Getting Started

Version 8.2
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Preface

Getting Started shows you how to define your installation data for IBM® Tivoli® Workload Scheduler for z/OS™ and how to create and modify plans.

The term “the scheduler,” when used in this book, refers to IBM Tivoli Workload Scheduler for z/OS.

Who Should Read This Manual

This book is intended for new users of IBM Tivoli Workload Scheduler for z/OS. It introduces terms and shows you how to define installation data and create plans. This book also introduces and describes the basic setup and monitoring tasks for inexperienced users of IBM Tivoli Workload Scheduler for z/OS.

Your workload can run on various platforms, but you control it from a central z/OS system that runs IBM Tivoli Workload Scheduler for z/OS controller.

Readers should know how to work with the following topics:

- z/OS operating system
- Interactive System Productivity Facility (ISPF)
- TSO

What This Manual Contains

This document contains the following sections:

- Chapter 1, “Introduction”, on page 1
  Describes IBM Tivoli Workload Scheduler for z/OS concepts and terminology. Introduces terms that are used throughout the book and summarizes the role of IBM Tivoli Workload Scheduler for z/OS in the production department.

- Chapter 2, “Communicating with the Scheduler”, on page 3
  Describes techniques for navigating through the panels.

- Chapter 3, “Describing Your Environment”, on page 13
  Explains how to create workstations, calendars, and special resources.

- Chapter 4, “Creating Applications”, on page 23
  Explains how to create applications, operations, and job descriptions.

- Chapter 5, “Creating and Using the Long-term Plan”, on page 35
  Explains how to create and use the long-term plan.

- Chapter 6, “Producing the Current Plan”, on page 43
  Explains how to create, use, and query the current plan.

- Chapter 7, “Communicating with Workstations”, on page 53
  Explains how to use the ready list to view information operations.

- Chapter 8, “Modifying the Current Plan (MCP)”, on page 59
  Explains how to add occurrences to the current plan, change details of an operation, and restart failed operations.


### Publications

This section lists publications in the IBM Tivoli Workload Scheduler for z/OS library and related documents. It also describes how to access Tivoli publications online and how to order Tivoli publications.

#### Publications for IBM Tivoli Workload Scheduler for z/OS

The following documents are available in the IBM Tivoli Workload Scheduler for z/OS library:

- **Customization and Tuning, SC32-1265**
  Describes how to customize IBM Tivoli Workload Scheduler for z/OS.

- **Diagnosis Guide and Reference, SC32-1261**
  Provides information to help diagnose and correct possible problems when using the product.

- **General Information, SC32-1256**
  Describes the benefits of the entire IBM Tivoli Workload Scheduler suite.

- **Installation Guide, SC32-1264**
  Explains how to install IBM Tivoli Workload Scheduler for z/OS.

- **IBM Tivoli Workload Scheduler Job Scheduling Console Release Notes, SC32-1258**
  Provides information about working with IBM Tivoli Workload Scheduler, regardless of platform, from a common GUI.

- **IBM Tivoli Workload Scheduler Job Scheduling Console User's Guide, SC32-1257**
  Provides information about working with IBM Tivoli Workload Scheduler, regardless of platform, from a common GUI.

- **Licensed Program Specifications, GI11-4208**
  Provides planning information to plan about IBM Tivoli Workload Scheduler for z/OS.

- **Managing the Workload, SC32-1263**
  Explains how to plan and schedule the workload and how to control and monitor the current plan.

- **Memo to Users, GI11-4209**
  Provides a summary of changes for the current release of the product.

- **Messages and Codes, SC32-1267**
  Explains messages and codes.

- **Program Directory, GI11-4203**
  Provided with the IBM Tivoli Workload Scheduler for z/OS installation tape, describes all of the installation materials and gives installation instructions specific to the product release level or feature number.

- **Programming Interfaces, SC32-1266**
  Provides information to write application programs.

- **Quick Reference, SC32-1268**
  Provides a quick and easy consultation reference to operate the product.
Publications for IBM Tivoli Workload Scheduler

The following manuals are available in the IBM Tivoli Workload Scheduler library:

- **IBM Tivoli Workload Scheduler Planning and Installation Guide**, SC32-1273
  Describes planning and installing IBM Tivoli Workload Scheduler.

- **IBM Tivoli Workload Scheduler Reference Guide**, SC32-1274
  Explains the IBM Tivoli Workload Scheduler command line, understanding how extended and network agents work, and integrating IBM Tivoli Workload Scheduler with NetView® and with IBM Tivoli Business Systems Manager.

- **IBM Tivoli Workload Scheduler Troubleshooting and Error Messages**, SC32-1275
  Explains IBM Tivoli Workload Scheduler error messages, and provides sources of information that will help you in solving problems with IBM Tivoli Workload Scheduler.

- **IBM Tivoli Workload Scheduler for Applications User’s Guide**, SC32-1278
  Describes installing, using, and troubleshooting for the IBM Tivoli Workload Scheduler extended agents.

- **IBM Tivoli Workload Scheduler for Applications Release Notes**, SC32-1279
  Provides last-minute information about the IBM Tivoli Workload Scheduler extended agents.

- **IBM Tivoli Workload Scheduler Limited Fault-tolerant Agent for AS/400® User’s Guide**, SC32-1280
  Describes installing, configuring, and using IBM Tivoli Workload Scheduler fault-tolerant agents on AS/400.

- **IBM Tivoli Workload Scheduler Plus Module User’s Guide**, SC32-1276
  Describes how to set up and use the IBM Tivoli Workload Scheduler Plus module.

- **IBM Tivoli Workload Scheduler Release Notes**, SC32-1277
  Contains late-breaking information about IBM Tivoli Workload Scheduler.

Using LookAt to Look up Message Explanations

LookAt is an online facility that lets you look up explanations for most messages you encounter, as well as for some system abends and codes. Using LookAt to find information is faster than a conventional search because in most cases LookAt goes directly to the message explanation.

You can access LookAt from the Internet at:

[http://www.ibm.com/eserver/zseries/zos/bkserv/lookat/](http://www.ibm.com/eserver/zseries/zos/bkserv/lookat/) or from anywhere in z/OS or z/OS.e where you can access a TSO/E command line (for example, TSO/E prompt, ISPF, z/OS UNIX® System Services running OMVS).

The LookAt Web site also features a mobile edition of LookAt for devices such as Pocket PCs, Palm OS, or Linux-based handhelds. So, if you have a handheld device with wireless access and an Internet browser, you can now access LookAt message information from almost anywhere.

To use LookAt as a TSO/E command, you must have LookAt installed on your host system. You can obtain the LookAt code for TSO/E from a disk on your SK3T-4270 Collection Kit or from the LookAt Web site’s **Download** link.
Accessing Publications Online

The documentation CD contains the publications that are in the product library. The format of the publications is PDF and HTML formats. To access the publications using a Web browser, open the infocenter.html file.

IBM posts the most current publications for this and all other Tivoli products to the Tivoli Software Information Center Web site. The Tivoli Software Information Center is located at the following Web address:

http://publib.boulder.ibm.com/tividd/td/tdprodlist.html

Click the IBM Tivoli Workload Scheduler for z/OS link to access the product library.

Note: If you print PDF documents on other than letter-sized paper, select the Fit to page check box in the Adobe Acrobat Print window. This option is available when you click File → Print. Fit to page ensures that the full dimensions of a letter-sized page print on the paper that you are using.

Softcopy Collection Kit

All the books in the library, except the licensed publications, are available in softcopy in the following collection kits:

- IBM Online Library Omnibus Edition OS/390 Collection Kit, SK2T-6700.
- IBM Online Library z/OS Software Products Collection Kit, SK2T-4270.

You can read the softcopy books on CD-ROMs using these IBM licensed programs:

- Softcopy Reader
- 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 PDF and HTML on the Web.

Ordering Publications

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


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, see the following Web site for a list of telephone numbers:

http://www.ibm.com/software/tivoli/order-lit/

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 additional information, see the Accessibility Appendix in the Installation Guide.

Contacting IBM Software Support

If you have a problem with any Tivoli product, refer to the following IBM Software Support Web site:


If you want to contact software support, see the IBM Software Support Guide at the following Web site:

http://techsupport.services.ibm.com/guides/handbook.html

The guide provides information about how to contact IBM Software 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 in which you are located
- Information you must have before contacting IBM Software Support

Conventions Used in This Manual

This book uses several conventions for special terms and actions, operating system-dependent commands and paths, and margin graphics. Technical changes to the text are indicated by a vertical line to the left of the change.

<table>
<thead>
<tr>
<th>Information type</th>
<th>Style convention</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commands</td>
<td>All capital letters</td>
<td>CREATE</td>
</tr>
<tr>
<td>References in the text to fields on panels</td>
<td>All capital letters</td>
<td>QUANTITY</td>
</tr>
<tr>
<td>Input you should type in panel fields</td>
<td>Monospace</td>
<td>MYAPPLICATION</td>
</tr>
<tr>
<td>First time new term introduced, book titles</td>
<td>Italics</td>
<td>Application</td>
</tr>
</tbody>
</table>

What Is New in This Version

The following sections summarize the changes in this version of Tivoli Workload Scheduler for z/OS.
z/OS Functions

- You can have the local time on a z/OS system change automatically, for example, for daylight savings time, without having to stop and restart Tivoli Workload Scheduler for z/OS.
- You can turn the JESLOG SPIN option on or off using the SPIN keyword in the OPCOPTS statement. By default Tivoli Workload Scheduler for z/OS adds the JESLOG=NOSPIN parameter to the JOB card when the following conditions both occur:
  - You submit a JCL on a CPU running z/OS Version 1.2 or higher.
  - In the OPCOPTS initialization statement, you specify data store or job completion checker activities.
- To facilitate migration from other scheduling products, Tivoli Workload Scheduler for z/OS operations now accept a new symbolic name that can be up to 54 characters long. This operation extended name enables you to represent the job with something other than the operation number. You can specify the operation extended name when you define an operation in the database or when you copy it into the current plan. You can also use it to filter queries on operations in the database and current plan.
- You can use a mixed connection (SNA and XCF) between the controller and allocated data stores.
- A new exit routine, EQQUXPIF, validates changes in an application description (AD) made using the programming interface (PIF), batch loader (BL), and the Job Scheduling Console (JSC).
- To increase the virtual storage from 16 MB to 2 GB, the Tivoli Workload Scheduler for z/OS components have been changed to use 31-bit addressing mode instead of 24-bit.

End-to-End Functions

- For fault-tolerant workstations, you can continue to use centralized scripts, which are stored in the JOBLIB data set. With centralized scripts, you can perform variable substitution, automatic recovery, JCL editing, and job setup (as for the jobs in the JOBLIB). However, this implies a loss of fault tolerance and requires downloading the script to the agent every time the job is submitted. You need to weigh the benefits and disadvantages of using centralized scripts.
- You can use a new syntax to recover non-centralized jobs on distributed agents automatically when the jobs abend. This recovery is similar to the recovery in the distributed environment.
- You can use variable substitution for jobs that run on fault-tolerant workstations and that do not use centralized scripts. Tivoli Workload Scheduler for z/OS supplied-variable and user-defined variable tables are supported.
- You can enable firewall support and SSL authentication in end-to-end scheduling.
- You can specify a success condition for each job that determines whether a job is considered successful or abended.
- You can specify or modify the deadline time for a job or a job stream.
- There are new log files for netman, batchman, mailman, the writer, and the translator.
- Multiple domain managers can be connected to the controller. This allows greater flexibility, scalability, and improved performance.
- You can make an application or an operation dependent on the existence of one or more files before it can begin execution.
• You can activate and deactivate the submission of jobs scheduled in an end-to-end environment.
• You can enable or disable the auditing trail of a plan.
• You can change the status of distributed agents and switch their domain manager.
• You can refresh the content of the work directory.
• You can use the ISPF panels to produce an APAR tape that collects end-to-end data.
• You can use the Job Migration Tool to migrate from tracker agents to distributed agents.

Server Connectivity

• The server can use APPC and TCP/IP in simultaneous connections with the Job Scheduling Console, PIF, ISPF panels, and distributed agents.
• When an application is moved to another system in a sysplex environment, for example, for maintenance of the current system or for a failure, the application can be reached under the same virtual IP address. Using a dynamic virtual IP address makes the end-to-end configuration more flexible, because your application is independent of the TCP/IP stack within the sysplex.
Chapter 1. Introduction

This chapter briefly describes IBM Tivoli Workload Scheduler for z/OS and introduces basic concepts and terminology.

What Is IBM Tivoli Workload Scheduler for z/OS?

The IBM Tivoli Workload Scheduler for z/OS licensed program is Tivoli’s foundation for enterprise workload management. IBM Tivoli Workload Scheduler for z/OS provides a comprehensive set of services for managing and automating the workload. Whether you manage a single-image z/OS system or multi-vendor networks and systems from a single point of control, IBM Tivoli Workload Scheduler for z/OS helps you manage and automate the production workload. If you are not familiar with IBM Tivoli Workload Scheduler for z/OS terminology or functions, read the General Information.

How Your Production Workload Is Managed

The scheduler builds operating plans from your descriptions of the production workload.

The scheduler consists of a base product, the tracker and a number of features. All the systems in your complex require the base product. The tracker is the link between the system that it runs on and IBM Tivoli Workload Scheduler for z/OS controller.

One z/OS system in your complex is designated the controlling system and runs the controller feature. From this system, you can automatically plan, control, and monitor your production workload. Only one controller feature is required, even when you want to start standby controllers on other z/OS systems in a sysplex.

The end-to-end feature lets you centrally manage the workload on supported operating systems from the controlling system, such as UNIX and Windows NT®. See the IBM Tivoli Workload Scheduler Release Notes for a list of supported operating systems.

Concepts and Terminology

The scheduler uses these important concepts:

Applications

An application is a description of a unit of production work. It includes a list of the operations (related tasks) associated with that unit of work. For example, a payroll application might include a manual task where an operator prepares a job, several computer-processing tasks where programs are run to read a database, update employee records, and write payroll information to an output file, and a print task that prints pay checks.

Business processing cycles

The scheduler uses business processing cycles, or periods, to calculate when your applications should be run. When you create an application, you specify when it
should be planned using a run cycle. You can use rule-based run cycles to specify run days using rules such as “Third Thursday in July,” or “Every work day in week 40,” where you select the words from a multiple-choice panel.

Calendars

The scheduler uses calendar information so that applications are not scheduled to run on days when processing resources are not available (for example, Sundays and holidays). This information is stored in a calendar. The scheduler supports multiple calendars for enterprises where different departments have different work days and free days or when multiple data centers in different states or regions are controlled from a single site.

Dependencies

Most data processing activities need to occur in a specific order. Activities performed out of order can create invalid output or corrupt your corporate data. This results in costly reruns, missed deadlines, and dissatisfied customers.

In IBM Tivoli Workload Scheduler for z/OS, you can specify dependencies for operations when a specific processing order is required.

Plans

The scheduler builds operating plans from your descriptions of the production workload. First a long-term plan (LTP) is created, which shows (for typically one or two months) the applications that should be run each day, and the dependencies between applications. Then a more detailed current plan is created. The current plan is used by IBM Tivoli Workload Scheduler for z/OS to submit and control operations.

You can simulate the effects of changes to your production workload, calendar, and installation, by generating trial plans.

Special resources

You can use special resources to represent any type of limited resource, such as tape drives, communication lines, or a database. A special resource can be used to serialize access to a data set or to limit the number of file transfers on a network link. The resource does not have to represent a physical object in your configuration, although often it does.

Workstations

The scheduler supports a range of work process types, called workstations, that map the processing needs of any task in your production workload. Each workstation supports one type of activity. This gives you the flexibility to schedule, monitor, and control any data processing activity, including:

- Job setup—both manual and automatic
- Jobs
- Started tasks
- NetView communication
- Print operations
- Manual preprocessing or postprocessing activity.
Setup Tasks

If you are new to IBM Tivoli Workload Scheduler for z/OS and it is your first time through this book, ensure that all the following activities are complete:

- You have a TSO user ID that is authorized to access IBM Tivoli Workload Scheduler for z/OS subsystem.
- The scheduler subsystem is started.
- You are authorized to update these scheduler databases:
  - Workstation
  - Calendar
  - Application description
  - Job description
- You are authorized to use these scheduler functions:
  - Long-term planning
  - Daily planning
  - Workstation communication
  - Modify current plan
  - Query current plan

About the Examples in This Book

Some examples show how to create and modify data elements in IBM Tivoli Workload Scheduler for z/OS databases. Before doing any modify or create tasks, you should get authorization from the IBM Tivoli Workload Scheduler for z/OS administrator.

Examples of tasks that result in IBM Tivoli Workload Scheduler for z/OS displaying the same panel multiple times have been simplified to show the panel only once. For those examples with multiple input fields, such as Creating General Information for a Workstation (Figure 9 on page 14), you see a completed panel with highlighted reference numbers next to applicable input fields.
Chapter 2. Communicating with the Scheduler

To perform most tasks, you use IBM Tivoli Workload Scheduler for z/OS panels, which run under Interactive System Productivity Facility (ISPF).

Like all ISPF applications, IBM Tivoli Workload Scheduler for z/OS displays messages in the upper-right corner of the panels. Use PF1 (HELP) to see the long message text. You can also use PF1 to get more information about input fields if you need help in the panels. To cancel a panel function, use the CANCEL command, which you can abbreviate to CAN. No data is saved when you enter the CANCEL command.

You can reach all the controller panels from the main menu:

---

Setting Options

The options, and many of the parameters that you enter in the panels, are saved when you leave ISPF (though not if the session is terminated abnormally) and will be the default next time.

The controller subsystem manages the panels, so you must communicate with the correct subsystem. This section shows how to set the controller subsystem name and the date and time format for your panel sessions.
Specifying the Subsystem Name

1. Select 0 on the main menu to display the Defining OPC Parameters and Options menu.
2. To display the panel on which you set the subsystem name, select option 1 from the Defining OPC Parameters and Options menu. You see this panel:

   EQQXLUSL  ----------  OPC CONTROLLERS AND SERVER LU NAMES -- Row 1 to 3 of 3
   Command ==>> Scrol1 ==>> CSR

   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(nn) - Delete

   Row   Con-  S  Server     Description
          troller       LU name
   '' / OPCO ISIMEOPV On other________________
   ''_ OPCO SEIBM200.ISIMEOPV ________________________
   ''_ OPCX _______________ OPC on same MVS_________

   Figure 2. Setting the Subsystem Name

3. Select a subsystem from the list by typing a slash in the S column of the list panel.

   If the subsystem you want to connect to is not on the list, you can add new rows or change existing ones. If the subsystem is running on another z/OS system, enter the LU name of the server associated to that controller in the Server LU name column. If the server is on another network, the fully-qualified LU name must be entered in the form NETWORKID.LUNAME.

   In the example shown here, the subsystem is OPCO running in another z/OS system, and the associate server LU name is ISIMEOPV.

4. Press PF4 (RETURN) to save the changes and return to the main menu.

Setting Date and Time Formats

To set the date and time formats, you enter 0.2 from the main menu. You see this panel:

   EQQXDATP  --------------  SETTING OPC DATE AND TIME FORMAT ---------------
   Enter/change data below:
   DATE-FORMAT ==> YYMMDD__ Combine the characters for
                   year ( YY or CCYY ), and month ( MM ) and
t                   day ( DD ), or day number ( DDD ).
                   You can use separation characters (such
                   as - or /) if space permits.
   TIME-FORMAT ==> HH.MM Combine the characters for
                   hours( HH ) and minutes( MM ).
                   Optionally separated by any character.
   DURATION-FORMAT ==> MMMM.SS_ Specify the characters for hours( HH )
                   and minutes( MM ) and seconds( SS )
                   or minutes( MMMM ) and seconds( SS ).
                   Optionally separated by any character.
   LOCAL TIME OFFSET ==> 0___ Specify local time offset in minutes.
                   The value must be in the range 0 to 1439.
   TIME OFFSET SIGN ==> + Specify - if local time is before OPC.
                   Specify + if local time is after OPC.
   CALENDAR ID ==> DEFAULT_________ Default calendar identification

   Figure 3. Setting the Date and Time Format
In the **DATE-FORMAT** field, you can combine the characters YY (year), MM (month), and DD (day) in any order. The Julian calendar format of YY (year) and DDD (day) is also supported. Any character except D, M, or Y can be used as a delimiter. YYMMDD is the format used in examples in this book.

In the **TIME-FORMAT** field, you combine the characters HH (hour) and MM (minute). The delimiter character, shown as a period (.) in [Figure 3 on page 6](#) is optional and can be any character. HH.MM is the format used in examples in this book.

In the **DURATION-FORMAT** field, you combine the characters HH (hour), MMMM (minute), and SS (second). The delimiter character, shown as a period (.) in [Figure 3 on page 6](#) is optional and can be any character. MMMM.SS is the format used in examples in this book.

The scheduler uses the calendar that you specify for panel functions, such as the Long Term Plan panel and the GENDAYS command for checking run cycles.

You use the **LOCAL TIME OFFSET** field and the **TIME OFFSET SIGN** field when you are working in a different time zone from the controller.

Save the changes and return to the main menu by pressing **PF4** (RETURN).

---

**Concatenating Options and Setting PF Keys**

This section shows how to use common panel commands and facilities and how to set program function (PF) keys to move quickly through panels.

**Concatenating Options**

The scheduler lets you enter concatenated options in the standard ISPF manner on the command line and in row command input fields. For example, you display the List of Applications panel without going through intermediate panels by entering **1.4.3.0** from the main menu.

You can also use the ISPF command delimiter (:) to concatenate options in the panels. When you use the ISPF command delimiter, you pass through confirmation panels without displaying them. This can make completing or deleting a long list of applications or occurrences much faster.

**Quick Return Command**

You can use the ISPF quick return command (=) as a fast path through the panels. For example, to return to the ready list from wherever you are in the panels, enter **=4.1.0** on the command line.

**Setting PF Keys**

The panels maintain separate PF keys from your normal ISPF key assignments. As with all ISPF applications, the END command (**PF3**) returns you to the previously displayed panel. The RETURN command (**PF4**) takes you directly to the main menu.
To display or change the key assignments, enter `=0.4.3` at the command prompt. The scheduler displays this panel:

```
ISPOPT3B ------- PF KEY DEFINITIONS AND LABELS - PRIMARY KEYS ------------------
COMMAND ===>
NUMBER OF PF KEYS ===> 24 TERMINAL TYPE ===> 3278
PF13 ==> ;=4.1.oper
PF14 ==> ;=4.1.cpu1
PF15 ==> ;=5.4.0
PF16 ==> ;=5.1
PF17 ==> ;=5.2
PF18 ==> ;=6.1
PF19 ==> ;=6.3
PF20 ==> ;=3.1
PF21 ==> ;=3.2
PF22 ==> ;=2.1
PF23 ==> ;=2.2
PF24 ==> ;=1.4.1
PF13 LABEL ===> rl_oper PF14 LABEL ===> rl_cpu1 PF15 LABEL ===> errors
PF16 LABEL ===> mcp_add PF17 LABEL ===> mcp_mod PF18 LABEL ===> qcp_app1
PF19 LABEL ===> qcp_job PF20 LABEL ===> dpreplan PF21 LABEL ===> dpeextend
PF22 LABEL ===> ltp_job PF23 LABEL ===> ltpbatch PF24 LABEL ===> ad_look

Press ENTER key to display alternate keys. Enter END command to exit.
```

F13=r1.oper F14=r1.cpu1 F15=errors F16=mcp_add F17=mcp_mod F18=qcp_app1
F19=qcp_job F20=dpreplan F21=dpeextend F22=ltp_job F23=ltpbatch F24=ad_look

**Figure 4. PF Key Definitions and Labels**

In this example, PF keys 13 to 24 are set, and a label is assigned to each PF key. A label is used for display in place of the corresponding PF key assignment when you issue the PFSHOW command. Assigning labels to PF key definitions is optional.

The PF key settings in this example are valid for all panels except those panels where you override these settings. To override or change PF key settings for a single panel, enter the KEYS command. The scheduler displays the panel shown in Figure 4. Any PF key changes you make affect only the panel from which you issued the KEYS command.

Recommendation- Do not alter the key assignments for PF1 (HELP) or PF12 (RETRIEVE). PF12 (RETRIEVE) returns the command last executed to the command prompt. A stack of approximately 25 commands is maintained.

### Using Filter Panels

Throughout the panels, options are provided to let you list data elements. This section shows how to use selection criteria to filter and limit the amount of data displayed in lists.

You use selection criteria to specify the contents of lists in the panels. Figure 5 on page 9 shows an example of a selection criteria panel. You can display this panel by entering 5.3 from the main menu.
On this and other selection criteria panels, you can use blanks, complete names, IDs, or generic search arguments in the input fields.

To reduce overhead during searches, use the fast-path option when it is available on selection criteria panels (see Figure 5).

Using Generic Search Arguments

Many input fields in the panels accept generic search arguments. You specify a generic search argument by entering either an asterisk (*) or a percent sign (%) in an input field. You can enter these characters by themselves or in combination with other characters.

Use an asterisk (*) to represent any character string or a null string. The percent sign (%) represents any single character.

If you want to select all applications whose first three letters are PAY, enter these characters in the input field:

APPLICATION ID ====> PAY*

If you want to select all applications where P is the first letter and Y is the third letter, you enter:

APPLICATION ID ====> P%Y*

The percent sign in this example results in a search for application identifiers where there is any single character between P and Y.

Some selection panels contain the following field:

TYPE OF MATCH ===>

Use this field to specify the type of match that should be applied for filters, allowing wild characters (*) and (%) to be treated as normal characters. If the field is left blank, then standard generic matching is done.
Using the HELP Command

To get help for any panel, press the PF1 (HELP) key. In help panels, scroll forward by pressing Enter. If you keep pressing Enter, you eventually get the first screen of help again—it wraps round.

Using the SORT and LOCATE Commands

This section shows how to use the SORT and LOCATE commands to manipulate lists of data displayed by IBM Tivoli Workload Scheduler for z/OS.

Sorting List Output

In all list displays, you can enter the SORT command at the command prompt to display a panel where you can specify the order of the list items. The panel for sorting a list of applications is shown in Figure 6 on page 10.

<table>
<thead>
<tr>
<th>Sort</th>
<th>Direction</th>
<th>Title of field</th>
<th>Description of field</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>Application ID</td>
<td>Application ID</td>
</tr>
<tr>
<td>2</td>
<td>D</td>
<td>Type</td>
<td>Application type</td>
</tr>
<tr>
<td>3</td>
<td>A</td>
<td>Status</td>
<td>Application status</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Application text</td>
<td>Verbal description of the application</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Calendar</td>
<td>Calendar name</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group def</td>
<td>Group definition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group id</td>
<td>Authorization group ID</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Owner</td>
<td>Application owner ID</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Owner text</td>
<td>Verbal description of application owner</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Priority</td>
<td>Application priority</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tot oper</td>
<td>Total number of operations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tot run</td>
<td>Total number of run cycles</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Upd-Date</td>
<td>Date in user format of last update</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Upd-Time</td>
<td>Time in user format of last update</td>
</tr>
</tbody>
</table>

Figure 6. Sorting a List

There are different sort options for different types of lists. The sort order you request remains in effect for that specific list type until changed.

These steps show how to set sort options for lists. The example uses options for a list of applications.

1. In the Sort order column, specify a number to tell IBM Tivoli Workload Scheduler for z/OS the order of precedence for the field you select. In this example, Application ID is the primary sort field.

2. In the Direction column of the same field, specify A or a D to set the sort sequence. In this example, Application ID is to be sorted in ascending order.

3. Press Enter to confirm your selections. The scheduler moves the selected fields to the top of the list.

4. You return to the list items panel by pressing PF3 (END).

The scheduler displays the list items in the new sequence.
Note: If you sort a list on date fields, use a date format that has the year first. For information on specifying the date format, see page 7.

Locating Data Strings in List Output

You can enter LOCATE (or LOC) at the command prompt on any list display panel to find a particular data string in the primary sort field. The command also supports generic search strings. For example, if you enter LOC ABC* to find any item in the list beginning with ABC, the list scrolls to the specified field. If the field is not found, the list is displayed starting with the entry before which the specified field would have occurred.

If application name is the primary sort field, request LOCATE applname; similarly, if jobname is the primary sort field, request LOCATE jobname. If you need to issue a LOCATE command against a list of items that is not sorted by the item you want to locate, you can change the sort order by entering the SORT command.
Chapter 3. Describing Your Environment

This chapter shows how to describe your data processing environment to IBM Tivoli Workload Scheduler for z/OS by performing the following tasks:

- Creating workstations
- Creating a calendar
- Creating special resources

To access your environment data that is stored in the scheduler databases, choose Option 1 on the main menu. The following panel is displayed:

![Figure 7. Maintaining the Databases](image)

Creating Workstations

Each operation controlled by IBM Tivoli Workload Scheduler for z/OS, whether a job, started task, or other activity, must be associated with a workstation. The workstation defines where in your installation the activity is performed. There are three workstation types:

- Computer workstations
- Printer workstations
- General workstations

Of these, the most commonly used are computer and general workstations. Computer workstations are used for batch job and started task operations. You should define at least one job computer workstation and one started task workstation, even though these may be the same physical processor.

General workstations let you control operations that are normally not automatic, such as manual job preparation.

Creating a Workstation

Complete the following steps to create a workstation:

1. Access the workstation panel by selecting option 1 (WS) on the Maintaining OPC Databases menu. The scheduler displays the Maintaining Workstation Descriptions menu.
2. Select option 2 (LIST) to display the Specifying Work Station List Criteria panel.
3. Enter your search criteria to see the workstations that you want to list. You see this panel:

```
3. Enter your search criteria to see the workstations that you want to list. You see
   this panel:

   EQQWMLSL --------- LIST OF WORKSTATION DESCRIPTIONS ---- ROW 1 TO 5 OF 5
   Command ==> SCROLL ==> PAGE

   Enter the CREATE command above to create a workstation description or enter
   any of the following row commands:
   B - Browse, D - Delete, M - Modify, C - Copy.

   Row Work station Type Last update cmd name description user date
   ' CPU1 Main JES processor C XRAYNER 940128
   ' PRT1 Printer pool P XRAYNER 940128
   ' SETP Used to prepare JCL G XRAYNER 940128
   ' STC1 Processor for started tasks C XRAYNER 940128
   ' WTO1 Messages for NetView G XRAYNER 940128

   Figure 8. List of Workstation Descriptions

4. To create a workstation, either copy and modify an existing workstation
description or use the CREATE command. In both cases, IBM Tivoli Workload
Scheduler for z/OS displays the panel you see in Figure 9.

   EQQCGEP ----- CREATING GENERAL INFORMATION ABOUT A WORK STATION ------
   Command ==> Enter the command R for resources, A for availability, or M for
   access method above, or enter data below:

   WORK STATION NAME ===> CPUA
   DESCRIPTION ===> System A-local processor
   WORK STATION TYPE ===> C
   REPORTING ATTR ===> A
   FT Work station ===> N
   PRINTOUT ROUTING ===> SYSPRINT
   SERVER USAGE ===> B
   Options:
   SPLITTABLE ===> N
   JOB SETUP ===> N
   STARTED TASK, STC ===> N
   WTO ===> N
   DESTINATION ===> _______
   Defaults:
   TRANSPORT TIME ===> 00.00
   DURATION ===> 0015.00

   Figure 9. General Information for a Computer Workstation

5. Specify the workstation details on the panel.

   Figure 9 shows these values for a computer workstation:

   WORK STATION NAME
   CPUA The name of the workstation.

   DESCRIPTION
   The text in is a brief description of the workstation.

   WORK STATION TYPE
   C describes the workstation as a computer workstation.
REPORTING ATTR (attribute)

Every operation in the current plan is assigned a status, which describes its current condition. When all processing for an operation is finished, the operation is assigned status C (complete). Before it completes, the operation will have many different statuses as it progresses through the system. The sequence of statuses that an operation is assigned and the mechanism used for reporting status updates depends on the reporting attribute of the workstation. In this example, A means that the status of operations at this workstation is automatically updated as the operation progresses through the system.

SERVER USAGE

This is a resource that limits the number of operations that can run at the same time. For workstations representing z/OS systems, a parallel server is usually a JES initiator. B (Both planning and control) in the SERVER USAGE field tells IBM Tivoli Workload Scheduler for z/OS to:

- Consider the number of servers when creating plans
- Submit jobs in the current plan, only up to the limit of the number of servers defined to the workstation.

This means that IBM Tivoli Workload Scheduler for z/OS takes the number of parallel servers into account when it develops plans for this workstation and submits work to be processed at this workstation. For example, if IBM Tivoli Workload Scheduler for z/OS has 10 jobs to start and there are only 5 servers available, IBM Tivoli Workload Scheduler for z/OS starts 5 jobs first, then starts each of the remaining 5 as servers become available.

DURATION

00.15.00 (15 minutes) is the default estimated processing time for operations on this workstation. When creating a current plan, IBM Tivoli Workload Scheduler for z/OS uses the estimated duration to work out a timetable for the operations. It is not necessary to give an accurate figure for duration because IBM Tivoli Workload Scheduler for z/OS can adjust this figure automatically, using actual durations. Putting a value in this field can save you time when creating operations that run at this workstation (see “Creating Operations” on page 28). The minimum value of the planned duration is 1 second, and the maximum value is 99 hours 59 minutes 00 seconds. If you specify 99 hours 59 minutes 01 second, you do not receive an alert message if actual duration is greater than the planned duration.

DESTINATION

When this field is blank, as shown in Figure 9 on page 14, jobs and started tasks are submitted on the system where the controller subsystem is started. Trackers can connect to the controller using a variety of communication methods. The destination can be an XCF member name, a VTAM® logical unit, the ddbname of a shared data set, a TCP/IP address, or an APPC partner logical unit.

Specifying Workstation Availability

The scheduler can schedule work on the workstation only when it is available (open for processing work). When you specify workstation availability, create open intervals for each day of the week and specify the number of servers and workstation resources that are available during the open intervals. You can also specify an alternate workstation that IBM Tivoli Workload Scheduler for z/OS uses when the normal workstation is not available.
Complete the following steps to specify availability for a computer workstation:

1. From the Creating General Information about a Work Station panel, type A on the command line and press Enter. You see this panel:

```
Figure 10. Availability of a Workstation

Figure 10 shows one open interval definition, STANDARD, that is used for all days of the week. The example on this panel is the default for any workstation you create.

2. To display or modify the availability of this workstation, enter the ALL command. You see this panel:

```
Figure 11. All Open Time Intervals

On this panel, you specify when the workstation is open for processing, the number of parallel servers that are available during the intervals specified, resources, and alternate workstations to assume the workload if this workstation fails or goes offline. The defaults for the open time interval, number of parallel servers, and resources are shown in the standard interval.

The example in Figure 11 uses the default number of resources and no alternate workstation. As shown, you can specify multiple open time intervals and vary the number of servers for each interval. The number of parallel servers..."
assigned to IBM Tivoli Workload Scheduler for z/OS for the open interval between midnight and 6 a.m. is 25. The number of servers assigned to the 6 a.m. to midnight interval is 10.

Note: If you leave a gap in the intervals that you create for a workstation, the workstation is closed for that time.

3. Save the workstation description by pressing PF3 (END) until you see the message WS CREATED or pressing PF4 (RETURN) to return to the main menu.

Creating a General Job Setup Workstation

This section shows how to create a new workstation description by copying an existing one.

A job setup workstation lets you manually prepare the input stream for an operation. Follow these steps to create a job setup workstation:

1. Display the list of workstations by entering =1.1.2 on the command line.
2. On the List of Workstation Descriptions panel, type C next to one of the workstations in the list, and press Enter. The scheduler displays general information for the workstation you are copying.
3. Type the workstation name /SF5800001/SF590000 and update the description /SF5800002/SF590000.
4. Type G in the WORK STATION TYPE field.
5. Change the reporting attribute because at a manual job setup workstation, you control the start and end of the operation. The S tells IBM Tivoli Workload Scheduler for z/OS that the status change of operations at this workstation is normally reported manually by an operator from the Ready List panel. The scheduler lets you manually prepare JCL at a workstation with this attribute.
6. Server usage is changed to N (neither planning nor control) to allow unlimited concurrent operations.
7. Specify Y in the SPLITTABLE field. SPLITTABLE means that you can interrupt the preparation of an input stream by entering the TSAVE (temporary save)
command. The scheduler sets the operation status to I (Interrupted). Any changes made to the job are saved but the job is not submitted. You can continue job preparation later.

8. Because this workstation is for job setup, change the JOB SETUP field 7 to Y. The default for all workstations is N.

9. Change the duration 8 to the average job preparation time. In this example, it is 5 minutes.

Creating Calendars

The scheduler uses calendars, periods, and run cycles to automatically include applications in the long-term plan on the dates that you specify.

A calendar specifies the status of each day and the work day end time. The status of each day is set to either W, work day or F, free day. A work day is a normal business day. Free days are non-business days, such as weekends and public holidays. You can create several calendars, but name your primary calendar DEFAULT.

Complete the following steps to create or modify a calendar:

1. Select option 1.2.2 on the main menu. You see this panel:

   ![Figure 13. Modifying Calendars](image)

   **Figure 13. Modifying Calendars**
2. Type C next to an existing calendar, or type the CREATE command, and press Enter. The scheduler displays this panel:

```
Command ===> Scroll ===> CSR

Enter/change data below and in the rows, and/or enter any of the following row commands:
I(nn) - Insert, R(nn), RR(nn) - Repeat, D(nn), DD - Delete

CAALENDAR ID ====> DEFAULT________
DESCRIPTION ====> OPC default calendar________
WORK DAY END TIME ====> 00.00
```

<table>
<thead>
<tr>
<th>Row</th>
<th>Weekday or Comments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Monday</strong></td>
<td>Australia Day</td>
<td>F</td>
</tr>
<tr>
<td><strong>Tuesday</strong></td>
<td></td>
<td>W</td>
</tr>
<tr>
<td><strong>Wednesday</strong></td>
<td></td>
<td>W</td>
</tr>
<tr>
<td><strong>Thursday</strong></td>
<td></td>
<td>W</td>
</tr>
<tr>
<td><strong>Friday</strong></td>
<td></td>
<td>W</td>
</tr>
<tr>
<td><strong>Saturday</strong></td>
<td></td>
<td>F</td>
</tr>
<tr>
<td><strong>Sunday</strong></td>
<td></td>
<td>F</td>
</tr>
</tbody>
</table>

Figure 14. Creating a Calendar

Figure 14 shows a calendar with 5 days of the week specified as work days, 2 days of the week specified as free days, and 2 holidays specified as free days.

3. Specify the new calendar name in the CAALENDAR ID field.
4. Specify the default, 00.00, in the WORK DAY END TIME field.
5. Specify the week days as work or free days. In the status column, W identifies work days, and F identifies free days.
6. Enter or change the dates of any holidays observed by your production department. The status that you assign to a date overrides the status for the corresponding day of the week. Identify each date with a comment.

### Creating Special Resources

You can use special resources to represent any resource in your environment. For example, you can create special resources to represent your tape drives or a database.

Complete the following steps to create a special resource called TAPES:

1. Select option **1.6** from the main menu. You see the Maintaining Special Resources menu.
2. Select option **3 (LIST)** from the menu to display the Specifying Special Resource List Criteria panel.
3. From this panel, you can display a list of the resources that already exist in the database. To do this, type * in the SPECIAL RESOURCE and SPECRES GROUP ID fields, leave the TYPE OF MATCH field blank, and press Enter. You see this panel:

![EQQDLSL panel showing list of special resources](image1)

*Figure 15. List of Special Resources*

4. Enter the CREATE command. The scheduler displays this panel:

![EQQQDCRP panel showing creating a special resource](image2)

*Figure 16. Creating a Special Resource*

5. Use these fields to create a resource:

**SPECIAL RESOURCE**

The name of the resource (up to 44 characters) is translated to uppercase. You can include national characters in the name, but do not use % and * because IBM Tivoli Workload Scheduler for z/OS uses these for filtering and searching in the panels.

**TEXT**

A description of the resource, up to 54 characters.

**SPECRES GROUP ID**

The resource group up to 8 characters. The group ID is for selecting subsets of resources in the panel (a list filter).

**Hiperbatch**

Whether the resource represents a data lookaside facility (DLF) object. Type N.
USED FOR
Whether the resource is used for:
P (planning, when the current plan is built)
C (control, when IBM Tivoli Workload Scheduler for z/OS starts an operation)
B (both)
N (neither)

ON ERROR
What happens if an operation that allocates this resource ends in error (and does not have an overriding keep-on-error specification in the operation definition).
You may want critical jobs to keep their allocated resources even when they fail (for example, so that there is no delay waiting for resources when they are restarted).
F (free any resource allocated)
FS (free its full shared allocation of this resource)
FX (free its full exclusive allocation of this resource)
K (keep its full allocation of this resource)
Blank (use the installation default)

The next two fields, QUANTITY and AVAILABLE, are default values. They apply to intervals where quantity or availability is not specified, and apply also to time ranges where there is no interval specified. You can save time by specifying the normal quantity and availability here and specifying only the exceptions in intervals.

QUANTITY 1 to 999 999.
AVAILABLE Available (Y) or unavailable (N). If a resource is not available, an operation that needs the resource cannot be started.

6. To specify the default-connected workstations, select option 2 (WS) on the Creating a Special Resource panel. You see this panel:

```
EQQDML - MODIFYING CONNECTED WORK STATIONS FOR A SPECIAL RE ROW 1 TO 2 OF 2
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

Special resource : TAPES
Text : tape drives on CPU1 and STC1
Interval : Default

Row Ws 1
  CPU1
  STC1

******************************************************************************* BOTTOM OF DATA ********************************************************************************
```

Figure 17. Modifying Connected Workstations for a Special Resource

7. An asterisk (*) in the Ws column means that the resource is connected by default to all workstations. If you want to restrict the resource to specific workstations, specify them as shown in Figure 17.

8. Save the connected workstations by pressing PF3 (END).
9. To create availability intervals, select option 1 (INTERVALS) from the Creating a Special Resource panel. You see this panel:

```
Figure 18. Modifying Intervals for a Special Resource
```

10. Specify values for each interval where you do not want the default values:

   **Day of week or Date**
   Specify a day of the week, a specific date, or STANDARD (days or dates not specified).

   **From Time, To Time**
   Specify a time range.

   **Qty**
   The quantity in the time interval specified. The default quantity and availability are those specified on page 21.

   **A**
   Available (Y) or unavailable (N).

11. If you want to modify the connected workstation for a certain interval, select the interval by typing the S row command. For example, to specify that only operations on the CPU1 workstation can use the TAPES resource on Saturday, type S beside the SATURDAY interval row. You see this panel:

```
Figure 19. Modifying Connected Workstations for a Special Resource
```

12. Specify the workstation that can use the resource in the Ws column. For this example, type CPU1.

13. Press PF3 (END) to return to the Modifying Intervals for a Special Resource panel. When you have specified all the intervals, press PF3 (END) to return to the Creating a Special Resource panel.
Chapter 4. Creating Applications

This chapter describes how to create and schedule applications and job descriptions.

An application in IBM Tivoli Workload Scheduler for z/OS is a set of related jobs or tasks. The result of these may be an output listing, a set of invoices, consolidations, or updates which in turn are used by other applications. An application can range from a single operation with no dependencies to a maximum of 99 operations at computer, general, and printer workstations. These operations can have complex links within the application and also to other applications. Most applications are run regularly with the required frequency specified when the applications are created.

You can group applications that run together to form an application group. With an application group, you specify the run cycles in the group definition and not in individual applications. By doing this, you avoid having to specify the same calendar and run-policy information for each application. The use of application groups can save you time in the initial specification of your work to IBM Tivoli Workload Scheduler for z/OS and in ongoing maintenance to the applications. You can also use groups in the Modify Current Plan panel to add, delete, and complete all or part of an application group in the current plan.

A standard application can have up to three parts:

**General information**
Specifying the application name and other general information that describes the application.

**Run cycles**
Specifying when the application is to run. This is optional.

**Operations**
Specifying the work to be done.

When creating an application, you must specify general information and operations.

Applications are kept in a database. From the main menu, display the application database menu by typing 1.4 on the command line and pressing Enter. You see this panel:

```
EQQASUBP  ------------ MAINTAINING APPLICATION DESCRIPTIONS  ------------
Option ===>

Select one of the following:
1 BROWSE  - Browse applications
2 CREATE   - Create an application
3 LIST     - List applications for further processing
             (browse, modify, copy, delete, print,
             calculate and print run days, modify LTP)
4 PRINT    - Perform printing of applications
5 MASS UPDATE - Perform mass updating of applications
```

*Figure 20. Maintaining Application Descriptions*
Use option 2 (CREATE) on this panel to create applications and application groups. Job descriptions are created from a different panel. Creating job descriptions is described in “Creating a Job Description” on page 33.

Creating an Application

This section shows you how to create and schedule an application. It covers the following tasks:

- Specifying general information
- Creating a rule-based run cycle
- Creating operations

Specifying General Information

When creating an application, you must specify general information before you can create the operations or run cycles.

1. Enter 1.4.2 on the main menu. You see this panel:

```
command: eqacgpp

enter/change data below:
enter the run command above to select run cycles or enter the oper command to select operations.

application: id ===> myapplication__
text ===> a sample application__ descriptive text
type ===> a 3 a - application, g - group definition
owner: id ===> sample___
text ===> pay office__ descriptive text of application owner
priority ===> 5
valid from ===> 940501__ date in the format yy/mm/dd
status ===> a a - active, p - pending
authority group id ===> __________ authorization group id
calendar id ===> ____________ for calculation of work and free days
group definition ===> ________________ group definition id
```

Figure 21. Creating an Application

[Figure 21] shows general information for a standard application.

2. Specify the Application ID 1. This can be a name from 1 to 16 characters. The first character must be either an alphabetic or national character. All other characters must be alphanumeric. This is a required input field.

3. Enter up to 24 characters of descriptive text in the Application TEXT field 2.

4. The same panel is used to create application groups. In the TYPE field 3, you must specify whether this is an application or application group definition.

5. In the Owner ID field 4, type the name of the owner of the application. It can be a department name, such as PAYROLL. This field can be used to control access to the application. It is a required input field.

6. In the Owner TEXT field 5, you can enter up to 24 characters of descriptive text.

7. Type a value from 1 (low) to 9 (high) in the PRIORITY field 6. This is a required input field for applications, but is blank for application groups.

8. VALID FROM 7 is the date from which your application is eligible to be included in the long-term and current plans. The default is the application creation date. This field allows you to create several versions of the same
application with different valid-from dates. The scheduler picks the correct version for the day it is planning. For example, on July 25 1994, you are asked to change the sequence of operations in an application that is run daily, and to make the change effective from August 1 1994. To do this:

a. Copy the application.

b. Change the valid-from date of the copy to 940801.

c. Make the requested changes.

d. Change the in-effect and out-of-effect dates on the run cycles of the copied and the original application. See “Creating a Rule-Based Run Cycle.”

e. Update the long-term plan.

The scheduler will automatically use the new version from August 1.

9. Type A in the STATUS field if you want to include your application in the long-term and current plans. Setting the status of an application to P (Pending) is a simple way to prevent IBM Tivoli Workload Scheduler for z/OS from scheduling an application that you want to keep out of the plan temporarily. The scheduler disregards Pending applications when it is creating plans. This is a required input field.

10. When calculating the run dates for an application, IBM Tivoli Workload Scheduler for z/OS uses the calendar that you specify in the CALENDAR ID field. If you do not specify a calendar, IBM Tivoli Workload Scheduler for z/OS uses the default calendar.

11. If the application is part of a group, specify the group name in the GROUP DEFINITION field.

12. After filling in the general information, verify your entries by pressing Enter.

Creating a Rule-Based Run Cycle

For an application to be automatically included in the long-term plan (LTP), it must contain at least one run cycle specified either in the application itself or in a group definition. The run cycle must also be in effect for the duration of the long-term plan (that is, the in-effect date of the run cycle must be within the range of time covered by the long-term plan).

When creating a rule-based run cycle you:

1. Specify general information on the Run Cycles panel.
2. Specify the run policy on the Modifying a Rule panel.
The example in this section shows how to use rules to create a run cycle for scheduling an application to run on the second Thursday of every month.

1. Display the Run Cycles panel by entering RUN on the Creating an Application panel. You see this panel:

```
Application : MYAPPLICATION___ A sample application
Name of period/rule Input Deadline F day effect Effect
Row cmd Text HH.MM day HH.MM Type rule YYYMMDD YYYMMDD Variable table
s'' RULE01 21.00 01 06.00 R 4 940129 991231 _____________
I/1 Run ONLY on the second Thursday of every month.
```

Figure 22. Run Cycles

2. In the Name of period/rule column, specify a name for the rule. In the example, it is RULE01.

3. In the Input HH.MM column, specify the application input arrival time on the day it is scheduled to run. In the example, the input arrival time is 21.00.

   Each instance of an application in the long-term or current plan is called an occurrence. Input arrival time forms part of the key that uniquely identifies each occurrence of the application in the plans; it is not the time that IBM Tivoli Workload Scheduler for z/OS starts the application, unless the first operation is time-dependent (creating a time-dependent operation is described in “Specifying Operation Details” on page 31).

   When the daily planning process is selecting occurrences from the long-term plan, it selects only those occurrences with input arrival times that fall within the planning period.

4. In the Deadline day and Deadline HH.MM columns, specify the deadline day and time for completion of the last operation in the application. In this example the deadline day is 1, and the deadline time is 06.00. This means that relative to the input arrival date for the occurrence, all operations in the application must be completed by 6 a.m. on the first work day after the occurrence is added to the current plan.

5. Press Enter, and IBM Tivoli Workload Scheduler for z/OS supplies the fields in the TYPE, F day rule, and In effect and Out of effect columns with default values. Figure 22 shows the default values.

   The fields can contain these values:

   **TYPE** There are two types of rule-based run cycles:

   - **R** Regular rule, which specifies when to run the application.
   - **E** Exclusion rule, which specifies when not to run the application.

   Use this rule to suppress runs that are generated by regular run cycles. For example, if the regular rule specifies “Every Thursday in the Year,” you may want a rule that excludes the “Last Thursday in April.”

   **F day rule** Free-day rules provide the flexibility to schedule your applications precisely when they are required. You use free-day rules to tell IBM...
Tivoli Workload Scheduler for z/OS what to do if an application run date falls on a free day. There are five free-day rule options:

E  Count only work days, and exclude free days. If the rule is “Every tenth day in the month,” for example, IBM Tivoli Workload Scheduler for z/OS generates every tenth work day, whereas the other options consider every tenth calendar day and then decide what to do if it is free.

1  Reschedule the application on the closest work day before the free day.

2  Reschedule the application on the closest work day after the free day.

3  Schedule the application on the free day.

4  Do not schedule the application at all. This is the default for rule-based run cycles.

In effect, Out of effect

The in-effect and out-of-effect dates specify the period of time when IBM Tivoli Workload Scheduler for z/OS uses this run cycle.

6. It is a good practice to document each run cycle with explanatory text. The scheduler provides the space to do this on the line below the other fields (in Figure 22 on page 26).

After filling in the fields, you specify the dates for the run cycle.

Specifying the Run Dates

The following steps show how to specify the dates for the run cycle:

1. On the Run Cycles panel, enter the $ row command next to the run cycle. You see this panel:

![Figure 23. Modifying a Rule](image)

2. Select or specify values for each of these columns:
   - Frequency
   - Day
   - Cycle Specifications

- Frequency:
  - S Only
  - Every
  - First
  - Second
  - Third
  - Fourth
  - Fifth
- Day:
  - Free day
  - Work day
  - Monday
  - Tuesday
  - Wednesday
  - Thursday
  - Friday
  - Saturday
  - Sunday
- Cycle Specifications:
  - Week
  - January
  - July
  - Month
  - Year
  - March
  - August
  - April
  - May
  - November
  - June
  - December
  - Week number
  - Period name
  - Shift default origin by ___ days

--- Frequency --- --- Day --- --- Cycle Specification ---
----------------------------------------------------------------------
  S Only | _ Day | _ Week | _ January | _ July
  Every  | _ Work day | _ Month | _ March | _ August
  First  | _ Free day | _ May | _ April | _ October
  Second | _ Work day | _ Year | _ June | _ December
  Third  | _ Monday | _ March | _ September
  Fourth | _ Tuesday | _ April | _ November
  Fifth  | _ Wednesday | _ May | _ December
  _ 4th Last | _ Thursday | _ June
  _ 5th Last | _ Friday | _ July
  _ 5th Last | _ Saturday | _ December
  _ 5th Last | _ Sunday | _ December

Figure 23. Modifying a Rule
The panel shows the selections for scheduling this application on the second Thursday of each month.

3. Check your definition by displaying the dates that the rule generates. To do this, enter the GENDAYS command on the command line, and return to the Modifying a Rule panel by pressing PF3 (END).

4. Press PF3 (END) to return to the Run Cycles panel.

5. Press PF3 (END) once more to return to the Creating an Application panel.

Now you create operations for the application.

Creating Operations

The operation that will be performed determines the type of workstation that you should create. The following list provides some guidelines:

- Batch jobs run on computer workstations.
- Started-tasks run on computer workstations that have the STC attribute.
- Job setup operations for jobs and started tasks are created on general workstations that have the SETUP attribute.
- Print operations are created on printer workstations.
- Write-to-operator (WTO) operations are created on a general workstation that has the WTO attribute.
- Dummy operations, which are used to simplify dependencies, are created on non-reporting general workstations.
- Other tasks that you want to be represented by operations are usually created on general workstations.

Creating operations for an application includes these tasks:

- Specifying values on the Operations panel
- Specifying operation predecessors
- Specifying operation details

The following sections explain how to perform each task.

Specifying Values on the Operations Panel

From the Creating an Application panel, enter the OPER command to display either the Operations panel on which you enter operations with predecessors (Figure 25 on page 30) or one on which you enter operations with text (Figure 24 on page 29). To switch between these two panels, enter TEXT to display the Operations panel for specifying text and PRED to display the Operations panel for specifying predecessors.
Specify values for the fields on the Operations panel. Figure 24 shows values that describe each operation in this example application.

**Oper ws**
For each operation, specify the name of the workstation where the task will be performed. In the example, the first operation is at a workstation called NONR.

**Oper no**
Each operation number must be unique because these numbers specify required links between operations in the application. The number of the first operation in the example is 001.

**Duration**
Specify either the estimated duration for each operation or leave blank to use the default specified in the workstation definition. The minimum value of the planned duration is 1 second, and the maximum value is 99 hours 59 minutes 00 seconds. If you specify 99 hours 59 minutes 01 second, you do not receive an alert message if the actual duration is greater than the planned duration.

**Job name**
Specify the name of the job the operation represents. The scheduler uses this name to find JCL for the job or started task.

Because operation 001 is at a non-reporting workstation, it does not need a job name. However, for each job setup (JCL1 in this example), computer (CPUA in this example), and printer workstation operation, you must specify a job name. The job name for a setup or print operation must be the same as the associated computer operation.

Operation 015 is a WTO operation. No job name is required for operations at WTO or non-reporting workstations.

**Operation text**
The operation text forms part of a WTO message EQQW775I that is issued on the system console.

### Specifying Operation Predecessors
In applications with multiple operations, each operation must be linked to at least one other operation within the application. If there are any unlinked operations, IBM Tivoli Workload Scheduler for z/OS displays the error message APPLICATION INCONSISTENT when you try to save the application.
Display the Operations panel for specifying dependencies by entering the PRED command on the Operations, Text Mode panel. The scheduler displays the panel in Figure 25.

![Figure 25. Operations, Predecessor Mode](image)

You specify the links between operations to describe the flow of work to IBM Tivoli Workload Scheduler for z/OS. In the application defined in Figure 25, operation 10 at workstation CPUA must be completed before operation 25 at the same workstation can be started. In addition, operation 20 at workstation JCL1 must be completed before operation 25 can be started. Therefore, operation 25 in this example has two internal prerequisite operations or internal predecessors; internal, because the linked operations are all in the same application. This relationship between operations is called a dependency.

You can specify up to eight internal predecessors on the panel in Figure 25. You can specify more predecessors on the Operation Details panel.

The operations in Figure 25 have the following dependencies:

- Operation 1 has no predecessor.
- Operations 5 and 10 both have operation 1 as their predecessor.
- Operation 15 has no predecessor.
- Operation 20 has operation 15 as a predecessor.
- Operation 25 has two predecessors, operations 10 and 20. Operation 25 is dependent on 20 because a job setup operation must be an immediate predecessor of the related computer workstation operation. Also, both operations must have the same job name.
Specifying Operation Details
For each operation in an application, you can specify external predecessors, additional internal predecessors, and additional requirements such as time dependency. To do this, select the operation from the Operations panel by typing $ next to the operation and pressing Enter. You see this panel:

Figure 26. Operation Details

The steps in this example show how to use operation details to make an operation time dependent, and also dependent on another application, ANOTHERAPPL.

1. To make an operation time dependent, select option 4 (AUTOMATIC OPTIONS). You see this panel:

   Figure 27. Job, WTO, and Print Options

2. To tell IBM Tivoli Workload Scheduler for z/OS to start this operation at or after a specific time, change the value for TIME DEPENDENT to Y 1.
3. Save the change by pressing PF3 (END).

4. Now select option 6 (TIME) on the Operation Details menu. You see the panel in Figure 28.

![Figure 28. Time Specifications](image)

5. Specify the start day (Operation input arrival DAY) and time (Operation input arrival TIME) for the operation.
   The fields DAY 2 and TIME 3 show the time specifications for this example. If no input arrival day or time is specified, IBM Tivoli Workload Scheduler for z/OS uses the input arrival time on the Application time specifications 1 (specified on the run cycle).

6. Save the job options and return by pressing PF3 (END).

7. To make the application dependent on another one, select option 1 (PREDECESSORS). You see this panel:

![Figure 29. Predecessors](image)

8. If you do not remember the full details of the external application, you can use the asterisk (*) and percent (%) characters, as shown. The scheduler searches the database for operations that match and gives you a list to select from.
9. After all operation details are specified, save the application and return to the main menu by pressing PF4 (RETURN). You see the message APPLICATION CREATED in the upper-right corner of the panel.

Creating a Job Description

A job description is an application consisting of a single job, started task, or WTO main operation, and an internal predecessor job preparation, a manual preparation operation, or both. The name of the job description is automatically set to the same name as the main operation.

If your application satisfies these restrictions, you can use the Job Description panel, which compresses most of the function of the Application Description panel into one panel by making some assumptions about the application you are creating.

You display the Creating a Job panel by entering 1.8.2 on the main menu. The panel is displayed with the settings from the previous job description that you created or modified.

The panel shown in Figure 30 shows settings for an example job description.

![Figure 30. Creating a Job]

You must specify values for these fields:

- **JOBNAME**
- **OWNER ID**
- **WORK STATION**
- **VALID FROM**
- **DURATION**
- **PRIORITY**
- **JCL PREPARATION**
- **MANUAL INTERACTION**
- **RUN CYCLES**
- **PREDECESSORS**
- **RESOURCE 1**
- **RESOURCE 2**
- **RESOURCE 3**
- **GROUP DEFINITION**

From this panel, you have the option to specify more operation details and additional run cycles. You must use the RUN command to add rule-based run cycles.
Chapter 5. Creating and Using the Long-term Plan

After you have described your installation to IBM Tivoli Workload Scheduler for z/OS in the databases, you must build two plans to control your production workload. They are the long-term and current plans.

The long-term plan (LTP) contains a high-level description of work scheduled for the coming weeks or months. The long-term plan typically spans 1 to 2 months. You create the long-term plan once, before a current plan has been created. After the first creation, the long-term plan is continually extended. You cannot create a long-term plan if a current plan already exists. If a current plan exists, you extend the long-term plan.

You build the long-term plan using batch jobs in IBM Tivoli Workload Scheduler for z/OS that use data from the application description database, the calendar and period definitions, and the old long-term plan, if one exists.

This chapter includes the following long-term-plan topics:
- Creating the long-term plan
- Adding an occurrence to the long-term plan
- Batch updating of the long-term plan occurrences
- Browsing long-term plan occurrences

Creating a Long-term Plan

The long-term plan batch jobs are usually submitted from the Selecting Long Term Plan Batch Job panel. The scheduler uses ISPF file-tailoring to generate JCL for these batch jobs. Skeleton JCL for these batch jobs is stored in a data set that must be allocated to ddname ISPSLIB in your TSO logon procedure. If the skeleton JCL data set is not allocated, you see the message NO JCL GENERATED when you try to submit a batch job.

The steps in this section describe how to create a long-term plan using the panel.
1. On the main menu, type 2.2 and press Enter to display the long-term plan batch-job menu:

   EQQLBATP ---------------- SELECTING LONG TERM PLAN BATCH JOB ----------------
   Option ===>
   Select one of the following:
   1 MODIFY - Modify the long term plan for all applications
   2 MODIFY ONE - Modify the long term plan for one application
   3 EXTEND - Extend the long term plan
   4 TRIAL - Make a trial long term plan
   5 PRINT - Print the long term plan for all applications
   6 PRINT ONE - Print the long term plan for one application
   7 CREATE - Create a new long term plan

   Figure 31. Selecting Long Term Plan Batch Job

2. Select option 7 (CREATE) to create a new plan. If a long-term plan or current plan already exists for your subsystem, select option 3 (EXTEND). The panels for extending are similar to the ones for creating. However, when you extend,
you do not specify a start date; specify just an end date, or the number of days
to extend the plan.

| EQQLCREP | CREATING THE LONG TERM PLAN | Command ===>
|----------------------------|-----------------------------|

Enter/Change data below:

Long term plan:

START === 030513  Date in format YYMMDD

END === 030518  Date in format YYMMDD

**Figure 32. Creating the Long Term Plan**

On this panel, you specify the duration of the long-term plan you are creating.

3. Type a start date and end date, and press Enter. The scheduler displays this
panel:

| EQQXSUBP | GENERATING JCL FOR A BATCH JOB | Command ===>
|---------------------------------|-----------------------------|

Enter/change data below and press ENTER to submit/edit the JCL.

JCL to be generated for: CREATE A NEW LONG TERM PLAN

SYSOUT CLASS ===> 1 (Used only if output to system printer)

LOCAL PRINTER NAME ===> 2 (Used only if output on local printer)

DATASET NAME ===> JOHNB.OPIC.LTCRE.LIST 3

(Used only if CLASS and LOCAL PRINTER are both blank). If blank default name used is JOHNB.OPIC.LTCRE.LIST

SUBMIT/EDIT JOB ===> S 4  S to submit JOB, E to edit

Job statement :

=== 5//OPCDPCR JOB (ACCTCDE),'LTP CREATE',

=== 6// CLASS=A,MSGCLASS=Q,MSGLEVEL=(1,1),NOTIFY=JOHNB

=== 7

**Figure 33. Generating JCL for a Batch Job**

On this panel, you supply data for IBM Tivoli Workload Scheduler for z/OS to
prepare the long-term plan create batch job.

4. If you want to send the report that IBM Tivoli Workload Scheduler for z/OS
generates from the long-term planning process to SYSOUT, specify a class 1.

5. If you want to send the report to a local printer, specify the local printer name
2.

If you do not specify a class or LOCAL PRINTER NAME, IBM Tivoli Workload
Scheduler for z/OS creates a data set with your TSO user ID as the first
qualifier of the data set name 3.

6. To submit the batch job from this panel, type S in the SUBMIT/EDIT JOB field
4.

You can edit and save the generated JCL by placing E in the SUBMIT/EDIT JOB
field.

7. If this is the first time that you are using the batch job functions with your
current TSO user ID, Job statement lines 5, 6, 7, and 8 are blank. On
the Job statement lines, type valid job card information.
8. After filling in the applicable fields, press Enter. If you selected the SUBMIT option, IBM Tivoli Workload Scheduler for z/OS submits the job, then redispaly the panel from which you started your long-term plan create action. If you selected the EDIT option, you see the JCL. Use the TSO SUBMIT command to submit the job.

The scheduler saves the information you supply for items 1, 2, 4, 5, 6, 7, and 8. The next time you invoke a batch function, it retrieves the information.

Adding an Occurrence to the Long-term Plan

The scheduler lets you manually add and remove occurrences and external dependencies in the long-term plan. In this section, the examples show how to add an occurrence and modify a dependency in the long-term plan. An occurrence of MYAPPLICATION is added, and an existing occurrence of TESTJOB1 is made an external predecessor to the new occurrence.

To make the steps easier to follow, the names of intermediate panels are mentioned but the panels are not shown.

1. On the main menu, type 2.1 (LTPONLINE) and press Enter to display the Specifying LTP Occurrence List Criteria panel.
2. On the criteria panel, press Enter to display this panel:

```
EQLSTOL -------------- LONG TERM PLAN OCCURRENCES ------  ROW 1 TO 6 OF 6
Command ===>   Scroll ===> PAGE
Enter the CREATE command above to create a new occurrence or enter the GRAPH command above to view occurrences graphically, or, enter any of the commands below:
B - Browse, D - Delete, J - Job setup, M - Modify, RG - Remove from Group
Row Application id Owner id Input arrival Deadline P C Pre Suc      cmd  date  time  date  time  date  time
'' TESTJOB1      SAMPLE 03/05/13 08.00 03/05/13 08.30 5  N  0  0
'' TESTJOB1      SAMPLE 03/05/14 08.00 03/05/14 08.30 5  N  0  0
'' TESTJOB1      SAMPLE 03/05/15 08.00 03/05/15 08.30 5  N  0  0
'' TESTJOB1      SAMPLE 03/05/16 08.00 03/05/16 08.30 5  N  0  0
'' TESTJOB1      SAMPLE 03/05/26 08.00 03/05/26 08.30 5  N  0  0
*** END OF DATA  ***************************************
```

Figure 34. Long Term Plan Occurrences
3. You can add extra occurrences to the long-term plan by entering the CREATE command to display this panel:

```
EQLADDP ----------------------- CREATING AN OCCURRENCE -----------------------
Command ===> 

Enter/Change data below and press ENTER to create an occurrence.

APPLICATION ID ===> MYAPPLICATION 1

Input arrival:
DATE ===> 030513 2 Date in format YYMMDD
TIME ===> 11.00 Time in format HH.MM

Deadline:
DATE ===> 030514 3 Date in format YYMMDD
TIME ===> 06.00 Time in format HH.MM

PRIORITY ===> 5 1-9 where 1=low, 8=high and 9=urgent
ERROR CODE ===> ____ Comment on daily plan report
VARIABLE TABLE ===> ________________ JCL variable table id
GROUP DEFINITION ===> ________________ Group definition id
MORE DETAIL ===> Y 4 Enter Y to specify further data before creating this occurrence.
```

Figure 35. Creating an Occurrence

4. Now you specify the new occurrence. In this example, these fields are specified:

**APPLICATION ID 1**
The name of the application you are adding.

**Input arrival DATE, TIME 2**
The input arrival date and time for the new occurrence. In this example, a new occurrence of MYAPPLICATION is added as a successor to an existing occurrence (TESTJOB1 03/05 13 08.30); so the input arrival date and time of the new occurrence must be on or after the input arrival date and time of its predecessor.

**Deadline DATE, TIME 3**
The deadline date and time for the new occurrence.

**MORE DETAIL 4**
Because a dependency is being created for the new occurrence, the MORE DETAIL field has Y.
5. After specifying more detail, press Enter to display this panel:

```
5. After specifying more detail, press Enter to display this panel:

   5. After specifying more detail, press Enter to display this panel:

   EQQLSEL  --------------- SPECIFYING FURTHER OCCURRENCE DATA ---------------------
   Option ===>
   Select one of the following:
   1 OPERATIONS - Modify operation data
   2 DEPENDENCIES - Modify dependencies
   3 OCCURRENCE - Modify general data
   4 JOB SETUP - Edit JCL
   5 BROWSE - Browse the occurrence
   Application : MYAPPLICATION A test application
   Input arrival : 030513 11.00
   Deadline : 030514 06.00
   Owner : SAMPLE Pay Office
   Priority : 5
   Error code :
   Variable table :
   Successors : 0
   Predecessors : 0

   Figure 36. Specifying Further Occurrence Data
```

6. Select option 2 (DEPENDENCIES) to display the Modifying Dependencies panel, where IBM Tivoli Workload Scheduler for z/OS displays any existing external dependencies.

7. On the Modifying Dependencies panel, enter the CREATE command to display this panel:

```
   6. Select option 2 (DEPENDENCIES) to display the Modifying Dependencies panel, where IBM Tivoli Workload Scheduler for z/OS displays any existing external dependencies.

   EQQLCADP ------------------- CREATING A DEPENDENCY ----------------------------
   Command ===>
   Enter/Change data below:
   Application : MYAPPLICATION A test application
   Input arrival : 030513 11.00
   DEPENDENCY TYPE ===> P
   If more than one occurrence meet the following criteria data will be selected from the long term plan.
   APPLICATION ID ===> TESTJOB*________
   Input arrival:
   DATE ===> ______ Date in format YYMMDD
   TIME ===> _____ Time in format HH.MM

   Figure 37. Creating a Dependency
```

In this example, the application TESTJOB1 is made a predecessor to MYAPPLICATION.

8. To create a dependency, specify these fields on the panel:

   **DEPENDENCY TYPE**
   Type P or S to specify the type of dependency.

   **APPLICATION ID**
   Type the name of the predecessor application (or use * if you do not remember the exact name), and press Enter. You see a list of occurrences for the application on the Selecting an Occurrence to Create a Dependency panel. Select a predecessor occurrence from the
The scheduler redisplays the Modifying Dependencies panel with the dependency information that you specified.

**Input arrival date, time**
If the input arrival date and time of the predecessor application are known, you can skip a step by filling in the date and time fields on this panel.

9. After filling in the fields on the Creating a Dependency panel, press Enter. The scheduler redisplays this panel:

```
EQQLCDPL ------------------- MODIFYING DEPENDENCIES ---------------------------
Command ===>
Enter the CREATE command above to create a new dependency or enter any of the commands below:
B - Browse, D - Delete
Application : MYAPPLICATION  A test application
Input arrival : 030513 11.00
Deadline : 030514 06.00
Row Dep Application id Input arrival Complete Manually Deleted
(cmd Type date time Created)
  P TESTJOB1 030513 08.00 N Y /SF5800001/SF590000
******************************* BOTTOM OF DATA ********************************
```

Figure 38. Modifying Dependencies

Although this panel shows that the new predecessor was manually created, the modification is not yet saved. If the predecessor occurrence displayed is not the one you want, you can enter the CANCEL command to exit from this panel.

10. You save the newly added predecessor by pressing PF3 (END). The scheduler redisplays the Long Term Plan Occurrences panel with the message CREATED in the upper-right corner of the panel.

---

**Using the Long-term Plan Modify Batch Function**

After the long-term plan is created, you use either the long-term plan modify one or the long-term plan modify all function to update the long-term plan. The long-term plan modify all automatically resolves external dependencies but the long-term plan modify one does not.

In the previous section, an external predecessor dependency was manually created for an occurrence. To make the relationship between the two occurrences complete, the predecessor must have a matching successor dependency link. In this section, the long-term plan modify all option is used to create a successor dependency.

To update the long-term plan and resolve external dependencies:

1. Enter 2.2.1 from the main menu to display the Generating JCL for a Batch Job panel.

   On this panel, you see that IBM Tivoli Workload Scheduler for z/OS retained the job statement information that you typed when you created the long-term plan. You also see a different output data set name. The third qualifier in the data set name has been changed to reflect the long-term plan modify all function.

2. Type S in the SUBMIT/EDIT JOB field, and press Enter to submit the batch job. The scheduler redisplays the main menu.
Browsing Occurrences in the Long-term Plan

You use the Online LTP option to browse occurrences in the long-term plan.

1. On the main menu, type **2.1** and press Enter to display the Specifying LTP Occurrence List Criteria panel.

2. Enter your search criteria to see the occurrences that you want to list. You see this panel:

```
**eqqlstol** ----------------- LONG TERM PLAN OCCURRENCES ------ ROW 1 TO 6 OF 6
Command ====> Scroll ==

Enter the CREATE command above to create a new occurrence or
enter the GRAPH command above to view occurrences graphically, or,
enter any of the commands below:
B - Browse, D - Delete, J - Job setup, M - Modify, RG - Remove from Group

Row Application id Owner id Input arrival Deadline P C Pre Suc
  cmd date  time date  time
'' TESTJOB1 SAMPLE 03/05/13 08.00 03/05/13 08.30 5 N 0 1
 '' MYAPPLICATION SAMPLE 03/05/13 11.00 03/05/14 06.00 5 N 1 0

*************** BOTTOM OF DATA *********************
```

**Figure 39. Long Term Plan Occurrences**

This panel shows the occurrences. In the Suc (external successor) column of TESTJOB1, you see the number 1. This means that this occurrence has one external successor. The long-term plan modify all batch function updated this occurrence.

3. To browse an occurrence, type **B (BROWSE)** next to the occurrence, and press Enter. You see this panel:

```
**eqqlbocp** ------------------ BROWSING AN OCCURRENCE -------------------
Option ===>

Select one of the following:
1 OPERATIONS - Browse operations
2 APPLICATION DEP - Browse dependencies (application level)
3 OPERATION DEP - Browse dependencies (operation level)

Application : MYAPPLICATION A test application
Input arrival : 030513 11.00
Deadline : 030514 06.00
Owner : SAMPLE Pay Office
Priority : 5
Error code : 

Variable table :
Successors : 0
Predecessors : 1
Manually created : Yes
Group Definition :
```

**Figure 40. Browsing an Occurrence**
4. You can display external dependencies for the occurrence by selecting option 2 (APPLICATION DEP) on this menu. You see this panel:

![Figure 41. Browsing Dependencies](image)

In Figure 41, you see that MYAPPLICATION has an external predecessor that was manually created.

5. To browse the operations in an occurrence, select option 1 on the Browsing an Occurrence menu. You see this panel:

![Figure 42. Browsing Operation Data](image)

In the example in Figure 42, you see that although the input arrival time for the occurrence is 11.00, IBM Tivoli Workload Scheduler for z/OS will not start operation 001 until 21.30 because the operation is time-dependent.

The input arrival time of 11.00 for operation 015 is taken from the input arrival time of the application.
Chapter 6. Producing the Current Plan

Before IBM Tivoli Workload Scheduler for z/OS can schedule work, you must produce a detailed plan called the current plan. The current plan (CP) is the heart of IBM Tivoli Workload Scheduler for z/OS processing. It drives your production workload and provides feedback about the current status of the workload. The current plan is derived from a section of the long-term plan and contains the work that IBM Tivoli Workload Scheduler for z/OS will run. It typically covers a period of 24 hours.

This chapter includes the following topics:
- Creating the current plan
- Extending the current plan
- Querying the current plan

Creating the Current Plan

The process of producing the CP is called daily planning. The task of creating the CP is normally done once. After creation, the plan is continually extended using batch functions.

When the CP is created or extended, IBM Tivoli Workload Scheduler for z/OS brings in from the long-term plan all occurrences with an input arrival time that is within the interval you specify. The scheduler creates a detailed schedule for the operations that are contained in these occurrences. When you extend the current plan, the planning process carries forward any uncompleted occurrences into the new plan and updates the long-term plan with completed occurrence information. Completed occurrences are not carried forward into the new plan.

These steps show how to create the current plan using the panels.
1. Select option 3 (DAILY PLANNING) on the main menu to display the Producing OPC Daily Plans menu.
2. To create or extend the current plan, select option 2 (EXTEND) from the Producing OPC Daily Plans menu. The scheduler displays this panel:

```
EQDPEXP ----------------- EXTENDING CURRENT PLAN PERIOD ----------------
Command ==>>
```

Enter/change data below and press ENTER

Current plan end date :

```
START DATE ===> 030513
END DATE ===> ________
EXTENSION LENGTH ===> 02400
TYPE ===> A
```

Report selection :

```
WS SUMMARY ===> Y  Summary for all work stations
OPERATING PLAN ===> Y  Daily operation plan
WS PLANS ===> Y  Plans for all work stations
INPUT ARRIVAL ===> Y  List of input arrival operations
NON REPORTING ===> Y  Plans for non reporting work station
CURRENT PERIOD ===> Y  Print current period results
PLANNED RESOURCE ===> Y  Planned resource utilization
ACTUAL RESOURCE ===> Y  Actual resource utilization
```

Figure 43. Extending Current Plan Period

3. Specify the length of the current plan and the reports that you want.

1, 2, and 3 in Figure 43 show input for creating a 24-hour CP which starts at 7 a.m. on May 13, 2003. This is the most commonly used format for specifying the length of the CP. If no current plan exists, IBM Tivoli Workload Scheduler for z/OS uses the current date and time as the default for 1 and 2. You can change both fields to suit your needs if no CP exists. When extending the CP, change only the extension length 3, if necessary.

The EXTENSION TYPE field 4 specifies whether both work days and free days (A) or work days only (W) are included when calculating the extension. For example, assume that Saturdays and Sundays are free days in your calendar and you extend the CP by 24 hours at 7 a.m. on Friday. If you include all days by specifying A, the CP extension ends at 7 a.m. on Saturday. If, however, you specify W, the CP is extended to 7 a.m. on Monday. Extension type A is used in the example in Figure 43.

When extending the CP, you have the option of producing reports about the contents of the plan (see 5 in Figure 43). The scheduler puts the generated reports into a data set with your user ID as the first qualifier if you do not specify SYSOUT or a local printer on the Generating JCL for a Batch Job panel (see Figure 33 on page 36).

4. After specifying the CP length and selecting the reports that you want, press Enter to display the Generating JCL for a Batch Job panel (see Figure 33 on page 36).

5. Press Enter to submit the current plan batch job. The scheduler redisplay the daily planning menu with the message JOB SUBMITTED.
Creating a Batch Job to Extend the Current Plan

When you extend the current plan you can duplicate the steps in “Creating the Current Plan” on page 43 or you can automate the process by following these steps:

1. Display the Extending Current Plan Period panel and specify the length of the extension.
2. Press Enter to display the Generating JCL for a Batch Job panel.
3. Type E in the SUBMIT/EDIT Batch Job field, then press Enter. The scheduler displays the JCL for the current plan batch job.
4. Type the copy command C9999 next to the first line of JCL.
5. Create a new member in the job library of IBM Tivoli Workload Scheduler for z/OS by entering the CREATE command on the command line of the Generating JCL for a Batch Job panel. You see this ISPF panel:

```
----------------------------- EDIT - CREATE -----------------------------
COMMAND ===> 
"CURRENT" DATA SET: SYS94163.T100711.RA000.JOHNB.R0000002
TO ISPF LIBRARY: 
  PROJECT ===> 
  GROUP ===> 
  TYPE ===> 
  MEMBER ===> 
TO OTHER PARTITIONED DATA SET MEMBER: 
  DATA SET NAME ===> 'dataset(member)' [1] 
  VOLUME SERIAL ===> (If not cataloged)
  DATA SET PASSWORD ===> (If password protected)
  SPECIFY PACK OPTION FOR "CREATE" DATA SET ===> NO (YES or NO)
Press ENTER key to create. 
Enter END command to cancel create.
```

Figure 44. Creating a Current Plan Extend Job

6. In the DATA SET NAME field [1], type the name of your job library data set and the name of the member you are creating, and press Enter.
7. After creating the batch job, create a job or application description for extending the current plan.

Querying the Current Plan (QCP)

The Query Current Plan (QCP) panel provides answers to your production status queries. You can request detailed or summary information on individual applications, operations, or workstations, and summary information concerning all the operations. The QCP panel looks at the current plan, which is continuously updated as the operations are processed.

You can invoke QCP functions from many places in the panel. For example, if you enter row command I (Information) next to an operation in the ready list (covered in Chapter 7, “Communicating with Workstations”, on page 53), the Selecting Application Occurrence and Operation Information panel (Figure 49 on page 49) is displayed. This can save time because you do not need to leave an area of the panel to get information.
To display the Current Plan and Status Inquiry menu, select option 6 (QCP) on the main menu or enter =6 from anywhere in the panels.

---

**Figure 45. Current Plan and Status Inquiry**

**Querying Application Occurrences**

This section shows how to use the QCP panel to check information about occurrences in the current plan. The topics include:
- Browsing application occurrences in the CP
- Displaying detailed information about an occurrence
- Displaying detailed operation information

**Browsing Application Occurrences in the CP**

To see details about occurrences:

1. Start by displaying the Current Plan and Status Inquiry panel.
2. Select option 1 (APPLICATIONS) to display the Selecting Application Occurrences filtering panel, where you specify the selection criteria.
   
   On this panel, if the STATUS field is left blank, all occurrences that have a status of W (Waiting), S (Started), C (Complete), E (Ended-in-error), or U (Undecided) are displayed. Deleted applications are displayed only when you specifically request applications in D status. You can also filter on the occurrence token.
3. After specifying selection criteria, press Enter to display the list of occurrences. You see this panel:

---

**Figure 46. Browsing Application Occurrences (left part)**

You can tell from the title line that this panel has a left part and a right part. To see the right part, press **PF11** (SCROLL RIGHT).

This example shows that:
- TESTJOB1 has a status W (Waiting).
- MYAPPLICATION was started at 13:02 on day 13 of the current month (Started at column).
- Both applications have an input arrival time on day 13 of the current month.
- Both occurrences were added by a CP batch job function; the Add func (Add function) column is blank.

To find out more about an occurrence, type $ next to the occurrence, and press Enter to display this panel:

```
EQQSAOSP ------ SELECTING APPLICATION OCCURRENCE INFORMATION --------------
Option ====>
Select one of the following:
  1 APPLICATION - Detailed information
  2 OPERATION LIST - Operations of the application occurrence
  3 EXTERNAL DEPS - External dependencies of the occurrence
Application : MYAPPLICATION A sample application
Owner : SAMPLE Pay Office
Status : Started
Priority : 5
Variable table :
Calendar name : DEFAULT
Occurrence token : B4B2BE36D856102
Input arrival time:
  Planned : 030513 11.00
  Actual : 030513 13.02

Figure 47. Selecting Application Occurrence Information
```

From this panel, you can request detailed information about the occurrence, the operations defined in the occurrence, or the external dependencies established with the occurrence.

**Requesting Detailed Information about an Occurrence**

To display detailed information about an occurrence, select option 1 (APPLICATION) on the Selecting Application Occurrence Information menu. You see the panel shown in **Figure 48 on page 48**.
On this panel, you see:

- The Status of the application
- Planned and actual start and end times for the occurrence
- The number of uncompleted critical operations
- The estimated duration for the uncompleted operations in the occurrence
- The method used to add the occurrence to the current plan
- If the occurrence is a rerun
- Other application information

### Getting Detailed Operation Information

Sometimes you need to know why a certain operation is not started. Here are some reasons why a computer workstation operation may not be started:

- The workstation is not open.
- Predecessors are not complete.
- No parallel server is available.
- The workstation is offline or has failed and no rerouting is in effect.
- Not enough workstation resources are available.
- Not all the required special resources are available.
- The operation is waiting for a specific time of day.
- The operation has been manually held.
- The automatic-job-submission option is set to NO for the operation.
- There was an error during job submission.
Complete the following steps to get detailed information to determine why an operation is not started:

1. Select option 2 (OPERATION LIST) from the Selecting Application Occurrence Information menu. The scheduler displays the Browsing Operations panel, which lists all operations in the occurrence.

2. On the Browsing Operations panel, type S next to the operation you want to check, and press Enter. The scheduler displays this panel:

```
EQQDSPS--SELECTING APPLICATION OCCURRENCE AND OPERATION INFORMATION ----------
Option ===>

Select one of the following:
1 APPLICATION - Detailed application occurrence information
2 OPERATION - Detailed operation information
3 OPERATION LIST - Operations of the application occurrence
4 DEPENDENCIES - Immediate predecessor and successor information
5 RESOURCES - List of resources used by the operation
6 JCL - Browse the JCL
7 OPERATOR INSTR - Operator instructions
8 EXTERNAL DEPS - Immediate external dependencies of the occurrence
9 ALL DEPS - All dependencies of this operation
10 CLEANUP OPTIONS - Cleanup options
11 EXTENDED INFO - Operation extended info

Application : MYAPPLICATION  A test application
Operation : CPUA 025  Depends on preds 020,010
Jobname and jobid : TESTJOB3
Status of operation : Ready 1  Waiting for time 2
on Work Station :
Priority of operation : 5

Planned input arrival: 030513 11.00
Actual input arrival:
```

Figure 49. Selecting Application Occurrence and Operation Information

You can reach this menu from almost anywhere in the modify current plan (MCP), QCP, or workstation communication panels. The example in Figure 49 shows why a selected operation is not started. It is Ready 1 but Waiting for time 2. Refer to Managing the Workload for a complete list of status codes.

Option 9 (ALL DEPS) can be helpful when you want to know why an operation has not started. You can use this option to find out what outstanding predecessors remain before an operation will start and to see the impact of its being late or failing.
To list all dependencies:

1. Select option 9 (ALL DEPS). You see this panel:

```
EQQSOPGD  ----------------- SELECTING ALL DEPENDENCIES ---------------------------
Command ===>
Specify selection criteria below and press ENTER to create a dependency list

TYPE OF SELECTION ====> AP
AP - All predecessor operations
NP - Non-completed predecessors only
AS - All successor operations
NS - Non-waiting successors only

NUMBER OF NESTINGS ====> 999
A digit 1 to 999

NESTING DETAIL ====> ALL
ALL or NONE
```

Figure 50. Selecting All Dependencies

2. Specify the type of dependencies you want to see, then press Enter. In the example, AP is selected, which lists all predecessors for the selected operation (Figure 51).

```
EQQSPG1L  ------ ALL DEPENDENCIES OF AN OPERATION (left part) ROW 1 TO 5 OF 5
Command ===> Scroll ===> PAGE
Enter the GRAPH command above to view operations graphically or scroll right or enter the row command S to select an operation for details.

Application : MYAPPLICATION A sample application
Operation : CPUA 251 Depends on preds 020,010
Jobname : TESTJOB3

Row Lev Ty Operation Jobname Application id Status
cmd ws no. text
'' 1 P CPUA 010 Depends on pred 001 TESTJOB2 MYAPPLICATION W
'' 1 P JCL1 020 Setup oper. for TESTJOB3 TESTJOB3 MYAPPLICATION W
'' 2 P NONR 001 Time dependent MYAPPLICATION W
'' 2 P WTO1 015 Setup req. for TESTJOB3 MYAPPLICATION S
'' 3 P CPUA 015 TESTJOB1 TESTJOB1 /SF580002/SF590000 A

******************************************************************************
```

Figure 51. All Dependencies of an Operation

On this panel, the operation dependencies are shown by type (Ty) and level (Lev). A P in the type column indicates that the operation in the list is a predecessor to the operation you are checking; S indicates that it is a successor.

If the listed operation is linked directly to the operation you are checking, its level is 1. A direct link from the level 1 operation to another operation is a level 2 dependency. This example shows 3 levels with the highest level being an operation in a different application.

From this panel, you can investigate further by selecting details for any of the operations in the list.

**Querying Late and Uncompleted Occurrences**

You can display the applications that are most critical and those that have missed, or are close to missing, the defined deadline.
From the main menu, you enter 6.2.0 to display a list of critical, uncompleted occurrences. You see the panel shown in Figure 52:

**Figure 52. Browsing Most Critical Occurrences**

On this panel, IBM Tivoli Workload Scheduler for z/OS displays occurrences sorted by the latest start time. For any occurrence that contains operations that are not yet started and their latest start times have passed, IBM Tivoli Workload Scheduler for z/OS puts Y in the L (Late) column (see Y in Figure 52). Late operations are at the top of the list.
Chapter 7. Communicating with Workstations

A workstation in IBM Tivoli Workload Scheduler for z/OS is the place where work is done. All operations in the current plan are associated with a workstation. For an overall view of operations, you use the Query Current Plan panel. However, if you want to find out which operations are due to start or are already started at a workstation, use the workstation ready list.

This chapter includes the following topics:
- Using the ready list panel.
- Selecting a ready list layout.
- Viewing operator instructions.
- Preparing jobs at a setup workstation.

Using the Ready List Panel

The ready list contains operations that have no outstanding predecessors, operations that are defined to the workstation that are waiting for a particular time or resource, operations that have already started, and operations that have ended in error. The status of operations in the ready list is specified by the following codes:

- **A** Arriving—ready for processing; no predecessors were defined.
- **I** Interrupted.
- **R** Ready for processing; all predecessors are complete.
- **+** Ready—at least one predecessor is defined on a non-reporting workstation; all predecessors are complete.
- **S** Started.
- **E** Ended-in-error.

The ready list can also include one operation in **C** (Complete) status; the last operation that you manually set to complete. This operation is maintained on the ready list to give you an opportunity to reset the operation if you change your mind.

Select option 4 (WORK STATIONS) from the main menu to display this menu:

```
Option ===>
Select one of the following:
1 READY LIST   - Using the ready list
2 WAITING LIST - Review submitted jobs that have a waiting status
3 JOB SETUP    - Setup the JCL for jobs
4 WORK STATIONS- Review the status of work stations
9 DEFINE RL    - Define alternative ready list layouts
```

Figure 53. Communicating with Workstations
To use ready list functions, select option 1 (READY LIST). The scheduler displays this panel:

\[
\text{EQQRSRLP} \quad \text{--------------- SPECIFYING READY LIST CRITERIA --------------------------}
\]

\[
\text{Command} \quad \Rightarrow \quad \text{Enter/Change data below and press ENTER to create a ready list.}
\]

\[
\begin{array}{l}
\text{WORK STATION NAME} \quad \Rightarrow \quad \text{JCL1} \quad \text{(Blank presents a list.)} \\
\text{LAYOUT ID} \quad \Rightarrow \quad * \quad \text{An id, blank for default, * for a list}
\end{array}
\]

Selection criteria:
\[
\begin{array}{l}
\text{APPLICATION ID} \quad \Rightarrow \quad \text{__________________________} \\
\text{OWNER ID} \quad \Rightarrow \quad \\
\text{JOB NAME} \quad \Rightarrow \quad \\
\text{LOWEST PRIORITY} \quad \Rightarrow \quad \text{Lowest priority to be selected.} \\
\text{OPERATION STATUS} \quad \Rightarrow \quad \text{List of status codes, A R * S I E or blank}
\end{array}
\]

Latest input arrival:
\[
\begin{array}{l}
\text{DATE} \quad \Rightarrow \quad \text{________} \\
\text{TIME} \quad \Rightarrow \quad \text{_____ (Format YYMMDD and HH.MM )}
\end{array}
\]

Status sort order:
\[
\begin{array}{l}
\text{Status sort order} \quad \Rightarrow \quad \text{CES} \\
\text{List of status codes, A R * S I E or C} \\
\text{(Any three must be selected, or all blank)}
\end{array}
\]

Clean Up Type:
\[
\begin{array}{l}
\text{Clean Up Type} \quad \Rightarrow \quad \text{_____} \\
\text{Types list: A M I N or blank}
\end{array}
\]

Clean Up Result:
\[
\begin{array}{l}
\text{Clean Up Result} \quad \Rightarrow \quad \text{_____} \\
\text{Status list: C E or blank}
\end{array}
\]

\[
\text{OP. EXTENDED NAME} \quad \Rightarrow \quad \text{_______________________________________}
\]

\[
\text{Figure 54. Specifying Ready List Criteria}
\]

On this panel, you specify the name of a workstation. You can display the ready list for only one workstation at a time. You also specify criteria to select which operations are included in the ready list.

The ready list displays information about the selected operations. There are up to 90 fields of information that you can select for display. You use \textit{ready list layouts} to identify the fields of information you want to see. Ready list layouts contain the titles of selected fields of information in the order that they are displayed. Several ready list layouts are supplied with IBM Tivoli Workload Scheduler for z/OS, each for a different workstation type. You can also create your own ready list layouts.

**Selecting a Ready List Layout**

To display the ready list layout for a workstation, follow these steps:

1. On the panel shown in \textbf{Figure 54} specify the workstation name in the WORK STATION NAME field 1.

   When you select the ready list for a workstation for the first time, you must specify the layout to use for the list. If you have not specified a layout for the workstation that you have selected, IBM Tivoli Workload Scheduler for z/OS displays the list of layouts that are available. The scheduler stores your preferred layout for each workstation in your ISPF profile.

2. To display all the ready list layouts, type * in the LAYOUT ID field 2 on the Specifying Ready List Criteria panel, and press Enter. You see the panel displayed in \textbf{Figure 55 on page 55}.
Enter the CREATE command to create a new layout or enter any of the row commands below:
- S - select a layout,
- C - create a copy of a layout.

3. To select a layout for the workstation, type S next to the layout, and press Enter. The scheduler displays the workstation ready list with the layout selected.

### Using the Ready List

You use the row commands that are displayed on the Ready List panel to do various tasks. The items in Table 1 show some of the tasks and the applicable row commands that you can use.

<table>
<thead>
<tr>
<th>Task</th>
<th>Row command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnose delays.</td>
<td>I (Information about an operation)</td>
</tr>
</tbody>
</table>
Table 1. Tasks and row commands on the Ready List (continued)

<table>
<thead>
<tr>
<th>Task</th>
<th>Row command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set the status of an operation.</td>
<td>N–x (Set specific status x) and N (Set next logical status)</td>
</tr>
<tr>
<td>Reset an operation to its previous state.</td>
<td>R (Reset status)</td>
</tr>
<tr>
<td>Interrupt an operation.</td>
<td>N–I (Set specific status)</td>
</tr>
<tr>
<td>Set an operation to ended-in-error.</td>
<td>N–E (Set specific status)</td>
</tr>
<tr>
<td>Read operator instructions.</td>
<td>0 (Operator Instructions)</td>
</tr>
<tr>
<td>Prepare JCL at a setup workstation.</td>
<td>N (Set next logical status)</td>
</tr>
<tr>
<td>Delay an operation, then release it.</td>
<td>MH (manual hold) and MR (manual release)</td>
</tr>
<tr>
<td>Make the operation a non-operation, which means that</td>
<td>NP (NOP operation) and UN (un-NOP operation)</td>
</tr>
<tr>
<td>IBM Tivoli Workload Scheduler for z/OS passes over it without</td>
<td></td>
</tr>
<tr>
<td>running it, and continues with its successors. Reverse this</td>
<td></td>
</tr>
<tr>
<td>by making the operation executable again.</td>
<td></td>
</tr>
<tr>
<td>Run an operation immediately with EXECUTE.</td>
<td>EX (execute operation)</td>
</tr>
<tr>
<td>Note: The scheduler takes account of predecessors,</td>
<td></td>
</tr>
<tr>
<td>but otherwise ignores other reasons for waiting (NOP,</td>
<td></td>
</tr>
<tr>
<td>Held, job submission inactive, time not reached, resources</td>
<td></td>
</tr>
<tr>
<td>unavailable, job not automatically submittable, workstation</td>
<td></td>
</tr>
<tr>
<td>is being shut down).</td>
<td></td>
</tr>
</tbody>
</table>

The next sections in this chapter show examples of how to use the 0 and N row commands on the ready list.

Viewing Operator Instructions

Some operations might require specific instructions about how they are to be handled. These instructions are called operator instructions. You can tell whether instructions exist for an operation by looking at the code in the Oi ready-list field (see Figure 56 on page 55). The three operator instruction codes displayed in the Oi ready-list field are:

- N: There are no operator instructions.
- Y: There are operator instructions.
- +: Some operator instructions have been changed recently. The default is 30 days, but the definition of “recent” depends on installation parameters.

1. To browse operator instructions for an operation, type the letter O next to the operation on the Ready List panel, and press Enter. The scheduler displays the instructions using the ISPF/PDF browse function.
2. To return to the Ready List panel, press PF3 (END).

Preparing Jobs at a Setup Workstation

A setup workstation is a general workstation used for preparing jobs manually, when this is necessary. The operation that runs the job on the computer workstation can be started as soon as job setup is complete, if it is not waiting for other conditions to be met.
1. To display the JCL for editing, type N (set next logical status) next to the operation, and press Enter. When you set the next logical status for an operation at a job setup workstation, IBM Tivoli Workload Scheduler for z/OS sets the status of the setup operation to S (Started). The action that IBM Tivoli Workload Scheduler for z/OS takes depends on whether it finds unresolved promptable variables in the job. A promptable variable is a variable that must be supplied by the operator.

The scheduler displays the input stream on this panel:

```
Application : MY#APPLICATION#2  A test application
Operation   : CPUA 025  Depends on preds 020,010
Jobname   : TESTJOB3  JCL last updated by: JOHNB

****** *********************** TOP OF DATA *******************************
000001  //TESTJOB3 JOB (account_field),'JOB3',
000002  // MSGLEVEL=(1,1),NOTIFY=notify_field,
000003  // MSGCLASS=Q,CLASS=init_class,REGION=4094K
000004  //*
000005  //BR14 EXEC PGM=IEFBR14
000006  //
****** *********************** BOTTOM OF DATA *******************************
```

Figure 57. Editing JCL for an Operation

When you edit the job using the Ready List or MCP panels, you edit the latest job from the JCL repository (JS file), which is where IBM Tivoli Workload Scheduler for z/OS places modified jobs. The original job is always left unaltered in the partitioned data set allocated to the ddname EQQJBLIB (JBLIB). This ensures that the master JCL is protected from temporary changes and that reruns of the job use the same JCL as in the original run. To force IBM Tivoli Workload Scheduler for z/OS to read a fresh copy of the job from JBLIB, delete all the lines, and end the edit.

To temporarily save changes you make to the job, enter the TSAVE (temporary save) command. The scheduler sets the operation status to I (Interrupted) and saves the JCL but does not submit the job. You redisplay the job by typing N next to the operation and pressing Enter.

2. To save the edited JCL, press PF3 (END). The scheduler sets the status of the operation to C (Complete) and redispays the Ready List panel.
Chapter 8. Modifying the Current Plan (MCP)

After the current plan is built, you might need to make changes to it if, for example, a processor becomes unavailable, or you need an extra run of an application. To perform these tasks, you use the Modify Current Plan (MCP) panel. This chapter shows how to use the MCP panel to:

• Add an occurrence to the current plan.
• Change the details of operations in the current plan.
• Correct and restart operations that ended in error.
• Rerun an occurrence from a specific operation.

To access the MCP panel, select option 5 from the main menu. You see this menu:

```
EQQMTOPP ---------------- MODIFYING THE CURRENT PLAN ------------------------
Option ===>
Select one of the following:
  1 ADD - Add a new occurrence to the current plan
  2 LIST - List existing occurrences for further processing
  3 OPERATIONS - List existing operations for further processing
  4 ERROR HANDLING - Handle operations in error
  5 WORK STATIONS - Change status and open interval of work stations
  6 JOB SETUP - Prepare JCL for jobs in the current plan
  7 SPECRES - Special resource monitor
  9 DEFINE EL - Define alternative error list layouts
```

Figure 58. Modifying the Current Plan

Adding an Occurrence to the Current Plan

You can add on-request work to the current plan using the MCP panel. Before you can add an application occurrence to the plan, however, a description of the application must exist in the application description database.

If your installation frequently adds work to the plan that does not have an application description defined for it, consider creating dummy model applications that match the work most commonly added. The simplest model application consists of one computer workstation operation. The job names in these model applications should be dummy names indicating that they are only models.

Note: To stop the planning programs adding occurrences for these applications, create them without run cycles, or with run cycles that never generate occurrences.
These steps show how to add an occurrence to the CP. In the example, the application MYAPPLICATION is added to the CP.

1. Select option 1 from the Modifying the Current Plan panel, or enter =5.1 from the command prompt in any other part of the panel.

   **Figure 59. Adding Applications to the Current Plan**

   The AUTOMATIC DEP and RESOLVE REQUIRED fields on this panel affect how IBM Tivoli Workload Scheduler for z/OS adds the occurrence. These fields and the APPLICATION ID field retain the values from the last occurrence you added. The scheduler always puts the current date in the Input arrival DATE field.

2. In this example, a generic application ID is entered so that IBM Tivoli Workload Scheduler for z/OS displays a selection list on the Selecting Applications to Add to the CP panel [Figure 60].

   You can save time by entering the full application name on the criteria panel. The scheduler then displays the Adding an Application to the Current Plan panel [Figure 61 on page 61].

   **Figure 60. Selecting Applications to Add to the CP**
3. Type A next to the application you are adding, and press Enter. The scheduler displays this panel:

```
EQQMAOCP ----------- ADDING AN APPLICATION TO THE CURRENT PLAN -----------
Command ==>  

Enter the DEP command above to verify automatic dependency resolution, or, enter the OPER command to modify operations.

Application : MYAPPLICATION  A sample application
Owner        : SAMPLE        Pay Office
Operations   : 6
External predecessors : 0

AUTOMATIC DEP  ==> Y  Automatic resolution of external dependencies, Y P S or N

Input arrival:
DATE  ==> 030513  Date in format YYMMDD
TIME  ==> 21.00   Time in format HH.MM

Deadline:
DATE  ==> 030514  Date in format YYMMDD
TIME  ==> 06.00   Time in format HH.MM

VARIABLE TABLE ==> ________________  JCL variable table to be used

GROUP DEFINITION ==> ________________

PRIORITY ==> 5 1-9
ERROR CODE ==>  If this is a rerun
```

![Figure 61. Adding an Application to the Current Plan](image)

4. If you are adding an occurrence for an application with no run cycle, you must fill in the input arrival TIME, and deadline DATE and TIME.

The input arrival and deadline DATE and TIME fields are filled in by IBM Tivoli Workload Scheduler for z/OS if the application has a run cycle. You can modify these fields to:
- Suit the on-request run times
- Change the input arrival TIME if you are adding another occurrence of the application.

5. When you press PF3 (END) to create the new occurrence, IBM Tivoli Workload Scheduler for z/OS displays the Selecting Applications to Add to the CP panel, with the message OCCURRENCE ADDED in the upper-right corner of the panel.

**Changing Details of an Operation in the Current Plan**

Use the MCP panel to change the details of operations in the CP. These steps show how to activate automatic submission, and how to remove the time dependency from an operation:

1. Select 2 (LIST) on the Modifying the Current Plan menu (Figure 58 on page 59) to display the Specifying MCP Occurrence List Criteria panel.
2. Specify selection criteria and press Enter. You see this panel:

![EQMQOCLL output](image1)

3. Type **M (Modify)** next to the occurrence, and press Enter. The scheduler displays this panel:

![EQMQOCP output](image2)

---

**Figure 62. Modifying Occurrences in the Current Plan**

**Figure 63. Modifying an Occurrence in the Current Plan**
4. On this panel, enter OPER to display this panel:

```
EQQMMOPL  --------  MODIFYING OPERATIONS IN THE CURRENT PLAN -  ROW 1 TO 1 OF 1
Command ===>
```

Enter the GRAPH command above to view operations graphically or 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
- J - Edit JCL, O - Browse operator instructions, S - Modify operation details
- L - Browse joblog

```
Application     : TESTJOB1       A job description
Owner           : SAMPLE         Pay Office
Input arrival   : 030513 08.00
Status          : Waiting

Row Operation   | Jobname | PS | Duration | Opt | Ext | Res | Stat
---------------|---------|----|----------|-----|-----|-----|-----
               | TESTJOB1|    |          | N   | N   | Y   | 0   |

```

**Figure 64. Modifying Operations in the Current Plan**

In this example, occurrence TESTJOB1 is being modified. In the Opt S (Submit) column, you see N. This means that automatic job submission is deactivated for the operation in TESTJOB1.

5. To activate automatic job submission for this operation, change the N to Y and press PF3 (END). The scheduler redisplay the panel in Figure 63 on page 62.

6. Press PF3 (END) once more to return to the panel in Figure 62 on page 62. The scheduler displays the message OCCURRENCE MODIFIED.

Time-dependent operations have Y in the Opt T (Time Dependent) column on this panel.

7. To remove time-dependency from an operation, change the Y to N and save the change. If there are no other dependencies, IBM Tivoli Workload Scheduler for z/OS starts the operation immediately.

**Correcting and Restarting Failed Operations**

When an operation under the control of IBM Tivoli Workload Scheduler for z/OS does not complete successfully, it is reported as having ended in error. The scheduler automatically reports failures of jobs or started tasks, and you can manually report failures of other operations using the panel.

The scheduler keeps an *error list*, which is a list of all operations that have ended in error. You can display this list using either the MCP panel, which lets you take some action on the operation, or the QCP panel, where you can only browse the operation.

When you use the Handling Operations Ended in Error panel (Figure 66 on page 64) in the MCP panel, you have access to these options:

- Restarting the operation
- Completing or deleting the operation or the occurrence
- Requesting automatic recovery for the operation
- Completing or deleting an occurrence group
- Initiating, discarding, or displaying catalog-management actions
- Browsing the job log
The steps in this section show how to display the error list:

1. Select option 4 (ERROR HANDLING) from the MCP menu. You see this panel:

```
**EQQMERRP** -- SPECIFYING ENDED IN ERROR LIST CRITERIA --
Command ===>
Specify selection criteria below and press ENTER to create a list of operations that have ended in error.

LAYOUT ID ===> OPCESA_1
JOBNAME ===>
APPLICATION ID ===>
OWNER ID ===>
AUTHORITY GROUP ID ===>
WORK STATION NAME ===>
ERROR CODE ===>
GROUP DEFINITION ===>
CLEAN UP TYPE ===>
CLEAN UP RESULT ===>
OP. EXTENDED NAME ===>
```

*Figure 65. Specifying Ended in Error List Criteria*

2. On this panel, you specify selection criteria to display only the list items you want to examine. The scheduler uses an error list layout to display selected fields of information about the operation that ended in error. You can create your own error list layout or use the supplied layout OPCESA.

3. Press Enter to display this panel:

```
**EQMEPIL** -- HANDLING OPERATIONS ENDED IN ERROR (left part Row 1 to 1 of 1
Command ===>
Scroll ===>
```

```
Scroll right, enter the EXTEND command to get extended row command information, enter the HIST command to select operation history list or enter any of the row commands below: I,O,J,L,RC,RI,C,MH,MR,SRJ or RER,ARC,WOC,CMP,MOD,DEL,RG,DG or CG
```

```
LAYOUT ID ===> OPCESA___ Change to switch layout id
Cmd Ended time Application ws no. Jobname Errc
030513 14.14 MYAPPLICATION CPUA 10 TESTJOB2 JCLI
```

*Figure 66. Handling Operations Ended in Error*

You use the row commands on this panel to act on operations in the error list. 
*Figure 66* shows extended explanatory text for the row commands. The scheduler displays this text when you enter the EXTEND command on this panel. You can suppress the text using the SUPPRESS command.

**Correcting Ended-in-Error Operations**

*Figure 66* shows job TESTJOB2 ended with a JCL interpreter error; the error code (Errc) is JCLI. Follow these steps to correct the JCL:

1. To display the JCL for an ended-in-error operation, type J (JCL edit) next to the operation, and press Enter. The scheduler displays the JCL on the Editing JCL for a Computer Operation panel.

The scheduler keeps a separate copy of the job for each run. The job you edit using the J row command is always the job that was used during the failing run of the job (unless you have edited it since the failure).
2. To save the edited JCL, press **PF3** (END). The scheduler saves the modified job in the JCL repository and redisplays the error list.

Editing and saving the JCL does not cause the operation to be restarted; restart the operation using the **RC** row command.

### Rerunning an Occurrence from a Specific Operation

Sometimes you need to rerun an occurrence either from the first operation or from a specific operation in the sequence. In this section, a sample application called **MYAPPLICATION** is used to demonstrate how to set up and rerun an application.

1. Type **R** (Rerun) next to an occurrence on the Modifying Occurrences in the Current Plan panel ([Figure 62 on page 62](#)) to display the panel shown in [Figure 67](#).

2. On this panel, you set the restart point in the application by entering the **S** row command next to the operation where you want to start the rerun.

If there are external dependencies defined to the operation, they are included on the List Dependency Status Change panel, which IBM Tivoli Workload Scheduler for z/OS displays automatically; if not, the Rerunning an Occurrence panel is updated to show the changes in operation status (see [Figure 68 on page 66](#)).
Figure 68 shows that IBM Tivoli Workload Scheduler for z/OS set the status of the restart point operation to R and the status of its successor dependency to W.

The completed operations at the general workstations and all predecessor operations are set to status C (Complete).

3. After setting the restart point, confirm the rerun request. Press PF3 (END) to display this panel:

![Image of EQQMRCL panel]

Figure 68. Rerunning an Occurrence in the Current Plan

If you use the MCP panel to browse details of the occurrence, you see Yes in the Rerun field of the Browsing Application Occurrence Details panel (see Figure 48 on page 48).

4. On this panel, you confirm or reject the rerun request. You must enter a reason for the restart. The scheduler redisplays the Modifying Occurrences in the Current Plan panel with the message STATUS SET TO RERUN.

If you use the MCP panel to browse details of the occurrence, you see Yes in the Rerun field of the Browsing Application Occurrence Details panel (see Figure 48 on page 48).
Chapter 9. Scheduling End-to-end

After the end-to-end environment has been set up, you can run any workload on the distributed network. You must define the following objects in the IBM Tivoli Workload Scheduler for z/OS database:

- The fault-tolerant workstations.
- The jobs that will be scheduled to run on the fault-tolerant workstations.

Defining a Fault-tolerant Workstation

A fault-tolerant workstation is the IBM Tivoli Workload Scheduler for z/OS definition of an existing IBM Tivoli Workload Scheduler fault-tolerant agent in the distributed network. The fault-tolerant agent is where the job associated with the fault-tolerant workstation will be actually run in the distributed network. To IBM Tivoli Workload Scheduler for z/OS, the fault-tolerant workstation is configured as a computer workstation.

To define the fault-tolerant workstation, you must:

1. Define the workstation in the CPUREC initialization statement.
2. Add the definition to the database via ISPF.

Creating the CPUREC Statement

First, 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 Tivoli Workload Scheduler network. Such network topology statement is made up by 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. Remember that you need not add CPUREC statements for every fault-tolerant agent in the distributed domain, but only for those that you want to be able to schedule jobs from the host.
In the example below, note that only the domain manager FTW1 of the IBM Tivoli Workload Scheduler domain DOMAIN1 is defined as a fault-tolerant workstation and that IBM Tivoli Workload Scheduler for z/OS is the master domain manager (with the hard-coded MASTERDM name) for the distributed domain.

```
****************TPLGINFO MEMBER ***********************

/******************************************************************************/
/* DOMREC: Domain definitions */
/******************************************************************************/
DOMREC DOMAIN(DOMAIN1)
DOMMNGR(FTW1)
DOMPARENT(MASTERDM)
/******************************************************************************/
/* CPUREC: Fault Tolerant Workstation definitions */
/******************************************************************************/
CPUREC CPUNAME(FTW1)
CPUOS(WNT)
CPUNODE('146.84.179.86')
CPUDOMAIN(DOMAIN1)
CPUTYPE(FTA)
CPUAUTOLNK(ON)
CPUAUTOLNK(ON)
CPUTZ('Europe/Rome')
CPUUSER('maestro')
```

Defining the Workstation with ISPF

The next figure shows the ISPF definition for FTW1. You must define fault-tolerant workstations as computer automatic and then set the FT Work station field to Y. As a rule of thumb, make sure you create the CPUREC statement before doing the ISPF definition. The ISPF definition alone has no effect without the CPUREC statement.

```
-------- CREATING GENERAL INFORMATION ABOUT A WORK STATION --------
Command ==> 

Enter the command R for resources A for availability or M for access method above, or enter data below:

WORK STATION NAME ===> FTW1
DESCRIPTION ===> FTA on my PC____________________
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 ===> B 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 70. Defining a Fault-tolerant Workstation
Defining a Job

End-to-end scheduling jobs and applications are defined just like any other in IBM Tivoli Workload Scheduler for z/OS. You just have to specify the fault-tolerant workstations on which they will be running. In the next figure, RECOV becomes a job used for end-to-end scheduling only because the associated workstation is FTW1.

Figure 71. Defining a Job for End-to-end Scheduling

You also have the option for specifying if the job is to use centralized scripts or not. You do that by specifying Y or N in the CENTRALIZED SCRIPT field of the panel shown in the next figure.

Figure 72. Defining Job Options

Usage of centralized scripts implies that the scripts are stored in the JOBLIB on the host, as opposed to the non-centralized alternative where the definition of a job is located in the SCRIPTLIB on the fault-tolerant agent where the job is supposed to run. If you opt for using centralized scripts when the job is run, then the statements in the script will be sent through the network to the fault-tolerant
agent. This poses a limitation on the fault-tolerance of the workstation and, if selected for a large number of end-to-end scheduling jobs, can add weight to network traffic.

The following is an example of a non-centralized job definition:

```
VARSUB
  TABLES(APPL1)
  PREFIX('&')
  BACKPREF('%')
  VARFAIL(YES)
JOBRUN
  JOBSCR('D:\win32app\maestro\valerr.bat')
  JOBUSR('&OWNER')
RECOVERY
  OPTION(RERUN)
  MESSAGE('Continue: YES or NO?')
  JOBSCR('D:\win32app\maestro\valeok.bat')
  JOBUSR('maestro')
  JOBWS(FTW1)
```
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Glossary

A

active application description. An application description that is complete and ready for use in planning or scheduling.

actual duration. At a workstation, the actual time in hours, minutes, and seconds it takes to process an operation from start to finish.

adjusted quantity. The current quantity of a special resource, taking the deviation into account.

AD. See application description.

all-days cyclic period. A cyclic period where all days are counted when calculating the interval.

application. A measurable and controllable unit of work that completes a specific user task, such as the running of payroll or financial statements. The smallest entity that an application can be broken down into is an operation. Generally, several related operations make up an application.

application description (AD). A database description of an application.

application group. Type of application description which holds run cycle and calendar information for standard applications or job descriptions which have been defined as a member of the group.

application ID. The name of an application. (For example, PAYROLL or DAILYJOBS.)

application version. See versions.

automatic events. Events recognized by or triggered by an executing program. Automatic events are usually generated by IBM Tivoli Workload Scheduler for z/OS tracking programs but can also be created by a user-defined program.

automatic hold/release. Function used to control jobs that are submitted outside of IBM Tivoli Workload Scheduler for z/OS. It allows you to define whether such jobs should be automatically released at the appropriate time if placed in HOLD status when submitted.

automatic job and started-task recovery. A function that lets you specify, in advance, alternative recovery strategies for operations that end in error.

automatic-reporting workstation. A workstation (for example, a processor or printer) that reports events (the starting and stopping of operations) in real time to IBM Tivoli Workload Scheduler for z/OS.

availability. The degree to which a system (and in IBM Tivoli Workload Scheduler for z/OS, an application) or resource is ready when needed to process data.

B

batch loader. A batch program that you can use to create and update information in the application-description and operator-instruction databases.

C

calendar. The data that defines the operation department’s work time in terms of work days and free days.

capacity. The actual number of parallel servers and workstation resources available during a specified open interval.

capacity ceiling. The maximum number of operations that a workstation can handle simultaneously.

catalog. A directory of files and libraries, with reference to their locations. A catalog may contain other information such as the types of devices in which the files are stored, passwords, blocking factors.

centralized script. In end-to-end scheduling, a script file that is managed centrally in the OS/390 library and then sent to the fault-tolerant agents for jobs that run in the distributed environment.

closed workstation. A workstation that is unavailable to process work for a specific time, day, or period.

completion code. A system code that indicates how the processing of an operation ended at a workstation. See error code.

computer workstation. (1) A workstation that performs z/OS processing of jobs and started-task operations, and that usually reports status to IBM Tivoli Workload Scheduler for z/OS automatically. (2) A processor used as a workstation. It can refer to single processors or multiprocessor complexes serving a single job queue (for example, JES2 or JES3 systems).

controller. The component that runs on the controlling system, and that contains the tasks that manage the plans and databases.
**controlling system.** The system that the controller runs on.

**control on servers.** If a workstation is defined with control on servers, IBM Tivoli Workload Scheduler for z/OS will not start more operations at the workstation than there are available servers.

**CP.** See *current plan*.

**current plan (CP).* A detailed plan of system activity that covers a period of at least 1 minute, and not more than 21 days. A current plan typically covers 1 or 2 days.

**cyclic interval.** The number of days in a cyclic period.

**cyclic period.** A period that represents a constant number of days. There are two types of cyclic periods:
- Work-days-only cyclic period, where only the work days are counted when calculating the number of days in the period.
- All-days cyclic period, where all days are counted.

**D**

**daily planning.** The process of creating a current plan.

**database.** A collection of data that is fundamental to a system. IBM Tivoli Workload Scheduler for z/OS uses six databases: calendar, period, workstation description, JCL variable table, application description, and operator instruction.

**data store.** The IBM Tivoli Workload Scheduler for z/OS component that manages the job runtime information at the tracked system. This component stores the structured and unstructured job log information so that the Controller can retrieve that information later.

**deadline.** See *deadline date* and *deadline time*.

**deadline date.** The latest date by which an occurrence must be complete.

**deadline time.** The latest time by which an occurrence must be complete.

**deadline WTO message.** You can have IBM Tivoli Workload Scheduler for z/OS issue an operator message (EQQW776I) when a started operation has not been marked as completed before the deadline time. In addition to the standard message, the user-defined text that describes the operation is issued as part of the WTO.

**default calendar.** (1) A calendar that you have defined for IBM Tivoli Workload Scheduler for z/OS to use when you do not specify a calendar in an application description. (2) A calendar that IBM Tivoli Workload Scheduler for z/OS uses if you have neither specified a calendar in an application description, nor defined your own default calendar.

**dependency.** A relationship between two operations in which the first operation must successfully finish before the second operation can begin.

**descriptive text.** User-written text describing the operation. This text is also issued as part of the write-to-operator message if the operation has been started, exceeds its deadline, and has the deadline write-to-operator (WTO) option specified.

**deviation.** A temporary variation in the quantity of a special resource.

**distributed agent.** The software running on a computer that is part of a Tivoli Workload Scheduler domain, on which you can schedule jobs from Tivoli Workload Scheduler for z/OS. Examples of distributed agents include standard agents, extended agents, fault-tolerant agents, and domain managers. Contrast with *fault-tolerant workstation*.

**duration.** The length of time an operation is active at a workstation.

**E**

**end-to-end scheduling.** Scheduling and controlling jobs running in Windows® and UNIX environments from a controller on a z/OS system.

**error code.** A code set by IBM Tivoli Workload Scheduler for z/OS to describe how the processing of an operation ended at a computer workstation.

**estimated duration.** The estimated length of time an operation will use a workstation. This is initially based on a value that is provided when the operation is defined, but can be adjusted automatically by the feedback to reflect actual durations. The minimum value of planned duration is 1 second, and the maximum value is 99 hours 59 minutes 00 seconds. If you specify 99 hours 59 minutes 01 second, you do not receive an alert message if the actual duration is greater than the planned duration.

**ETT.** See *event-triggered tracking*.

**event.** An action that changes an operation’s status and changes the current plan.

**event manager.** The function that processes all tracking events and determines which of these are scheduler-related.

**event reader.** A task that reads event records from an event data set.
event tracking. A function that follows events in the operations department in real time and records status changes in the current plan.

event-triggered tracking (ETT). A component that waits for specific events to occur, and then adds a predefined application to the current plan. ETT recognizes two types of events: the reader event, which occurs when a job enters the JES reader, and the resource event, which occurs when the availability status of a special resource is set to “yes”.

event writer. A task that writes event records in an event data set.

exclusive resource. A resource that can be used by only one operation at a time.

expected arrival time. The time when an operation is expected to arrive at a workstation. It can be calculated by daily planning or specified in the long-term plan.

extended status code. Together with the normal status codes, IBM Tivoli Workload Scheduler for z/OS maintains extended status codes that provide additional information about the status of operations. The extended status code is not always present.

external dependency. A relationship between two occurrences, in which an operation in the first occurrence (the predecessor) must successfully finish before an operation in the second occurrence (the successor) can begin processing.

event tracking. A function that follows events in the operations department in real time and records status changes in the current plan.

event-triggered tracking (ETT). A component that waits for specific events to occur, and then adds a predefined application to the current plan. ETT recognizes two types of events: the reader event, which occurs when a job enters the JES reader, and the resource event, which occurs when the availability status of a special resource is set to “yes”.

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extended status code. Together with the normal status codes, IBM Tivoli Workload Scheduler for z/OS maintains extended status codes that provide additional information about the status of operations. The extended status code is not always present.

external dependency. A relationship between two occurrences, in which an operation in the first occurrence (the predecessor) must successfully finish before an operation in the second occurrence (the successor) can begin processing.

F

fault-tolerant workstation. A computer workstation configured to schedule jobs in a distributed environment. It is the logical representation of a distributed agent in the IBM Tivoli Workload Scheduler for z/OS plan.

feedback limit. A numeric value in the range 100–999 that defines the limits within which actual data that is collected in tracking is fed back and used by IBM Tivoli Workload Scheduler for z/OS.

first critical operation. An operation of an occurrence that has the earliest latest-start-time. The first critical operation of an occurrence determines the critical path.

first operation. (1) An operation in an occurrence that has no internal predecessor. (2) The start node in a network.

fixed resources. A set of resource names used to check the authority of users to access the IBM Tivoli Workload Scheduler for z/OS dialogs.

form number. A user-defined code that identifies the type of paper to be used for an operation on a printer workstation. IBM Tivoli Workload Scheduler for z/OS can use the form number to identify the different print operations belonging to one job.

free day. Any day that is not a work day.

free-day rule. A rule that determines how IBM Tivoli Workload Scheduler for z/OS will treat free days when the application run day falls on a free day.

general workstation. A workstation where activities other than printing and processing are carried out. A general workstation reporting to IBM Tivoli Workload Scheduler for z/OS is usually manual, but it can also be automatic. Manual activities can include data entry and job setup.

generic alert. An alert that is broadcast by IBM Tivoli Workload Scheduler for z/OS, and collected by NetView, when an operation ends in error. You can specify this as an option when defining application descriptions.

global search character. In IBM Tivoli Workload Scheduler for z/OS, a percent sign (%), which represents any single character, or an asterisk (*), which represents any character string of any length.

global variable table. The JCL variable table that IBM Tivoli Workload Scheduler for z/OS checks for a variable substitution value if no value is found in the specific JCL variable table that is associated with the operation.

group definition. The application group to which the application description or job description is a member.

H

highest return code. A numeric value in the range 0–4095. If this return code is exceeded during job processing, the job will be reported as ended-in-error.

I

incident log. An optional function available under the job completion checker.

initiator/terminator. The job scheduler function that selects jobs and job steps to be executed, allocates input/output devices for them, places them under task control, and at completion of the job, supplies control information for writing job output on a system output unit.

input arrival time (IAT). The user-defined date and time when an operation or an application is planned to be ready for processing.
**intermediate start.** The date and time an operation started after processing was interrupted.

**internal date.** Internally, IBM Tivoli Workload Scheduler for z/OS uses a two-digit year format when handling dates. In order to handle dates before and after 31 December 1999 correctly, IBM Tivoli Workload Scheduler for z/OS uses an origin year of 72 for the internal century window. This means that internally the year 1972 is represented as 00 and 2071 is represented as 99.

**internal dependency.** A relationship between two operations within an occurrence, in which the first operation (the predecessor) must successfully finish before the second operation (the successor) can begin.

**J**

**JCC.** See job completion checker.

**JCL tailoring.** IBM Tivoli Workload Scheduler for z/OS provides automatic JCL tailoring facilities, which enable jobs to be automatically edited using information that is provided at job setup or submit.

**JCL variable table.** A group of related JCL variables. See variable table.

**job.** (1) A set of data that completely defines a unit of work for a computer. A job usually includes all necessary computer programs, linkages, files, and instructions to the operating system. (2) In IBM Tivoli Workload Scheduler for z/OS, an operation performed at a computer workstation.

**job class.** Any one of a number of job categories that can be defined. By classifying jobs and directing initiators to initiate specific classes of jobs, it is possible to control a mixture of jobs that can be run concurrently.

**job-completion checker (JCC).** An optional function that allows extended checking of the results from CPU operations.

**job description.** A single processor (job or started-task) operation and its dependencies.

**job ID.** The JES job ID of the job associated with the operation.

**job name.** The name of the job associated with an operation. The job name is assigned in the JOB statement of a job. It identifies the job to the system.

**job preparation.** Job preparation involves modifying jobs in preparation for processing. This can be performed manually, by a job preparer, or automatically by IBM Tivoli Workload Scheduler for z/OS JCL tailoring functions.

**job recovery.** In end-to-end scheduling, a recovery operation (stop, continue, or rerun), or a recovery action (recovery job or recovery prompt) that is performed by IBM Tivoli Workload Scheduler for z/OS if a distributed job terminates unsuccessfully. That is, if the job terminates with a non-zero exit code. You specify the type of job recovery when you schedule a job or when you define its properties.

**job setup.** The preparation of a set of JCL statements for a job at a job setup workstation. Job setup can be performed manually by an operator, or automatically by IBM Tivoli Workload Scheduler for z/OS.

**job setup workstation.** A general workstation defined with the job setup option. A job setup workstation lets you modify your job or STC JCL before execution.

**job submission.** A process that presents jobs to z/OS for running on a workstation after the scheduling criteria for the operation is met.

**job tracking.** A process that communicates with operating systems that control computer workstations.

**JS.** The JCL repository data set.

**L**

**last operation.** (1) An operation in an occurrence that has no internal successor. (2) The terminating node in a network.

**latest out time.** See latest start.

**latest start.** The latest day and time (calculated by IBM Tivoli Workload Scheduler for z/OS) that an operation can start and still meet the deadline specified for the operation and any successor operations. The latest out time for an operation is identical to the latest start time.

**limit for feedback.** See feedback limit.

**local processor.** (1) In a complex of processors under JES3, a processor that executes users’ jobs and that can assume global functions if the global processor fails. (2) In IBM Tivoli Workload Scheduler for z/OS, a processor in the same installation that communicates with the controlling scheduler processor through shared DASD or XCF communication links.

**localopts file.** A file in which the local options are defined. Each workstation in the IBM Tivoli Workload Scheduler network must have a localopts file.

**long-term plan (LTP).** A high-level plan of system activity that covers a period of at least 1 day, and not more than 4 years. It serves as the basis for a service level agreement with your users, and as input to daily planning.
manual reporting. A type of workstation reporting in which events, once they have taken place, are manually reported to IBM Tivoli Workload Scheduler for z/OS. This type of reporting requires that some action be taken by a workstation operator. Manual reporting is usually performed from a list of ready operations.

mass updating. A function of the Application Description dialog in which a large update to the application database can be requested.

modify current plan (MCP). A dialog function used to dynamically change the contents of the current plan to respond to changes in the operation environment. Examples of special events that would cause alteration of the current plan are: a rerun, a deadline change, or the arrival of an unplanned application.

most critical application occurrences. Those unfinished applications whose latest start time is less than or equal to the current time.

NetView operations. Operations that consist of an operator instruction that IBM Tivoli Workload Scheduler for z/OS passes to NetView. These operations are run at a general workstation with the WTO option specified.

noncyclic period. A period that does not represent a constant number of days or work days. Examples: quarter, academic semester.

nonreporting. A reporting attribute of a workstation, which means that information is not fed back to IBM Tivoli Workload Scheduler for z/OS.

occurrence. An instance of an application in the long-term plan or current plan. An application occurrence is one attempt to process that application. Occurrences are distinguished from one another by run date, input arrival time, and application ID. For example, an application that runs four times a day is said to have four occurrences per day.

occurrence group. Consists of one or more application occurrences added to the long-term plan or current plan, where such occurrences are defined as belonging to a particular application group specified in the group definition field of the application description or job description.

occurrence token. A unique search key for an occurrence based on the time of day (TOD). IBM Tivoli Workload Scheduler for z/OS defines the occurrence token when the occurrence is created. The occurrence token does not change when the current plan is modified.

offset. Values, in the ranges 1 to 999 and −1 to −999, that indicate which days of a calendar period an application runs on. This is sometimes called displacement.

open interval. The time interval during which a workstation is active and can process work.

operation. A unit of work that is part of an application and that is processed at a workstation.

operation deadline. The latest time when the operation must be complete.

operation latest out. For an operation that has predecessors, the latest out date and time are the latest start time for the first critical operation in the application occurrence. If the first critical operation has not started by this date and time, then the operation is flagged as late, because it will be impossible for it to start on time based on the sum of the planned durations of all the operations on its critical path.

operation number. The number of the operation. This uniquely identifies each operation in an application.

operator instruction (OI). An instruction that an operator can view when the operator must manually intervene in scheduler operations.

origin date. The date that a period (cyclic or noncyclic) starts on.

owner ID. Owner ID is an identifier that represents the application owner.

parallel operations. Operations that are not dependent on one another and that can, therefore, run at the same time.

parallel servers. These represent the number of operations that can be processed concurrently by that workstation.

pending application description. An application description that is incomplete and not ready for use in planning or scheduling. See active application description.

pending occurrence. The dummy occurrence created by the daily planning process to honor a dependency that has been resolved in the long-term plan but cannot be resolved in the current plan because the predecessor’s input arrival time is not within the current plan end time.
**pending predecessor.** A predecessor dependency to an occurrence which is defined in the long-term plan but not yet included in the current plan. See also *pending occurrence.*

**period.** A time period defined in IBM Tivoli Workload Scheduler for z/OS calendar.

**PIF.** See *program interface (PIF)*.

**plan.** See *current plan.*

**predecessor.** An operation in an internal or external dependency that must finish successfully before its successor operation can begin.

**print workstation.** A workstation that prints output and usually reports status to IBM Tivoli Workload Scheduler for z/OS automatically.

**printout routing.** The ddname of the daily planning printout data set.

**priority.** The priority of an operation is a value from 1 to 9 (where 1=low, 8=high, and 9=urgent). It is one of the factors that determines how IBM Tivoli Workload Scheduler for z/OS schedules applications.

**program interface (PIF).** An interface that lets user-written programs issue various requests to IBM Tivoli Workload Scheduler for z/OS.

**query current plan (QCP) dialog.** An ISPF dialog that displays information taken directly from the current plan. The information includes information on operations, workstations, and application occurrences.

**ready list.** An ISPF display list of all the operations ready to be processed at a workstation. Ready lists are the means by which workstation operators manually report on the progress of work.

**recovery.** See automatic job and started-task recovery.

**remote job tracking.** The function of tracking jobs on remote processors connected by VTAM links to a controller. This function enables a central site to control the submitting, scheduling, and tracking of jobs at remote sites.

**remote processor.** A processor connected to IBM Tivoli Workload Scheduler for z/OS host processor via a VTAM network.

**replan current period.** A function that recalculates planned start times for all occurrences to reflect the actual situation.

**reporting attribute.** A code that specifies how a workstation will report events to IBM Tivoli Workload Scheduler for z/OS. A workstation can have one of four reporting attributes:

- **A** Automatic
- **C** Completion only
- **N** Nonreporting
- **S** Manual start and completion

**rerun.** A function that lets an application or part of an application that ended in error be run again.

**restart and cleanup.** A recovery function that ensures the restart of a failed job and the related cleanup actions, for example, deleting or uncataloging data sets created when a job is run.

**restartable.** If an operation is defined as restartable, IBM Tivoli Workload Scheduler for z/OS can automatically restart that operation if the workstation that it is using becomes inactive. This option applies only to the operation while it has status S (started). The operation will be reset to status R (ready).

**return code.** An error code that is issued by IBM Tivoli Workload Scheduler for z/OS for automatic-reporting workstations.

**rule.** A named definition of a run cycle that determines when an application will run.

**run cycle.** A specification of when an application is to run. The specification may be in the form of a rule or as a combination of period and offset.

**schedule.** (1) The current or long-term plan. (2) To determine the input arrival date and time of an occurrence or operation.

**server.** The optional component that runs on the controlling system and handles requests from remote ISPF dialogs, remote PIF applications, and the Graphical User Interface for Application Description.

**service functions.** Functions that let the user deal with exceptional conditions, such as investigating problems, preparing APAR tapes, and testing IBM Tivoli Workload Scheduler for z/OS during implementation.

**shared resource.** A special resource or workstation resource that can be used simultaneously by more than one operation.

**slack.** Extra time that can be calculated for the critical path by subtracting the input arrival and the sum of operation durations from the deadline.

**smoothing factor.** A value in the range 0-100 that controls the extent to which actual durations are fed back into the application description database.
**special resource.** A resource that is not associated with a particular workstation, such as a data set.

**splittable.** Refers to a workstation where operations can be interrupted while being processed.

**standard.** User-specified open intervals for a typical day at a workstation.

**started-task computer workstation.** You can specify that a computer workstation will support started tasks by giving the workstation the STC option. Operations defined for this workstation will be treated as started tasks, not as jobs.

**started-task operations.** Operations that start or stop started tasks. These operations are run at a computer workstation with the STC option specified.

**status code.** Codes that represent the current state of an operation. The status code is often associated with an extended status code.

* The status of an operation can be one of the following:

* The operation is ready for processing. There is a predecessor at a nonreporting workstation, but all other predecessors are reported as complete.

A The operation is waiting for input to arrive.

C Operation processing has completed.

D The operation has been deleted from the current plan.

E The operation has ended in error.

I Operation processing has been interrupted.

R The operation is ready for processing (all predecessors have been reported as complete).

S Operation processing has started.

U The operation status is not known.

W The operation is waiting for a predecessor to complete.

**submit/release data set.** A data set shared between IBM Tivoli Workload Scheduler for z/OS host and a local scheduler processor that is used to send job-stream data and job-release commands from the host to the local processor.

**subresources.** A set of resource names and rules for the construction of resource names. IBM Tivoli Workload Scheduler for z/OS uses these names when checking a user’s authority to access individual scheduler data records.

**successor.** An operation in an internal or external dependency that cannot begin until its predecessor completes processing.

**symphony file.** This file contains the scheduling information needed by Tivoli Workload Scheduler to execute the plan. The file is built and loaded during the pre-production phase. During the production phase, it is updated to indicate the current status of production processing: work completed, work in progress, work to be done. In Tivoli Workload Scheduler for z/OS where end-to-end scheduling is configured, the file is produced during daily planning and is sent to distributed agents to execute their part of the plan.

**SYSOUT class.** An indicator used in data definition statements to signify that a data set is to be written on a system output unit. It applies only to print workstations.

**T**

**tail plan.** Created during the daily planning process, includes only tail work; that is, work that started during or before the current planning period and that extends beyond its end.

**temporary operator instructions.** Operator instructions that have a specific time limit during which they are valid. They will be displayed to the workstation operator only during that time period.

**time dependent.** IBM Tivoli Workload Scheduler for z/OS attempts to start operations as soon as possible, when all dependencies have been resolved and processing resources are available. However, you can specify that an operation is time-dependent, so IBM Tivoli Workload Scheduler for z/OS will not start it until a specific time.

**time zone support.** A feature that lets applications be planned and run with respect to the local time of the processor that runs the application. Some networks might have processors in different time zones. The controlling processor will make allowances for differences in time during planning activities to ensure that interacting activities are correctly coordinated.

**tracker.** The component that runs on every system in your complex. It acts as the communication link between the z/OS system that it runs on and the controller.

**tracking event log.** A log of job-tracking events and updates to the current schedule.

**transport time.** The time allotted for transporting materials from the workstation where the preceding operation took place to the workstation where the current operation is to occur. The transport time is used only for planning purposes. Operations will be started regardless of the transport time specified.

**turnover.** A subfunction that is activated when IBM Tivoli Workload Scheduler for z/OS creates an updated version of the current plan.
validity period. The time interval defined by an origin date and an end date within which a run cycle or an application description is valid.

variable table. A group of related JCL variables. IBM Tivoli Workload Scheduler for z/OS can check these variable tables for substitution values for variables that occur in JCL. This substitution can occur during job setup or at job submit.

versions. Applications with the same ID but different validity dates.

waiting list. A list of jobs that have been submitted but still have predecessors that have not finished running. Operations will be included in the waiting list if the JCL is not submitted by the Tivoli OPC controller and the Tivoli OPC tracker has been started with HOLDJOB(YES).

work day. A day on which applications can normally be scheduled to start.

work-days-only cyclic period. A cyclic period where only work days are counted when calculating the interval.

work-day end time. The time when one work day ends and the next day begins. By default, this time is midnight.

For example, if the work-day end time is 02:00, work for Friday can continue until 02:00 on Saturday morning, even if Saturday is a free day. If Saturday and Sunday are free days, no new work will be started until 02:00 on Monday.

workstation. (1) A unit, place, or group that performs a specific data processing function. (2) A logical place where work occurs in an operations department.

IBM Tivoli Workload Scheduler for z/OS requires that you define the following characteristics for each workstation: the type of work it does, the quantity of work it can handle at any particular time, and the times it is active. The activity that occurs at each workstation is called an operation. (3) See also personal workstation.

workstation description database. A database containing descriptions of the workstations in the operations department.

workstation resource. A physical resource, such as a tape drive, that must be allocated among jobs. When you define a workstation, you can specify the quantity of each of two resources (R1 and R2) that are available to operations. When defining operations to that workstation, you can specify the number of these resources that must be available for the operation to start on that workstation.

workstation type. Each workstation can be one of three types: computer, printer, or general.

write-to-operator workstation. A general workstation that lets you use the scheduling facilities to issue a write-to-operator (WTO) message at a specific operator console defined by the workstation destination. NetView can intercept the WTO message and take necessary action.

WTO operations. Operations that consist of an operator instruction that IBM Tivoli Workload Scheduler for z/OS passes to NetView. These operations are run at a general workstation with the WTO option specified.
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