker agent that in turn submits the job to the R/3 system using the scheduling agent.

When a R/3 job submitted by scheduler changes its status, the scheduler controller is notified of the status changes. From the scheduler controller it is possible to retrieve the job log of the submitted R/3 jobs.

Features

You can do the following:
- Use scheduler standard job dependencies and controls on R/3 jobs.
- Schedule R/3 jobs to run on specified days and times and in a prescribed order.
- Define interdependencies between R/3 jobs and jobs that run on different platforms, including UNIX, Windows NT, and OS/390.

R/3 Scheduling Agent Process

The scheduling agent is defined in a standard scheduler workstation definition, which associates the scheduler workstation with the R/3 scheduling agent and identifies the access method as r3batch. When invoked, the method reads configuration information from an options file named r3options. Each instance of R/3 is defined as a separate scheduler workstation, and each has a separate entry in the r3options file.
To launch an R/3 job, the scheduler tracker agent (where the scheduling agent is installed) executes r3batch, passing it information about the job. Using the workstation name as a key, r3batch looks up the corresponding entry in the r3options file to determine which instance of R/3 will run the job.

The r3batch access method looks up the job in the R/3 batch table, marks it as runnable, and sets its start time to “now” to launch the job. It then monitors the job through completion, writing job progress and status information to the job’s standard list file.

For more information about job management, refer to the scheduler documentation.
This chapter provides information for installing the Tivoli Scheduling Agent for R/3.

Software Requirements

To use the Tivoli Scheduling Agent for R/3 Version 4.0.1 with Tivoli Workload Scheduler for z/OS, you must be running the following:

- Tivoli OPC Version 2.2.0 or later.
- Tivoli OPC Tracker Agent Version 2.2.0 or later.
- One of the R/3 versions listed in [Supported R/3 Versions](#) on page viii

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<thead>
<tr>
<th>To resolve different issues on</th>
<th>Refer to these R/3 notes</th>
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<td>R/3</td>
<td>399449, 430087</td>
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<tr>
<td></td>
<td>(Install the appropriate R/3 Support Package as stated by the R/3)</td>
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<tr>
<td>R/3. 31i</td>
<td>393708</td>
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</tr>
<tr>
<td>R/3 4.6x</td>
<td>326752, 352606</td>
</tr>
</tbody>
</table>

Installation Overview

1. Perform the following steps on the Tivoli Workload scheduler for z/OS tracker agent:
   a. Extract the Tivoli Scheduling Agent for R/3 software from the product CD-ROM.
      - For UNIX, execute the `r3setup` script to decompress the files and perform initial setup.
      - For Windows NT, execute the `SETUP.EXE` program to install the files and perform initial setup.
   b. On the system running the Tivoli Workload Scheduler for z/OS tracker agent, create the `r3options` file and install it to the `OPChome/methods` directory. This file is required.
   c. Create the `r3options` file. This file is required.

2. On the R/3 system, install the `R3BATCH` ABAPs:
   - Create the RFC user.
   - Import the Correction and Transport files.
Installing on UNIX

Follow these instructions to install the R/3 scheduling agent on a UNIX system running the Tivoli Workload Scheduler for z/OS tracker agent for UNIX:

1. Log in as root and change to the OPChome directory (the $SEQQHOME directory, usually /home/tracker).

2. Mount the installation CD-ROM, and extract the software:

   - From tape:
     ```
     tar -xv [f tape]
     ```
   - From CD:
     ```
     tar -xvf cd/SAP/platform/sap.tar
     ```
   
   where:
   - tape  The pathname of your tape drive.
   - cd    The pathname of your CD-ROM drive.
   - platform  Your platform type. Choose from one of the following:
     - AIX  IBM
     - OSF  Compaq Tru 64
     - HPUX  Hewlett Packard
     - SOLARIS  Sun Solaris

3. Execute the r3setup script to decompress the scheduling agent files, perform the initial setup, and create the r3options file:

   ```
   /bin/sh r3setup -new|-update
   ```
   
   where:
   - -new  Use the new parameter when this is a new installation.
   - -update  Use the update parameter when you are installing over a previously installed version of the R/3 scheduling agent.

4. Create the r3batch.opts file. This file must reside in the OPChome/methods directory. During the installation you are prompted to enter following attributes:

   ```
   LJuser=launch_user
   IFuser=info_user
   JobDef=jobdef
   ```

   where launch_user:

   Is the UNIX user name that executes the r3batch method. This must be a valid UNIX account.

   info_user:

   The UNIX user name that executes the r3batch method to retrieve job information. It must be the same as the LJuser.
Enter **r3batch** as the job definition type to access specific job definition windows in Tivoli Workload Scheduler for z/OS. Enter **Generic** for the standard composer job definition GUI.

5. The **r3options** file must reside on the Tivoli Workload Scheduler for z/OS tracker agent host workstation in the `OPChome/methods` directory. It contains an entry for each R/3 Scheduling Agent. You are prompted to enter a number of attributes for each R/3 Scheduling Agent.

6. Open the Job Scheduling Console or the Tivoli Workload Scheduler for z/OS ISPF panels and create a workstation definition in Tivoli Workload Scheduler for z/OS for each instance of R/3.

### Installing on Windows NT/2000

Follow these instructions to install the R/3 Scheduling Agent on a Windows NT/2000 workstation running the Tivoli Workload Scheduler for z/OS tracker agent for Windows NT/2000:

1. Log in as a user in the Administrators group or the Domain Administrators group, as appropriate.

2. Insert the installation CD-ROM.

3. Exit any Windows applications, including the File Manager.

4. Run the `SETUP.EXE` program:
   
   ```cmd
   X:\SAP\i386\SETUP.EXE
   ```

   where X is your CD-ROM drive letter. This starts the install program which prompts you for installation information.

5. The Welcome screen provides information about installing the R/3 Scheduling Agent. To continue, click the **Next** button. The Choose Destination Location screen is displayed.

6. Define the directory to install the R/3 Scheduling Agent method. Click the **Browse** button to locate and select the `OPChome` directory. Click the **Next** button to select the Setup type.

7. Select the Setup type you prefer and click the **Next** button to continue. The Typical Installation is recommended.

8. Select the Program Folder of the R/3 Scheduling Agent for R/3. To continue, click the **Next** button.

9. Define the **LJUser** and the **IFUser** and click the **Next** button. The r3batch.opts file will be created in the `OPChome/methods` directory.

   ```none
   where LJ User:
   ```

   The Windows NT/2000 user name on the Tivoli Workload Scheduler for z/OS tracker agent host computer under which the method runs to launch R/3 jobs. For example: tracker. This name overrides the name entered in all job definitions.

   ```none
   IF User:
   ```
The Windows NT/2000 user name on the Tivoli Workload Scheduler for z/OS tracker agent host computer under which the method runs to retrieve a list of R/3 jobs. It must be the same as **LJUser**:.

Setup sets the job definition type (**JobDef**) to **r3batch** by default.

**Note:** if the r3batch.opts file already exists in the **OPChome\methods** directory, you are prompted whether to keep it or to create a new one. Click the **No** button to create a new r3batch.opts file.

10. Now a bar graph is displayed showing the installation progress. Click the **Cancel** button to interrupt the process.

11. When the setup is complete, click the **Finish** button to exit the setup wizard. If this is a new installation, make sure the **Launch the R3 Options Editor R3Opt** check box is selected to launch the options editor right after the setup. You can launch the options editor at any time by using the **Start Menu**.

12. If the options editor is launched on a new installation, the r3options file does not exist, and you are asked whether or not to create it. Click the **OK** button to continue. Enter the options for each R/3 Scheduling Agent you are going to run.

13. When you have completed entering the options, click the **Save** button and confirm. The r3options file is saved in the **OPChome\methods** directory. Click the **Exit** button and confirm.

14. Open the Job Scheduling Console or the Tivoli Workload Scheduler for z/OS ISPF panels and create a workstation definition in Tivoli Workload Scheduler for z/OS for each instance of R/3.

**r3options File Reference**

The r3options file must reside on the Tivoli Workload Scheduler for z/OS Tracker Agent host workstation in the **OPChome\methods** directory. It contains a set of options for each R/3 Scheduling Agent workstation.

The options are separated by one or more spaces. To create and maintain the file, you can either use a text editor, or you can use the **r3setup -maintain** command for UNIX or the program **R3Opt 1.1** from the Start Menu for Windows NT/2000.

Each set of options has the following syntax:

```
HostWorkstationName R/3ApplicationServer [R/3GatewayHost] R/3SystemName R/3Instance ClientNumber Userid Password ShortInterval LongInterval AuditLevel [Language] [RetryCount] [Prohibition of job definition]
```

The options for each R/3 scheduling agent are:

**Host workstation (CPU) Name**

The Tivoli Workload Scheduler for z/OS workstation name of the Scheduling Agent for the instance of R/3. This must be the same name as the workstation Name entry in the Scheduling Agent’s workstation definition.

**R/3 Application Server**

The host name of the R/3 application server.
R/3 Gateway Host (optional)
The host name of the R/3 gateway system, if different from the R/3 host.

R/3 System Name
The R/3 system identifier.

R/3 Instance
The R/3 instance number on R/3 Host.

Client Number
The R/3 client number for starting jobs.

Userid
The R/3 user name that the R/3 Scheduling Agent will use to release R/3 jobs and to connect to the R/3 servers. This user must have batch administration privileges. When R/3 jobs are released by Tivoli Workload Scheduler for z/OS, the job log output in R/3 is found under this user name.

Password
The password for Userid. The R/3 user should be given a password that does not expire.

Re-enter Password
Re-enter the password defined previously.

Short Interval
The minimum interval in seconds for R/3 job status updates. The default is 30.

Long Interval
The maximum interval in seconds for R/3 job status updates. The default is 300.

Audit Level
The Audit level used to log Tivoli Workload Scheduler for z/OS activities on R/3. A higher level means more messages are logged. Valid values are 0 to 5.

Language (optional)
The language x-agent will use to logon into the R3 system. If this entry is omitted, x-agent will use English as the logon language. The syntax for the language is L=XX where XX specifies either the one-byte language or the two-byte ISO language. For example L=DE would select German as the login language of the x-agent.

Note:
To get a message of the x-agent in the selected language you will need a related language message catalog. Currently, only an English message catalog is provided.

Retry count (optional)
The number of retries to execute an R/3 function module, if the R/3 system becomes unavailable. If you leave this field blank Tivoli Workload Scheduler scheduling agent for R/3 uses a default value to determine the number of retries. The syntax for the retry count is RETRY=X where X is the number of retries.

Prohibition of job definition
If present, this flag prohibits definition of R/3 jobs through the Tivoli Workload Scheduler. The syntax for this flag is NOJOBDEFS.
Sample r3options File Entry

The following is a sample r3options file entry for a R/3 Scheduling Agent workstation called SAP001:

SAP001 SYS01 SYS01 SAP 00 100 MAESTRO <ENCRYPTED> 30 300 0 L=DE RETRY=5 NOJOBDEFS

Modifying the r3options File

The r3options file can be modified with any text editor, or by using the following:

- For a UNIX Scheduling Agent host, log on as root and run the following command:
  
r3setup -maintain

- For Windows NT/2000 Scheduling Agent host, log on as administrator and in the Start menu select the following program: R3Opt 1.1

Note: If you use a text editor for Windows NT/2000, make sure it does not add any special end-of-line characters.

Encrypting R/3 User Passwords on UNIX Host

When you make your entries in the r3options file using the r3setup script, the r3pass 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. Run the encryption command as follows:

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 r3options file.

Installing the Scheduling Agent on the R/3 System

Install R3BATCH ABAP modules on the R/3 system. Installing the R3BATCH ABAP modules is explained in detail in "R/3 Configuration" on page 9. It includes instructions for creating an RFC user, and installing the following ABAP modules:

J_101_BDC_STATUS
J_101_DATE_TIME
J_101_JOB_COPY
J_101_JOB_DELETE
J_101_JOB_FIND
J_101_JOB_FINDALL
J_101_JOB_OPEN
J_101_JOB_LOG
J_101_JOB_START
J_101_JOB_STATUS
J_101_JOB_STOP
To communicate and control job execution on R/3, Tivoli Workload Scheduler for z/OS requires you to install correction and transport files on the R/3 database system.

These steps require an R/3 BASIS Administrator.

Overview

These procedures add new ABAP/4 function modules to your R/3 system, and several new internal tables. No existing R/3 system objects are modified.

Here is an overview of the procedure:
1. Create the authorization profile.
2. Create the Tivoli Workload Scheduler for z/OS RFC user ID.
3. Copy the correction and transport files from the Tivoli Workload Scheduler for z/OS server to the R/3 server.
4. Import correction and transport files into R/3.
5. Verify the installation.

Creating the Authorization Profile

Before you create an RFC user ID for Tivoli Workload Scheduler for z/OS batch processing, you need to create the profile of the authorizations that the Tivoli Workload Scheduler for z/OS user requires. The authorizations required differ depending on your version of R/3. The -defined authorizations are found under the Object Class Basis: Administration.

Notes:
1. It is possible that S_RFC_ALL is found under the Object Class Cross-application Authorization Objects or Non-application-specific Authorization Objects.
2. It might be necessary to give additional authorizations for the MAESTRO user for some special jobs.

For R/3 Versions 3.1g, 3.1h, 3.1i, 4.0x, 4.5x, and 4.6x

Create the following authorization profile:
1. Create a profile called Z_MAESTRO.
2. Insert the following authorizations:

Note: Depending on the version of the R/3 system, following warning can occur: “Choose another profile name (this name does not conform to the standard)”. This warning can
be ignored or another name can be chosen.

<table>
<thead>
<tr>
<th>Object</th>
<th>Text</th>
<th>Authorization</th>
</tr>
</thead>
<tbody>
<tr>
<td>S_RFC</td>
<td>Auth. check for RFC access</td>
<td>S_RFC_ALL</td>
</tr>
<tr>
<td>S_XMI_PROD</td>
<td>Auth. for External Management Interfaces (XMI)</td>
<td>S_XMI_ADMIN</td>
</tr>
<tr>
<td>S_BTCH_ADM</td>
<td>Background Processing: Background administrator</td>
<td>S_BTCH_ADM</td>
</tr>
<tr>
<td>S_BTCH_NAM</td>
<td>Background Processing: Background User Name</td>
<td>S_BTCH_ALL</td>
</tr>
<tr>
<td>S_BTCH_JOB</td>
<td>Background Processing: Operations on Background Jobs</td>
<td>S_BTCH_ALL</td>
</tr>
<tr>
<td>S_XMI_LOG</td>
<td>Internal Access Authorizations for XMI Log</td>
<td>S_XMILOG_ADM</td>
</tr>
<tr>
<td>S_SPO_ACT</td>
<td>Spool: Actions</td>
<td>S_SPO_ALL</td>
</tr>
<tr>
<td>S_SPO_DEV</td>
<td>Spool: Device Authorizations</td>
<td>S_SPO_DEV_AL</td>
</tr>
</tbody>
</table>

Creating the Tivoli Workload Scheduler for z/OS RFC User

For Tivoli Workload Scheduler for z/OS to communicate with R/3, you need to create a user ID in R/3 for Tivoli Workload Scheduler for z/OS batch processing. Tivoli suggests a new user ID rather than using an existing one, for security reasons.

1. Create a new RFC user ID.
2. Give this new RFC user ID the following attributes:
   - The user type should be CPIC/Communications (resp. depending on the R/3 release).
   - A password at least six characters in length; Tivoli Workload Scheduler for z/OS requires this password to start or monitor R/3 jobs. If this password changes in R/3, you must update the r3options file with the new password.
   - Assign the appropriate security profiles depending on your version of R/3.

Copy the Correction And Transport Files

The setup file loads two correction and transport files into OPC home directory. You must copy these correction and transport files to the server and import them into the R/3 database.

1. On your R/3 database server, log on to your R/3 system as an administrator.
2. Copy the controlfile and datafile from the OPC home directory to the following directories on your R/3 database server:
   ```
   copy controlfile /usr/sap/trans/cofiles/
   copy datafile /usr/sap/trans/data/
   ```

   The names of the controlfile and datafile vary from to release to release. They are usually named **K000.xxx.tv1** (control file) and **R000.xxx.tv1** (data file).
Import ABAP/4 Modules into R/3

This procedure generates, activates, and commits new ABAP/4 function modules to your R/3 system and several new internal tables. No existing R/3 system objects are modified.

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` is the transport request and `sid` is your R/3 system ID. The name of the transport file is `tv1k000.xxx`.

3. Execute the `tp tst` command to test the import.
   `tp tst transport sid`

   After you have run this command, examine the log files in the `/usr/sap/trans/log` directory for error messages. Warnings of severity level 4 are normal.

   If you have errors, check with a person experienced in Correction and Transport, or try using unconditional modes to do the import.

4. Execute 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 R/3 database. They automatically become active.

   After you have run this command, examine the log files in the `/usr/sap/trans/log` directory for error messages. Warnings of severity level 4 are normal.

   If a problem is encountered, use unconditional mode when executing this step:
   `tp import transport sid U126`

5. When the import has completed, check the log files to verify that the import was successful. The log files are in the:
   `/usr/sap/trans/log` directory.

Troubleshooting the R/3 Connection

If you are unable to submit R/3 jobs using Tivoli Workload Scheduler for z/OS after the R/3 configuration, perform the following tests:

- Make sure you can ping the R/3 system from the Tivoli Workload Scheduler for z/OS system. This will show basic network connectivity.

- Execute the following telnet command to verify connectivity:
  `telnet systemname 33xx`

  where `systemname` is the system name or IP address of the R/3 server and `xx` is the R/3 instance.

- Attempt to manually log on to R/3 (with SAPGUI) using the Tivoli Workload Scheduler for z/OS log on name. Verify that the permissions are correct.
Create a new Tivoli Workload Scheduler for z/OS job to be run under R/3, and add the following advanced options:
- `debug`
- `trace`

Using the `debug` option, additional debug information is included in the job’s `stdlist` file (in Tivoli Workload Scheduler for z/OS).

Using the `trace` option on UNIX, a trace file `dev_rfc` is created in the OPC home directory. Using the trace option on Windows NT/2000, a `trace` file `rfcxxxxx_xxxxx.trc` is created in the OPC home directory. Make sure to delete the `trace` option from the job after you have performed debug procedures. The `trace` file can become very large and unmanageable.

**Note:** Typically these options are for debugging the Scheduling Agent and should not be used in standard production.

Verify that an R/3 gateway process is active on the R/3 system to which you are connecting. Verify that a `sapgwNN` entry is present in the services file of the Tivoli Workload Scheduler for z/OS system.

**Note:** that if YP/NIS (or any other directory service) is managing the services entries, you should verify that the master services file on your Tivoli Workload Scheduler for z/OS system is being used rather than the local services file.

If you are installing on an AIX system not using U.S. English, note that the U.S. Language Environment must be installed on the Tivoli Workload Scheduler for z/OS workstation and the R/3 database workstation. Otherwise the error “BAD TEXTENV” (or similar error message) might appear in the `dev_rfc` trace file, and connections to R/3 will fail.

### Changing the Tivoli Workload Scheduler for z/OS RFC User ID Password

If the password of the Tivoli Workload Scheduler for z/OS RFC user ID is modified after the initial installation, the `r3options` file must be updated with this change.

**Option 1**

1. For a UNIX Scheduling Agent host, log on as root and run the following command: `r3setup -maintain`
2. For Windows NT/2000 Scheduling Agent host, log on as administrator and in the Start menu select the following program: `R3Opt 1.1`
3. This prompts you to specify a new password for the Tivoli Workload Scheduler for z/OS RFC user ID.

**Option 2**

1. Log on as root to the system where the Scheduling Agent is installed, or for Windows NT/2000, log on as an administrator and start a DOS shell on the system where the Scheduling Agent is installed.
2. Generate an encrypted version of the new password. To do this, use the utility command `enigma` in `OPChome\bin.`
3. In a command shell, type:
   
enigma newpass

   where newpass is the new password for the Tivoli Workload Scheduler for z/OS RFC user ID. The enigma command prints an encrypted version of the password.

4. Copy this encrypted password into the r3options file. The r3options file is located in the OPChome/methods directory. The file can be edited with any text editor.

   Be sure to copy the password exactly, preserving upper/lower case and punctuation. The encrypted password will look something like:

   #TjM-pYm#-z82G-rB

   If the encrypted password is mistyped, Tivoli Workload Scheduler for z/OS will not be able to start or monitor R/3 batch jobs.

**Migrating from Previous Versions**

This version of the Tivoli Scheduling Agent for R/3 supports all releases of R/3 from 3.1g to 4.6x. To achieve R/3 XBP certification for R/3 release 4.0 and 4.5 a few changes had to be made to the Scheduling Agent for R/3. Version 4.x of the Tivoli Scheduling Agent for R/3 uses the official R/3 RFC interfaces for job scheduling. These are:

- the SXMI_XBP interface for R/3 releases 3.1g to 4.0x
- the BAPI_XBP interface since release 4.5a

To avoid conflicts with other vendors the Tivoli ABAP modules now belong to the Tivoli partner namespace J_1O1_xxx. After you have completed the imports, as described in the RFC J_1O1_xxx, function modules are installed on your system.

If you had a former installation of Tivoli Scheduling Agent for R/3 on your system, you can delete the following function modules from your 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_OPEN
- Z_MAE2_JOB_LOG
- Z_MAE2_JOB_START
- Z_MAE2_JOB_STATUS
- Z_MAE2_JOB_STOP

These are the old versions of the Tivoli ABAP functions, which belong to the customer name space. You also can delete the function group YMA3.

It is not necessary to delete the function modules and the function group, but it is recommended if you want to clean up your system.
Print Parameter and Job Class issues

Tivoli Workload Scheduler scheduling agent for R/3 Version 4.x uses the official RFC interfaces for job scheduling. Due to limitations of these interfaces, migrating from previous versions of Tivoli Workload Scheduler scheduling agents for R/3 can lead to problems with print parameters in jobs launched by TWS. The following table shows the supported print parameters (X = print parameter is supported):

<table>
<thead>
<tr>
<th>Print Parameter</th>
<th>3.1x</th>
<th>4.0x</th>
<th>4.5x</th>
<th>4.6x</th>
</tr>
</thead>
<tbody>
<tr>
<td>output device</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>print immediately</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>delete after output</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>number of copies</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>archiving mode</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>authorization</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>selection cover page</td>
<td>--</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>R/3 cover page</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>spool retention period</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>recipient</td>
<td>--</td>
<td>--</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>lines</td>
<td>--</td>
<td>--</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>columns</td>
<td>--</td>
<td>--</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Installation of the appropriate R/3 Support Package as stated in the R/3 Notes no. 399449 and 430087 resolves loss of print parameters.

The same applies to the job class: official R/3 interfaces for job scheduling allow only class C jobs. Installation of the R/3 Support Package will resolve this issue as well.
Scheduling R/3 Jobs

The Tivoli Workload Scheduler for z/OS Controller submits R/3 jobs through the R/3 scheduling agent. The Tivoli Workload Scheduler for z/OS Controller sends a submit event to the Tivoli Workload Scheduler for z/OS tracker agent that, in turn, invokes the R/3 scheduling agent component to start and track the job on the R/3 system.

The definition of the workstation in Tivoli Workload Scheduler for z/OS has been enhanced to allow the specification of the access method. After this information is specified, the tracker agent can start to submit all the jobs defined on that workstation by means of the specified access method. The access method for R/3, called r3batch, must be installed on the machines where the Tivoli Workload Scheduler for z/OS tracker agent associated with these workstations run.

To launch a job on an R/3 x-agent, the Tivoli Workload Scheduler for z/OS tracker agent executes r3batch and passes it information about the job. Using the Tivoli Workload Scheduler for z/OS workstation name as a key, r3batch looks up the corresponding entry in the r3options file to determine which instance of R/3 will run the job. r3batch looks up the job in the R/3 batch table, marks it as runnable and sets its start time to "now" to launch the job. It then monitors the job through completion, writing job progress and status information to the standard list file of the job.

To schedule and control a R/3 job from Tivoli Workload Scheduler for z/OS, you must:

1. Define in R/3 the jobs that you want to start and track using Tivoli Workload Scheduler for z/OS. You can define these jobs using standard R/3 tools.
2. Define one or more workstations in the Tivoli Workload Scheduler for z/OS Controller associated with the R/3, and make sure that the corresponding entry is set in the r3options file on the tracker agent side.
3. Define operations in Tivoli Workload Scheduler for z/OS that correspond to the jobs to be scheduled in R/3.
4. Schedule and control R/3 jobs from the Tivoli Workload Scheduler for z/OS Controller.

For more information about general concepts of job management with Tivoli Workload Scheduler for z/OS, refer to Tivoli OPC Monitoring and Controlling the Workload and to Tivoli OPC Planning and Scheduling the Workload.
Defining Jobs in R/3

To define a job in R/3, use the standard R/3 tools for defining jobs. Refer to the R/3 documentation for information on creating the job with R/3 tools. Do not assign a start time and do not specify any dependencies. These are specified and controlled in Tivoli Workload Scheduler for z/OS. The job is identified in Tivoli Workload Scheduler for z/OS by its R/3 job name and job ID. The same job can be scheduled to run repeatedly by Tivoli Workload Scheduler for z/OS without having to redefine it in R/3.

Notes:

1. For R/3 jobs controlled by Tivoli Workload Scheduler for z/OS, the job log output in R/3 is found under the user name defined in the r3user option of the r3options file.
2. R/3 jobs have an authorization user name, which might be different for each step in the job. Normally, this name defaults to the user that created the job. For R/3 jobs run by Tivoli Workload Scheduler for z/OS, the authorization user fields are not changed. Permissions are neither gained nor lost relative to running the same jobs without Tivoli Workload Scheduler for z/OS.

Defining R/3 Workstations in Tivoli Workload Scheduler for z/OS

Tivoli Workload Scheduler for z/OS requires a workstation definition for each end node where a job is submitted. A workstation definition is required for each instance of the R/3 scheduling agent that will execute R/3 jobs submitted by Tivoli Workload Scheduler for z/OS.

In the Tivoli Workload Scheduler for z/OS Controller, more than one workstation can be defined for a Tivoli Workload Scheduler for z/OS tracker agent. To enable a workstation to submit R/3 jobs, this workstation must be defined in the following way:

- Its destination must be the name (specified in the ROUTOPTS statement of the Tivoli Workload Scheduler for z/OS parmlib) of the tracker agent where the R/3 x-agent is installed.
- Its associated access method name must be set to r3batch.

You have two means to define the workstation:

- The Tivoli Workload Scheduler for z/OS ISPF panels
- The Job Scheduling Console

The following figures show the sample definition of a SAP R/3 workstation named SAP1 that is associated to a tracker agent where the SAP R/3 scheduling agent is installed. All jobs submitted on that workstation will be handled as SAP R/3 jobs.
To set access method parameters for a Tivoli Workload Scheduler for z/OS workstation, enter `m` on the command line of the panel above. Normal workstations do not have access method data associated with them, while workstations handling SAP R/3 jobs must have the access method name set to `r3batch`.

```
------------------ MODIFYING GENERAL INFORMATION ABOUT A WORK STATION ------------------
Command == >
Enter the command D for resources, A for availability or M for access method above, or enter/change data below:

Work station name : SAP1
DESCRIPTION === > SAP R/3 workstation
WORK STATION TYPE === > C
DELEGATION TYPE === > A
DELEGATION CODE === > 0
DELEGATION NAME === > A Automation, 0 Manual start and complete
DELEGATION limits, B Min reporting
PERIODIC SENDING === > NEVER
The default of daily plan printout data set
SPECIAL TASKS === > N
Parallel server usage C, F, R or N
Options:
SPLIT BiRCH === > N
Expiration of operation allowed, Y or N
JOB EXIT === > N
Ending of JCL allowed, Y or N
STARTED TASKS === > N
Started task report, Y or N
TIME === > N
Automatic STD, T or N
DESCRIPTION === > R3batch
Name of destination
STANDARD TIME === > Time from previous work station.CreateDirectory
LOCATION === > Destination for a normal operation DML HH
Last updated by === > On ME
```

The next figure shows the same workstation definition made with the **Create Workstation** facility of the Tivoli Job Scheduling Console.

```
------------------ WORK STATION ACCESS METHOD INFORMATION ------------------
Command == >
Enter/change data below:

Work station : SAP1
Access Method
ACCESS NAME === > r3batch
Access Name of the access method
ACCESS ADDRESS === > Optional TSO node address
ACCESS PORT NUMBER === > Optional Node port number
```

---

*Scheduling Agent for R/3*
The **Node Address** and **Port Number** fields are optional fields and are not used when you specify `r3batch` as the access method name.

### Defining Tivoli Workload Scheduler for z/OS Operations for R/3 Jobs

You must make Tivoli Workload Scheduler for z/OS operation definitions for each R/3 job you intend to schedule. R/3 jobs are defined like other Tivoli Workload Scheduler for z/OS jobs and include the job name and R/3-specific options.

A Tivoli Workload Scheduler for z/OS application (as defined in the Tivoli Workload Scheduler for z/OS database) can contain operations that can be both R/3 operations and normal operations, you can also create dependencies between R/3 operations and normal operations.

Tivoli Workload Scheduler for z/OS operations that correspond to R/3 jobs are defined in Tivoli Workload Scheduler for z/OS in the same way as normal operations. To make an operation that corresponds to a R/3 job, you should follow these rules:

- The operation number and the job name are your choice.
- The workstation name associated to the operation must be the name of a R/3 workstation.
- You must edit the JOBLIB member for that jobname and insert R/3 job-specific parameters (that is, the R/3 job name and jobID, or the R/3 userid), as shown in the following example:
When defining an R/3 job to Tivoli Workload Scheduler for z/OS, the R/3 job must already exist in the R/3 job database or must be created before it is scheduled by Tivoli Workload Scheduler for z/OS.

**R/3 Job Parameters**

R/3-specific information for the job must be coded in the joblib member that is specified when defining an operation in the application database. R/3-specific information is defined in the following way:

```
-job r3jobname -user r3username [-i r3jobid] [-vn varname [...] [-c a|b|c] [-nobdcwait] [-s step_num]
```

where:

- **-job r3jobname**
  - The name of the job in R/3. If the name contains spaces, it must be imbedded in single quotes. This parameter is required.

- **-user r3username**
  - The name of the R/3 job creator. Embedded spaces are not allowed. This parameter is required.

- **-i r3jobid**
  - The R/3 job ID. It must identify a job with the same name and user as specified in -job and -user or the Tivoli Workload Scheduler for z/OS jobname and username, whichever applies. This parameter is optional.

- **-v[n] varname**
  - Describes the variants to be passed to the R/3 job. Where **n** is the variant step number (default is 1) and **vname** is the variant name. Names with spaces must be enclosed in single quotes. Multiple variants can be included, if separated by spaces. This parameter is optional.

- **-c**
  - The class under which the job will run in R/3. It can be one of: a, b, or c. This overrides the class specified in the R/3 job definition, which is the default. This definition is valid only for R/3 releases prior to 3.1.G. This parameter is optional.

- **-nobdcwait**
  - Tells r3batch not to wait for the completion of BDC sessions that were started by the R/3 job. This parameter is optional.

See the next section for an explanation of the parameters.
-s step_number
   Specifies the R/3 step from which the R/3 job will be run. This parameter is
   optional.

-debug -trace
   Activates the r3batch trace and creates the dev_rfc file in the Tivoli Workload
   Scheduler for z/OS tracker agent home directory. These parameters are optional.

-flag IMMED
   Tells R/3 to submit the job immediately or as soon as possible. This parameter is
   optional.

The following is an example:
   -job myjob -user usrl -i 11239288 -v1 default -c b -nobdcwait

BDC Wait

With the BDC wait option, you can specify that an R/3 job launched by Tivoli Workload
Scheduler for z/OS will not be considered complete until all of its BDC (Batch Data
Collector) sessions have completed. This prevents other Tivoli Workload Scheduler for z/OS
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 complete.

To make use of the option, an R/3 job must be modified to write informational messages in
its joblog. To do this, add a message statement to your ABAP program for each BDC
session, using the following syntax:
   message i001(ZM) with 'name'
   message i001(ZM) with 'queueid'

where name is the BDC session name (up to 12 characters), and queueid is the BDC queue
ID (up to 20 characters). Multiple messages can be written to allow monitoring of multiple
BDC sessions.

BDC Session Names

If BDC sessions are specified by name, multiple BDC sessions can be created with the same
name. In this case, all of the BDC sessions with matching names must complete, provided
they were created during the execution of the R/3 job launched by Tivoli Workload
Scheduler for z/OS. Sessions with matching names created before the job starts or after it
finishes are ignored.

For example, suppose that a Tivoli Workload Scheduler for z/OS-launched R/3 job starts
three BDC sessions with the name ORD2, and issues one BDCWAIT message,
"BDCWAIT:ORD2". All three ORD2 sessions must complete before the R/3 job status is
shown as Completed in Tivoli Workload Scheduler for z/OS.

BDC sessions can also be specified by queueid, the 20-digit BDC session identifier. Because
each R/3 assigned queueid is unique, one BDCWAIT message must be issued for each
separate queueid to be monitored.

The completion status of an Tivoli Workload Scheduler for z/OS-launched R/3 job, whether
Completed or Error, is based entirely on the batch job’s execution status. It is not related to
the success or failure of any BDC sessions, which are considered finished regardless of any
errors found during BDC processing.
Tivoli Workload Scheduler for z/OS and R/3 Job Status

When an R/3 job is launched by Tivoli Workload Scheduler for z/OS, you can monitor its progress from the ISPF panels of the Tivoli Workload Scheduler for z/OS current plan. The status transitions in Tivoli Workload Scheduler for z/OS and the corresponding R/3 statuses are listed in the following table.

<table>
<thead>
<tr>
<th>Tivoli Workload Scheduler for z/OS Job Status</th>
<th>R/3 Job Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>STARTED</td>
<td>Ready</td>
</tr>
<tr>
<td>STARTED</td>
<td>Active</td>
</tr>
<tr>
<td>COMPLETED</td>
<td>Finished</td>
</tr>
<tr>
<td>ENDED IN ERROR</td>
<td>Cancelled or finished in error</td>
</tr>
</tbody>
</table>

Although a job might be finished in R/3, Tivoli Workload Scheduler for z/OS will keep it in the STARTED state if its BDC sessions are not complete and you have not selected the Disable BDC Wait option or -nobdcwait in the command line.
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