



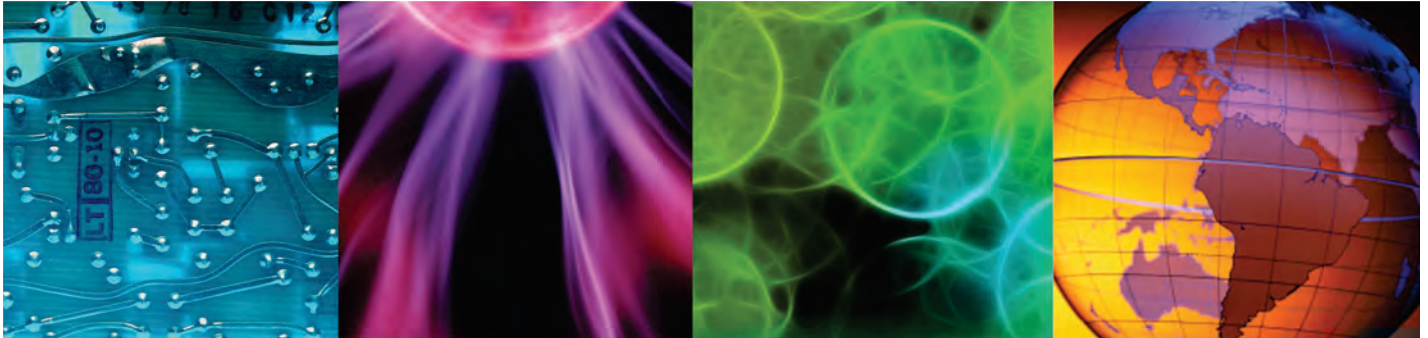
IBM Training

IBM Tivoli Workload Scheduler for z/OS 9.2 Scheduling and Operations

Student Exercises

Course code TM405 ERC 1.0

October 2015



All files and material for this course are IBM copyright property covered by the following copyright notice.

© Copyright IBM Corp. 2015. All Rights Reserved.

US Government Users Restricted Rights: Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

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

Trademarks or trademarks of Adobe Systems Incorporated in the United States, and/or other countries.

IT Infrastructure Library is a registered trademark of the Central Computer and Telecommunications Agency which is now part of the Office of Government Commerce.

Intel, Intel logo, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Celeron, Intel Xeon, Intel SpeedStep, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.

ITIL is a registered trademark, and a registered community trademark of the Office of Government Commerce, and is registered in the U.S. Patent and Trademark Office.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Java and all Java-based trademarks and logos are trademarks or registered trademarks of Oracle and/or its affiliates.

Cell Broadband Engine is a trademark of Sony Computer Entertainment, Inc. in the United States, other countries, or both and is used under license therefrom.

Linear Tape-Open, LTO, the LTO Logo, Ultrium, and the Ultrium logo are trademarks of HP, IBM Corp. and Quantum in the U.S. and other countries.

The information contained in this publication is provided for informational purposes only. While efforts were made to verify the completeness and accuracy of the information contained in this publication, it is provided AS IS without warranty of any kind, express or implied. In addition, this information is based on IBM's current product plans and strategy, which are subject to change by IBM without notice. IBM shall not be responsible for any damages arising out of the use of, or otherwise related to, this publication or any other materials. Nothing contained in this publication is intended to, nor shall have the effect of, creating any warranties or representations from IBM or its suppliers or licensors, or altering the terms and conditions of the applicable license agreement governing the use of IBM software.

References in this publication to IBM products, programs, or services do not imply that they will be available in all countries in which IBM operates. Product release dates and/or capabilities referenced in this presentation may change at any time at IBM's sole discretion based on market opportunities or other factors, and are not intended to be a commitment to future product or feature availability in any way. Nothing contained in these materials is intended to, nor shall have the effect of, stating or implying that any activities undertaken by you will result in any specific sales, revenue growth, savings or other results.



Contents

About these exercises	v
General information	v
1 Introduction exercises	1
There are no student exercises for this unit.	
2 Workstations exercises	2
Exercise 1 Creating workstations	2
Creating a computer workstation	2
Defining open intervals (availability)	5
3 Exercises for Calendars, periods, and run cycle groups	10
Exercise 1 Creating calendars, periods, and run cycle groups	10
Creating a Tivoli Workload Scheduler for z/OS calendar	10
Creating a period	11
Creating run cycle groups	12
4 Applications exercises	18
Exercise 1 Creating an application group	18
Exercise 2 Creating application run cycles	19
Exercise 3 Creating an application with operations	25
Creating an application description	26
Exercise 4 Creating job descriptions	33
5 Operation submission, throughput, and monitoring exercises	35
Exercise 1 Defining critical path operations	35
U#CRITA application	35
U#CRITB	40
6 Long-term and current plans exercises	42
Exercise 1 Reviewing the long-term plan	42
Exercise 2 Working with your application occurrence in the current plan with the ready list and ended-in-error panel.	43
Using workstation ready lists	43
Editing JCL at a job setup workstation	45
Handling errors	49
Restarting failed operations	52
Overriding operation definition values in the current plan	53
Exercise 3 Working with critical operations and conditional dependencies	57
Working with critical jobs	57

Adding an occurrence to the current plan but excluding defined conditions	67
Exercise 4 Using advanced ISPF panels	69
7 Restart and cleanup exercises	71
Exercise 1 The restart and cleanup function	71
Using the operations details cleanup options panel	71
Restarting operations with no cleanup	72
Using the Operations Details Cleanup Options panel	76
Restarting operations with data set cleanup	76
8 Special resources exercises	80
Exercise 1 Creating and using special resources	80
Creating a special resource	80
Using a special resource	82
Using the special resource monitor	84
Exercise 2 Creating a special-case application	86
Creating a special resource with max usage defined	86
Creating an application that uses a special resource with max usage defined	88
Creating a run cycle for an application that uses the Every option	90
Adding the application to the current plan	91
Exercise 3 Verifying multiple application occurrences	94
9 Automated job tailoring exercises	98
There are no student exercises for this unit.	
10 Automatic recovery exercises	99
There are no student exercises for this unit.	
11 Managing unplanned work exercises	101
Exercise 1 Define an application with automatic recovery, job tailoring, and TWSz commands	101
Creating the T#U11APPL application description	102
Creating a variable table	105
Creating EQQJBLIB members	106
Exercise 2 Running the T#U11APPL application manually	109
Exercise 3 Using an event trigger	115



About these exercises

General information

For all exercises, you work in assigned teams. Each team is assigned an identifier by the instructor. All the student teams share one z/OS It is running a single Tivoli Workload Scheduler for z/OS instance. This controller subsystem is called TWCL. The instructor explains how to access and log on to the z/OS system. The actual steps that you need to do in each exercise are numbered. Unnumbered comments describe what steps you are about to take or clarify what you did in previous steps.

In all exercises, wherever the number sign (#) is used, substitute it with your assigned team identifier. You see the number sign or hash tag (#) used in workstation names, calendar and period names, application names, and operation names.

User IDs have a six-character prefix of OPCUSR followed by the one-character team identifier.



Important: In all exercises, wherever a number sign (#) is used, substitute it with your assigned team identifier. You see this sign used in workstation names, calendar and period names, application names, and operation names.

Sample values:	Your teams values:
Team Identifier = 1	Team Identifier =
TSO User ID = OPCUSR1	TSO User ID =
Password = B4cccc4B	Password =

Replace cccc with the four-character course code. For example, if the course code is 1234, the password is: B4**1234**4B

TRK00LU is the name of the VTAM destination that is used in the Tivoli Workload Scheduler for z/OS workstation definition you create.

The various screen captures in this document were taken from an early Tivoli Workload Scheduler for z/OS 9.2 installation. They might differ from the panels in your environment due to modifications done by IBM or by customization in your own environment.



Note: You can change your TSO password the first time you log on. However, this is not required. If you change it, write it down.

The controller-started task, TWCL, communicates with a single tracker-started task, TWTL, using a VTAM connection. The controller VTAM LU name is CTL00LU. The tracker VTAM LUname is TRK00LU, TRK00LU is to be the destination name in the Tivoli Workload Scheduler for z/OS workstation definition.

The exercises have somewhat explicit instructions for the first time that you perform a task. After that, the instructions are less explicit.



Important: There are places in the student exercises where you must notify the instructor and wait for an instructor demonstration before you can proceed.



1 Introduction exercises

There are no student exercises for this unit.



2 Workstations exercises

Exercise 1 Creating workstations

Workstations are created and saved in the workstation database. In this exercise you create four workstations to use in the follow-on exercises:

- A computer workstation
- A job setup workstation
- A non-reporting workstation
- A wait workstation

Creating a computer workstation

Tivoli Workload Scheduler for z/OS uses computer workstations to schedule the job runs and started tasks (STCs). The workstation that you create in this section of the exercise is for running jobs. The name of the computer workstation you create in this exercise must be U#CP, where # is your assigned team identifier. Wherever you see a number sign (#) in any exercise, substitute it with your assigned team identifier. Perform the following steps to create your computer workstation:

1. Log on to your assigned z/OS system. On the ISPF menu, select the **Tivoli Workload Scheduler for z/OS** option. This option is =E.T from the main ISPF panel. Your instructor

demonstrates this action for you. The following example shows the primary Tivoli Workload Scheduler for z/OS panel.

```
EQQOPCAP ----- TIVOLI WORKLOAD SCHEDULER FOR Z/OS -----
Option ==> _

Welcome to Tivoli Workload Scheduler for z/OS V9R2M0 (TWSz)
Connected to TWCL

Select one of the following options and press ENTER.

0 OPTIONS          - Define TWSz dialog user parameters and options
1 DATABASE          - Display or update TWSz data base information
2 LTP               - Long Term Plan query and update
3 DAILY PLANNING    - Produce daily plans, real and trial
4 WORK STATIONS     - Work station communication
5 MCP               - Modify the Current Plan
6 QCP               - Query the status of work in progress
7 OLD OPERATIONS    - Restart old operations from the DB2 repository

9 SERVICE FUNC      - Perform TWSz service functions
10 OPTIONAL FUNC    - Optional functions
X EXIT              - Exit from the TWSz dialog
```

2. Type **1** and press Enter to display the **Maintaining TWSZ Data Bases** menu.
3. On the **Maintaining TWSZ Data Bases** menu, type **1** and press Enter to display the Maintaining Work Station Descriptions panel.
4. On the Maintaining Work Station Descriptions Panel, select option **2** (LIST) and press Enter.

```
EQQODBSP ----- MAINTAINING TWSZ DATA BASES -----
Option == 1

Select one of the following:
1 WS          - Work station descriptions
2 CALENDAR    - Calendar descriptions
3 PERIOD      - Period descriptions
4 AD          -
5 OI          -
6 SPECRES     -
7 EDWA        -
8 JD          -
9 JCLVAR      -
10 RUN CYCLE  -

EQQWSSP ----- MAINTAINING WORK STATION DESCRIPTIONS -----
Option == 2

Select one of the following:
1 BROWSE WS   - Display a list of work station descriptions
2 LIST WS     - List existing work station descriptions
                (Create, Browse, Delete, Modify or Copy)
3 BROWSE CLOSED - Display intervals when all work stations are closed
4 MODIFY CLOSED - Modify intervals when all work stations are closed
5 JOBS MIGRATION - Tracker agent jobs migration to End-to-end environment
9 PRINT WS    - Print all work station descriptions
```

Note: you can fast path using the menu numbers e.g. 1.2 from the primary menu. From anywhere else in the dialog you may use an equals sign '=' before the string to pass through the TWSz main menu and jump to the screen you want e.g. =1.2

The Specifying Work Station List Criteria panel opens.

```

EQQWSEP ----- SPECIFYING WORK STATION LIST CRITERIA -----
Command ==>

Specify selection criteria below and press ENTER to create a list.

WORK STATION NAME  ==> _____
DESTINATION        ==> _____
TYPE               ==> _____ G , C , P , R in any combination, or blank
REPORTING ATTRIBUTE ==> _____ A , S , C , N in any combination, or blank
FT Work station    ==> _____ Y , N or blank
AUTOMATION         ==> _____ Y , N or blank
WAIT Work station  ==> _____ Y , N or blank
VIRT Work station  ==> _____ Y , N or blank
z-Centric Agent    ==> _____ Y , N or blank
Dynamic           ==> _____ Y , N or blank
Remote engine type ==> _____ Z , D or blank
  
```

5. Clear all fields and press Enter to display the List of Work Station Descriptions panel.

```

EQQWMLSL ----- LIST OF WORK STATION DESCRIPTIONS ----- Row 1 of 11
Command ==> create                                SCROLL ==> CSR

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

Row  Work station  V T R  Last update
cmd  name  description  user  date  time
'    INCP  z/OS local tracker VTAM LU  N C A  INGC100  14/04/03  20.43
'    INNR  Non reporting WS           N G N  INGC100  14/04/03  20.44
  
```

6. On the List of Work Station Descriptions panel, type **create** and press Enter. The Creating General Information about a Work Station panel opens.

```

EQQWCSEP ----- CREATING GENERAL INFORMATION ABOUT A WORK STATION -----
Command ==>
Enter the command R for resources A for availability O for end-to-end options
or D for Destinations above, or enter data below:

WORK STATION NAME  ==> _____
DESCRIPTION        ==> _____
WORK STATION TYPE  ==> G          G General, C Computer, P Printer
                                R Remote Engine
REPORTING ATTR     ==> S          A Automatic, S Manual start and completion
                                C Completion only, N Non reporting
PRINTOUT ROUTING   ==> SYSPRINT  The ddname of daily plan printout data set
SERVER USAGE       ==> B          Parallel server usage C , P , B or N
DESTINATION        ==> _____ Name of destination
Options: allowed   Y or N
SPLITTABLE         ==> N          JOB SETUP                ==> N
STARTED TASK, STC  ==> N          WTO                      ==> N
AUTOMATION         ==> N          FAULT-TOLERANT AGENT    ==> N
WAIT               ==> N          Z-CENTRIC AGENT          ==> N
VIRTUAL           ==> N          DYNAMIC                  ==> N

REMOTE ENGINE TYPE ==> _          Z z/OS or D Distributed
Defaults:
TRANSPORT TIME     ==> 00.00      Time from previous work station HH.MM
DURATION           ==> _____ Duration for a normal operation HH.MM.SS
  
```

7. In the **Work Station Name** field, type the name of your workstation, **U#CP**, where # is your assigned team identifier.
8. In the **Description** field, type a brief description of your workstation.

9. In the **Work Station Type** field, type **c** to define this workstation as a Computer workstation.
10. In the **Reporting Attr** field, type the letter **a** to specify the Automatic attribute for your computer workstation.
11. In the **Server Usage** field, specify planning and control for this workstation by typing **b** for both.
12. In the **Destination** field, enter the VTAM LU-name for the Tivoli Workload Scheduler for z/OS tracker: **TWTL**.
The tracker VTAM LU-name is **TRK00LU**.
13. In the **Duration** field, enter a default duration of **5** minutes for this workstation. Type **00.05.00** to specify the time, and press Enter to replace the cursor to the home location.

Defining open intervals (availability)

Open intervals are the times of day when a workstation is available to run work. By default, all workstations are open 24 hours a day. However, you can change this setting. In this exercise, you specify the open intervals, number of parallel servers, fixed resources, and alternate workstation (if any) for your environment. Perform the following steps:

```

EQQWCGEP ----- CREATING GENERAL INFORMATION ABOUT A WORK STATION -----
Command ==> A
Enter the command R for resources A for availability 0 for end-to-end options
or D for Destinations above, or enter data below:

WORK STATION NAME    ==> U#CP
DESCRIPTION          ==> Team # CPU workstation
WORK STATION TYPE    ==> C      G General, C Computer, P Printer
                                R Remote Engine
REPORTING ATTR       ==> A      A Automatic, S Manual start and completion
                                C Completion only, N Non reporting
PRINTOUT ROUTING     ==> SYSPRINT The ddname of daily plan printout data set
SERVER USAGE         ==> B      Parallel server usage C , P , E or N
DESTINATION          ==> TRK00LU_ Name of destination
Options: allowed Y or N
SPLITTABLE           ==> N      JOB SETUP ==> N
STARTED TASK, STC    ==> N      WTO ==> N
AUTOMATION           ==> N      FAULT-TOLERANT AGENT ==> N
WAIT                 ==> N      Z-CENTRIC AGENT ==> N
VIRTUAL              ==> N      DYNAMIC ==> N

REMOTE ENGINE TYPE   ==> _      Z z/OS or D Distributed
Defaults:
TRANSPORT TIME       ==> 00.00   Time from previous work station HH.MM
DURATION              ==> 00.05.00 Duration for a normal operation HH.MM.SS
  
```

14. Type **A** on the command line of the Creating General Information about a Work Station panel, and press Enter. The Availability of a Work Station panel opens.

```

EQQWMAVL ----- AVAILABILITY OF A WORK STATION ----- Row 1 of 8
Command ==> _ Scroll ==> CSR

Work station      : U#CP      Team # CPU workstation

Enter the ALL command above to get all open time intervals 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
C - Close a day/date, S - Define open intervals for a day/date

Row  cmd  Day of week or  Status  Description of day
      YY/MM/DD
.....
..... STANDARD..... DEFINED.....
..... MONDAY..... STANDARD.....
..... TUESDAY..... STANDARD.....
..... WEDNESDAY..... STANDARD.....
..... THURSDAY..... STANDARD.....
..... FRIDAY..... STANDARD.....
..... SATURDAY..... STANDARD.....
..... SUNDAY..... STANDARD.....
***** Bottom of data *****

```

On the Availability of a Work Station panel, you see the word **Standard**. The days of the week are in the Day of week or YY/MM/DD column. In the **Standard** definition, the open intervals represent the typical processing day for the workstation. Each of the days of the week point to the **Standard** definition but can each be individually defined when required. To change the open intervals for a specific date, specify the date in this column. The open intervals on specified dates override the setting for that weekday.

The Status column shows whether open intervals are explicitly defined for a day or date. An explicitly defined day or date has a status of DEFINED. [Table 1](#) shows the availability and the alternate workstation that you should define for your computer workstation.

Table 1 Workstation availability

Day of week or YY/MM/DD	Open interval	Parallel servers	Alternate workstation
Standard	00:00 to 08:00	550	UNCP
	08:00 to 18:00	20	UNCP
	18:00 to 24:00	400	UNCP
Next Saturday	Closed for	20	UNCP
	maintenance from 02:00 to 06:00.		

15. On the Availability of a Work Station panel, type row command **S** next to **Standard** and press Enter.

The Open Time Intervals for One Day panel opens. In this panel, you can define open intervals for a day or date for **Standard**.

```

EQQWMOTL ----- OPEN TIME INTERVALS FOR ONE DAY ----- Row 1 of 1
Command ==> _ Scroll ==> CSR

Work station      : U#CP                      Team # CPU workstation
Day or specific date : STANDARD
All work station closed : NO

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

Row  Open time interval  Parallel  Resources  Alternate
cmd  HH.MM - HH.MM      servers    R1  R2      Work Station
----  --
00.00 - 24.00          00099    99  99
***** Bottom of data *****

```

16. Use the information in the Workstation Availability table to define the following values for your computer workstation:

- Open time interval
- Parallel servers
- Alternate work station

The open intervals that you define look similar to the following example.

```

EQQWMOTL ----- OPEN TIME INTERVALS FOR ONE DAY ----- Row 1 of 3
Command ==> _ Scroll ==> CSR

Work station      : U#CP                      TEAM # zOS worksta
Day or specific date : STANDARD
All work station closed : NO

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

Row  Open time interval  Parallel  Resources  Alternate
cmd  HH.MM - HH.MM      servers    R1  R2      Work Station
----  --
00.00 - 08.00          00550    00  00      UNCP
08.00 - 18.00          00020    00  00      UNCP
18.00 - 24.00          00400    00  00      UNCP
***** Bottom of data *****

```

17. Press END (F3) to return to the Availability of a Work Station panel.
18. On the Availability of a Work Station panel, insert a new line and use next Saturday's date for the specific date. Provide a description also.
19. Define the workstation availability for next Saturday as specified in the Workstation Availability table.

The open intervals that you define look similar to the following example.

```

EQQWMOTL ----- OPEN TIME INTERVALS FOR ONE DAY ----- Row 1 of 3
Command ==> Scroll ==> CSR

Work station      : U#CP                      TEAM # zOS worksta
Day or specific date : 15/08/08
All work station closed : NO

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

Row cmd  Open time interval      Parallel  Resources  Alternate
         HH.MM - HH.MM          servers    R1  R2      Work Station
-----
00.00    02.00                  00020    00  00      UNCP
02.00    06.00                  00000    00  00      UNCP
06.00    24.00                  00020    00  00      UNCP
***** Bottom of data *****

```

20. When you finish, save your workstation definition by pressing END (F3). Repeat pressing F3 until you see the WS CREATED message in the upper right corner of the List of Work Station Descriptions panel.

Creating a job setup workstation

In Tivoli Workload Scheduler for z/OS, you use **job setup** workstations to edit job statements when required before job submission. Name this workstation **U#JS**, where # is your assigned team identifier. Perform the following steps:

21. On the List of Work Station Descriptions panel, type **CREATE** and press Enter to begin creating your job setup workstation. The Creating General Information about a Work Station panel opens.
22. In addition to the workstation name and a description, input the values that are provided in [Table 2](#) :

Table 2 Job setup workstation fields and settings

Field	Setting
WORK STATION TYPE	G (General)
REPORTING ATTR	S (Manual start and completion)
SERVER USAGE	N
SPLITTABLE	Y
JOB SETUP	Y

23. When you finish, save your workstation definition by pressing END (F3). Repeat F3 until you see the WS CREATED message in the upper right corner of the List of Work Station Descriptions panel.

Creating a nonreporting workstation

You can use **nonreporting** workstations to trigger the start of multiple independent operations within an application and other dummy uses, eliminating the need for IEFBR14 jobs.

Name this workstation **U#NR**, where # is your assigned team identifier. Perform the following steps:

24. Use the information in [Table 3](#) when defining the workstation.

Table 3 Non-reporting workstation fields and settings

Field	Setting
WORK STATION TYPE	G (General)
REPORTING ATTR	N (Non-reporting)
SERVER USAGE	N

25. When you finish, save your workstation definition by pressing END (F3). Repeat pressing F3 until you see the `WS CREATED` message in the upper right corner of the List of Work Station Descriptions panel.

Creating a wait workstation

You use a **wait** workstation to include operations in an application that wait for a specified time period. Jobs at wait workstation create a waiting period within the application's flow of operations.

Name this workstation **U#WT**, where the number symbol (#) is your assigned team identifier. Perform the following steps:

26. On the List of Work Station Descriptions panel, type **CREATE** and press Enter to begin creating your wait workstation, use the information in [Table 4](#)

Table 4 Wait workstation fields and settings

Field	Setting
WORK STATION TYPE	G
REPORTING ATTR	N
Wait	Y

27. When you finish, save your workstation definition and return to the Tivoli Workload Scheduler for z/OS main menu by pressing RETURN (F4). You see the `WS CREATED` message in the upper right corner of the screen.



3 Exercises for Calendars, periods, and run cycle groups

Exercise 1 Creating calendars, periods, and run cycle groups

In this exercise, you create a calendar, one period (noncyclic), and two run cycle groups that you can use to schedule applications in IBM Tivoli Workload Scheduler for z/OS. The scheduler uses **calendars** to identify business days (**workdays**) and nonbusiness days (**free days**). You create a calendar that is named U#CAL, where # is your team identifier.

The **periods** and **run-cycle groups** are user-defined and generate run dates for your applications. You create one period: U#BDAYS to represent a user specified run schedule (it contains all your birthdays which the instructor collects). You also create two run cycle groups, U#WEEKRG and U#MTHRG, which represent a weekly, and a monthly, schedule.

Wherever you find the # in a name, replace it with your student team ID number.

Creating a Tivoli Workload Scheduler for z/OS calendar

There are a couple of calendars already defined in the database, one where everyday is a working day and a second where everyday except (US) holidays are a working day.

Create a calendar that is named U#CAL, where # is your assigned team identifier. In another exercise, you use your calendar to schedule an application.

Perform the following steps to create your calendar:

1. On the Tivoli Workload Scheduler for z/OS main menu panel, select option **1** (DATABASE) and press Enter.
The Maintaining TWSZ Data Bases panel opens.
2. On the Maintaining TWSZ Data Bases panel, select option **2** (CALENDAR) and press Enter.
The Maintaining the TWSZ Calendars panel opens.

- On the Maintaining the TWSZ Calendars panel, select option **2** (MODIFY CALENDAR). Press Enter to list the calendars in the database.

The Modifying Calendars panel opens.

```
EQOTCAML ----- MODIFYING CALENDARS ----- CALENDAR DELETED
Command ==> Scroll ==> CSR

Enter the CREATE command above to create a new calendar or
enter any of the following row commands:
B - Browse, C - Copy, D - Delete, M - Modify,
or G to display a calendar graphically

Row Calendar Description Last update
cmd id user date time
' ALLDAYS everyday is a working day INGC109 15/08/03 17.21
c DEFAULT all work days except US hols INGC109 15/08/03 17.23
***** Bottom of data *****
```

- On the Modifying Calendars panel, copy the DEFAULT calendar by typing the **C** (copy) row command next to it and pressing Enter.

The Creating a Calendar panel opens.

- Type the name of your calendar, **U#CAL**, in the **CALENDAR ID** field.
- In the **DESCRIPTION** field, type a brief description for your calendar.
- In your calendar, Monday through Friday should be defined as workdays, and Saturday and Sunday as free days. Holidays are also defined in the calendar. Verify that the following holidays are defined in your calendar for this year:

New Year's day
 Memorial day
 Independence day
 Labor day
 Thanksgiving day
 Day after Thanksgiving
 Christmas day
 Day after Christmas (Boxing day)

- Be sure that the WORK DAY END TIME is **00.00**.
- Press END (F3) to save your calendar (check it displays correctly in the list of calendars) and then return to the primary panel.

Creating a period

The advent of Run-cycle Groups means there is no longer a requirement to create **cyclic** periods, so only a non-cyclic period is created in this exercise.

The **noncyclic** period has a period name of U#BDAYS with Interval Origin dates that match the class birthdays. These dates represent the specific dates a business area requested that their batch run. The instructions take you through the steps that are needed.

10. On the Tivoli Workload Scheduler for z/OS main menu panel, select option **1** (DATABASE) and press Enter.
The Maintaining TWSZ Data Bases panel opens.
11. On the Maintaining TWSZ Data Bases panel, select option **3** (PERIOD) and press Enter.
The Maintaining the TWSZ Periods panel opens.
12. On the Maintaining the TWSZ Periods panel, select option **2** (MODIFY PERIOD) to list the periods in the database. Press Enter.
The List of Periods panel opens.

Creating a noncyclic period

Perform the following steps to create your period named U#BDAYS::

13. On the List of Periods panel, type **create** and press Enter.
The Creating a Period panel opens.
14. Tab to the **PERIOD NAME** field and type the name of your period, **U#BDAYS**.
15. In the **PERIOD TYPE** field, type **N** to specify noncyclic.
Note - The **INTERVAL** field now has a value of 0.
16. In the Interval origin column, type the date for your next birthday.
17. Repeat this interval origin entry and insert the birthdays of the whole class. (It is not necessary to do these entries in any specific order. Tivoli Workload Scheduler for z/OS puts the dates in chronological order when you exit the panel).
18. When the Interval end column is left blank then the start of the next Interval implies the end of the previous Interval. The interval end date is used to do calculation from the end of the interval (for example, date minus 3 days). It is necessary to provide an interval end date for the last entry.
19. Press END (F3) to save your period and check it is listed correctly. You see the message **PERIOD CREATED** in the upper right corner. Modify your period to check the dates were correctly reordered.

Creating run cycle groups

Run cycle groups differ from periods in many ways, but essentially the outcome is the same. A list of interval start dates to be used by an application to determine when it should run. There is no concept of cyclic and noncyclic for run cycle groups. In addition, you can say which calendar should be used in the calculation of the interval start dates and you can even point to a period. For now, you create a couple of simple run cycle groups.

The **run-cycle groups** that you create, named U#RGMON and U#RGLWDM, generate run dates that match the first day of every week (Monday) and the last work day of every month. You also create a run cycle group that combines both rules with an 'and' to find dates that are both the last workday of the month AND a Monday, called U#RGLWD1.

In this section, you create one weekly and one monthly run cycle group. Perform the following steps:

20. On the Tivoli Workload Scheduler for z/OS main menu panel, select option **1** (DATABASE) and press Enter.

The Maintaining TWSZ Data Bases panel opens.

21. On the Maintaining TWSZ Data Bases panel, select option **10** (RUN CYCLE GROUP) and press Enter.

A Filter Panel is displayed (specifying run cycle group list criteria). There might be many different run cycle groups defined and this filter panel allows selection of a subset. Leave all the fields blank and press enter to create a full list of run cycle groups.

By default the list of run cycle groups panel uses the advanced panel format. Placing the cursor on an action bar word and pressing enter displays a menu. From this panel choose either **Action** or **Help**. To create a new run cycle group you can type **create** on the command line, or use the *action* tab and select option 1 (create).

Creating your monthly run-cycle group

22. Perform the following steps to create a weekly run cycle group that starts on a Monday.

23. On the List of run cycle groups panel, type **CREATE** and press Enter.

```

  Action  Help
-----
EQQNRLSL          LIST OF RUN CYCLE GROUPS
Command ==> create_ Scroll ==> CSR_

View: Compact (EQQNRLST)          Row 1 of 1          >>
Row Run cycle group description          Tot run
cmd ID                                     cycles
LASTWDM                                     1
***** end of data *****
```

The Creating a run cycle group panel opens.

```

EQQRRCGL ----- CREATING A RUN CYCLE GROUP ----- Row 1 to 1 of 1
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
S - Specify run days/Modify rule
Enter the GENDAYS command to show the dates generated by this Run cycle group

RUN CYCLE GROUP ID ==> _____ Run cycle group name
DESCRIPTION ==> _____
OWNER ID ==> _____ Owner name
INPUT HH.MM ==> 00.00 Input arrival time
DEADLINE DAY/TIME ==> ____/____ Deadline
CALENDAR ID ==> _____ Calendar name
VARIABLE TABLE ==> _____ JCL variable table id

Row cmd Name of Input Deadline In Out of
cmd rule HH.MM day HH.MM Type rule effect Effect Variable table
-----
Description: _____
Subset ID: _____ Calendar: _____

***** Bottom of data *****
    
```

24. Tab to the RUN CYCLE GROUP ID field and give your run cycle group the name **U#RGMON**. Insert your groups calendar (**U#CAL**) in the calendar field.
 The Green fields are optional, if you like to provide a description and owner id you can.
25. A run cycle group is a collection of run cycle RULES. A blank rule line is provided. Move to the rule line and provide a name for the rule within the group (for example, weekly). Press enter
 The remaining red fields were completed with default values. The Free Day rule is set to 4 (do not run on a free day). The free days here refer to the calendar used to calculate the interval origin days. You used your calendar so the free days defined there are non-workdays.
26. Select the row (S in the Row cmd column) to display the Modifying a rule panel.

```

EQQRRLEP ----- MODIFYING A RULE -----
Command ==>

Enter the GENDAYS command to display the dates generated by this rule
Enter the E command to specify EVERY options
Enter S and user data in the fields below to define a rule

Run cycle group : U#RGMON
Rule : WEEKLY

--- Frequency ---      --- Day ---      --- Cycle Specification ---
Only      Day      Week      January      July
$ Every    Free day $ Month      February     August
           Work day  Year       March        September
           $ Monday  June       April        October
           Tuesday   Week number May         November
           Wednesday Period name  June         December
           Thursday
           Friday
           Saturday
           Sunday
           Shift default origin by ____ days

If no other selection FIRST is assumed
Select either ONLY or EVERY
At least one item must be selected from each section
At least one item must be selected from each section
    
```

The three sections, **Frequency**, **Day**, and **Cycle Specification** all need an entry.

27. Tab to the **Every** keyword and press S to select it. Tab to the **Monday** keyword and press S to select it. Tab to the **Year or Month** keyword and press S to select it.

28. To verify that you have the correct dates return to the command line and enter the command **GENDAYS**.

There are no Mondays that are highlighted before the start date of the Interval. Any free days in the calendar that is used are shown. Field colors can be changed in the Options dialog so the colors on your display might not match the ones shown here.

```
EQQRULRG ----- LIST OF GENERATED DATES ----- Command ==> Scroll ==> CSR
```

```
Run cycle group id:   U#RGMON                                Goto Year ==>
Calendar       : U#CAL                                Work day end time: 00.00
Interval       : 15/08/03 - 18/12/31
```

July 2015							August 2015							September 2015						
Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su
			01	02	03	04	03	04	05	06	07	08	09				01	02	03	04
06	07	08	09	10	11	12	10	11	12	13	14	15	16	07	08	09	10	11	12	13
13	14	15	16	17	18	19	17	18	19	20	21	22	23	14	15	16	17	18	19	20
20	21	22	23	24	25	26	24	25	26	27	28	29	30	21	22	23	24	25	26	27
27	28	29	30	31			31							28	29	30				

October 2015							November 2015							December 2015						
Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su
				01	02	03	02	03	04	05	06	07	08				01	02	03	04
05	06	07	08	09	10	11	09	10	11	12	13	14	15	07	08	09	10	11	12	13
12	13	14	15	16	17	18	16	17	18	19	20	21	22	14	15	16	17	18	19	20
19	20	21	22	23	24	25	23	24	25	26	27	28	29	21	22	23	24	25	26	27
26	27	28	29	30	31		30							28	29	30	31			

29. Press the END key (F3) until you exit the run-cycle group you created and are back in the run cycle group list and receive the RUN CYCLE GROUP CREATED message in the upper right of the screen. Your new run cycle group should now be in the list

Creating your monthly run-cycle group

Perform the following steps to create your monthly run-cycle group named **U#RGLWDM**:

30. On the List of Run cycle groups panel, type **create** and press Enter.
 The Creating a run cycle group panel opens.
31. Tab to the **RUN CYCLE GROUP ID** field and type the name of your run cycle group, **U#RGLWDM**.
32. Tab to the **RULE** line and give the rule a reasonable name, such as **LWDM** and press enter.
33. Select the rule.
34. Select keywords for ONLY the LAST WORK DAY of the MONTH.
35. Use the **GENDAYS** command to confirm the results.
36. Press **END** (F3) to save your run cycle group and return to the list. You see the message **RUN CYCLE GROUP CREATED** in the upper right corner. Check your run-cycle group is listed correctly.

Creating your combined run cycle group

With run cycle Groups, you can collect multiple run cycle rules into subsets of the RCG (run cycle group). The result of the combination of days is the eventual interval dates for this RCG. Perform the following steps to create your combined RCG named **U#RGLWD1**:

37. On the List of Run cycle groups panel, type **create** and press Enter.

The Creating a run cycle group panel opens.

38. Tab to the **RUN CYCLE GROUP ID** field and type the name of your run cycle group, **U#RGLWD1**.

39. Tab to the RULE line and give the rule a reasonable name, such as LWDM and press enter.

40. Select the rule and select keywords for ONLY the LAST WORK DAY of the MONTH.

41. Use the GENDAYS command to confirm the results.

42. Press END (F3) to save your first rule.

43. On the row command type **R** to repeat the rule or **I** to insert a second rule line. Give this rule a reasonable name, like Monday.

44. Select this rule line and select keywords for EVERY MONDAY of the YEAR.

45. Use the GENDAYS command to confirm the results.

46. Press the END key (F3) to save this second rule line.

47. Issue the GENDAYS command now and see the combined effect of the two rule lines - it should show both the last working days of the months and every Monday.

The TYPE value for both rules is R (positive Rule) and by default the combination is evaluated as OR. Even though a subset id was not provided the rules are combined. The subset ID can be any name that you like. The letter A on both is sufficient to expressly combine the two rule lines.

48. Change the TYPE value to A (positive AND) and do a GENDAYS to review the results. Fewer run days are displayed as only Mondays that are also the last working day of the month are shown..Press EXIT (F4) to return to the main menu.

```

----- LIST OF GENERATED DATES -----
Command ==>
Run cycle group id:  U#RGLWD1
Calendar   :  U#CAL
Interval   :  15/08/03 - 18/12/31
Goto Year ==>
Scroll ==> CSR
    
```

July 2015							August 2015							September 2015						
Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su
		01	02	03	04	05	03	04	05	06	07	08	09	07	08	09	10	11	12	13
06	07	08	09	10	11	12	10	11	12	13	14	15	16	14	15	16	17	18	19	20
13	14	15	16	17	18	19	17	18	19	20	21	22	23	21	22	23	24	25	26	27
20	21	22	23	24	25	26	24	25	26	27	28	29	30	28	29	30				
27	28	29	30	31			31													

October 2015							November 2015							December 2015						
Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su
			01	02	03	04	02	03	04	05	06	07	08	07	08	09	10	11	12	13
05	06	07	08	09	10	11	09	10	11	12	13	14	15	14	15	16	17	18	19	20
12	13	14	15	16	17	18	16	17	18	19	20	21	22	21	22	23	24	25	26	27
19	20	21	22	23	24	25	23	24	25	26	27	28	29	28	29	30	31			
26	27	28	29	30	31		30													



4 Applications exercises

These exercises give you the opportunity to create a Tivoli Workload Scheduler for z/OS application group, an application with multiple operations, and two job descriptions by using the scheduler panels. These exercises are the first of several where you create Tivoli Workload Scheduler for z/OS applications. You schedule and run these two applications during the [Unit 6, “Long-term and current plans exercises”](#) on page 42.

An application group definition does not contain any jobs, just the scheduling information for the applications that use it.

Exercise 1 Creating an application group

Wherever you find the hash tag (#) in a name, replace it with your student team ID number.

In this section, you create an application group, U#APPL1G, where # is your assigned team identifier. You provide general information and run-cycles for this application group. Perform the following steps to create your group definition:

1. On the Tivoli Workload Scheduler for z/OS main menu panel, select option **1** (DATABASE) and press Enter.
The Maintaining TWSZ Data Bases panel opens.
2. On the Maintaining TWSZ Data Bases panel, select option **4** (AD) and press Enter.
The Maintaining Application Descriptions panel opens.
3. Select option **2** (CREATE) on the Maintaining Application Descriptions panel and press Enter.
The Creating an Application panel opens.
4. Type the name of your application group, **U#APPL1G**, in the **Application: ID** field.
5. Write a brief description of your application in the **TEXT** field.
6. Type **g** in the **TYPE** field to define your application as a group.
7. In the **Owner: ID** field, type your team name, **TEAM#**.
8. Leave the **PRIORITY** field blank as a priority cannot be assigned to an application group.
9. Make your group active by typing '**a**' in the **STATUS** field.

10. Specify your calendar, **U#CAL**, in the **CALENDAR ID** field.
11. In the next exercise, you will be adding run-cycles to the application group, but for now, save out of your application group by pressing END (F3) until you see the `Application created` message in the upper right. You see a `No Run Cycles` message the first time you press F3. You can ignore this message for now.
12. Press END (F3) until you return to the main TWSz menu (or press RETURN - F4, which should take you back to the main menu in one step).

Exercise 2 Creating application run cycles

In this exercise, you create run cycles in your team's application group (U#APPL1G). The applications in this group are to run on Mondays except when Monday is also the last day of the month, in this case the applications should run on the Tuesday. To do this, you need to use the run-cycle groups you created previously. You define rule-based run cycles and use the **GENDAYS** command to verify defined rules. The process of building a run-cycle for an application or application group is similar to creating a run cycle group; however there are a couple of extra fields.

The scheduling requirements are as follows:

- Run the application group every Monday.
- If Monday is a holiday, run on the closest workday following.
- Do not run the applications on the last working day of the month.
- If Monday is the last working day of the month run the group on Tuesday.

Perform the following steps to create your run cycles:

1. On the Tivoli Workload Scheduler for z/OS main menu panel, select option **1** (DATABASE) and press Enter.
The Maintaining TWSz Data Bases panel opens.
2. On the Maintaining TWSZ Data Bases panel, select option **4** (APPLICATIONS) and press Enter.
The Maintaining Application Descriptions panel opens.
3. On the Maintaining Application Descriptions panel, select option **3** (LIST) and press Enter.
The Specifying Application List Criteria panel opens.
4. In the **Application: ID** field, type **U#**, where **#** is your assigned team identifier. Press Enter to display the List of Applications panel.
Your application group is listed.
5. Type the **M** (modify) row command next to your application group, U#APPL1G, and press Enter.

The Modifying an Application panel opens.

- On the Command line, type **run**, and press Enter to display the Run Cycles panel.

```
----- RUN CYCLES ----- Row 1 of 1
Command ==> Scroll ==> CSR
Enter/Change data in the rows, and/or enter any of the following
row commands:
I(nn) - Insert, R(nn),RR(nn) - Repeat, D(nn),DD - Delete
S - Specify run days/Modify rule

Application : U#APPL1G Team # Appl group
Row Name of rg/ Input Deadline F day In Out of Variable table
cmd period/rule HH.MM day HH.MM Type rule effect Effect YY/MM/DD YY/MM/DD
****
Text :
Shift: Shift Day Type:
***** Bottom of data *****
```

This first rule schedules your application group on Mondays or closest work day following.

- In the Name of period/rule column, type a name for your first rule, such as **Monday**.
- Specify an application input arrival time of **06.00** in the Input column.
- In the Deadline day column, specify **00**.
- In the Deadline HH.MM column, specify **18.00** (6:00 PM).
- Press Enter to accept default values for the remaining fields.
- Check the value in the F day rule column is **2**. This value means that your application must not be scheduled on a free day but on the closest work day following. In your calendar Monday might be a public holiday.
- Press F1 to view help information for the Run Cycles panel. Press Enter to scroll through the help information and review the possible values that are associated with the F day rule column. Press F3 to exit help.
- In the Variable table column, specify the name of your team's JCL variable table. The table name is **TEAM#**, where # is your assigned team identifier.
- Type a simple description for your run cycle on the blank line under your current entries. Your Run Cycles panel looks similar to the following example.

```
----- RUN CYCLES ----- Row 1 of 1
Command ==> Scroll ==> CSR
Enter/Change data in the rows, and/or enter any of the following
row commands:
I(nn) - Insert, R(nn),RR(nn) - Repeat, D(nn),DD - Delete
S - Specify run days/Modify rule

Application : U#APPL1G Team # Appl group
Row Name of rg/ Input Deadline F day In Out of Variable table
cmd period/rule HH.MM day HH.MM Type rule effect Effect YY/MM/DD YY/MM/DD
**** MONDAYS_ 06.00 00 18.00 R 2 14/04/12 71/12/31 TEAM#
Text : run jobs on Monday or closest work day following
Shift: 0 Shift Day Type:
***** Bottom of data *****
```

16. Type the **S** (Specify) row command next to your rule name and press Enter. The Modifying a Rule panel opens.
17. Specify a run frequency by typing **s** next to **Every** in the Frequency column.
18. Select the run day from the Day column by typing **s** next to **Monday**.
19. Specify the business processing cycle by selecting a cycle from the Cycle Specification column. Type **s** next to **Year** and press Enter.
20. Verify that the generated dates are the ones that you want. Type **gendays** on the command line and verify that the scheduled dates are working Mondays.
Your Modifying a Rule panel should look like the following example.

```

----- MODIFYING A RULE -----
Command ==>

Enter the GENDAYS command to display the dates generated by this rule
Enter the E command to specify EVERY options
Enter S and user data in the fields below to define a rule

Application      : U#APPL1G                      Team # Appl group
Rule             : MONDAYS      run jobs on Monday or closest work day following

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

```

21. Press END (F3) to return to the Run Cycles panel.

Your second rule is a negative rule to prevent the application group running on a Monday that falls on the last day of the month. Earlier you created a run cycle group that combined Mondays with the last working day of the month (U#RGLWD1). Create a second run cycle that uses your run cycle group. Perform the following steps to complete the task:

22. Repeat the first run cycle by typing the **R** row command next to the run cycle and pressing Enter.
23. Change the rule name of the second run cycle to make it unique within the application. Call it **NOTLWD1**.
24. Modify the description of the run cycle to indicate that it is used to delete schedule when Monday and last work day of month coincide.
25. Change the type value to E (negative rule). The free day rule can be 3 or 4 as the last WORK day can never be a free day.
26. Select the run cycle to specify the run days by typing **s** next to the run cycle and pressing Enter.

27. On the Modifying a Rule panel, change your selections as follows:

- **Frequency** selections: **Only** and **First**
- **Day** selection: **Work day**
- **Period/RG name**: **U#RGLWD1**
- clear all other entries that are selected.
- Issue GENDAYS to verify that your rule only shows last work days that are Mondays.

28. Press END (F3) twice to return to the Run Cycles panel.

Your third rule will be a positive rule to run the application group on the workday after a Monday that is also the last work day of the month. You use your combination run cycle group (U#RGLWD1) again. Perform the following steps to complete the task:

29. Repeat the second run cycle by typing the **R** row command next to the run cycle and pressing Enter.
30. Change the rule name of the second run cycle to make it unique within the application. Call it Tuesdays.
31. Modify the description of the run cycle to indicate that it is used to schedule on the next work day when Monday and last work day of month coincide.
32. Change the type value to R (positive rule). The free day rule should be 3 as you do not like to move the job into a free day.
33. Select the run cycle to specify the run days by typing **s** next to the run cycle and pressing Enter.

34. On the Modifying a Rule panel, change your selections as follows:

- **Frequency** selections: **Only** and **Second**
- **Day** selection: **Work day**
- **Period/RG name**: **U#RGLWD1**
- clear all other entries that are selected.
- Issue GENDAYS to verify that your rule only shows the workday following last work days that are Mondays.

```

----- MODIFYING A RULE -----
Command ==> _

Enter the GENDAYS command to display the dates generated by this rule
Enter the E command to specify EVERY options
Enter S and user data in the fields below to define a rule

Application      : U#APPL1G          Team # Appl group
Rule             : TUESDAY          move to next day when monday = last working day

--- Frequency ---      --- Day ---      --- Cycle Specification ---
-----
      S Only
      _ Every

      _ First          _ Last
      S Second         _ 2nd Last
      _ Third          _ 3rd Last
      _ Fourth         _ 4th Last
      _ Fifth          _ 5th Last

      _ _             _ _
      _ _             _ _
      _ _             _ _

      _ Day
      _ Free day
      S Work day
      _ Monday
      _ Tuesday
      _ Wednesday
      _ Thursday
      _ Friday
      _ Saturday
      _ Sunday

      _ Week
      _ Month
      _ Year

      _ January
      _ February
      _ March
      _ April
      _ May
      _ June
      _ July
      _ August
      _ September
      _ October
      _ November
      _ December

      Week number
      Period/RG   U#RGLWD1
      name

      Shift default origin by _ days
  
```

35. Press END (F3) twice to return to the Run Cycles panel.

Your three combined rules meet the scheduling requirement. Consider that you built the run-cycles using rules (types R or E) and specified run cycle groups in the cycle specification. Instead you could have used types N and X (Normal and eXclude) which are associated with using periods and offsets. Try to create a run-cycle using the run-cycle group as the name of the run-cycle and using type N. When this rule is selected, you do not get the rules panel, but the offset panel - the default offset is 1 (run on the interval origin day). You can set the offset to 2, run on the second day of the

interval, just as you did in the rule. You can also use the shift value to move the run day The example shows an alternative 2nd and 3rd run cycle.

```
----- RUN CYCLES ----- Row 1 of 3
Command ==> Scroll ==> CSR

Enter/Change data in the rows, and/or enter any of the following
row commands:
I(nn) - Insert, R(nn),RR(nn) - Repeat, D(nn),DD - Delete
S - Specify run days/Modify rule

Application : U#APPL1G Team # Appl group

Row Name of rg/ Input Deadline F day In Out of Variable table
cmd period/rule HH.MM day HH.MM Type rule effect Effect
' ' MONDAYS_ 06.00 00 18.00 R 2 14/04/12 71/12/31 TEAM#
Text : run jobs on Monday or closest work day following
Shift: 0 Shift Day Type: _

' ' U#RGLWD1 06.00 00 18.00 X 3 14/04/12 71/12/31 TEAM#
Text : do not run if Monday is the last workday of month
Shift: 0 Shift Day Type: _

' ' U#RGLWD1 06.00 00 18.00 N 3 14/04/12 71/12/31 TEAM#
Text : shift by 1 workday when monday is last workday
Shift: 1 Shift Day Type: W

***** Bottom of data *****
```

You will need to define a fourth rule that has nothing to do with the regular scheduling of this run-cycle group, for a one-off test run tomorrow. This rule is for a specific date, a positive rule, to run the application group tomorrow.

36. Insert a new rule line or repeat the Monday rule so most of the values are already completed. Call the new rule **TESTRUN**, type **R** and free day rule **3**. Select the rule and on the Modifying a Rule panel, change your selections as follows:

- **Frequency** selections: **Only** and tomorrow's **day of month**
- **Day** selection: **Day**
- **Cycle Specification**: tomorrow's **month**
- clear any other entries that are selected and save (you can issue the GENDAYS command first).

```
EQQRULEP ----- MODIFYING A RULE -----
Command ==>

Enter the GENDAYS command to display the dates generated by this rule
Enter the E command to specify EVERY options
Enter S and user data in the fields below to define a rule

Application : U#APPL1G Team # Appl group
Rule : TESTRUN test run of jobs for 25th of march

--- Frequency --- --- Day --- --- Cycle Specification ---
$ Only $ Day - Week - January - July
- Every - Free day - Month - February - August
- Monday - Year - March - September
- Tuesday - April - October
- Wednesday - May - November
- Thursday - June - December
- Friday
- Saturday
- Sunday

Week number
Period/RG
name
Shift default origin by days

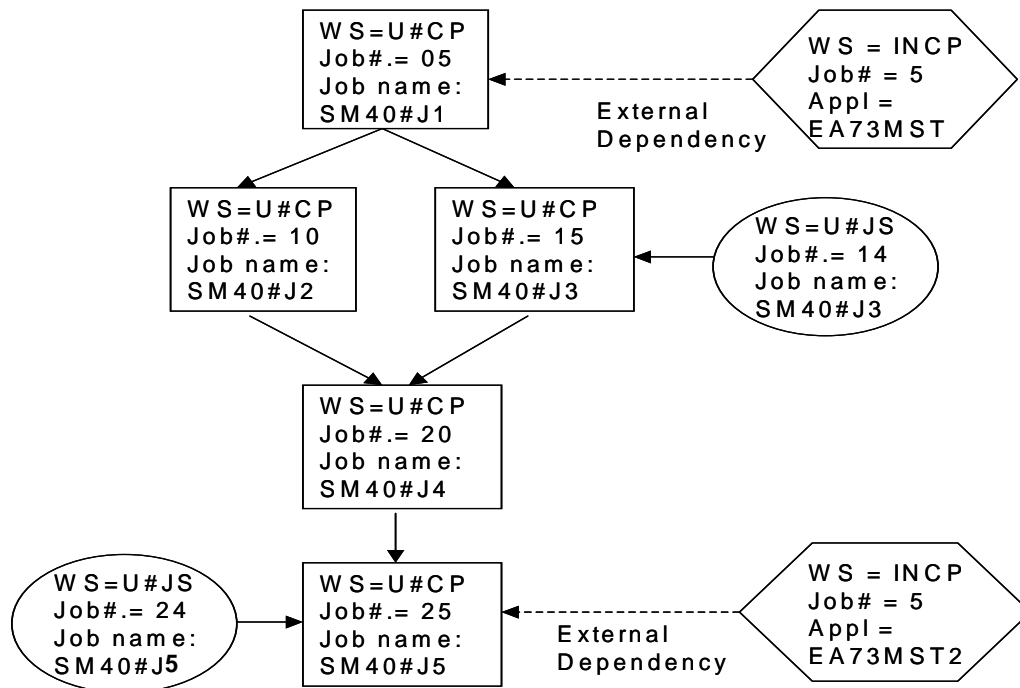
Assume that tomorrow is the 25th of March and this is the ONLY test run ( we hope ! )
```

Exercise 3 Creating an application with operations

This exercise gives you the opportunity to create an application description, U#APPL1A and populate it with operations by doing the following tasks:

- Define operations for computers and general workstations.
- Specify internal and external dependencies for operations.
- Specify job options as follows:
 - Acceptable return codes
 - Time dependency
 - Restart & Cleanup options

The following diagram shows the application job stream that you define in this exercise.



The rectangles represent operations that run as jobs on a computer workstation. The ovals represent job setup operations. The hexagons are operations that represent external dependencies.

Creating an application description

You create an application description, U#APPL1A, where # is your assigned team identifier. The application is a member of the group you created in the previous section. Perform the following steps:

37. From the main menu, select option 1 (Database); then 4 (Application Description); and then 2 (create) on the Maintaining Application Descriptions panel and press Enter. Or on the command line enter =1.4.2 to jump straight there from wherever you are in the TWSz dialog.

The Creating an Application panel opens.

38. Type the name of your application description, **U#APPL1A**, in the **Application: ID** field.
 39. Write a brief description of your application in the **TEXT** field.
 40. In the **TYPE** field put an 'a' to define your application as an application and not as an application group.
 41. In the **Owner: ID** field, type your team name, **TEAM#**.
 42. Write a brief description of your application in the **TEXT** field.
 43. Type **5** in the **PRIORITY** field to assign medium priority to your application description.
 44. Make your application description active by typing 'a' in the **STATUS** field.
 45. Leave the **CALENDAR ID** field blank.
 46. Type the name of your application group, **U#APPL1G**, in the **GROUP DEFINITION** field.
- The general part of the application is complete, next you need to add the operations you want run. The exercise continues by describing how to add your operations into the application.

```

EQQACGPP ----- CREATING AN APPLICATION -----
Command ==>

Enter/Change data below:
Enter the RUN command above to select run cycles or enter the OPER command
to select operations.

Application:
ID           ==> U#APPL1A_____
TEXT         ==> team # application_____ Descriptive text
TYPE         ==> A             A - Application, G - Group definition
Owner:
ID           ==> TEAM#_____
TEXT         ==> team #_____
Descriptive text of application owner
PRIORITY     ==> 5             A digit 1 to 9 , 1=low, 8=high, 9=urgent
VALID FROM   ==> 15/08/11      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 c
GROUP DEFINITION ==> U#APPL1G_____ Group definition id
SMOOTHING FACTOR ==> _____ LIMIT ==> _____ Deadline Feedback options
  
```


47. On the **Command** line of the Creating an Application panel, type the OPER command and press Enter to display the Operations panel.

```

EQQAM0PL ----- OPERATIONS ----- Row 1 of 1
Command ==>                                     Scroll ==> CSR

Enter/Change data in the rows, and/or enter any of the following
row commands:
I(nn) - Insert, R(nn),RR(nn) - Repeat, D(nn),DD - Delete
S - Select operation details, J - Edit JCL
Enter the PRED command above to include predecessors and number of conditions
in this list, or, enter the GRAPH command to view the list graphically.

Application      : U#APPL1A      Team # Appl 1A

Row  Oper      Duration  Job name  Operation text
cmd  ws   no.    HH.MM.SS
----  --  -
****   000
***** Bottom of data *****

```

48. On the Operations panel, press the Tab key until you arrive in the Oper ws column. Type the name of your team's computer workstation, **U#CP**. Remember to replace the # with your team number.
49. In the Oper no. column, type **005** and in the Duration column, type **00.01.00** (1 minute).
50. Operation **005** is job name SM40#J1
51. Type the remaining operations information and descriptive text for each operation into the Operations panel. Remember to replace the number sign (#) with your team number.
- After entering your operations information, your Operations panel looks similar to the following example.



Hint: If you do not see the Operation text column on your screen, type **text** on the command line and press Enter.

```

EQQAM0PL ----- OPERATIONS ----- Row 1 of 7
Command ==> _                                     Scroll ==> CSR

Enter/Change data in the rows, and/or enter any of the following
row commands:
I(nn) - Insert, R(nn),RR(nn) - Repeat, D(nn),DD - Delete
S - Select operation details, J - Edit JCL
Enter the PRED command above to include predecessors and number of conditions
in this list, or, enter the GRAPH command to view the list graphically.

Application      : U#APPL1A      Team # Appl 1A

Row  Oper      Duration  Job name  Operation text
cmd  ws   no.    HH.MM.SS
----  --  -
****   U#CP   005    00.00.30  SM40#J1_   Job 1
****   U#CP   010    00.00.30  SM40#J2_   Job 2
****   U#JS   014    00.05.00  SM40#J3_   Job 3 setup
****   U#CP   015    00.01.00  SM40#J3_   Job 3
****   U#CP   020    00.01.30  SM40#J4_   Job 4
****   U#JS   024    00.05.00  SM40#J5_   Job 5 setup
****   U#CP   025    00.00.30  SM40#J5_   Job 5
***** Bottom of data *****

```

After entering all the operations on the Operations text panel, you must connect the internal predecessors.

52. On the Command line, type '**pred**' and press Enter to display the Operations panel with Internal predecessors definition columns.
53. Enter the appropriate internal predecessors for the operations. Your panel looks similar to the following example when you finish.

```

EQQAMOSL ----- OPERATIONS ----- Row 1 of 7
Command ==> _ Scroll ==> CSR

Enter/Change data in the rows, and/or enter any of the following
row commands:
I(nn) - Insert, R(nn),RR(nn) - Repeat, D(nn),DD - Delete
S - Select operation details, J - Edit JCL
Enter the TEXT command above to include operation text, or,
enter the GRAPH command to view the list graphically.

Application          : U#APPL1A          Team # Appl 1A

Row  Oper  Duration  Job name  Internal predecessors  Morepreds  No.c
cmd  ws   no.    HH.MM.SS  SM40#J1_              005         0  0
..... U#CP 010  00.00.30  SM40#J2_              005         0  0
..... U#JS 014  00.05.00  SM40#J3_              005 014     0  0
..... U#CP 015  00.01.00  SM40#J3_              010 015     0  0
..... U#CP 020  00.01.30  SM40#J4_              020 024     0  0
..... U#JS 024  00.05.00  SM40#J5_              020 024     0  0
..... U#CP 025  00.00.30  SM40#J5_              020 024     0  0
***** Bottom of data *****

```

54. Type an **s** in the Row cmd column for **operation 005, Job name SM40#J1** and press Enter. The Operation Details panel opens.
- In the following lettered substeps, you define an external predecessor for operation number 005 and then set the automatic options for operation 005. The external predecessor is job EA73JOB1 operation 005 in application EA73MST on workstation INCP.
- Type option **1** (Predecessors) on the Operation Details panel and press Enter.
 - Type the application name EA73MST in the **Application: ID** column of the first blank row on the Predecessors panel and press Enter. If needed, you can use the '**I**' (Insert) row command to insert a blank line.
 - Select the operation 005 with job name EA73JOB1 on the Predecessors - List of Jobs panel and press enter - you see *SELECTED on your choice. Press PF3.

Your external predecessor definition looks similar to the Predecessors panel displayed in the following example.

```

EQQAMPDL ----- PREDECESSORS ----- Row 1 of 1
Command ==> _ Scroll ==> CSR

Enter the COND command to view the list of conditions, enter/change
data in the rows, and/or enter any of the following row commands:

I(nn) - Insert, R(nn),RR(nn) - Repeat, D(nn),DD - Delete
S - Description of external dependency, T - Dependency resolution criteria

Application      : U#APPL1A      Team # Appl 1A
Operation        : U#CP 005      SM40#J1      Job 1
No. of conditions: 0

Row  Dependency  Oper  Transport time  Application id  Jobname
cmd  Resl Mand  ws no.  HH.MM  (for ext pred only)
---  ---  ---  ---  ---  ---
C    N          INCP 005          EA73MST          EA73JOB1
***** Bottom of data *****

```

- a. Press F3 again to return to the Operations Detail panel.
 - b. Type option **4** (AUTOMATIC OPTIONS) on the Operation Details panel and press Enter.
 - c. Type an **N** next to the **Submit** option to turn off automatic submission for operation 005.
 - d. Press F3 to save the option.
 - e. Press F3 again to return to the Operations panel.
55. Type an **s** in the Row cmd column for **Operation 014, Job name SM40#J3** and press Enter. The Operation Details panel opens.
- In the following lettered substeps, you define an operator instruction for operation number 014.
- a. Type option **7** (OP INSTRUCTIONS) on the Operation Details panel and press Enter.
 - b. Type **create** and press Enter on the List Of Operator Instructions panel.
 - c. Type **NUM OFF** and press Enter on the Creating an Operator Instruction panel command line.
 - d. Type in the bold text that is shown here into the TEXT area of the panel:
- When editing this JCL, you must make these changes.
Replace:
- account_num with 999
 - initiator_class with A
 - your_TSO_ID with OPCUSR#, where # is your assigned team identifier.

Your screen now looks similar to the following example.

```

EQQKMODE ----- MODIFYING AN OPERATOR INSTRUCTION -----
Command ==> Scroll ==> CSR

Edit instruction text below:

Application id      : U#APPL1A
Operation number   : 014
Valid from        :
Valid to          :
Last updated by INGC103 on 14/04/12 at 19.04

----- TEXT -----
***** ***** Top of Data *****
000001 WHEN EDITING THIS JCL, YOU MUST MAKE THESE CHANGES.
000002 REPLACE:
000003 - ACCOUNT_NUM WITH 999
000004 - INITIATOR_CLASS WITH A
000005 - YOUR_TSO_ID WITH OPCUSR#, WHERE # IS YOUR ASSIGNED TEAM IDENTIFIER.
***** ***** Bottom of Data *****

```

- a. Press F3 three times to save the text and return to the Operations panel.
56. Type an **s** in the Row cmd column for **Operation 015, Job name SM40#J3** and press Enter. The Operation Details panel opens.
- In the following lettered substeps, you make operation 015 time-dependent and set a start time of 11:30 AM on the same day that the application is brought into the current plan.
- a. Type option **4** (automatic options) on the Operation Details panel and press Enter.
 - b. Set the **Time Dependent** options to **Y** and press F3.
 - c. Type option **6** (time) on the Operation Details panel and specify the time as shown in the following screen capture.

```

EQQAMTMP ----- TIME SPECIFICATIONS -----
Command ==>

Enter/Change data below:

Application time specifications:
Input arrival time :
Deadline day/time  :

Operation          : U#CP 015          Job 3

Operation input arrival:
DAY               ==> 00               The day the input arrives for operation,
                                     relative to application start day
                                     (0 means the start day).
TIME              ==> 11.30           Arrival time of the input
                                     in the format HH.MM

Operation deadline:
DAY               ==> _____      Deadline day for operation completion,
                                     relative to application start day
                                     (0 means the start day).
TIME              ==> _____      Deadline time of deadline day
                                     in the format HH.MM

```

- d. Press F3 until you return to the Operations panel. Ignore any message stating that the application input arrival time is missing.
57. Type an **s** in the Row cmd column for **Operation 020, Job name SM40#J4** and press Enter. The Operation Details panel opens.

In the following lettered substeps for operation 020, you set the highest acceptable return code for the job in this operation to **4**.

- a. Type option **4** (automatic options) on the Operation Details panel.
- b. Set the **Highest Return** code to **4** and press F3 until you return to the Operations panel.

58. Type an **s** in the Row cmd column for **Operation 024, Job name SM40#J5** and press Enter. The Operation Details panel opens.

In the following lettered substeps for operation 024, you create operator instructions.

- a. Type option **7** (OP instructions) on the Operation Details panel.
- b. Type **create** and press Enter on the List of Operator Instructions panel.
- c. Type **NUM OFF** and press Enter on the command line of the Creating an Operator Instruction panel.
- d. Type the bold text that is shown here in the TEXT area of the panel:

When editing this JCL, you must make these changes.

Replace:

- account_num with 999
- initiator_class with A
- your_TSO_ID with OPCUSR#, where # is your assigned team identifier.

- e. Press F3 until you return to the Operations panel.

59. Type an **S** in the Row cmd column for **Operation 025, Job name SM40#J5** and press Enter. The Operation Details panel opens.

In the following lettered substeps, for operation 025, you create an external predecessor from application EA73MST2. The predecessor is operation number 005 on workstation INCP with job name EA73JOB2.

- a. Type option **1** (predecessors) on the Operation Details panel and press Enter.
- b. Use the **I** (Insert) row command to insert a blank line in of the Predecessors panel.
- c. Type the application name EA73MST2 in the **Application: ID** column of the blank line of the Predecessors panel and press Enter.
- d. Select the operation 005 with job name EA73JOB2 on the Predecessors - List of Jobs panel and press F3.

You see the external predecessor now on the Predecessors panel.

- e. Press F3 until you return to the Operations panel.

60. After defining all internal and external predecessors for your operations, review the Operations panel. It looks similar to the following example.

```

EQQAMOSL ----- OPERATIONS ----- Row 1 of 7
Command ===> Scroll ==> CSR

Enter/Change data in the rows, and/or enter any of the following
row commands:
I(nn) - Insert, R(nn),RR(nn) - Repeat, D(nn),DD - Delete
S - Select operation details, J - Edit JCL
Enter the TEXT command above to include operation text, or,
enter the GRAPH command to view the list graphically.

Application          : U#APPL1A          Team # Appl 1A

Row  Oper  Duration  Job name  Internal predecessors  Morepreds  No.of
cmd  ws   no.    HH.MM.SS  SM40#J1_              -IntExt-   Conds
-----
..... U#CP 005    00.00.30  SM40#J1_              0    1    0
..... U#CP 010    00.00.30  SM40#J2_              0    0    0
..... U#JS 014    00.05.00  SM40#J3_              0    0    0
..... U#CP 015    00.01.00  SM40#J3_              0    0    0
..... U#CP 020    00.01.30  SM40#J4_              0    0    0
..... U#JS 024    00.05.00  SM40#J5_              0    0    0
..... U#CP 025    00.00.30  SM40#J5_              0    1    0
***** Bottom of data *****

```

61. Press END (F3) until you see the message `Application Modified` in the upper right corner of the panel. If you cannot save your application, ask your instructor for help.



Note: The jobs in your application should not start until any previous runs of your application are complete. To do this, you must make the last operation in your application an external predecessor of the first operation in your application.

Modify your application again to add one more external predecessor.

62. Type the **M** (modify) row command next to your application description, **U#APPL1A**, and press Enter.

The Modifying an Application panel opens.

63. On the Command line, type **oper** and press Enter to display the Operations panel.
64. Display the Operation Details panel by typing the **S** row command next to operation **005** and pressing Enter.
65. On the Operation Details panel, select option **1** (PREDECESSORS) and press Enter to define the external predecessor.
66. Use the **I** (Insert) row command to insert a blank line in of the Predecessors panel.
67. On the Predecessors panel, type your application name, **U#APPL1A**, in the **Application ID** column of the blank line and press Enter.

68. When the Predecessors - List of Jobs panel is displayed, type **s** next to operation **025** to select the operation as a predecessor. Press PF3.

```

EQQAMPDL ----- PREDECESSORS ----- Row 1 of 2
Command ==> _ Scroll ==> CSR

Enter the COND command to view the list of conditions, enter/change
data in the rows, and/or enter any of the following row commands:

I(nn) - Insert, R(nn),RR(nn) - Repeat, D(nn),DD - Delete
S - Description of external dependency, T - Dependency resolution criteria

Application      : U#APPL1A          Team # Appl 1A
Operation        : U#CP 005          Job 1
No. of conditions: 0

Row  Dependency  Oper  Transport time  Application id  Jobname
cmd  Resl Mand  ws  no.  HH.MM  (for ext pred only)
...  C      N      INCP 005  -----  EA73MST        EA73JOB1
...  C      N      U#CP 025  -----  U#APPL1A       SM40#J5
***** Bottom of data *****

```

69. Press END (F3) to save your selection and return to the Operations panel.

Operation 005 shows two external predecessors.

70. Press RETURN (F4) to save your application and return to the main menu.

Exercise 4 Creating job descriptions

In this exercise, you create two job descriptions that you use in later exercises. Perform the following steps:

- On the Tivoli Workload Scheduler for z/OS main menu panel, select option **1** (database) and press Enter.
The Maintaining TWSZ Data Bases panel opens.
- On the Maintaining TWSZ Data Bases panel, select option **8** (job descriptions) and press Enter.
The Maintaining Job Descriptions panel opens.
- Select option **2** (CREATE) on the Maintaining Job Descriptions panel and press Enter.

```

EQQJCGPP ----- CREATING A JOB -----
Command ==>

Edit data below:
Enter the RUN command above to select run cycles or enter the DETAILS
command to specify job details.
JOBNAME - TEXT      ==> _____
OWNER: ID - TEXT    ==> _____
CALENDAR ID        ==> _____
VALID FROM - to    ==> 15/08/11 - 71/12/31
RUN TIME FROM - TO ==> _____
WORK STATION       ==> _____
JCL PREPARATION     ==> N JCL WS==> _____
MANUAL INTERACTION ==> _____
RUN CYCLES          ==> _____
PREDECESSORS        ==> _____
SPECIAL             ==> _____
RESOURCES            ==> _____
GROUP DEFINITION    ==> _____
SMOOTHING FACTOR    ==> _____
LIMIT ==> _____
Authority Group ID ==> _____
DURATION            ==> _____
TIME DEPENDENT      ==> N
PRIORITY             ==> 5
HIGHEST RETURN CODE ==> _____
MANUAL WS==> _____
Deadline Feedback option

```

The Creating a Job panel opens, as shown in the previous screen capture. The values used in this panel are stored in the user profile, therefore the values in some of the fields might be blank or completed with values different from the screen capture.

You use your first job description in a later exercise about creating and using special resources.

4. Type the name of your job description, **SM40#RES**, in the **JOBNAME** field.
5. In the **TEXT** field, type **TEAM# SPEC RES JOB**, which is a brief description of your job.
6. Verify that the **OWNER ID** and **OWNER TEXT** fields have the owner ID and description that you specified in the application in an earlier exercise.
7. If the **DURATION** field is blank, specify a duration of **00.01.00** (1 minute).
8. In the **WORK STATION** field, specify the name of your computer workstation, **U#CP**.
9. Type **5** in the **PRIORITY** field to set medium priority.
10. Check the **GROUP DEFINITION** field. It must be blank; so delete any data that is in the field.
11. Press END (F3) to save your job description.

You create a model job description that you can use for on-demand or special-purpose scheduling of jobs.

12. Create another job description named **SM40#REQ**. Enter a description of **TEAM# Model Job Desc**. Accept the defaults on all of the other fields.
13. Press F4 to save the job description and return to the main menu.



5 Operation submission, throughput, and monitoring exercises

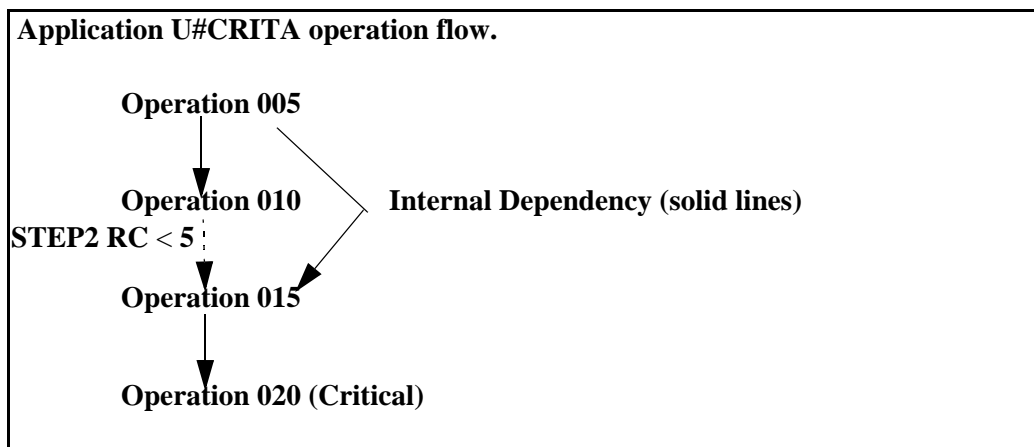
Exercise 1 Defining critical path operations

In this exercise, you create two more Tivoli Workload Scheduler for z/OS applications, which are not part of a group, and incorporate both critical operations and conditional dependencies. Schedule these two applications to run tomorrow. Running and monitoring the applications from this unit and the last will be the next exercise.

Wherever you find the # in a name, replace it with your student team ID number.

U#CRITA application

The application U#CRITA has four operations. The fourth operation is defined as critical. The third operation has a step-level conditional dependency with the second operation, which is defined in a later exercise in this unit. The dotted arrow in the diagram indicates the step-level conditional dependency.



The solid arrows indicate the normal internal dependencies. The dotted line shows a conditional dependency.

Defining an application with a critical operation

Create an application description, U#CRITA, where # is your assigned team identifier. This application is not part of a group. You are still at the Maintaining Application Descriptions panel. Perform the following steps:

1. Select option **2** (CREATE) on the Maintaining Application Descriptions panel and press Enter. The Creating an Application panel opens.
2. Type the name of your application description, **U#CRITA**, in the **Application: ID** field.
3. Write a brief description of your application in the **TEXT** field.
4. Type **A** in the **TYPE** field to define your application as an application and not as an application group.
5. In the **Owner: ID** field, type your team name, **TEAM#**.
6. Type **7** in the **PRIORITY** field to assign medium priority to your application description.
7. Make your application description active by typing **A** in the **STATUS** field.
8. Type your team's calendar name **U#CAL** the **CALENDAR ID** field.

Defining U#CRITA operations

9. On the Command line of the Creating an Application panel, type the **OPER** command and press Enter to display the Operations panel.
10. On the Operations panel, press the tab key until you arrive at the Oper ws column, and type the name of your team's computer workstation, **U#CP**. Remember to always replace the # with your team number.
11. In the Oper no. column, type **005**.
12. In the Duration column, type **00.00.10** (10 seconds).
13. In the Job name column, specify **U#CRITJ1**.
14. Use the **I** (insert) row command to create the definitions for operations 010, 015, and 020. Use the same workstation name and duration as operation 005 except for operation 020. Operation 020 has a duration of 1 minute. Job names are:-
 - Operation 010 is **U#CRITJ2**
 - Operation 015 is **U#CRITJ3**
 - Operation 020 is **U#CRITJ4**

15. Define all normal internal dependencies as shown in the following screen capture.

```

EQQAMOSL ----- OPERATIONS ----- Row 1 of 4
Command ==> Scroll ==> CSR

Enter/Change data in the rows, and/or enter any of the following
row commands:
I(nn) - Insert, R(nn),RR(nn) - Repeat, D(nn),DD - Delete
S - Select operation details, J - Edit JCL
Enter the TEXT command above to include operation text, or,
enter the GRAPH command to view the list graphically.

Application          : U#CRITA          Team # Critical App A

Row  Oper  Duration  Job name  Internal predecessors  Morepreds  No.of
cmd  ws   no.    HH.MM.SS  U#CRITJ1              -IntExt-    Conds
----  --  -
****  U#CP 005    00.00.10  U#CRITJ1              0  0        0
****  U#CP 010    00.00.10  U#CRITJ2    005              0  0        0
****  U#CP 015    00.00.10  U#CRITJ3    005              0  0        0
****  U#CP 020    00.01.00  U#CRITJ4    015              0  0        0
***** Bottom of data *****

```

16. Issue the **TEXT** command to change ISPF panels and enter a description for each operation.

Defining an operation as a critical path target.

17. Type the **S** row command and press Enter to select operation **020**. The Operation Details panel opens.
18. Type option **4** (AUTOMATIC OPTIONS) on the Operation Details panel and press Enter.
19. Type a **P** next to the **CRITICAL** option to flag this operation as a critical path target. Press F3 to save the option. You do not use a Workload Manager Service Policy or Class for this situation.
20. Press F3 again to return to the Operations panel.

Defining an internal step-level conditional dependency.

Conditional dependencies are defined in the operation details of the successor operation. Define an internal step-level conditional dependency for predecessor operation number 010 on workstation U#CP.

21. Type the **S** row command and press Enter to select operation **015**. The Operation Details panel opens.
22. Select option **1** on the Operation Details panel and press Enter. You see the Predecessors panel.

23. On the Predecessors panel, type **COND** on the command line and press Enter. You must use the **COND** command to define conditional predecessors.

```

EQQAMPDL ----- PREDECESSORS ----- Row 1 of 1
Command ==> COND                               Scroll ==> CSR

Enter the COND command to view the list of conditions, enter/change
data in the rows, and/or enter any of the following row commands:

I(nn) - Insert, R(nn),RR(nn) - Repeat, D(nn),DD - Delete
S - Description of external dependency, T - Dependency resolution criteria

Application      : U#CRITA                      Team # Critical App A
Operation        : U#CP 015                      U#CRITJ3
No. of conditions: 0

Row  Dependency  Oper  Transport time  Application id  Jobname
cmd  Resl Mand  ws  no.  HH.MM  (for ext pred only)
***  C      N      U#CP 005
***** Bottom of data *****

```

24. On the Conditions List panel, create a new condition and assign it a number of **001** and a description of **TEAM # STEP DEP** as shown in the following screen capture.

```

EQQAMCCL ----- CONDITIONS LIST ----- Row 1 of 1
Command ==>                               Scroll ==> CSR

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

Application      : U#CRITA                      Team # Critical App A
Operation        : U#CP 015                      U#CRITJ3

Row  Condition  Text  Cond  Rule
cmd  no.         Deps
***  001        TEAM # STEP DEP
***** Bottom of data *****

```

25. Type the **S** row command to select the new condition entry and press Enter. The **CONDITION DEPENDENCIES DEFINITION** panel opens. You now define a single step-level condition dependency.

26. Leave the **Rule** default at **000**.

```

EQQAMCCP ----- CONDITION DEPENDENCIES DEFINITION ----- Row 1 of 1
Command ==>                               Scroll ==> CSR

To define a condition dependency enter/change data in the rows, using any
of the following row commands:
I(nn) - Insert, R(nn),RR(nn) - Repeat, D(nn),DD - Delete, T - Dependency
resolution criteria

Application      : U#CRITA                      Team # Critical App A
Operation        : U#CP 015                      U#CRITJ3

Rule:
Specify the number of condition dependencies that need to be verified
to make the condition true 000. Leave 0 for all of them.

Row  Oper  Application Id  Jobname  StepName  ProcStep  Co  Co  St  Ret.Code
cmd  ws. no.  (ext Addid only)  Val1 Val2
***  000
***** Bottom of data *****

```

27. Move your cursor down to the blank row command and type a workstation name of **U#CP** and an operation number of **010**. This internal predecessor operation is the target of this internal step-level dependency.

28. Allow the **Application Id** and **Jobname** to default.

29. In the **ProcStep** column, specify **STEP2**, which means the condition dependency is a step-level dependency for a step that is called STEP2 in operation 010.

30. Specify the condition type as **RC**, the condition option as **LT** (less than) and the return code value as **005**.

31. Press Enter.

The defaults fill as a result, such as the **Jobname**. Your information resembles the following screen capture.

```

EQQAMCCP ----- CONDITION DEPENDENCIES DEFINITION ----- Row 1 of 1
Command ==> Scroll ==> CSR

To define a condition dependency enter/change data in the rows, using any
of the following row commands:
I(nn) - Insert, R(nn),RR(nn) - Repeat, D(nn),DD - Delete, T - Dependency
resolution criteria

Application      : U#CRITA                               Team # Critical App A
Operation        : U#CP 015                               U#CRITJ3

Rule:
Specify the number of condition dependencies that need to be verified
to make the condition true 000 . Leave 0 for all of them.

Row Oper  Application Id  Jobname  StepName  ProcStep  Co  Co  St  Ret.Code
cmd ws.   no.            (ext Adid only)                               Ty  OP  Val  Val1 Val2
--- --  ---  ---
1  U#CP 010  U#CRITJ2  STEP2    RC  LT  _  0005
***** Bottom of data *****

```

32. Press F3 to save the condition dependency definition.

The Conditions List panel shows that the COND DEPS column has a **1** in it and that the Rule column has **ALL** in it for condition number 001.

33. Press F3 to save the condition definition.

34. Press F3 until you return to the Operations panel and you can see a **1** is in the No. of Conds column for operation 015.

35. Press F3 to return to the Creating an Application panel.

Defining a run cycle for U#CRITA

Perform the following steps:

36. Type **run** on the Command line of the Creating an Application panel and press Enter. You see the Run Cycles panel.

37. Specify a rule name of **CRITRULE**.

38. Press Enter to insert defaults into the rule fields.

39. Specify an input arrival time of **07.00** and a deadline time of **07.15**. The application and critical operation finish by 7:15.

40. Specify a type of **R** and a free day rule **3**.

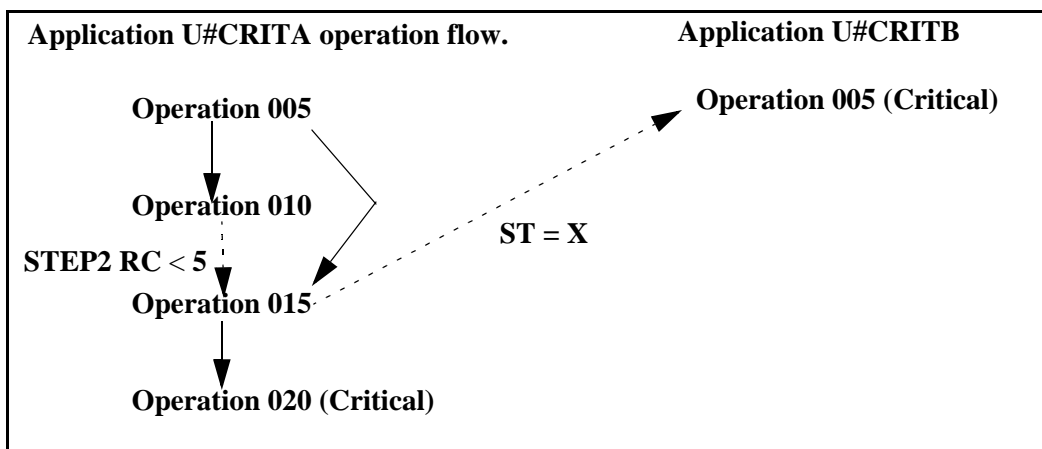
41. Specify a variable table of **TEAM#**.

42. Type the **S** row command to select the new rule entry and press Enter.

43. On the Modifying a Rule panel, specify that the application runs tomorrow. Press F3, you see the message `VALID RULE`.
44. Press F4 to create and save the application U#CRITA.

U#CRITB

You now define a second application named U#CRITB with a critical path target operation and an external condition dependency with an operation in U#CRITA. There is a job-level dependency with operation 015 in application U#CRITA. U#CRITB contains only one operation, as shown in the following diagram. The dotted arrows in the diagram indicate the conditional dependencies. The solid arrows are for internal dependencies.



Defining a second application with a critical operation

Create an application description, U#CRITB, where the number symbol (#) is your assigned team identifier. This application is not part of a group.

As you have defined several applications, the instructions for this section are abbreviated. You can refer to previous sections or ask your instructor for help if you need it. Perform the following steps:

45. Create an application called U#CRITB.
 - a. The general information for the application is similar to that of U#CRITA.
 - a. The run cycle is also the same except for the deadline time of 7:05. This time is 5 minutes after the input arrival time.
 - a. There is only one operation and it has an operation number of 005 and a job name of U#CRTBJ1. The duration time is 10 seconds.
 - a. In the operation details of operation 005, set the operation as a critical path target by specifying a **P** in the CRITICAL option.
 - a. Define an external job-level condition dependency with operation 015 of application U#CRITA. You do this task from the Operations Details panel. Select option **1** (predecessors) and run the **COND** command. Define the condition and define a condition

dependency as shown in the following screen capture. The condition dependency criteria is for a job status of X.

```

EQQAMCCP ----- CONDITION DEPENDENCIES DEFINITION ----- Row 1 of 1
Command ==> Scroll ==> CSR

To define a condition dependency enter/change data in the rows, using any
of the following row commands:
I(nn) - Insert, R(nn),RR(nn) - Repeat, D(nn),DD - Delete, T - Dependency
resolution criteria

Application      : U#CRITB                      Team # Critical App B
Operation       : U#CP 005      U#CRITBJ1

Rule:
Specify the number of condition dependencies that need to be verified
to make the condition true 000 . Leave 0 for all of them.

Row  Oper  Application Id  Jobname  StepName  ProcStep  Co  Co  St  Ret.Code
cmd  ws.   no.  (ext Adid only)      U#CRITJ3
'''  U#CP 015  U#CRITA      U#CRITJ3      ST EQ X
***** Bottom of data *****
    
```

46. Press F4 to save the U#CRITB application.
47. Return to the application description selection criteria panel. List the applications that start with U#*. Review and verify both U#CRITA and U#CRITB for accuracy.



6 Long-term and current plans exercises

In these exercises, you use the Tivoli Workload Scheduler for z/OS panels to review the Long-Term and current plans and work with and monitor a scheduled unit of work. You work with an application in the current plan (CP) and edit job statements in operations in the application. You also correct failed operations and monitor the application to a successful completion.

You need the *IBM Tivoli Workload Scheduler for z/OS Version 9.2 Managing the Workload* manual for reference in this exercise.



Note: When you first log in, you might see JES messages for jobs that ended. Press Enter. You work with these operations later in the exercises.



Important: Wherever you find the hash tag (#) in a name, replace it with your student team ID number.

Exercise 1 Reviewing the long-term plan

There are seven operations in your application, U#APPL1A. Five operations are defined to run on your team's computer workstation named U#CP, and two are job-setup operations on your U#JS workstation. Perform the following steps to ensure that your application was added to the Long-term and current plans:

1. Use the Tivoli Workload Scheduler for z/OS ISPF option **2.1** and list the occurrences for your application U#APPL1A. Remember to replace the # with your team ID number.
2. Select the occurrence for the current date by typing the **B** (browse) row command next to the appropriate occurrence and pressing Enter.
3. Type option **1 OPERATIONS** and press Enter to access the Browsing Operation Data panel.

Exercise 2 Working with your application occurrence in the current plan with the ready list and ended-in-error panel

The following screen capture shows the operations in the Browsing Operation Data panel. This panel is displayed when you browse operation data online for an application in the long-term plan.

```

EQQLB0PL ----- BROWSING OPERATION DATA ----- Row 1 of 7
Command ==> Scroll ==> CSR

Enter the row command S to select operation details.

Application      : U#APPL1A      Team # Appl 1A
Input arrival    : 15/08/17 06.00
Deadline         : 15/08/17 18.00
  
```

Row cmd	Operation ws no. text	Jobname	Input arrival date time	Duration HH.MM.SS
.	U#CP 005 Job 1	SM40#J1	15/08/17 06.00	00.00.30
.	U#CP 010 Job 2	SM40#J2		00.00.30
.	U#JS 014 Job 3 setup	SM40#J3	15/08/17 06.00	00.05.00
.	U#CP 015 Job 3	SM40#J3	15/08/17 11.30	00.01.00
.	U#CP 020 Job 4	SM40#J4		00.01.30
.	U#JS 024 Job 5 setup	SM40#J5	15/08/17 06.00	00.05.00
.	U#CP 025 Job 5	SM40#J5		00.00.30

***** Bottom of data *****

Exercise 2 Working with your application occurrence in the current plan with the ready list and ended-in-error panel

Using workstation ready lists

The various physical and logical locations, where tasks are performed at your installation, are defined as Tivoli Workload Scheduler for z/OS workstations. The workstation defines what type of task the operation is. Tivoli Workload Scheduler for z/OS maintains a list, called the **ready list**, of the ready-to-process operations for each workstation in the current plan. A job to be edited at a job setup workstation is an example of an operation that is ready for processing.

For each operation in the current plan, Tivoli Workload Scheduler for z/OS maintains more than 90 fields of information. These fields include job name, JES job ID, operation status, and error code. You use ready list layouts to display selected fields of information about ready-to-process operations. You can also create your own layouts or use one of the six sample layouts that are supplied.

In this exercise, you use one of the sample layouts to edit JCL for a job at a job setup workstation. After you complete the JCL edit, the scheduler submits the job to JES if all other requirements are met.

Before you start monitoring the application, you edit the JCL for jobs SM40#J3 and SM40#J5.
Perform the following steps:

- On the Tivoli Workload Scheduler for z/OS panel, select option **4 (WORK STATIONS)** and press Enter.

The Communicating with Work Stations panel opens.

```

EQQRTOPP ----- COMMUNICATING WITH WORK STATIONS -----
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
  
```

- On the Communicating with Work Stations panel, select **READY LIST** by typing **1** and pressing Enter.

The Specifying Ready List Criteria panel opens.

- On the Specifying Ready List Criteria panel, type the following values:

- WORK STATION NAME: **U#JS**
- LAYOUT ID: **S1**
- APPLICATION ID: **U#APPL1A**, where # is your team ID

Your panel looks similar to the following example.

```

EQQRSRLP ----- SPECIFYING READY LIST CRITERIA -----
Command ==>
Enter/Change data below and press ENTER to create a ready list.

WORK STATION NAME ==> U#JS      (Blank presents a list.)
LAYOUT ID          ==> S1      An id, blank for default, * for a list

Selection criteria:
APPLICATION ID     ==> U#APPL1A
OWNER ID           ==>
JOB NAME           ==>
LOWEST PRIORITY    ==>
OPERATION STATUS   ==>
Latest input arrival:
DATE              ==>
TIME              ==>
STATUS SORT ORDER ==> CES
CLEAN UP TYPE      ==>
CLEAN UP RESULT    ==>
OP. EXTENDED NAME  ==>
OP. SE NAME        ==>
WAITING FOR SE     ==> Y or N, leave blank to select all
  
```

7. Press Enter to display operations on the ready list for the U#JS workstation.

```

EQQLRLM ----- READY LIST ----- Row 1 of 2
Command ==> Scroll ==> CSR

Enter the HIST primary command or
enter any of the following row commands:
N - Set NEXT logical status, N-x - Set specific status( x ),
R - Reset status, O - Operator Instructions, I - Information about operation,
MH manual hold operation, MR manual release operation, NP nop operation,
UN un-nop operation, EX execute operation, BND Reset bind information.

WORK STATION      ==> U#JS          Change to switch work station
LAYOUT ID         ==> S1          Change to switch layout id

Cmd St no. Operation text          Ia day Ia time Jobname  Lo  time Oi U
''' A   14 Job 3 setup              17   06.00  SM40#J3   17 17.52 Y  Y
''' A   24 Job 5 setup              17   06.00  SM40#J5   17 17.54 Y  Y
***** Bottom of data *****

```

Status codes are displayed on the Ready List panel for each operation. Use the *IBM Tivoli Workload Scheduler for z/OS Version 8.6 Managing the Workload* manual, Appendix E, to review the meaning of the status codes.

8. Review the meaning of the operation status code in the St column for operations 14 and 24.

Editing JCL at a job setup workstation

In this section of the exercise, you edit JCL for jobs SM40#J3 and SM40#J5 to specify job card information. Perform the following steps:

9. Display the JCL to edit by typing **N** (Set NEXT logical status) next to operation **14** with job name **SM40#J3** and pressing Enter. **N** sets NEXT logical status for that workstation type, which for a JCL prep workstation is S-Started. The Editing JCL for an Operation panel opens.

```

EQQRJCLE ----- EDITING JCL FOR AN OPERATION -----
Command ==> Scroll ==> CSR

Edit JCL below and press END to complete, CANCEL to reject and reset,
or TSAVE to save changes and interrupt the operation.

Application       : U#APPL1A          Team # Appl 1A
Operation         : U#CP 015          Job 3
Jobname           : SM40#J3           JCL last updated by: INGC103

***** ***** Top of Data *****
==MSG> -CAUTION- Profile changed to CAPS OFF (from CAPS ON) because data
==MSG>          contains lower case characters.
==MSG> -Warning- The UNDO command is not available until you change
==MSG>          your edit profile using the command RECOVERY ON.
000001 //*%OPC SCAN
000002 //SM40#J3 JOB (account_num),'JOB # 3',
000003 //          NOTIFY=your_TSO_ID,MSGLEVEL=(1,1),
000004 //          MSGCLASS=%MSGCLASS,CLASS=initiator_class,REGION=512K
000005 //*
000006 //* Find OPCUTIL
000007 //JOBLIB DD DISP=SHR,DSN=%JOBLIB
000008 //*
000009 //STEPX EXEC PGM=OPCUTIL,PARM=(' /WAIT=01')
000010 //SYSPRINT DD SYSOUT=*
000011 //*
000012 //BR14#1 EXEC PGM=IEFBR14
000013 //
***** ***** Bottom of Data *****

```

10. On this panel, turn on capitalization for the edit session by typing **caps on** in the Command line and pressing **Enter**. (You can also set REC ON)
11. Edit the JCL as follows:
 - Replace *account_num* with **9999**.
 - Replace *your_TSO_ID* with **OPCUSR#**, where # is your team identifier.
 - Replace *initiator_class* with **A**.
12. When you finish editing, press END (F3) to save the JCL. The Ready List panel is redisplayed. The status for operation 14 now is C for Complete.
13. Display the JCL for operation 24 by typing **N** (Set NEXT logical status) next to the operation and pressing Enter.
14. On the Editing JCL for an Operation panel, turn on capitalization for the edit session. Type **caps on** in the command line and press Enter.
15. Edit the JCL as follows:
 - Replace *account_num* with **9999**.
 - Replace *your_TSO_ID* with **OPCUSR#**, where # is your team identifier.
 - Replace *initiator_class* with **A**.
16. When you finish editing, press END (F3) to save the JCL. The Ready List panel is redisplayed. The status for the St column should now be C for Complete.



Note: When you defined the first operation in the U#APPL1A application, you set the job submit attribute to No (**N**). You were instructed to do this to prevent the first operation in the U#APPL1A application from running immediately when the current plan runs.

You now override the current job submission attribute for the first operation, operation 5, by forcing execution from the ready list.

17. Press the tab key to go to the **WORK STATION** field on the Ready List panel. Type the computer workstation name, **U#CP**, Remember to replace the # with your team identifier.

```

Command --->
Enter the HIST primary command or
enter any of the following row commands:
N - Set NEXT logical status, N-x - Set specific status( x ),
R - Reset status, O - Operator Instructions, I - Information about operation,
MH manual hold operation, MR manual release operation, NP nop operation,
UN un-nop operation, EX execute operation, BND Reset bind information.

WORK STATION      ===> U#CP  Change to switch work station
LAYOUT ID         ===> S1    Change to switch layout id

Cmd St no. Operation text          Ia day Ia time Jobname Lo time Oi U
''' C 24 Job 5 setup              17 06.00 SM40#J5 17 17.54 Y
***** Bottom of data *****
  
```

Press Enter. The ready list now looks like the following example.

```

EQQLRLM ----- READY LIST ----- Row 1 of 1
Command ==> Scroll ==> CSR

Enter the HIST primary command or
enter any of the following row commands:
N - Set NEXT logical status, N-x - Set specific status( x ),
R - Reset status, O - Operator Instructions, I - Information about operation,
MH manual hold operation, MR manual release operation, NP nop operation,
UN un-nop operation, EX execute operation, BND Reset bind information.

WORK STATION      ==> U#CP          Change to switch work station
LAYOUT ID         ==> S1          Change to switch layout id

Cmd St no. Operation text          Ia day Ia time Jobname Lo time Oi U
--- --
' ' R    5 Job 1                    17    06.00 SM40#J1  17 17.56 N Y
***** Bottom of data *****

```

The operation status might be either A for Arriving or R for Ready.

18. Press the Tab key until you arrive at the operation, and type **I** (Information about operation) in the Cmd column to find information about the operation. Press Enter.

The Selecting Application Occurrence and Operation Information panel opens.

```

EQQSOPSP  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
12 AUTOMATION INFO - System automation operation info
13 USER FIELDS     - User fields operation info
14 REMOTE JOB INFO - Detailed information about remote job

Application       : U#APPL1A          Team # Appl 1A
Operation         : U#CP 005          Job 1
Jobname and jobid : SM40#J1
Status of operation : Ready           No automatic job submission
on Work Station   :
Priority of operation : 5
Planned input arrival : 15/08/17 06.00 Actual input arrival :

```

The message **No automatic job submission** is displayed in the column to the right of the operation status. The text is generated by Tivoli Workload Scheduler for z/OS because the automatic job submission attribute for the operation is set to **N**.

19. Return to the ready list by pressing END (F3).



Note: This job is not the one that you edited earlier. That job name was SM40#J3. The job name for this operation is SM40#J1.

20. Force submission of the job by typing **EX** (EXecute operation) in the Cmd column next to the operation and pressing Enter.

You see the message `Operation Execute Issued` in the upper right corner of your screen. The information on your ready list changes, and you see the two operations for jobs SM40#J2 and SM40#J3. You also eventually get JES messages when the jobs complete. The SM40#J3 message is similar to the following message:

```
12.54.30 JOB00504 $HASP165 SM40#J3 ENDED AT MVSCA01 MAXCC=0 CN(INTERNAL) ***
```

For each operation, the Ready List panel displays status codes. Refer to the *IBM Tivoli Workload Scheduler for z/OS Version 9.2 Managing the Workload* manual, Appendix E, for their meanings.

21. Press Enter several times. The status of these jobs changes.

The information on your Ready List panel eventually looks similar to the following example.

```

EQQLRLM ----- READY LIST ----- Row 1 of 1
Command ==> Scroll ==> CSR

Enter the HIST primary command or
enter any of the following row commands:
N - Set NEXT logical status, N-x - Set specific status( x ),
R - Reset status, O - Operator Instructions, I - Information about operation,
MH manual hold operation, MR manual release operation, NP nop operation,
UN un-nop operation, EX execute operation, BND Reset bind information.

WORK STATION      ==> U#CP          Change to switch work station
LAYOUT ID         ==> S1          Change to switch layout id

Cmd St no. Operation text          Ia day Ia time Jobname  Lo time  Oi U
''' E   10 Job 2                   17   06.00  SM40#J2   17 17.57 N Y
***** Bottom of data *****

```

Because it is after 11:30, job SM40#J3 that was time-dependent is complete (operation number 015).

You see a status of E (Error) for operation number 10, job name SM40#J2. There is a special dialog for handling jobs in error.

22. Return to the Tivoli Workload Scheduler for z/OS main menu by pressing RETURN (F4).

Handling errors

In this section of the exercise, you monitor the progress of your application and handle operations that end in error. Perform the following steps:

23. Because Job SM40#J2 in your application ended in error, you need to access the error handling dialog. On the command line, type **5** and press Enter to display the Modifying the Current Plan panel.

```

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
  
```

24. On this panel, type **4** and press Enter to display the Specifying Ended in Error List Criteria panel.

25. On the Specifying Ended in Error List Criteria panel, type **OPCESA** in the **LAYOUT ID** field. Type the name of your team's application in the **Application ID** field.

```

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__      Id of layout, * for a list

JOBNAME            ==>
APPLICATION ID      ==> U#APPL1A
OWNER ID           ==>
AUTHORITY GROUP ID ==>
WORK STATION NAME  ==>
ERROR CODE         ==>
GROUP DEFINITION   ==>
CLEAN UP TYPE      ==>              Types list: A M I N or blank
CLEAN UP RESULT    ==>              Results list: C E or blank
OP. EXTENDED NAME  ==>
OP. SE NAME        ==>
RECOVERED BY COND  ==> ( Y N ) leave blank to select all
UNEXPECTED RC      ==> ( Y N ) leave blank to select all
SHADOW JOB         ==> ( Y N ) leave blank to select all
  
```


26. Press Enter. The Handling Operations Ended in Error (left part) panel opens.

```

EQQMEP1L ----- HANDLING OPERATIONS ENDED IN ERROR (left part) ----- Row 1 of 1
Command ==>                                     Scroll ==> CSR

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, LJ, RC, FSR, FJR, FSC, RI, C, MH, MR, SJR or RER, ARC, WOC, CMP, MOD, DEL, RG, DG, CG

LAYOUT ID          ==> 0PCESA__ Change to switch layout id

Cmd Ended   time Application      ws   no. Jobname  Errc
''' 15/08/17 21.37 U#APPL1A      U#CP  10 SM40#J2  JCLI
***** Bottom of data *****

```

27. If your screen looks similar to this example, type **extend** on the command line and press Enter. Text explanations are displayed for the row commands.

28. Review the row commands. Open the Help facility by pressing HELP (F1).

29. After reviewing the row commands, exit from the Help facility by pressing END (F3).

30. Issue the **I** (QUERY INFORMATION) row command to display the Selecting Application Occurrence and Operation Information panel.

31. Select option **2** (OPERATION) and press Enter to display detailed information about the operation.

The Browsing Detailed Operation Information panel opens.

```

EQQMEP1L ----- 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
12 AUTOMATION INFO  - System automation operation info
13 USER FIELDS      - User fields operation info
14 REMOTE JOB INFO  - Detailed information about remote job

Application       : U#APPL1A           Team # Appl 1A
Operation         : U#CP 010           Job 2
Jobname and jobid : SM40#J2           JOB00555
Status of operation : Ended in error    JCLI
on Work Station   :
Priority of operation : 5
Planned input arrival : 15/08/17 06.00 Actual input arrival : 15/08/17 21.37

```

The operation displays information on this panel. You can use the Tivoli Workload Scheduler for z/OS Help facility to review the meaning of each field.

32. Press F1 and review the help information for the fields on this panel.

What is the status of the operation as shown on this panel?

Use the *IBM Tivoli Workload Scheduler for z/OS Version 9.2 Managing the Workload* manual, Appendix E, to review the meaning of the status code that is displayed for the operation.



Note: The status of **JCLI** is an error code because the operation ended in error.

33. Press END (F3) until you return to the Handling Operations Ended in Error panel.

The next few steps show you how to correct the JCL error for the operation.

34. Type the **J** (EDIT JCL) row command next to the operation and press Enter.

The Editing JCL for a Computer Operation panel opens.

```

EQQLJCL      EDITING JCL FOR A COMPUTER OPERATION      Scroll ==> CSR
Command ==>

Edit JCL below and press END to finish or CANCEL to reject:

Application      : U#APPL1A      Team # Appl 1A
Operation       : U#CP 10      Job 2
Status of operation : Ended in error      JCLI
Jobname        : SM40#J2      JCL last updated by: INGC103

***** ***** Top of Data *****
000001 //>OPC SCAN
000002 //SM40#J2 JOB (9999),'JOB # 1',
000003 //      NOTIFY=INGC103,MSGLEVEL=(1,1),
000004 //      MSGCLASS=H,CLASS=A,REGION=512K
000005 //*
000006 //*
000007 //*****
000008 //*
000009 //* WHEN JOB FAILS WITH A JCL ERROR, CHANGE XGM TO PGM AND *
000100 //* RESTART. *
000101 //*****
000102 //*
000103 //BR14#1 EXEC XGM=IEFBR14
000104 //
***** ***** Bottom of Data *****

```

The JCL includes instructions for correcting the error.

35. Read the instructions and correct the JCL error.

36. Press F3 to save the corrected JCL and redisplay the HANDLING OPERATIONS ENDED IN ERROR panel. You restart the operation from that panel.



Note: Only a copy of the JCL is changed in Tivoli Workload Scheduler for z/OS. The corrected JCL is not saved back into the original EQQJBLIB member.

Restarting failed operations

After correcting the JCL, issue a restart command to resubmit the job. Perform the following steps:

37. On the Handling Operations Ended in Error panel, type the **SJR** (simple JOB RESTART) row command next to the operation and press Enter. You use this restart row command when you do not want to start the restart and cleanup function.

The Confirm Restart of an Operation panel opens.

```

EQMEE1L ----- HANDLING OPERATIONS ENDED IN ERROR(left part) ----- Row 1 of 1
Command ==>
Scroll ==> CSR

Scroll right or enter the SUPPRESS command to suppress full row command
information, enter the HIST command to select operation history list
or enter any of the row commands below:

OPERATION RELATED COMMANDS :
I query information, O browse operator instructions, J edit JCL,
C complete, MH manual hold, MR manual release, SJR simple job restart,
RC restart and cleanup, FSR Fast path SR, FJR Fast path JR, FSC Fast path SC
L Browse joblog, RI Recovery info, LJ Browse joblog via ITOM

OCCURRENCE RELATED COMMANDS:
RER rerun, ARC attempt automatic recovery, WOC reset to waiting, CMP complete,
MOD modify, DEL delete, RG Remove from Group, DG Delete Group, or
CG Complete Group

LAYOUT ID          ==> OPCESA__ Change to switch layout id

Cmd  ended   time Application      ws  no. Jobname  Errc
SJR  5/08/17 21.37 U#APPL1A        U#CP 10 SM40#J2 JCLI
***** Bottom of data *****

EQMSJRP ----- CONFIRM RESTART OF AN OPERATION -----
Command ==> Y Scroll ==> CSR

Enter Y in the command field to restart the operation. That means
- Operation status is set to Ready

Enter N to reject the actions.

Application      : U#APPL1A      Team # Appl 1A
Operation        : U#CP 10      SM40#J2  Job 2
Input arrival    : 15/08/17 06.00

Error code       ==> JCLI
User field
Reason for restart ==> Corrected typo
  
```

38. On this panel, document the reason for your restart request on the **Reason for restart** lines.

Type **Y** on the command line and press Enter to confirm your restart request.

You see a JES message when the job SM40#J2 completes. The Handling Operations Ended in Error panel is redisplayed, and the operation is no longer on the error list.

39. Press Enter a few more times until the error list shows a new job. This step can take several minutes. The job name is SM40#J4, and it ended with error code 0008. Look in the Errc column for the error code. You also see a JES message similar to the following message when the job SM40#J4 completes.

```
12.55.49 JOB00504 $HASP165 SM40#J4 ENDED AT MVSCA01 MAXCC=8 CN(INTERNAL) ***
```

Before starting the next section, check the progress of your application.

40. Press the Tab key until you arrive at the row with the failed SM40#J4 operation. Type the **I** query information row command and press Enter.

The Selecting Application Occurrence and Operation Information panel opens.

41. On the Selecting Application Occurrence and Operation Information panel, select OPERATION LIST by typing **3** on the option line and pressing Enter.

The Browsing Operations panel opens with a list of the operations in your application.

```

EQSQ0P1L ----- BROWSING OPERATIONS (left part) ----- Row 1 of 7
Command ==> Scroll ==> CSR

Enter the GRAPH command above to view operations graphically or
scroll right or enter the row command S to select an operation for details.

```

Row cmd	Application id	Operation ws no.	Jobname	S	Input arrival	Deadline	Latest start	Crit path
....	U#APPL1A	U#CP 005	SM40#J1	C	17 06.00	17 18.00	17 17.56	N N
....	U#APPL1A	U#CP 010	SM40#J2	C	17 06.00	17 18.00	17 17.57	N N
....	U#APPL1A	U#JS 014	SM40#J3	C	17 06.00	17 18.00	17 17.52	N N
....	U#APPL1A	U#CP 015	SM40#J3	C	17 11.30	17 18.00	17 17.57	N N
....	U#APPL1A	U#CP 020	SM40#J4	E	17 06.00	17 18.00	17 17.58	N N
....	U#APPL1A	U#JS 024	SM40#J5	C	17 06.00	17 18.00	17 17.54	N N
....	U#APPL1A	U#CP 025	SM40#J5	W	17 06.00	17 18.00	17 17.59	N N

***** Bottom of data *****

42. Review the S (status) column on this panel. It shows that the first four operations in your application completed. The status is C.

The next operation, number 20, has a status of E (ended in error) so Tivoli Workload Scheduler for z/OS does not start any of the successor operations.

If your status codes are correct, proceed to the next step. Otherwise, fix the problem or ask your instructor for help.

43. Press END (F3) until the Handling Operations Ended in Error panel is redisplayed.

Overriding operation definition values in the current plan

Perform the following steps:

44. Request the retrieval of the JES job log. On the Handling Operations Ended in Error panel, type the **L** (browse job log) row command next to the operation with **Errc** of **0008**. Press Enter.

The message **JOBLOG REQUESTED** is in the upper right corner.

45. Press Enter until you see notification that the job log arrived. The message is similar to the following example:

```

06/07 13.20.07 EQQM923I JOBLOG FOR SM40CJ4 (JOB00765) ARRIVED CN(INTERNAL)
***

```

46. Press Enter to redisplay the Handling Operations Ended in Error panel.

47. On the Handling Operations Ended in Error panel, type the **L** row command in the row command column again and press Enter.

The JES Job Log panel for job SM40#J4 opens.

```

Menu  Utilities  Compilers  Help
ISRBROBA  SYS15229.T222342.RA000.INGC109.OPCAWRK1.H0 Line 00000000 Col 001 080
Command ==>
***** Top of Data *****
$$$EQQFSWWU-START-JESMSG
JES2 JOB LOG -- SYSTEM CA4D -- NODE
22.15.19 JOB00557 ---- MONDAY, 17 AUG 2015 ----
22.15.19 JOB00557 IRR010I USERID INGC109 IS ASSIGNED TO THIS JOB.
22.15.19 JOB00557 ICH70001I INGC109 LAST ACCESS AT 22:15:19 ON MONDAY, AUGUST
22.15.19 JOB00557 $HASP373 SM40#J4 STARTED - INIT 1 - CLASS A - SYS CA4D
22.16.19 JOB00557 - --TIMINGS (MINS.)--
22.16.19 JOB00557 -JOBNAME STEPNAME PROCSTEP RC EXCP CPU SRB CLOCK
22.16.19 JOB00557 -SM40#J4 STEPA 00 5 .00 .00 1.00
22.16.19 JOB00557 -SM40#J4 S1 00 3 .00 .00 .00
22.17.19 JOB00557 -SM40#J4 STEPX 00 5 .00 .00 1.00
22.17.19 JOB00557 -SM40#J4 STEPY 08 5 .00 .00 .00
22.17.19 JOB00557 -SM40#J4 STEPZ 00 3 .00 .00 .00
22.17.19 JOB00557 -SM40#J4 ENDED. NAME-JOB # 4 TOTAL CPU TIME=
22.17.19 JOB00557 $HASP395 SM40#J4 ENDED

```

The job log shows that STEPY ended with a return code of 08. Assume that for this run the support team request a rerun of the job, allowing a return code of 08 in STEPY. You now modify this instance of the application to indicate that return code 08 is valid for the operation.

48. Press END (F3) to return to the Handling Operations Ended in Error panel.

49. On the Handling Operations Ended in Error panel, type the occurrence-related **MOD** (modify) row command next to the operation. Press Enter.

The Modifying an Occurrence in the Current Plan panel opens.

```

EQQMMOCP ----- MODIFYING AN OCCURRENCE IN THE CURRENT PLAN -----
Command ==> oper

Enter/change data below:
Enter the DEP command above to verify external dependencies, or,
enter the OPER command to modify operations.

Application      : U#APPL1A          Team # Appl 1A
Owner            : TEAM#
Status           : Ended in error
Operations       : 7
External predecessors : 2
Calendar name    : U#CAL

Input arrival:
DATE            ==> 15/08/17          Date in format YY/MM/DD
TIME            ==> 06.00            Time in format HH.MM
Deadline:
DATE            ==> 15/08/17          Date in format YY/MM/DD
TIME            ==> 18.00            Time in format HH.MM
VARIABLE TABLE ==> TEAM#             JCL variable table id
PRIORITY        ==> 5                1-9
GROUP DEFINITION ==> U#APPL1G         Group definition id

```

50. On this panel, type **OPER** on the command line and press Enter.

Exercise 2 Working with your application occurrence in the current plan with the ready list and ended-in-error panel

The Modifying Operations in the Current Plan panel opens with a list of the operations.

```

EQQMMOPL ----- MODIFYING OPERATIONS IN THE CURRENT PLAN ----- Row 1 of 7
Command ==> _ Scroll ==> CSR

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, LJ - Browse joblog via ITOM

Application      : U#APPL1A          Team # Appl 1A
Owner            : TEAM#
Input arrival    : 15/08/17 06.00
Status           : Ended in error

Row  Operation                               Jobname  PS  Duration  Opt  Dep  Res  Stat
cmd  ws  no.  text                               SM40#J1_  1  00.00.30  N  N   N    0  0  C
...  U#CP 005 Job 1                               SM40#J2_  1  00.00.30  Y  N   0  0  C
...  U#JS 014 Job 3 setup                         SM40#J3_  1  00.05.00  Y  N   0  0  C
...  U#CP 015 Job 3                               SM40#J3_  1  00.01.00  Y  Y   0  0  C
...  U#CP 020 Job 4                               SM40#J4_  1  00.01.30  Y  N   0  0  E
...  U#JS 024 Job 5 setup                         SM40#J5_  1  00.05.00  Y  N   0  0  C
...  U#CP 025 Job 5                               SM40#J5_  1  00.00.30  Y  N   N    0  0  W
***** Bottom of data *****

```

51. On the Modifying Operations in the Current Plan panel, type the **S** row command (modify operation details) next to operation **20**. Press Enter.

The Modifying an Operation in the Current Plan panel opens.

```

EQQMMODP ----- MODIFYING AN OPERATION IN THE CURRENT PLAN -----
Option ==>

Select one of the following:

 1 DEPENDENCIES      - Delete and add (internal and external)
 2 SPEC RESOURCES    - Special resources
 3 AUTOMATIC OPTIONS - Job, WTO, and print options
 4 TIME              - Time specifications
 5 JCL               - Edit JCL for MVS job
 6 GENERAL           - General information
 7 CLEANUP OPTIONS   - Cleanup Options
 8 EXTENDED INFO     - Operation extended info
 9 AUTOMATION INFO   - Automation info
10 USER FIELDS       - User fields operation info
11 REMOTE JOB INFO   - Remote job information

Application      : U#APPL1A          Team # Appl 1A
Operation        : U#CP 020          Job 4
Jobname          : SM40#J4
Input arrival    : 15/08/17 06.00
Duration (HH.MM.SS) : 00.01.30
External predecessors : No          Conditional predecessors : No
External successors  : No          Conditional successors   : No
Special resources   : No          Number of conditions    : 0

```

52. Select AUTOMATIC OPTIONS by typing **3** on the option line. Press Enter.

The Modifying Job, WTO, and Print Options in the CP panel opens.

```

EQMMJOP ----- MODIFYING JOB, WTO, AND PRINT OPTIONS IN THE CP -----
Command ==>
Enter/change data below:
Application      : U#APPL1A          Team # Appl 1A
Input arrival   : 15/08/17          06.00
Operation       : U#CP 020          Job 4
JOB NAME        ==> SM40#J4_        Name of the job or task
JOB/SYSOUT CLASS ==>                Job/sysout class depending on workstation
ERROR TRACKING  ==> Y                Automatically track errors, Y or N
HIGHEST RETURN CODE ==> 4_          Highest return code not treated as error
EXTERNAL MONITOR ==> N              Job monitored by external product (Y/N)
CENTRALIZED SCRIPT ==> Y            Centralized script Y/N (for FTW only)
COND RECOVERY JOB ==> N             Recovery job for a cond predecessor (Y/N)
CRITICAL        ==> N              Critical job: N P W
POLICY ==> _ CLASS ==> _            WLM Policy and Service Class
Job options :                      Specify Y or N for the following options:
SUBMIT        ==> Y                HOLD/RELEASE ==> Y
TIME DEPENDENT ==> N                SUPPRESS IF LATE ==> N
DEADLINE WTO  ==> N                RESTARTABLE ==> _
REROUTEABLE   ==> _                Operation is eligible for reroute
Print options :                      Specify for a printer operation:
FORM NUMBER   ==> _                Sysout forms name
  
```

Now specify the highest acceptable return code for job SM40#J4 for this run. The modification that is made on this panel does not affect the definition in the application database. With Tivoli Workload Scheduler for z/OS, you can modify the attributes on panels in the current plan without affecting the application object in the database.

53. Change the highest acceptable return code for the operation from **4** to **8** in the **HIGHEST RETURN CODE** field. Press END (F3).

You are returned to the Modifying an Operation in the Current Plan panel.

54. Continue to press END (F3) until the Handling Operations Ended in Error panel is redisplayed. You see the message **OCCURRENCE MODIFIED** in the upper right corner of your screen.

55. Rerun SM40#J4 by using the **SJR** row command. It should complete now.

A few minutes later SM40#J5 ends with a S806 abend.

56. Edit the JCL with the **J** row command and following the instructions in the JCL to correct the problem.
57. Rerun the SM40#J5 job by using the **SJR** row command. All the operations in U#APPL1A are now complete. Verify this success by listing the operations in your U#APPL1A application by using ISPF option **=5.2**.

Exercise 3 Working with critical operations and conditional dependencies

You created two applications that are called U#CRITA and U#CRITB. In this exercise, you review the status of these two applications. You investigate the status of their critical operations and conditional dependencies. Tivoli Workload Scheduler for z/OS added these two operations to the current plan as part of the daily plan processing.

The purpose of this exercise is to provide an introduction to both conditional dependencies and critical jobs. It is not meant to be an in-depth coverage of these features. The use of conditional dependencies and critical jobs are combined in this lab. However, the two features are independent functions and do not have to be used together. This exercise also shows that conditional dependencies are not used when determining the critical path for a critical path target operation.

This exercise demonstrates that conditional dependencies are not always evaluated. This excerpt from the *IBM Tivoli Workload Scheduler for z/OS 9.2 Managing the Workload* manual describes when conditional dependencies are evaluated.

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

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

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

Working with critical jobs

The exercise is an instance of a conditional dependency not being evaluated. You modify the occurrence in the plan to cause Tivoli Workload Scheduler for z/OS to evaluate the condition dependency. Perform the following steps:

1. From the Tivoli Workload Scheduler for z/OS main ISPF panel, select option **6 QCP** and select option **7 Critical Jobs**. Press Enter.

You see the Browsing Active Critical Jobs (left part) panel displayed. It has two operations listed similar to the following screen capture. These two jobs are the jobs that you defined as critical

path targets in the U#CRITA and U#CRITB applications. There might be several other jobs that are listed, you can ignore them.

```

EQQSCJOB ----- BROWSING ACTIVE CRITICAL JOBS (left part) ----- Row 1 of 2
Command ==> Scroll ==> CSR

Enter any of the row commands below:
S - critical path          H - critical hot list
Press ENTER to refresh.

Row  cmd  Application id  Operation  Jobname  Input Arrival  Deadline  RL  S  R
ws  no.  Date      Time    Date      Time
----  -  -
'...' U#CRITA      U#CP      020  U#CRITJ4  15/08/17  07.00  15/08/17  07.15  H  W  C
'...' U#CRITB      U#CP      005  U#CRITBJ1 15/08/17  07.00  15/08/17  07.05  H  W  P
***** Bottom of data *****

```

- Review the column data that is associated with the two applications U#CRITA operation 020 and U#CRITB operation 005. Use the F1 help key to get information on the purpose of each column.

Both of the operations are in a wait (W) status and both have an H in the Risk Level column, indicating a high risk of missing the deadline time.

- Press F11 to scroll to the right and review the columns that are displayed on the right part of the ISPF panel.

Operation 020 in the application U#CRITA shows one late predecessor. Operation 005 in U#CRITB does not show one as it is an external conditional dependency that is defined to operation 005. (Shown in the following screen capture).

```

EQQSCJ01 ----- BROWSING ACTIVE CRITICAL JOBS (right part) ----- Row 1 of 2
Command ==> Scroll ==> CSR

Enter any of the row commands below:
S - critical path          H - critical hot list
Press ENTER to refresh.

Row  cmd  Operation  Jobname  Estimated end  Last Update  Op  Predecessors
ws  no.  Date      Time    Date      Time  H N  Late Long Error
----  -  -
'...' U#CP 020  U#CRITJ4  15/08/17  21.30  15/08/17  21.29  N N  1  0  0
'...' U#CP 005  U#CRITBJ1 15/08/17  07.05  15/08/17  21.27  N N  0  0  0
***** Bottom of data *****

```

- Type the **S** row command next to the first operation listed, which is operation 020 in U#CRITA with job name U#CRITJ4. Press Enter. The Browsing Critical Path (left part) ISPF panel opens.

```

EQQSCP1L ----- BROWSING CRITICAL PATH (left part) ----- Row 1 of 2
Command ==> Scroll ==> CSR
Application      : U#CRITA
Operation        : U#CP 20
WLM Class and Policy :

Enter the row command S to select an operation for details.
Press ENTER to refresh.

Row  cmd  Application id  Operation  Jobname  Promot  Flags  S  P  Latest  Input
ws  no.  Date      Time    Date      Time  L R  W  S  start  arrival
----  -  -
'...' U#CRITA      U#CP      015  U#CRITJ3  N N  Y N  W  5  17 07.13  17 07.00
'...' U#CRITA      U#CP      020  U#CRITJ4  N N  N N  W  5  17 07.14  17 07.00
***** Bottom of data *****

```

- Review the Flags column and Latest start time column. Operation 015 is late.
- Review all the time-pertinent columns by pressing the F11 key. The estimated start and estimated end times are in the past.

7. Press F3 to return to the Browsing Active Critical Jobs (right part) panel.
8. Type the **H** row command next to the first operation listed, which is operation 020 in U#CRITA with job name U#CRITJ4. Press Enter. The Browsing Critical Hot List (left part) ISPF panel is displayed. It shows the predecessor operation 015 that is causing the critical path target operation 020 to wait. The ISPF panel is similar to the following example.

```

EQQSCP1L ----- BROWSING CRITICAL HOT LIST (left part) ----- Row 1 of 1
Command ==>                                     Scroll ==> CSR
Application      : U#CRITA
Operation        : U#CP 20
WLM Class and Policy :

Enter the row command S to select an operation for details.
Press ENTER to refresh.

Row Application id Operation Jobname Promot Flags S P Latest Input
cmd      U#CRITA      U#CP 015 U#CRITJ3 N N   Y N   W 5  17 07.13 17 07.00
***** Bottom of data *****

```

Operation 015 is flagged as late and has a status of waiting. You now investigate why and try to resolve the problem. The predecessor has a status of waiting which means it also has incomplete dependencies.

9. Type **S** on the Row command and press Enter.
10. On the Selecting application occurrence and operation information panel that opens select dependencies (menu option 4) and press Enter. The predecessor and successors to an operation (left part) panel opens.

```

EQQSPP1L -- PREDECESSORS AND SUCCESSORS TO AN OPERATION (left part) Row 1 of 4
Command ==>                                     Scroll ==> CSR

Issue command COND to show list of defined Conditions.
Scroll right or enter the row command S to select an operation for details.

Application      : U#CRITA                      Team # Critical App A
Operation        : U#CP 15
Jobname          : U#CRITJ3
Overall Conditions Status : Undefined

Row Type Operation Jobname Application id S Con
cmd  ws no. text      U#CRITA      Id
...  P   U#CP 005      U#CRITJ1  U#CRITA      C 000
...  PC  U#CP 010      U#CRITJ2  U#CRITA      E 001
...  S   U#CP 020      U#CRITJ4  U#CRITA      W 000
...  SC  U#CP 005      U#CRITB1  U#CRITB      W 001
***** Bottom of data *****

```

You can now see that one of the predecessors to Operation 015 is in error. Select the operation in error to find out what the error is. You already know how to use the ended in error dialog to fix a problem. In this case it is a conditional predecessor, which means there might be situations (or conditions) where an error status is expected and catered for in the definition. You need to investigate further.

11. Type **=5.2** on the command and press Enter.
12. On the Specifying MCP Occurrence List Criteria panel, type **U#C*** in the **Application ID** field and press Enter.

Both of the critical application occurrences look similar to the following screen capture.

```

----- MODIFYING OCCURRENCES IN THE CURRENT PLAN ----- Row 1 of 2
Command ==> Scroll ==> CSR

Enter the CREATE command to add a new occurrence or
enter the GRAPH command to display occurrence list graphically or
enter any of the row commands below:
B - Browse, D - Delete, M - Modify, RG - Remove from group, DG - Delete Group,
C - Complete, W -Set to Waiting, R - Rerun, CG - Complete Group

Row Application      Input arrival  S  P  G  Add
cmd id      text      date      time
''' U#CRITA      Team # Critical App A      15/08/17 07.00  E  5  N
''' U#CRITB      Team # Critical App B      15/08/17 07.00  W  5  N
***** Bottom of data *****

```

U#CRITA has a status of error (E) and U#CRITB has a status of waiting (W). Investigate this issue now, and try to resolve the problem.

13. Select U#CRITA by typing the **M** (modify) row command and pressing Enter.

14. On the Modifying An Occurrence In The Current Plan, type the **OPER** command on the command line and press Enter. A MODIFYING OPERATIONS IN THE CURRENT PLAN ISPF panel similar to the following screen capture opens.

```

----- MODIFYING OPERATIONS IN THE CURRENT PLAN ----- Row 1 of 4
Command ==> Scroll ==> CSR

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, LJ - Browse joblog via ITOM

Application      : U#CRITA      Team # Critical App A
Owner            : TEAM#
Input arrival    : 15/08/17 07.00
Status          : Ended in error

Row Operation      Jobname  PS  Duration  Opt  Dep  Res  Stat
cmd ws  no.  text      U#CRITJ1 1 00.00.10 Y N  S/P  S R1 R2 N Cu
''' U#CP 005      U#CRITJ2 1 00.00.10 Y N  C      0 0  E
''' U#CP 010      U#CRITJ3 1 00.00.10 Y N  C C      0 0  W
''' U#CP 015      U#CRITJ4 1 00.01.00 Y N      0 0  W
''' U#CP 020
***** Bottom of data *****

```

15. Operation 010 ends in error. Operation 015 has a conditional dependency with operation 010, but operation 015 still waits. Use the **L** row command to browse the job log of operation 010.

The job log shows that step STEP2 ends with a return code of 8. This return code is outside the range that is specified in the condition dependency you defined in operation 015. You know this because you created the conditional dependency. However, this might be someone else's batch delay you are investigating. How can we discover this information from the Current Plan?

```

$$$EQQFSWWU-START-JESMSG
JES2 JOB LOG -- SYSTEM CA4D -- NODE
21.29.20 JOB00551 ---- MONDAY, 17 AUG 2015 ----
21.29.20 JOB00551 IRR010I USERID INGC109 IS ASSIGNED TO THIS JOB.
21.29.20 JOB00551 ICH70001I INGC109 LAST ACCESS AT 21:29:20 ON MONDAY, AUGUST
21.29.20 JOB00551 $HASP373 U#CRITJ2 STARTED - INIT 1 - CLASS A - SYS CA4D
21.29.20 JOB00551 - --TIMINGS (MINS.)--
21.29.20 JOB00551 -JOBNAME STEPNAME PROCSTEP RC EXCP CPU SRB CLOCK
21.29.20 JOB00551 -U#CRITJ2 S1 00 3 .00 .00 .00
21.29.20 JOB00551 -U#CRITJ2 STEP2 08 5 .00 .00 .00
21.29.20 JOB00551 -U#CRITJ2 S3 00 3 .00 .00 .00
21.29.20 JOB00551 -U#CRITJ2 ENDED. NAME-JOB # 4 TOTAL CPU TIME=
21.29.20 JOB00551 $HASP395 U#CRITJ2 ENDED
----- JES2 JOB STATISTICS -----

```

16. Press F3 to exit the job log.
17. On the Modifying an Occurrence in the Current Plan, type the **S** row command next to operation 010 (the job in error) and press Enter. The Modifying an Operation in the Current Plan ISPF panel opens. Select menu item 1 to access the jobs dependencies.

```

----- MODIFYING DEPENDENCIES IN THE CURRENT PLAN ----- Row 1 of 2
Command ==>
Scroll ==> CSR

Enter any of the following command above:
COND - handle conditional dependencies      CREATE - create a new dependency
enter the row command D to delete a dependency:

Application      : U#CRITA                  Team # Critical App A
Input arrival    : 15/08/17   07.00
Operation        : U#CP 010
Overall Conditions Status :

CHECK DEP. ==> Y   Y - When leaving panel (only if conditions do not exist)
                  N - At occurrence update (all dependencies)

Row Trans Application id Input Arrival Operation S D Con
cmd time (ext deps only) date   time   ws no. text ID
-----
. 00.00 .                U#CP 005 C P 000
. 00.00 .                U#CP 015 W SC 001
***** Bottom of data *****
    
```

18. We can confirm that the successor with the conditional dependency on this job is part of the same occurrence, U#CRITA, and is operation 015 (it would be possible to delete the dependency here, but that is not the requested recovery action). Press F3 twice to return to the list of operations. Type the **S** row command next to operation 015 and press Enter.
19. Type option **1 DEPENDENCIES** on the command line and press Enter. The Modifying Dependencies in the Current Plan panel similar to the following screen capture opens.

```

----- MODIFYING DEPENDENCIES IN THE CURRENT PLAN ----- Row 1 of 4
Command ==> _
Scroll ==> CSR

Enter any of the following command above:
COND - handle conditional dependencies      CREATE - create a new dependency
enter the row command D to delete a dependency:

Application      : U#CRITA                  Team # Critical App A
Input arrival    : 15/08/17   07.00
Operation        : U#CP 015
Overall Conditions Status : Undefined
CHECK DEP. ==> Y   Y - When leaving panel (only if conditions do not exist)
                  N - At occurrence update (all dependencies)

Row Trans Application id Input Arrival Operation S D Con
cmd time (ext deps only) date   time   ws no. text ID
-----
. 00.00 .                U#CP 005 C P 000
. 00.00 .                U#CP 020 W S 000
. 00.00 .                U#CP 010 E PC 001
. 00.00 U#CRITB          15/08/17 07.00 U#CP 005 W SC 001
***** Bottom of data *****
    
```

This panel shows that operation 015 has a predecessor condition that is defined for the internal operation 010. Operation 015 also has successor condition that is associated with operation 005 in application U#CRITB.

20. Type the **COND** command on the command line and press Enter. The Modifying Conditional Dependencies in the CP panel opens.
 The condition status is undefined (U), which means that it has not been evaluated yet.

21. Type the **S** row command next to condition **001** and press Enter. A single step-level conditional dependency has been defined, and the status of the condition dependency is undefined (U).
22. Press F11 to scroll right. The step name is STEP2, as shown in the following screen capture.

```

----- MODIFY CONDITION DETAILS IN THE CP ----- Row 1 of 1
Command ==> Scroll ==> CSR
Enter CREATE command to create new condition dependencies or scroll LEFT to
see more details. Enter/modify row data and/or any of the following row
commands:  R(nn),RR(nn) - Repeat, D(nn),DD - Delete, T - Set to true,
F - Set to false.

Application      : U#CRITA          Team # Critical App A
Input arrival    : 15/08/17  07.00
Operation        : U#CP 15
Condition        : 1                Status Undefined
Extended Status  :

Rule:
Specify the number of condition dependencies that need to be verified
to make the condition true 000 . Leave 0 for all of them.

Row  Application Id  Input  Jobname  StepName  ProcStep  Con  Con  St  Ret Code
cmd  arrival        arrival      U#CRITJ2  STEP2      RC   LT   _   Val  Val1 Val2
*** U#CRITA          17 07.00 U#CRITJ2  STEP2      RC   LT   _   0005
***** Bottom of data *****

```

The condition dependency logical expression is for the STEP2 return code to be less than 5. Its is the only condition dependency for this operation. The condition dependency is not evaluated and remains undefined. If you have questions ask your instructor for clarification. The original intent is for this condition dependency to evaluate false for return codes greater than 4.

23. Before you try to manually set the condition dependency to false, press F10 to scroll back to the left.
24. Type the **F** (set to false) row command next to the condition dependency and press Enter.
A message is in the upper right corner, Command Not Allowed.
25. Press F1 to see message details.

EQQM306E Condition dependency must be undefined with MI set to Y

The MI flag must be set to **Y**, but it is set to **N**, as the screen capture shows.

26. The row command **F** (or **T**) does not work in the described case because the missing information flag (column MI) is set to **N**. Otherwise, the F row command is allowed for step dependencies.

```

----- MODIFY CONDITION DETAILS IN THE ----- COMMAND NOT ALLOWED
Command ==> Scroll ==> CSR
EQQM306E Condition dependency must be undefined with MI set to Y
Enter CREATE command to create new condition dependencies or scroll RIGHT to
see more details. Enter/modify row data and/or any of the following row
commands:  R(nn),RR(nn) - Repeat, D(nn),DD - Delete, T - Set to true,
F - Set to false.

Application      : U#CRITA          Team # Critical App A
Input arrival    : 15/08/17  07.00
Operation        : U#CP 15
Condition        : 1                Status: Undefined
Extended Status  :

Rule:
Specify the number of condition dependencies that need to be verified
to make the condition true 000 . Leave 0 for all of them.

Row  Oper  Application Id  Input  Jobname  Con  Con  St  Ret Code  S  R  S  M
cmd  ws.   no.         arrival      U#CRITJ2  RC   LT   _   Val  Val1 Val2  I  I
*** U#CP 010 U#CRITA          17 07.00 U#CRITJ2  RC   LT   _   0005   U  N  ?  N
***** Bottom of data *****

```

The **F** row command does not work. You need an alternative means for making the condition dependency evaluate to FALSE.

For your information, the following message was received in the message log (DD EQQMLOG) of the Tivoli Workload Scheduler for z/OS Controller when the job failed.

```

EQQE142W UNEXPECTED RC OCCURRED FOR OPERATION: 602
ADID=U#CRITA, IA=1508170700, OPNO=010, WS=U#CP
JOBNAME=U#CRITJ2, JOBID=JOB00551, DEST=TRK00LU
WHEN CHECKING END OF STEP: STEP2

```

The job stream has come to a halt because you only defined: if the condition is true, do **this** action. You did not say what to do if any other situation was encountered. So the job stream is stuck - Tivoli Workload Scheduler for z/OS does not know what to do next.

You must provide a path for the current plan to follow for this condition. In the following steps, you add a dummy operation into the plan with a conditional dependency on operation 10 in U#CRITA (our error job) that is true for this issue. As all operations need to be connected in an application, it is also necessary to connect the dummy job to another operation in the application.

27. Press F3 until you return to the Modifying Operations In the Current Plan ISPF panel.

28. Define a new operation **025** on non-reporting workstation **U#NR**. Insert operation 025 after operation 020 by using the **I** (insert) row command. Using the **I** or **R** command automatically creates the operation as a successor of the job where the row command was issued. This satisfies the need to connect the new operation into the application network. A nonreporting operation does not need a job name, but you can create one if you like. Use a duration of 1 second. The following screen capture shows the result.

```

----- MODIFYING OPERATIONS IN THE CURRENT PLAN ----- Row 1 of 5
Command ==> Scroll ==> CSR

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, LJ - Browse joblog via ITOM

Application      : U#CRITA          Team # Critical App A
Owner            : TEAM#
Input arrival    : 15/08/19 07.00
Status           : Ended in error

Row  Operation      Jobname  PS  Duration  Opt  Dep  Res  Stat
cmd  ws   no.  text                HH.MM.SS  S/T  S/P  SR1 R2  N  Cu
---  ---  ---  ---
...  U#CP  005  _____  U#CRITJ1  1  00.00.05  Y  N  C  0  0  -  C
...  U#CP  010  _____  U#CRITJ2  1  00.00.10  Y  N  C  0  0  -  E
...  U#CP  015  _____  U#CRITJ3  1  00.00.05  Y  N  C  0  0  -  W
...  U#CP  020  _____  U#CRITJ4  1  00.01.00  Y  N  C  0  0  -  W
...  U#NR  025  _____  DUMMYOP_  1  00.00.01  Y  N  C  0  0  -  W
***** Bottom of data *****

```

29. Type the **S** row command next to operation 025 and press Enter. You see the Modifying an Operation in the Current Plan panel.

The next few steps show you how to follow the ISPF panel path to create a new condition and condition dependency for operation 025. The criteria for the conditional dependency are as follows:

- The predecessor operation for the condition dependency is operation 010.
- The conditional dependency logical expression is RC GT 4.
- The condition dependency does not need to be at the step level, but it can be at job level. Make the condition dependency job-level.

30. Type a **1** (dependencies) on the Option line and press Enter. You see the Modifying Dependencies in the Current Plan panel. This panel shows a single normal internal dependency with operation 020 (added by default due to using the I (insert) row command).

31. Type the **COND** command on the command line and press Enter. You see the Modifying Conditional Dependencies in the CP panel.

32. Type a Cond No. of **001** and a brief description for your new condition and press Enter. Your screen looks similar to the following screen capture:

```

----- MODIFYING CONDITIONAL DEPENDENCIES IN THE CP ----- Row 1 of 1
Command ===>                                         Scroll ===> CSR

Enter/Change data in the rows, and/or enter any of the following
row commands:
I(nn) - Insert, D(nn),DD - Delete
S - Specify conditional dependencies

Application      : U#CRITA                      Team # Critical App A
Input arrival    : 15/08/19   07.00
Operation        : U#NR 25

Row  Cond  Text                                     Cond  Rule  Status  Ext.
cmd no.                                     Deps                                     Status
---  ---  ---                                     ---  ---  ---  ---
1    001  NEW CONDITION FROM OP 10                0
***** Bottom of data *****

```

33. Select the new condition by typing an **S** in the Row cmd column and press Enter. You see the Creating a Conditional Dependency in the Current Plan panel.

```

EQQMADC --- CREATING A CONDITIONAL DEPENDENCY IN THE CURRENT PLAN -----
Command ===>

Specify identity of an operation below and press ENTER to create it as
a conditional dependency, or, if the operation is not uniquely defined,
to create a list of operations.

Application      : U#CRITA                      Team # Critical App A
Input arrival    : 15/08/19   07.00
Operation        : U#NR 025

Dependency      :                               Identity of dependency.
APPLICATION ID  ===> _____ Blank means internal dependency
INPUT DATE     ===> _____ Date in format YY/MM/DD
TIME           ===> _____ Time in format HH.MM
WORK STATION    ===> _____
OPERATION NUMBER ===> _____
JOBNAME         ===> _____

```

34. Leave all the fields blank and press Enter. You see the Defining Conditional Dependencies in the Current Plan panel. By leaving the **Application ID** blank, you select the current application, U#CRITA, by default. Your screen now looks similar to the following image:

```

EQQMMCLL --- DEFINING CONDITIONAL DEPENDENCIES IN THE CURRENT PLAN Row 1 of 3
Command ==> _ Scroll ==> CSR

Enter S below to select operation(s) as conditions.

Application      : U#CRITA      Team # Critical App A
Input arrival    : 15/08/19    07.00
Operation        : U#NR 025

S Application id  Input arrival  Jobname  Operation  S
  ws   no.      date      time   ws   no.  text
-----
U#CRITJ1 U#CP 005
U#CRITJ2 U#CP 010
U#CRITJ3 U#CP 015
***** Bottom of data *****

```

35. Select operation 010 using the **S** row command and press F3.
36. Press F3 again to see the Modify Condition Details in the CP panel.
37. Modify the condition details to meet the requirements that are shown in this screen capture:

```

EQQMMCCP ----- MODIFY CONDITION DETAILS IN THE CP ----- Row 1 of 1
Command ==> Scroll ==> CSR

Enter CREATE command to create new condition dependencies or scroll RIGHT to
see more details. Enter/modify row data and/or any of the following row
commands: R(nn),RR(nn) - Repeat, D(nn),DD - Delete, T - Set to true,
F - Set to false.

Application      : U#CRITA      Team # Critical App A
Input arrival    : 15/08/19    07.00
Operation        : U#NR 25
Condition        : 1
Extended Status  :
Rule:
Specify the number of condition dependencies that need to be verified
to make the condition true 000. Leave 0 for all of them.

Row Oper  Application Id  Input  Jobname  Con  Con  St  Ret Code  S R S M
cmd ws.   no.   arrival   U#CRITJ2  Typ  OP  Val  Val1 Val2  D I
*** U#CP 010                RC  GT  0   004_  U N N N
***** Bottom of data *****

```

38. Press F4 to save the occurrence modifications. Check for “OCCURRENCE MODIFIED” message at the upper right of the ISPF screen.
39. Return to ISPF option =5.2 and browse the operation list for application U#CRITA. The critical operation 020 is now started and operation 015 has a status of X as shown in the screen capture. Operation 025 waits because it has a normal dependency on operation 020. This dependency was created by default when you inserted operation 025.

```

EQQSOP1L ----- BROWSING OPERATIONS (left part) ----- Row 1 of 5
Command ==> _ Scroll ==> CSR

Enter the GRAPH command above to view operations graphically or
scroll right or enter the row command S to select an operation for details.

Row Application id  Operation  Jobname  S Input  Deadline  Latest  Crit
cmd  ws.   no.      arrival  arrival  start   start   path
*** U#CRITA      U#CP 005  U#CRITJ1 C 19 07.00  19 07.15  19 07.13 Y N
*** U#CRITA      U#CP 010  U#CRITJ2 E 19 07.00  19 07.15  19 07.14 N N
*** U#CRITA      U#CP 015  U#CRITJ3 X 19 07.00  19 07.15  19 07.13 Y N
*** U#CRITA      U#CP 020  U#CRITJ4 S 19 07.00  19 07.15  19 07.13 Y P
*** U#CRITA      U#NR 025  DUMMYOP W 19 07.00  19 07.15  19 07.14 N N
***** Bottom of data *****

```


40. Type **=6.7** on the command line and press Enter to open the Browsing Active Critical Jobs (left part) ISPF panel.
41. Type the **S - critical path** row command next to the U#CRITA operation 020 row and press Enter.

```

EQQSCP1L ----- BROWSING CRITICAL PATH (left part) ----- Row 1 of 2
Command ==> Scroll ==> CSR
Application      : U#CRITA
Operation        : U#CP 20
WLM Class and Policy :

Enter the row command S to select an operation for details.
Press ENTER to refresh.

Row cmd Application id Operation Jobname Promot Flags S P Latest Input
ws no. U W L R L R start arrival
'...' U#CRITA U#CP 015 U#CRITJ3 N N Y N X 5 19 07.13 19 07.00
'...' U#CRITA U#CP 020 U#CRITJ4 Y N N N S 5 19 07.14 19 07.00
***** Bottom of data *****

```

Operation 020 with a status of S (started) was promoted to the Urgent Queue. A Y in the Promot U column indicates this promotion, as shown in the following screen capture. The urgent queue promotion applies only to operations that belong to a critical path, including the critical job itself. Promotions occur for operations if they have not started and are approaching being late.

42. Press F3 one time. Select U#CRITB with the **S** row command and press Enter. Verify that it was also promoted to the Urgent Queue.
43. Use the **S** row command to select the U#CRITB entry. Navigate the ISPF panels to verify that the condition dependency in application U#CRITB operation 005 has evaluated to True. You must use the **COND** command to see the conditional dependencies.

After 6 minutes, both critical operations are complete.

Adding an occurrence to the current plan but excluding defined conditions

In this section, you add the U#CRITA and U#CRITB applications to the current plan but without including the conditional dependencies. You explore the results and how they differ from the previous section. Perform the following steps:

44. From the Tivoli Workload Scheduler for z/OS main ISPF panel, select option **5 MCP** and select option **1 Add**.

You see the Adding Applications to the Current Plan panel displayed.

45. Use **U#C*** as the selection criteria in the **APPLICATION ID** field and press Enter.

46. Select both **U#CRITA** and **U#CRITB** with the **A** row command and press Enter. The Adding an Application to the Current Plan ISPF panel opens.

47. Ensure that the AUTOMATIC DEP flag is set to **N**. Add both applications to the current plan without including the conditional dependencies. Change the input arrival time to **7.10** to avoid a duplicate occurrence. Enter a deadline time for a few minutes later than the input arrival time.

```
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      : U#CRITA          Team # Critical App A
Owner            : TEAM#
Operations       : 4
External predecessors : 0

Dependency resolution options:
AUTOMATIC DEP    ==> N              Automatic resolution of Conditional
                                   and External dependencies: Y P S or N
                                   Auto deps must be resolved: Y or N
RESOLVE REQUIRED  ==> N
Input arrival:   ==> 15/08/19      DATE ==> 15/08/19 (format YY/MM/DD )
TIME            ==> 07.10         TIME ==> 07.14 (format HH.MM )
VARIABLE TABLE ==> TEAM#         JCL variable table to be used
GROUP DEFINITION ==>
PRIORITY         ==> 5            1-9
ERROR CODE       ==>             If this is a rerun
```

48. Press F3 to add U#CRITA to the current plan. The Confirm Add Occurrence panel similar to the following screen capture opens. Read the panel text.

```

EQQMCADC ----- CONFIRM ADD OCCURRENCE -----
Command ==>

You are adding an occurrence without automatic dependency resolution.
This means that the occurrence will be added without Conditions.
This Application has conditions that will be lost in this addition.
If you do not want to lose Conditions, you must reject this addition
and set AUTOMATIC DEP to yes.

Enter Y in the command field to confirm the add or
Enter N to reject the add.

Application      : U#CRITA           Team # Critical App A
Owner            : TEAM#
Input arrival:   : 15/08/19   07.10

```

49. Type **Y** and press Enter.
50. Repeat the process for the U#CRITB application. Set the deadline time to **7.15** for U#CRITB.
51. Type **=6.7** and press Enter.
52. Review the critical jobs panel. Both of the critical jobs are already started because the conditional dependencies were not included. The following screen capture displays the critical jobs as started.

```

EQQSCJOB ----- BROWSING ACTIVE CRITICAL JOBS (left part) ----- Row 1 of 2
Command ==>                               Scroll ==> CSR

Enter any of the row commands below:
S - critical path          H - critical hot list
Press ENTER to refresh.

Row  Application id  Operation  Jobname  Input Arrival  Deadline  RL  S  R
cmd         ws      no.                Date      Time   Date      Time
----
**** U#CRITA        U#CP      020  U#CRITJ4  15/08/19  07.10  15/08/19  07.14  H  S  D
**** U#CRITB        U#CP      005  U#CRITB1  15/08/19  07.10  15/08/19  07.15  N  S  D
***** Bottom of data *****

```

53. Select the jobs to see whether they were promoted to the urgent queue. Press Enter occasionally until both jobs end. The risk level changes to H for U#CRITB. The jobs run for 6 minutes.

Exercise 4 Using advanced ISPF panels

In this exercise you explore the advanced ISPF panels available from IBM Tivoli Workload Scheduler for z/OS version 8.6.

1. From the main IBM Tivoli Workload Scheduler for z/OS ISPF, type the command **=0.8** and press **Enter**.

You see the Setting Panel Style panel as shown in the following screen capture.

```

EQQXPSTL ----- SETTING PANEL STYLE -----
Command ==>

Enter Y to use the advanced ISPF panels, or N to use the basic ISPF
panels.

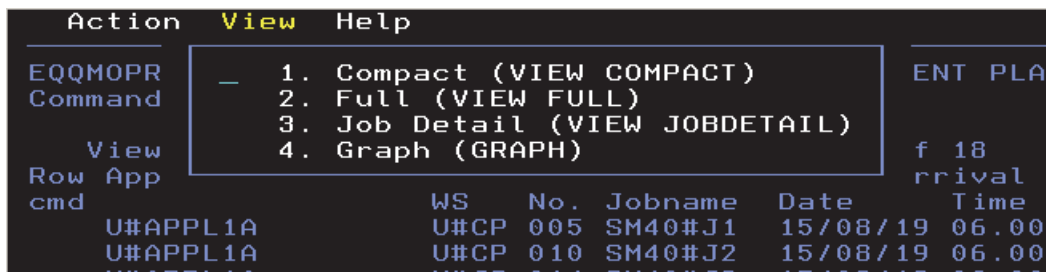
Advanced ISPF panels ==> Y _
  
```

2. Type **Y** in the Advanced ISPF panels field and press **F4** to enable the advanced ISPF panels.
3. From the main IBM Tivoli Workload Scheduler for z/OS ISPF, type the command **=5.3** and press **Enter**.
4. Filter for your applications only by typing **U#*** in the **Application ID** field and press **Enter**.

You see the advanced Operations in the Current Plan panel (an example is shown in the following screen capture).

Action View Help											
EQQMOPRV OPERATIONS IN THE CURRENT PLAN											
Command ==> _____ Scroll ==> CSR											
View: Compact (EQQMOPRT)						Row 1 of 18					
Row	Application ID	Operation			Input	Arrival	Dep	Cond	Dep	SXU	
cmd		WS	No.	Jobname	Date	Time	Suc	Pre	Suc	Pre	
_____	U#APPL1A	U#CP	005	SM40#J1	15/08/19	06.00	2	1	0	0	C N
_____	U#APPL1A	U#CP	010	SM40#J2	15/08/19	06.00	1	1	0	0	C N
_____	U#APPL1A	U#JS	014	SM40#J3	15/08/19	06.00	1	0	0	0	C N
_____	U#APPL1A	U#CP	015	SM40#J3	15/08/19	11.30	1	2	0	0	C N
_____	U#APPL1A	U#CP	020	SM40#J4	15/08/19	06.00	1	2	0	0	C N
_____	U#APPL1A	U#JS	024	SM40#J5	15/08/19	06.00	1	0	0	0	C N
_____	U#APPL1A	U#CP	025	SM40#J5	15/08/19	06.00	0	2	0	0	C N
_____	U#CRITA	U#CP	005	U#CRITJ1	15/08/19	07.00	2	0	0	0	C N
_____	U#CRITA	U#CP	005	U#CRITJ1	15/08/19	07.10	2	0	0	0	C N
_____	U#CRITA	U#CP	010	U#CRITJ2	15/08/19	07.00	0	1	2	0	E N
_____	U#CRITA	U#CP	010	U#CRITJ2	15/08/19	07.10	0	1	0	0	E N
_____	U#CRITA	U#CP	015	U#CRITJ3	15/08/19	07.00	1	1	1	1	X N
_____	U#CRITA	U#CP	015	U#CRITJ3	15/08/19	07.10	1	1	0	0	C N
_____	U#CRITA	U#CP	020	U#CRITJ4	15/08/19	07.00	1	1	0	0	C N
_____	U#CRITA	U#CP	020	U#CRITJ4	15/08/19	07.10	0	1	0	0	C N
_____	U#CRITA	U#NR	025	DUMMYOP	15/08/19	07.00	0	1	0	1	C N
_____	U#CRITB	U#CP	005	U#CRTBJ1	15/08/19	07.10	0	0	0	0	C N
_____	U#CRITB	U#CP	005	U#CRTBJ1	15/08/19	07.00	0	0	0	1	C N
***** end of data *****											

- Click the **View** menu and press Enter. You see a drop-down menu similar to the following screen capture.



- Select each of the options in turn and review the new panels that are provided. Use PF11 to scroll right (possible when you see >> on the panel) and PF10 to scroll left (possible when you see double carats [<<] on the panel)
- Explore the other menu items and panels displayed. Use the F10 and F11 keys when possible to view additional information.
- Explore other areas of the current plan list and browse functions to discover where the advanced ISPF panels are used.
- When you are finished exploring the advanced ISPF panels, return to ISPF option **=0.8.** and disable the advanced panels by typing an **N** and pressing F4.
- Type **=5.3** and press Enter.
- Filter for your applications again and view the differences in the ISPF panel that is presented when advanced panels are disabled.



7 Restart and cleanup exercises

In this exercise, you use the Tivoli Workload Scheduler for z/OS panels to define the cleanup types for operations in the application database. You then restart failed operations at job level and step level with different cleanup attributes.

Exercise 1 The restart and cleanup function

Using the operations details cleanup options panel

In this section, you modify application SM40#CM1 to specify cleanup options for an operation in the application. Perform the following steps:

1. On the Tivoli Workload Scheduler for z/OS main menu panel, select option **1** (database) and press Enter.
The Maintaining TWSZ Data Bases panel opens.
2. On the Maintaining TWSZ Data Bases panel, select option **4** (AD) and press Enter.
The Maintaining Application Descriptions panel opens.
3. On the Maintaining Application Descriptions panel, select option **3** (LIST) and press Enter.
The Specifying Application List Criteria panel opens.
4. In the **Application ID** field of the Specifying Application List Criteria panel, type **SM40#CM1**. Remember that the # is your assigned team identifier. Press Enter to display the List of Applications panel.
5. On the List of Applications panel, type the **M** (modify) row command next to the application and press Enter.
6. On the Modifying an Application panel, type **oper** and press Enter to display the Operations panel.
7. Type the **S** (operation details) row command and press Enter to select operation **015** with job name **SM40#CM1**.
The Operation Details panel opens.

8. Select option **9** (cleanup options) on the Operation Details panel and press Enter.
The Restart and Cleanup Operation Details panel opens.

```
EQQAMRCL ----- RESTART AND CLEANUP OPERATION DETAILS -----
Command ==>
Enter/Change data below:
Application      : SM40#CM1          RCLEANUP APPL #
Operation       : UNCP 015          RESTART-NO CLEANUP!!
Job name        : SM40#CM1

Clean Up Type    ==> N      Clean up Type (A/I/M/N)
Expanded JCL     ==> N      Use expanded JCL for Restart (Y/N)
User Sysout      ==> N      Log user sysout too (Y/N)
```

9. Ensure that *no* Tivoli Workload Scheduler for z/OS-initiated data set cleanup actions are allowed for this operation. Ensure that an **N** is in *all three* fields and press F4.

Restarting operations with no cleanup

In this section, you add the application SM40#CM1 to the current plan and use the error-handling panel to do job-level and step-level restarts of a failed operation in the application. The **Operations Clean Up Type** option is originally set to **No**. Perform the following steps:

10. On the Command line, type **=5.1** and press Enter to display the Adding Applications to the Current Plan panel.
11. Type the name of your application, **SM40#CM1**, in the **Application ID** field and press Enter.
The Adding an Application to the Current Plan panel opens with the name of your application in the **Application** field.
12. Press Enter. Tivoli Workload Scheduler for z/OS puts the current time in the **Input Arrival: Time** field. The message `No Input Arrival` is displayed in the upper right corner.
13. Press Enter a second time. Tivoli Workload Scheduler for z/OS puts the current date in the **Deadline: DATE** field. The message `Deadline Incomplete` is displayed.
14. In the **Deadline: TIME** field, specify a time that is several minutes later than the input arrival time.
15. In the **VARIABLE TABLE** field, type **team#**, where **#** is your assigned team identifier. Press Enter. The messages clear.
16. Press RETURN (F4) to add the occurrence and return to the main menu. The message `Occurrence Added` is displayed.
17. Press Enter. A TSO notification indicates that your job abended.
18. Type **=5.4** on the command line. Press Enter for the Specifying Ended in Error List Criteria panel.
19. Type your application name, **SM40#CM1**, in the **APPLICATION ID** field and press Enter.

The Handling Operations Ended in Error panel opens.

20. Perform a job-level restart without cleanup by typing the **SJR** (simple job restart) row command next to the operation. Press Enter.
21. On the Confirm Restart of an Operation panel, type **Y** and press Enter to confirm the restart. The job will fail again, this time you can do a step-level restart.
22. After the Handling Operations Ended in Error panel is redisplayed, press Enter. Repeat pressing Enter until your job is back on the error list.
23. Perform a step-level restart without cleanup by typing the **RC** (restart and cleanup) row command next to the operation. Press Enter.

The Operation Restart and Cleanup panel opens.

You can do both job-level and step-level restarts from this panel. You specified **N** (no cleanup) for the operation in the application database. Therefore, restarts are all that you can do for this operation.

In the next few steps, you attempt a job cleanup and do a step-level restart without the use of a cleanup.

24. To see the JCL for editing, type **Y** in the **EDIT JCL** field and press Enter. The **Expanded JCL** option shows **N**. *Do not* try to use expanded JCL.
25. On the command line, type **3** (start cleanup) and press Enter.
The message displays `SC Not Possible`. You can press **HELP (F1)** to find the meaning of the message.

Perform a step-level restart.

26. On the Command line, type **1** (step restart) and press Enter to request a step-level restart.
The message `Joblog Info Requested` is displayed.
27. Press Enter until a TSO message indicates that the job log arrived. The message is similar to the following example:
`06/09 18.06.25 EQQM641I OPERINFO FOR SM40CCM1 (JOB00846) RETRIEVED. CN(INTERNAL)`
28. On the command line, type **1** (step restart) and press Enter again.

This time, the Step Restart Selection List panel opens.

```

EQQMERSL ----- STEP RESTART SELECTION LIST ----- Row 1 of 8
Command ==> Scroll ==> CSR

Primary commands:  GO - to confirm the selection, END - to save it,
                   CANCEL - to exit without saving,
                   STEP - to show JCL Step Info (Expanded JCL only)
User Selection:    S - Start restart step      E - Last restart step
                   X - Step excluded (simulated flushed)
                   F - Step excluded (simulated with specified RC)
                   I - Step included

Application       : SM40#CM1          15/08/19 23.00
Operation         : UNCP 15           RESTART-NO CLEANUP!!
Jobname and jobid : SM40#CM1         JOB00634

Best Restart Step :                   FAIL      0005
Current selected Step :                FAIL      0005

Usr Sel Act Sel Rest Step No StepName ProcStep PgmName Step Type Step Status Compl. Code
'   I   Y   Y   0001   STEP1   IEFBR14   Normal   Executed   0000
'   I   Y   Y   0002   STEP2   IEFBR14   Normal   Executed   0000
'   I   Y   Y   0003   RC04    OPCUTIL   Normal   Executed   0004
'   I   Y   Y   0004   STEP3   IEFBR14   Normal   Executed   0000
S   S   B   0005   FAIL     OPCS806   Normal   Abended    S806
'   I   N   0006   STEP4   IEFBR14   Normal   Flushed    FLUSH
'   I   N   0007   STEP5   IEFBR14   Normal   Flushed    FLUSH
'   I   N   0008   STEP6   IEFBR14   Normal   Flushed    FLUSH
***** Bottom of data *****

```

29. Press HELP (F1) to learn more about the fields on this panel, and continue.

Tivoli Workload Scheduler for z/OS shows a potential restart step. An **S** for *first step to be restarted* is in the Usr Sel column. A **B** is in the Rest (restartable) column of the step. A **Y** is in the restartable column of all the steps that have already run. An **N** is in the restartable columns of steps that were flushed.

30. Scroll FORWARD (F8), if necessary, to see the steps that were flushed.

31. Restart the job at step number **4**, exclude step numbers **5** and **6**, and end at step number **7**. Do this by placing the following commands in the Usr Sel column for the steps:

- Type **X** (Step excluded) next to step numbers **0001**, **0002** and **0003**.
- Type **S** (Start restart step) next to step number **0004**.
- Type **X** (Step excluded) next to step numbers **0005** and **0006**.
- Type **E** (Last restart step) next to step number **0007** and press Enter.

Your screen looks similar to the following screen capture:

```

EQQMERSL ----- STEP RESTART SELECTION LIST ----- Row 1 of 8
Command ==>                                     Scroll ==> CSR

Primary commands:  GO - to confirm the selection, END - to save it,
                   CANCEL - to exit without saving,
                   STEP - to show JCL Step Info (Expanded JCL only)
User Selection:    S - Start restart step          E - Last restart step
                   X - Step excluded (simulated flushed)
                   F - Step excluded (simulated with specified RC)
                   I - Step included

Application        : SM40#CM1          15/08/19 23.00
Operation          : UNCP 15           RESTART-NO CLEANUP!!
Jobname and jobid   : SM40#CM1         JOB00634

Best Restart Step   :                   FAIL      0005
Current selected Step :                   STEP3    0004

Usr Sel  Act Sel  Rest Step StepName ProcStep PgmName Step Type Step Status Compl.
  '    '    '    '    '    '    '    '    '    '    '    '
  '    I    Y    0001  STEP1  IEFBR14  Normal  Executed  0000
  '    I    Y    0002  STEP2  IEFBR14  Normal  Executed  0000
  '    I    Y    0003  RC04   OPCUTIL  Normal  Executed  0004
S    S    Y    0004  STEP3  IEFBR14  Normal  Executed  0000
  '    X    B    0005  FAIL   OPCS806  Normal  Abended   S806
  '    X    N    0006  STEP4  IEFBR14  Normal  Flushed   FLUSH
E    E    N    0007  STEP5  IEFBR14  Normal  Flushed   FLUSH
  '    I    N    0008  STEP6  IEFBR14  Normal  Flushed   FLUSH
***** Bottom of data *****

```

32. Type **GO** on the command line and press Enter to confirm the selection.

The Editing JCL from Restart panel opens.

```

EQQMMJCL ----- EDITING JCL FROM RESTART -----
Command ==> _                                     Scroll ==> CSR

Edit JCL below: press PF3 to save, CANCEL to reject, GO to save and continue.

The confirmed JCL will be used for restart. If submitted, the JCL will
be saved in JS.

Application        : SM40#CM1          15/08/19 23.00
Operation          : UNCP 15           RESTART-NO CLEANUP!!
Jobname and jobid   : SM40#CM1         JOB00634
JCL last updated by : INGC109          15/08/19 23.39
Expanded JCL        : N

***** ***** Top of Data *****
000001 //*>OPC SCAN
000002 //SM40#CM1 JOB (9999),'JOB # 4',REGION=512K,
000003 //      MSGLEVEL=(1,1),MSGCLASS=H,CLASS=A,NOTIFY=INGC103
000004 //JOB LIB DD DISP=SHR,DSN=SYS3.OPC.LOADLIB
000005 //*
000006 //STEP1 EXEC PGM=IEFBR14
000007 //*
000008 //STEP2 EXEC PGM=IEFBR14
000009 //*
000010 //RC04 EXEC PGM=OPCUTIL,PARM=(' /RC=04')
000011 //SYSPRINT DD SYSOUT=*
000012 //SYSUDUMP DD SYSOUT=*
000013 //*
000014 //STEP3 EXEC PGM=IEFBR14
000015 //*
000016 //*AIL EXEC PGM=OPCUTIL,PARM=(' /RC=4095')
000017 //FAIL EXEC PGM=OPCS806
000018 //S3DD DD DISP=(,PASS),DSN=&&S3DD,SPACE=(TRK,1),UNIT=SYSDA
000019 //SYSPRINT DD SYSOUT=*

```

If necessary, you can edit the JCL before continuing the restart. However, no changes are required here.

33. On the command line, type **GO** and press Enter to save and continue.

34. On the Confirm Restart of an Operation panel, type **Y** and press Enter to confirm the restart.
You are returned to the Operation Restart and Cleanup panel.
35. Press Enter. You receive notification that your job ended with a condition code of zero.
36. Press END (F3). Your application is not on the error list.

Using the Operations Details Cleanup Options panel

In this section, you modify application SM40#CM2P to specify cleanup options for the operation in the application. Perform the following steps:

37. On the command line, type **=1.4.3** and press Enter to display the Specifying Application List Criteria panel.
38. In the **Application ID** field of the Specifying Application List Criteria panel, type **SM40#CM2P**. Remember that the number sign (#) is your assigned team identifier. Press Enter to display the List of Applications panel.
39. On the List of Applications panel, type the **M** (modify) row command next to the application and press Enter.
40. On the Modifying an Application panel, type **oper** and press Enter to display the Operations panel.
41. Type **S.9** next to the operation **SM40#PRC** and press Enter. That is row command “select operation details” followed by menu option 9 “clean-up options”. (When you know the menu option that you need you can skip the menu panel if there is space in the row command column)
The Restart and Cleanup Operation Details panel opens.
42. Specify **A** (Automatic cleanup) for **Clean Up Type**.
43. Specify **N** for all other options.

Restarting operations with data set cleanup

In this section, you add the application SM40#CM2P to the current plan. You use the error-handling panel to do a job-level restart of the failed operation with the **Clean Up Type** option set to **Automatic**.

Application SM40#CM2P has a single job, SM40#PRC, which runs a procedure. The procedure creates two data sets in its initial steps and deletes them in its final steps if the job runs successfully. Perform the following steps:

44. On the Command line, type **=5.1** and press Enter. Tivoli Workload Scheduler for z/OS saves your modification and displays the Adding an Application to the Current Plan panel.
45. Type the name of your application, **SM40#CM2P**, in the **Application** field and press Enter.

Tivoli Workload Scheduler for z/OS puts the current time in the **Input Arrival: TIME** field.

46. Press Enter a second time. Tivoli Workload Scheduler for z/OS puts the current date in the **Deadline: DATE** field.
47. In the **Deadline: TIME** field, specify a time that is later than the input arrival time.
48. In the **VARIABLE TABLE** field, type **team#**, where # is your assigned team identifier.
49. Press RETURN (F4) to add the occurrence and return to the main menu.
50. Press Enter. A TSO notification indicates that your job ended with RC=**08**.
51. Type **=5.4** on the command line and press Enter to display the Specifying Ended In Error List Criteria panel.
52. Type your application name, **SM40#CM2P**, in the **Application ID** field and press Enter. The Handling Operations Ended in Error panel opens.
53. Enter the **RC** (restart and cleanup) row command next to the operation that ended in error and press Enter. The Operation Restart and Cleanup panel opens.

Perform a job-level restart.

54. On the command line, type **2** (job restart) and press Enter to do a job-level restart.
The message displays `JOBLOG INFO REQUESTED`.
55. Press Enter again until you see a retrieved message similar to the following example:

```
06/09 18.06.25 EQQM641I OPERINFO FOR SM40CPRC (JOB00846) RETRIEVED. CN(INTERNAL)
***
```
56. On the command line, type **2** (job restart) again and press Enter.
The Editing JCL from Restart panel opens.
57. Continue the restart by typing **GO** on the command line and pressing Enter.
58. Type **Y** on the Confirm Restart panel and press Enter.

After Tivoli Workload Scheduler for z/OS cleans up affected data sets, the job is submitted. It runs and ends with the same error. However, you do not know which data sets were affected. Set a user option that causes the scheduler to display affected data sets before you initiate any cleanup action.

In the following steps, you set the user option to display affected data sets before a restart. Then, you try the job-level restart again.

59. Press END (F3) until you return to the Handling Operations Ended in Error panel. The operation ends with the same error.
60. Press RETURN (F4) to return to the main menu.
61. Select option **0** (Define TWSZ panel user parameters and options) and press Enter.

The Defining TWSZ Parameters and Options panel opens.

62. On the Defining TWSZ Parameters and Options panel, select option **7** (cleanup check).
63. Specify **Y** for cleanup check, and press RETURN (F4) until you return to the main menu.
64. On the command line, type **=5.4.0** to display the error list.
65. Type the **RC** (restart and cleanup) row command next to the operation and press Enter to display the Operation Restart and Cleanup panel.
66. Set the attribute for the **EDIT JCL** field to **Y**.
67. On the command line, type **2** (JOB RESTART) and press Enter to do a job-level restart.
The message Joblog Info Requested is displayed.
68. Press Enter again until the message joblog retrieved is displayed.
69. On the command line, type **2** (job restart) and press Enter a second time.
This time, the Modifying Cleanup Actions panel opens.

```

----- MODIFYING CLEANUP ACTIONS ----- Row 1 of 2
Command ===> Scroll ==> CSR

Enter GO to confirm the selection, DISCARD to exclude all the actions,
END to save the selection, CANCEL to exit without saving.
Row commands: I to include the data set in the actions
               X to exclude the data set from the actions

Application      : SM40#CM2P          15/08/19 23.59
Operation        : UNCP 15           CALLS A PROC
Jobname and jobid : SM40#PRC          JOB00646

Row Sel ProcStep Dataset name Act Volser Prot
cmd  [ ]
...  I  STEP1    INGC103.ATSTPROC.S1DD D SMS002 N
...  I  STEP2    INGC103.ATSTPROC.S2DD D SMS002 N
***** Bottom of data *****

```

On this panel, you can include or exclude listed data sets from the cleanup actions.

70. Press HELP (F1) to learn more about this panel.
71. Continue the restart by typing **GO** on the command line and pressing Enter.
The Editing JCL from Restart ISPF panel opens.
72. Notice the two JCL statements that are inserted by Tivoli Workload Scheduler into the JCL of the job. These are used for collecting the job log data for the Tivoli Workload Scheduler Data Store. The statements are as follows:

```

//TIVDST00 OUTPUT JESDS=ALL,DEST=TWS          INSERTED BY TWS
//TIVDSTAL OUTPUT JESDS=ALL                    INSERTED BY TWS
//TIVDST00 EXEC PGM=...                         INSERTED BY TWS

```

73. Type **GO** and press Enter again.
74. Type **Y** on the Confirm Restart panel and press Enter.

The job runs and ends with the same error, but this time you know which data sets were affected. To tidy up the application you can: do a step restart and skip the steps that failed; complete the

application; or you can skip just the step with a cc08 and change the operation options so that RC04 is acceptable, your choice.



8 Special resources exercises

Exercise 1 Creating and using special resources

In this exercise, you create a special resource with varying quantities, availability intervals, and workstation connections. You then use a special resource as a requirement for an operation in an application. Adding the application to the current plan causes Tivoli Workload Scheduler for z/OS to start a new occurrence. You then use the special resource monitor panels to modify available quantity and workstation access for the special resource.

Creating a special resource

In this section, you create a special resource with availability intervals and workstation allocation controls. You define the special resource with a default quantity of 10. You then restrict availability to a quantity of 2 between the hours of 7:00 A.M. and 9:00 P.M. on Monday through Friday. During these intervals, the resource is available to a single workstation only.

Perform the following steps to create the special resource:

1. On the Tivoli Workload Scheduler for z/OS main menu panel, select option **1** (database) and press Enter.
The Maintaining TWSZ Data Bases panel opens.
2. On the Maintaining TWSZ Data Bases panel, select option **6** (special resources) and press Enter.
The Maintaining Special Resources panel opens.
3. Select option **2** (create) on the Maintaining Special Resources panel and press Enter.

The Creating a Special Resource panel opens.

```

EQQDCRP ----- CREATING A SPECIAL RESOURCE -----
Option ==>

Select one of the following:

1 INTERVALS - Specify intervals
2 WS        - Modify default connected work stations

SPECIAL RESOURCE ==> _____
TEXT              ==> _____
SPECRES GROUP ID  ==> _____
Hiperbatch        ==> N          DLF object Y or N
USED FOR          ==> B          Planning and control C , P , B or N
ON ERROR          ==> _____ On error action F , FS , FX , K or blank
ON COMPLETE       ==> _____ On Complete action Y , N , R or blank
MAX USAGE LIMIT   ==> 0          Max number of allocations before usage reset
MAX USAGE TYPE    ==> R          Status change type Y , N or R

Defaults
QUANTITY          ==> 1          Number available 1-999999
AVAILABLE         ==> Y          Available Y or N
  
```

4. Specify the name of your special resource, **SM40#TAPES**, in the **SPECIAL RESOURCE** field.
5. Type some descriptive text for your special resource, such as **TAPE DRIVES for TEAM#**.
6. Set the default quantity to **10**.
7. Accept the defaults for the remaining attributes.

Define the availability intervals and workstation connections for this special resource.

8. Select option **1** (INTERVALS) to define the availability intervals and press Enter.

The Modifying Intervals for a Special Resource panel opens.

```

----- MODIFYING INTERVALS FOR A SPECIAL RESOURCE ----- Row 1 of 1
Command ==> _ Scroll ==> CSR

Enter any of the row commands below:
I(nn) - Insert, R(nn),RR(nn) - Repeat, D(nn),DD - Delete, or,
S - Work stations

Special resource : SM40#TAPES
Text             : team # tape SR

Row Day of From To Qty A
cmd week or Date Time Time   |
... ..

***** Bottom of data *****
  
```

9. In the Day of week or Date column, type **Monday**.
10. Press the Tab key to reach the From Time column and type **07.00**.
11. In the To Time column, type **21.00**.
12. Type **2** in the Qty (Quantity) column.
13. Type **Y** in the A (Availability) column.
14. Repeat the **Monday** interval and create intervals for **Tuesday** through **Friday**.

You have defined the intervals of time during which you are restricting the quantity of the resource. Outside of these intervals, the defaults are used by Tivoli Workload Scheduler for z/OS. Your intervals look similar to the following screen capture.

```
----- MODIFYING INTERVALS FOR A SPECIAL RESOURCE ----- Row 1 of 5
Command ===>                                     Scroll ===> CSR

Enter any of the row commands below:
I(nn) - Insert, R(nn),RR(nn) - Repeat, D(nn),DD - Delete, or,
S - Work stations

Special resource : SM40#TAPES
Text             : team # tape SR

Row cmd Day of week or Date From Time To Time Qty A
''' MONDAY 07.00 21.00 2 Y
''' tuesday 07.00 21.00 2 Y
''' wednesday 07.00 21.00 2 Y
''' thursday 07.00 21.00 2 Y
''' friday 07.00 21.00 2 Y
***** Bottom of data *****
```

Add a further control by specifying which workstations are allowed to allocate the special resource.

15. Type the **S** row command next to the **Monday** interval and press Enter.

The Modifying Connected Work Stations for a Special Resource panel opens.

```
----- MODIFYING CONNECTED WORK STATIONS FOR A SPECIAL RESOURCE Row 1 of 1
Command ===> _                                     Scroll ===> CSR

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 : SM40#TAPES
Text             : team # tape SR
Interval         : MONDAY          07.00    21.00

Row Ws
cmd
'''

***** Bottom of data *****
```

16. In the Ws (Workstation) column, specify workstation **INCP**.
17. Press END (F3) to return to the Modifying Intervals for a Special Resource panel.
18. Repeat the process of adding the INCP workstation for each of the remaining intervals of Tuesday through Friday. Alternatively you can repeat the definition for Monday to create definitions for Tuesday through Friday, and delete the old Tuesday through Friday definitions)
19. Press RETURN (F4) to save the special resource and return to the main menu. The message Special Resource Created is displayed.

Using a special resource

Perform the following steps to define the special resource as a requirement for an operation:

20. Type **=1.4.3** on the Command line and press Enter to display the Specifying Application List Criteria panel.

21. Clear the **Application ID** field. Type your team ID **TEAM#** in the **OWNER ID** field and press Enter.
The List of Applications panel opens.
22. Press the Tab key to move next to your team's special resources application, **SM40#RES**. Type the **M** (modify) row command, and press Enter.
The Modifying an Application panel opens.
23. On the command line, type **oper** and press Enter to display the Operations panel.
24. Type row command **s** next to the operation **015**, job name **SM40#RES**, and press Enter to specify operation details.
25. Select option **3** (special resources) to display the Special Resources panel to define the requirement.
26. Press the tab key until you arrive at the Special Resource column. Type the name of your special resource, **SM40#TAPES**.
27. Specify a required quantity of **3** in the **Qty** column.
28. Type **X** in the Shr/Ex column to indicate that the operation requires exclusive use of the resource.
29. There is no need to keep the resources allocated to the job if it fails (these special resources represent physical tape units, so keeping them allocated to the job would not make sense.)
Type **N** in the Keep on Error column.
30. Type **Y** in the Avail on Complete column (typing N would make those resources unavailable when the job completed). Your Special Resources panel looks similar to the following screen capture.

```

----- SPECIAL RESOURCES ----- Row 1 of 1
Command ==> _ Scroll ==> CSR
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
Operation : U#CP 015
Row Special Qty Shr Keep On Avail on
cmd Resource Ex Error Complete
.... SM40#TAPES 3 X N Y
***** Bottom of data *****

```

31. Press Return (F4) to save the modification and return to the main menu.

Using the special resource monitor

In this section, you use the special resource monitor to view the waiting queue of your team's special resource. You then adjust the available quantities of the resource and modify workstation access to the special resource. Perform the following steps:

32. On the command line, type **=5.1** and press Enter to display the Adding Applications to the Current Plan panel.
33. Enter the name of your special resource application, **SM40#RES**, in the **Application ID** field and press Enter.
The Adding an Application to the Current Plan panel opens with the name of your application in the **Application ID** field.
34. Press Enter. Tivoli Workload Scheduler for z/OS puts the current time in the **Input Arrival: TIME** field.
35. Press Enter a second time. Tivoli Workload Scheduler for z/OS puts the current date in the **Deadline: DATE** field.
36. In the **Deadline: TIME** field, specify a time that is a few minutes later than the input arrival time.
37. In the **VARIABLE TABLE** field, type **team#**, where **#** is your assigned team identifier. Press Enter.
38. Press RETURN (F4) to add the occurrence to the current plan and return to the main menu.

Use the special resource monitor to adjust the quantity and workstation connection for your special resource.

39. Display the Specifying Resource Monitor List Criteria panel by typing **=5.7** on the Command line and pressing Enter.
40. On the Specifying Resource Monitor List Criteria panel, type the name of your special resource, **SM40#TAPES**, in the **SPECIAL RESOURCE** field. Press Enter.
The Special Resource Monitor panel opens.

```
----- SPECIAL RESOURCE MONITOR ----- Row 1 of 1
Command ===>                               Scroll ===> CSR
Enter any of the row commands below:
B - Browse, M - Modify, I - In use list, W - Waiting queue

R Special Resource Adjust Used Used W
' SM40#TAPES Y NNN 2 0 Shared Excl Y
***** Bottom of data *****
```

41. On this panel, a **Y** is in the **W** (waiting queue) column. The **Y** means that at least one operation waits for the special resource. Display the waiting queue for your special resource by typing the **W** row command next to your special resource and pressing Enter.

The Special Resource Monitor - Waiting Queue panel opens.

```
----- SPECIAL RESOURCE MONITOR - WAITING QUEUE ----- Row 1 of 1
Command ==> Scroll ==> CSR

Enter any of the row commands below:
S - Select details, D - Delete from queue

Special resource : SM40#TAPES
Text             : team # tape SR

Row Latest Out Operation Jobname Pri Qty Type Reason
cmd Date   Time  ws      no.      5   3   X   Wait
''' 15/08/20 16.59 U#CP    015 SM40#RES 5   3   X   TOOFEW
***** Bottom of data *****
```

The Reason Wait column on this panel displays TOOFEW, indicating that the quantity is too low to satisfy the waiting operation.

42. Press END (F3) to return to the Special Resource Monitor panel.

Modify the resource in the current plan:

43. On the Special Resource Monitor panel, the value in the **Adjust Qty** field is 2. Enter the **M** (modify) row command next to your special resource to change the available quantity and press Enter.

The Modifying a Special Resource panel opens.

The operation in your special resource application requires a resource quantity of three to run, but only two are currently available. Modify the available quantity by adding 1 to it:

44. Type **1** in the **Deviation** field to adjust the quantity. Your Modifying a Special Resource panel now looks similar to the following screen capture.

```
----- MODIFYING A SPECIAL RESOURCE -----
Option ==>
Select one of the following:
1 INTERVALS - Specify intervals
2 WS        - Modify default connected work stations

Special resource : SM40#TAPES
Text             : team # tape SR
Specres group id :
Hiperbatch       : No Usage Counter : 0

USED FOR      ==> B Planning and control C , P , B or N
ON ERROR      ==> On error action F , FS , FX , K or blank
DEVIATION     ==> 1 Number to deviate -999999 to 999999 or blank
AVAILABLE     ==> Global availability Y or N or blank
QUANTITY      ==> Global quantity 1 to 999999 or blank
ON COMPLETE   ==> On Complete action Y or N , R , or blank
MAX USAGE LIMIT ==> 0 Max number of allocations before usage reset
MAX USAGE TYPE ==> R Status change type Y , N or R

Defaults
QUANTITY      ==> 10 Number available 1-999999
AVAILABLE     ==> Y Available Y or N
Active LIFESPAN : Action= Expiration Date=
Last updated by INGC109 on 15/08/20 at 16.03
```

45. Return to the Special Resource Monitor panel by pressing END (F3).

The value in the **Adjust Qty** field is now 3 instead of 2. However, you still have an operation in the waiting queue.

46. Check the waiting queue of the resource again.

This time, you see a different reason: NOWSC (no workstation connected). When you created the resource, you specified that only workstation INCP could access the resource between 7:00 A.M. and 9:00 P.M. on Monday through Friday. Because your operation runs on workstation U#CP, you must modify the workstation connection for the resource.

47. On the Special Resource Monitor panel, type the **M** (modify) row command next to your special resource.

48. On the Modifying a Special Resource panel, select option **1** (INTERVALS) to set the workstation connection for this interval of time and press Enter.

The Modifying Intervals for a Special Resource panel opens.

49. Press the Tab key until you arrive at the row with that includes the interval for today and the time for starting your operation. Type the **S** (work stations) row command and press Enter.

The Modifying Connected Work Stations for a Special Resource panel opens.

50. Insert a row in the Ws column and type the name of your team's computer workstation, **U#CP**.

51. Press END (F3) until the Special Resource Monitor panel is redisplayed.

The W (waiting queue) column now has N in it. Your operation starts and finishes after you modify the workstation connection.

Exercise 2 Creating a special-case application

In this exercise, you review the process for creating an application. This process includes defining the application's operations, run cycles, and special resources. The operations send you a TSO console message when they run.

Creating a special resource with max usage defined

In this section, you create a special resource with the **Max Usage** option set. You assign the resource to operations that you define in a new application. The application also uses your wait workstation and the **Run Cycle Every** option. Perform the following steps:

1. On the Tivoli Workload Scheduler for z/OS main menu panel, select option **1** (database) and press Enter.

The Maintaining TWSZ Data Bases panel opens.

2. On the Maintaining TWSZ Data Bases panel, select option **6** (special resources) and press Enter.

The Maintaining Special Resources panel opens.

3. Select option **2** (create) on the Maintaining Special Resources panel and press Enter.
The Creating a Special Resource panel opens.
4. Type the following values on the Creating a Special Resource panel:
SPECIAL RESOURCE = TEAM#DSN
TEXT = Data Set used by TEAM#
ON ERROR = Keep (makes sense for a data set, prevents other jobs accessing a corrupt file)
MAX USAGE LIMIT = 3
MAX USAGE TYPE = N (Sets availability to No when maximum is reached.)
 Your screen looks similar to the one shown in the following screen capture.

```

----- CREATING A SPECIAL RESOURCE -----
Option ==>

Select one of the following:

1 INTERVALS - Specify intervals
2 WS        - Modify default connected work stations

SPECIAL RESOURCE ==> TEAM#DSN
TEXT              ==> dataset resource for TEAM #
SPECRES GROUP ID ==>
Hiperbatch       ==> N          DLF object Y or N
USED FOR         ==> B          Planning and control C , P , B or N
ON ERROR         ==> K_        On error action F , FS , FX , K or blank
ON COMPLETE      ==> _        On Complete action Y , N , R or blank
MAX USAGE LIMIT  ==> 3        Max number of allocations before usage reset
MAX USAGE TYPE   ==> R        Status change type Y , N or R

Defaults
QUANTITY         ==> 1        Number available 1-999999
AVAILABLE        ==> N _     Available Y or N
  
```

5. Type option **2** for workstations (WS) on the command line and press Enter.
6. Ensure that there is a single row for workstations with an asterisk (*) in the Ws column as shown in the following screen capture. With this setting, all workstations can use this special resource.

```

----- MODIFYING CONNECTED WORK STATIONS FOR A SPECIAL RESOURCE Row 1 of 1
Command ==>                               Scroll ==> CSR

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 : TEAM#DSN
Text              : Data Set used by TEAM#

Row  Ws
cmd  *
***** Bottom of data *****
  
```

7. Press F4 to create the special resource and return to the main Tivoli Workload Scheduler for z/OS menu. The message `Special Resource Created` is in the upper right corner.

Creating an application that uses a special resource with max usage defined

8. On the option line, type **1.4.2** and press Enter.

The Creating an Application panel opens.

You are creating an application and not an application group. The application has a status of Pending, and it is not part of a group.

9. Type the following values for the indicated fields and accept the defaulted values for the other fields.

Application: ID = **SM40#MAX3**

Application: TEXT = **Appl using TEAM#DSN**

Application: TYPE = **A**

STATUS = **P**

CALENDAR ID = **U#CAL**

Define the operations for this application as follows:

10. Type the OPER command on the command line and press Enter.

The Operations panel opens.

11. Define three operations for this application as follows for SM40#MS1, SM40#WT1, and SM40#MS2:

- SM40#MS1 is the first operation, 005, and is an actual JCL job to run on the workstation U#CP. Set the duration of the operation to 1 second.
- SM40#WT1 is the second operation, 010. Assign it to the wait workstation U#WT, causing a 1-minute delay between the first operation and the third operation by setting the duration to 1 minute, which is the actual wait time.
- SM40#MS2 is the third operation, 015, and is another JCL job that you assign to workstation U#CP. Set the duration of the operation to 1 second.
- Operations 005 and 015 are to both use the special resource TEAM#DSN.
- The three operations are sequential predecessors of each other. The two JCL jobs SM40#MS1 and SM40#MS2 are provided for you in the *EQQJBLIB DD* concatenation. These jobs issue messages to your user ID when they end.

Your Operations panel looks similar to the following screen capture.

```

----- OPERATIONS ----- Row 1 of 3
Command ==> Scroll ==> CSR

Enter/Change data in the rows, and/or enter any of the following
row commands:
I(nn) - Insert, R(nn),RR(nn) - Repeat, D(nn),DD - Delete
S - Select operation details, J - Edit JCL
Enter the TEXT command above to include operation text, or,
enter the GRAPH command to view the list graphically.

Application : SM40#MAX3 Appl using TEAM#DSN

Row Oper Duration Job name Internal predecessors Morepreds No. of
cmd ws no. HH.MM.SS SM40#MS1 0 0 0
.... U#CP 005 00.00.01 SM40#MS1 005 0 0
.... U#WT 010 00.01.00 SM40#WT1 005 0 0
.... U#CP 015 00.00.01 SM40#MS2 010 0 0
***** Bottom of data *****

```



Note: You must make the first operation in the application time-dependent (operation menu option 4). The **Run Cycle Every** option that you define later in this exercise then schedules the application occurrences sequentially, not simultaneously. Without the time dependency, all of the application occurrences run immediately when the current plan is generated.

12. Select operation number **005** with job name **SM40#MS1** by typing **S** in the **Row cmd** column and pressing Enter.
13. On the Operation Details panel, select option **4** (automatic options) and press Enter.
14. Type a **Y** next to TIME DEPENDENT and press F3 twice to return to the Operations panel.

In the next few steps, assign the special resource **TEAM#DSN** to job number **005** and job number **015**.

15. Select operation number **005** with job name **SM40#MS1** by typing **S** in the **Row cmd** column and pressing Enter.
The Operation Details panel opens.
16. Type **3** (special resources) on the option line and press Enter.
The Special Resources panel opens.
17. Type the name of your max usage special resource **TEAM#DSN**. Specify a quantity of **1** and an exclusive (**X**) use. Leave the other fields at their defaults.

Your Special Resources panel look similar to the following screen capture.

```
----- SPECIAL RESOURCES ----- Row 1 of 1
Command ==> _ Scroll ==> CSR

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

Operation : U#CP 005

Row cmd Special Resource Qty Shr Keep On Avail on
    ' ' TEAM#DSN 1 X - -
***** Bottom of data *****
```

18. Press F3 twice to save the definition and return to the Operations panel.
19. Repeat the process to assign the special resource TEAM#DSN with the same options for operation number 015 with job name SM40#MS2.
20. Press F3 until you return to the Creating an Application panel.

Creating a run cycle for an application that uses the Every option

You now create a run cycle for this application that uses the **Every** option. The **Every** option allows the application to run multiple times whenever it is scheduled. You define this application to run three times, every 2 minutes whenever it is scheduled.

21. Type the **RUN** command on the command line of the Creating an Application panel and press Enter.
The Run Cycles panel opens.
22. Define a rule that is called RULE3 with an input arrival time of 07.00, a deadline of 23.00, a description, and a variable table of TEAM#. Take defaults on the other fields. Your screen looks similar to the following screen capture.

```
----- RUN CYCLES ----- Row 1 of 1
Command ==> _ Scroll ==> CSR

Enter/Change data in the rows, and/or enter any of the following
row commands:
I(nn) - Insert, R(nn),RR(nn) - Repeat, D(nn),DD - Delete
S - Specify run days/Modify rule

Application : SM40#MAX3 Appl using TEAM#DSN

Row cmd Name of rg/ Input Deadline F day In Out of Variable table
    ' ' period/rule HH.MM day HH.MM Type rule effect Effect
    ' ' YY/MM/DD YY/MM/DD
    ' ' RULE3 07.00 00 23.00 R 4 14/04/20 71/12/31 TEAM#
    ' ' Text : Team# run cycle using Every option
    ' ' Shift: 0 Shift Day Type: _

***** Bottom of data *****
```

23. Type **S** (Specify run days/Modify rule) in the Row cmd column next to RULE3 and press Enter.
The Modifying a Rule panel opens.

24. On the Modifying a Rule panel, use the **S** selection command to select every workday of the week. Type an **E** on the command line.

Your Modifying a Rule panel looks similar to the following screen capture.

```
----- MODIFYING A RULE -----
Command ==> E
Enter the GENDAYS command to display the dates generated by this rule
Enter the E command to specify EVERY options
Enter S and user data in the fields below to define a rule

Application      : SM40#MAX3          Appl using TEAM#DSN
Rule             : RULE3             Team# run cycle using Every option

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

25. Press Enter.

The Every Options panel opens.

26. Set the application to repeat every 2 minutes until 07.04, starting at 07.00. This setting causes the application to run three times. Your Every Options panel looks similar to the following screen capture.

```
----- EVERY OPTIONS -----
Command ==>

REPEAT EVERY ==> 00.02          Repeat every HH.MM
FROM          ==> 07.00          Input Arrival time
UNTIL         ==> 07.04          Repeat end time in the HH.MM format
```

27. Press F3 twice. You see the message Valid Rule.

28. Press F4 to return to the main Tivoli Workload Scheduler for z/OS panel. The message Application Created is displayed.

Adding the application to the current plan

In this section, add the application to the current plan and monitor the execution. Perform the following steps:

29. Type option **5.1** on the command line and press Enter.

30. On the Adding Applications to the Current Plan panel, type your application ID **SM40#MAX3** in the corresponding field and press Enter.

The message `Application Not Found` is displayed in the upper right corner. This message is displayed because you set the status of the application **SM40#MAX3** to Pending in the database.

31. Modify the application status to a value of Active. Type **=1.4.3.0** on the option line and press Enter.

32. Type the **M** (modify) row command in the Row cmd column for your application **SM40#MAX3** and press Enter.

33. Change the status to **A** for Active and Type option **=5.1** on the command line and press Enter. The message `Application Modified` is displayed.

34. On the Adding Applications to the Current Plan panel, type your application ID **SM40#MAX3** in the corresponding field and press Enter.

The Adding an Application to the Current Plan panel opens.

35. Press F4 to add the application.

36. Press Enter until you see a message that indicates that job **SM40#MS1** is completed.

```
17.03.41 JOB00864 $HASP165 SM40#MS1 ENDED AT MVSC10 MAXCC=0 CN(INTERNAL)
***
```

After 1 minute, the message that **SM40#MS2** finished is displayed. The reason for the 1-minute wait is that operation 010 is assigned to a wait workstation with a duration time of 1 minute.

37. Press Enter to see the message.

```
17.03.41 JOB00864 $HASP165 SM40#MS2 ENDED AT MVSC10 MAXCC=0 CN(INTERNAL)
***
```

38. Press Enter to clear the last message.

Jobs **SM40#MS1** and **SM40#MS2** only ran one time each. They did not run three times each as planned according to the **Run Cycle Every** option. When you added the application **SM40#MAX3** to the current plan, only one occurrence was created in the current plan. Only when the **Run Cycle Every** option is processed by the long-term plan batch job, multiple occurrences of the application are created.

The special resource **TEAM#DSN** now has a usage count of 2.

In the next few steps you verify the following results:

- Operation **010** assigned to the Wait workstation functioned correctly and caused a delay of 1 minute.
- The usage count of the special resource **TEAM#DSN** is 2.



Note: Only a single application occurrence was added to the current plan.

39. Type **=5.2** on the command line and press Enter.

The Specifying MCP Occurrence List Criteria panel opens.

40. Type your application **SM40#MAX3** into the **Application ID** field and press Enter.

The Modifying Occurrences in the Current Plan panel opens. Only one occurrence of your application has a status of C for complete. Adding the application to the current plan added only one occurrence.

41. Browse the application occurrence by typing a **B** in the Row cmd column and pressing Enter.

The Selecting Application Occurrence Information panel opens.

42. Type **2** (operation list) on the Option line and press Enter to see that the operations are complete.

43. Press F11 to scroll to the right to see the Browsing Operations (right part) panel.

```

EQQSOP2L ----- BROWSING OPERATIONS (right part) ----- Row 1 of 3
Command ==> Scroll ==> CSR

Enter the GRAPH command above to view operations graphically or
scroll left or enter the row command S to select an operation for details.

```

Row cmd	Operation ws no.	Op. text	P	Planned start	Actual start	Duration HH.MM.SS	Crit OccP	W P
----	U#CP 005		5	20 17.00	20 17.00	00.00.01	N	
----	U#WT 010		5	20 17.00	20 17.00	00.01.00	N	
----	U#CP 015		5	20 17.01	20 17.01	00.00.01	N	

***** Bottom of data *****

44. Review the Actual start time column and note when operation 010 started (17.00 in the example). Operation 015 started 1 minute later (17.01 in the example).

45. Review the Duration column. Operation 010 had a duration of 00.01.00, which is 1 minute.

46. Press F4 to return to the main Tivoli Workload Scheduler for z/OS panel.

47. Type **5.7** on the Option line and press Enter.

The Specifying Resource Monitor List Criteria panel opens.

48. Enter your special resource name **TEAM#DSN** and press Enter.

The Special Resource Monitor panel opens.

```

EQQMLSL ----- SPECIAL RESOURCE MONITOR ----- Row 1 of 1
Command ==> Scroll ==> CSR

Enter any of the row commands below:
B - Browse, M - Modify, I - In use list, W - Waiting queue

```

R	Special Resource	A	RDM AQD	Adjust Qty	Used Shared	Used Excl	W
'	TEAM#DSN	Y	NNN	1	0	0	N

***** Bottom of data *****

The special resource is still available, with a Y in column A.

49. Browse the special resource TEAM#DSN by typing a **B** in the Row cmd column and pressing Enter. The Usage Counter is set to 2.

Exercise 3 Verifying multiple application occurrences

In this exercise, you verify the **Special Resource** and **Run Cycle Every** options that you specified for your application in the previous exercise. The application SM40#MAX3 must be processed by a long-term plan extend/modify job to add the number of required application occurrences, based on the **Run Cycle Every** option multiple occurrences, into the LTP. The current plan extend batch job can then expand the occurrences into the Current Plan. Because all of the students are using a single Tivoli Workload Scheduler for z/OS instance for the exercises, the instructor must run the LTP and CP batch jobs as part of a demonstration.

After the CP batch job runs, Tivoli Workload Scheduler for z/OS schedules all occurrences of the application as soon as possible after reaching their input arrival times. Therefore, the input arrival times must be changed for this exercise. The input arrival times must be a time in the future that follows the start of the new current plan. In your work environment the current plan runs automatically; and the application occurrences then run on schedule as intended.



Note: Notify your instructor when you are ready to have the long-term and current plan refreshed and recreated. The instructor demonstrates this process.

After your instructor provides you with the new input arrival time and all of the students are ready, proceed with the following steps:

1. Modify the input arrival time of your SM40#MAX3 application. Use the Tivoli Workload Scheduler for z/OS option **=1.4.3** to modify the run cycle RULE3 for SM40#MAX3 in the application database.

Use the time that is provided by the instructor, approximately 15 minutes later than the current time. The 15 minutes provide the instructor enough time to demonstrate the Service Function Refresh and batch plan build process.

2. Select the **RULE3** run cycle and press Enter.
3. Type an **E** on the command line for the **Every** option and press Enter.
4. On the Every Options panel, change the UNTIL time to be **4** minutes later than the new input arrival time.
5. Press F4 to save the application run cycle modifications.

6. Notify your instructor that you completed the update to your SM40#MAX3 application description.



Important: The instructor demonstrates the service function refresh and batch plan build process. The REFRESH service function completely destroys the Long-term and Current Plans and should never be used in normal processing.

7. After the instructor has done a service functions refresh and created the new long-term plan, check that your application is scheduled to run three times today. From the main menu, enter command 2.1 (LTP - online) and in the LTP list criteria panel type SM40#*. The list of occurrences should be similar to this screen capture (obviously with different times and dates 0- but you should have three occurrences per workday).

```
EQQLSTOL ----- LONG TERM PLAN OCCURRENCES (left part) ----- Row 1 of 213
Command ==> _ Scroll ==> CSR

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

Row cmd	Application id	Input date	arrival time	Deadline date	time	P	C	Pre	Suc	Cond Pre	Cond Suc	Pnd Man Pre
...	SM40#MAX3	15/08/20	22.00	15/08/20	23.00	5	N	0	0	0	0	0
...	SM40#MAX3	15/08/20	22.02	15/08/20	23.02	5	N	0	0	0	0	0
...	SM40#MAX3	15/08/20	22.04	15/08/20	23.04	5	N	0	0	0	0	0
...	SM40#MAX3	15/08/21	22.00	15/08/21	23.00	5	N	0	0	0	0	0
...	SM40#MAX3	15/08/21	22.02	15/08/21	23.02	5	N	0	0	0	0	0
...	SM40#MAX3	15/08/21	22.04	15/08/21	23.04	5	N	0	0	0	0	0
...	SM40#MAX3	15/08/24	22.00	15/08/24	23.00	5	N	0	0	0	0	0
...	SM40#MAX3	15/08/24	22.02	15/08/24	23.02	5	N	0	0	0	0	0
...	SM40#MAX3	15/08/24	22.04	15/08/24	23.04	5	N	0	0	0	0	0
...	SM40#MAX3	15/08/25	22.00	15/08/25	23.00	5	N	0	0	0	0	0
...	SM40#MAX3	15/08/25	22.02	15/08/25	23.02	5	N	0	0	0	0	0

8. Immediately after the current plan is created, complete the following steps:
 - a. Check the Usage Counter of the special resource TEAM#DSN. Use the Tivoli Workload Scheduler for z/OS option =5.7 to get started.
 - b. Drill down to the Browsing a Special Resource panel. The current plan refresh has reset the counter to 0.
 - c. Using Tivoli Workload Scheduler for z/OS option =6.1.0 (if you get a list is empty message do =6.1 and clear the values on the filter panel) review the application occurrences for the SM40#MAX3 application. Three occurrences are waiting.



Note: At some point after the new input arrival time, messages indicate that the SM40#MS1 and SM40#MS2 jobs are complete. The exact timing of the messages depends on the input arrival time that you use. It also depends on the amount of time the instructor uses for refreshing the long-term and current plans. If you browse the occurrences by using 6.1 you can press enter to update the screen and see status changes along with the messages detailed.

Three similar messages arrive over a period of several minutes in this order:

```
12.31.00 JOB00883 $HASP165 SM40#MS1 ENDED AT MVSC10 MAXCC=0 CN(INTERNAL)
12.32.00 JOB00884 $HASP165 SM40#MS2 ENDED AT MVSC10 MAXCC=0 CN(INTERNAL)
12.33.00 JOB00885 $HASP165 SM40#MS1 ENDED AT MVSC10 MAXCC=0 CN(INTERNAL)
***
```

9. Press Enter until you see all three of the messages. This step can take a while; the length of time depends on the input arrival time of your run cycle.
10. Using Tivoli Workload Scheduler for z/OS option **=6.1.0**, review the application occurrences for the SM40#MAX3 application again. The Browsing Application Occurrences (left part) panel shows three application occurrences similar to the following screen capture.

```
EQQSA01L ----- BROWSING APPLICATION OCCURRENCES (left part) ----- Row 1 of 3
Command ===> _ Scroll ===> CSR

Enter the GRAPH command above to view occurrences graphically or
scroll right or enter the row command S to select an occurrence for details.
```

Row cmd	Application id	text	Input arrival	Started at	Status	P	Add func
...	SM40#MAX3	Appl using TEAM#DSN	20 22.00	20 22.00	C	5	
...	SM40#MAX3	Appl using TEAM#DSN	20 22.02	20 22.02	S	5	
...	SM40#MAX3	Appl using TEAM#DSN	20 22.04		W	5	

```
***** Bottom of data *****
```

The first occurrence has completed. The second has started, and the third occurrence waits.

11. Select the second occurrence, the one with a status of S for Started and press Enter.
12. On the Selecting Application Occurrence Information panel, select option **2** (operation list) and press Enter.

The Browsing Operations (left part) panel opens.

```
EQQSOP1L ----- BROWSING OPERATIONS (left part) ----- Row 1 of 3
Command ===> _ Scroll ===> CSR

Enter the GRAPH command above to view operations graphically or
scroll right or enter the row command S to select an operation for details.
```

Row cmd	Application id	Operation ws no.	Jobname	S	Input arrival	Deadline	Latest start	Crit path
...	SM40#MAX3	U#CP 005	SM40#MS1	C	20 22.02	20 23.02	20 23.00	N N
...	SM40#MAX3	U#WT 010	SM40#WT1	C	20 22.02	20 23.02	20 23.00	N N
...	SM40#MAX3	U#CP 015	SM40#MS2	*	20 22.02	20 23.02	20 23.01	N N

```
***** Bottom of data *****
```

The first two operations completed, but the third operation, number 015, has a status of an asterisk (*). Refer to the *IBM Tivoli Workload Scheduler Managing the Workload* manual, Appendix E, for an explanation of this status code.

13. Select the third operation, number 015, and press Enter.
- The Selecting Application Occurrence and Operation Information panel opens.
14. Find the **Status of operation on Work Station** field on the panel. The text field has the following information:

Ready, pred nonrep Waiting for special resource

The operation waits for the special resource to become available. You set the Max Usage counter of the Special Resource TEAM#DSN to **3**. Three jobs ran after the new current plan

was created, which caused Tivoli Workload Scheduler for z/OS to set the special resource to a status of unavailable. You requested this action when you defined the special resource TEAM#DSN.

15. Check the status of the first operation, operation **005**, in the third application occurrence. It is waiting for the special resource.
Reset the special resource TEAM#DSN status to run the remaining jobs.
16. Type **=5.7.0** on the command line and press Enter.
17. On the Special Resource Monitor panel, select the special resource **TEAM#DSN** by using the **M** (modify) row command.
18. On the Modifying a Special Resource panel, change the **AVAILABLE** field from **N** to **Y**. Press F4 to save the change.

19. Press Enter until you see two messages similar to the following examples:

```
14.02.06 JOB00890 $HASP165 SM40#MS2 ENDED AT MVSC10 MAXCC=0 CN(INTERNAL)
14.02.06 JOB00891 $HASP165 SM40#MS1 ENDED AT MVSC10 MAXCC=0 CN(INTERNAL)
***
```

The second operation (010), which you assigned to the wait workstation of the third application occurrence, takes 1 minute.

20. Press Enter to see one more message similar to the following example:

```
14.03.06 JOB00892 $HASP165 SM40#MS2 ENDED AT MVSC10 MAXCC=0 CN(INTERNAL)
***
```

Verify that all three application occurrences completed, and that they were scheduled to start 2 minutes apart. The actual start time for the third occurrence is different because it had to wait for the special resource to become available.



9 Automated job tailoring exercises

There are no student exercises for this unit.



10 Automatic recovery exercises

There are no student exercises for this unit.



11 Managing unplanned work exercises

The exercises for this unit combine what you learned in Units 9, 10, and 11. You create an application with operations that use automatic recovery, automated job tailoring, and event-triggered tracking. You issue IBM Tivoli Workload Scheduler for z/OS SRSTAT and OPSTAT commands from a batch job and TSO.

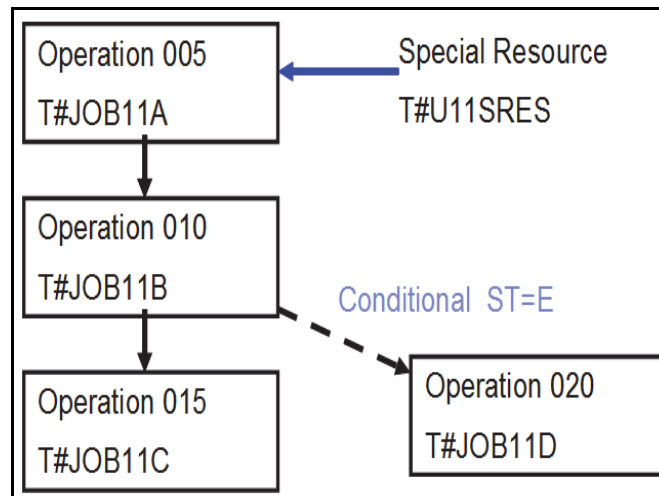
In the first exercise, you define the application and its jobs. In the second exercise, you run the application manually. In the third exercise, you add the application with event triggered tracking.

Exercise 1 Define an application with automatic recovery, job tailoring, and TWSz commands

In this exercise, you create application **T#U11APPL** that has four operations. The first operation has a special resource dependency that you satisfy with the TWSz SRSTAT command from TSO. The second operation fails and blocks the third operation. You use a conditional dependency with the fourth operation that runs the TWSz OPSTAT command in batch to mark the second operation status complete. The third operation, which uses automatic recovery, can then run. You specify automatic recovery to delete a bad step and include a JCL member from EQQPRLIB. Automatic recovery causes the third operation to run three times. The fourth job also uses job tailoring and a user variable from a new variable table.

You also create the JCL members that are used by the controller. You can copy sample members or you can create your own members from scratch. You create the members in a data set called

SYS2.TWS920.TM405.STUDENT.JOBLIB. This data set is in the EQQJBLIB concatenation of the controller started task. Here are the operations for the T#U11APPL application that you create.



Creating the T#U11APPL application description

Application T#U11APPL is not part of a group. Because you will add it to the current plan manually, you do not have to create a run cycle.

21. On the Tivoli Workload Scheduler for z/OS main menu panel, you select option **1** (DATABASE) and press Enter (the Maintaining TWSZ Data Bases panel opens). On the Maintaining TWSZ Data Bases panel, select option **4** (AD) and press Enter (the Maintaining Application Descriptions panel opens). Select option **2** (create) on the Maintaining Application Descriptions panel and press Enter (the Creating an Application panel opens). Or enter =1.4.2 from wherever you are in Tivoli Workload Schedule for z/OS dialog.
22. Type the name of your application description, **T#U11APPL**, in the **Application: ID** field.
23. Write a brief description of your application in the **TEXT** field.
24. Type **a** in the **TYPE** field to define your application as an application and not as an application group.
25. In the **Owner: ID** field, type your team name, **TEAM#**.
26. Write a brief description of your application in the **TEXT** field.
27. Type **5** in the **PRIORITY** field to assign medium priority to your application description.
28. Make your application description active by typing **a** in the **STATUS** field.
29. Leave the **CALENDAR ID** field blank.
30. Press Enter.

You see the No Operation Found message in the upper right corner. Your screen looks similar to the following image:

```

----- CREATING AN APPLICATION ----- NO OPERATION FOUND
Command ==>

Enter/Change data below:
Enter the RUN command above to select run cycles or enter the OPER command
to select operations.

Application:
ID          ==> T#U11APPL_____
TEXT        ==> team # unit 11_____ Descriptive text
TYPE        ==> A          A - Application, G - Group definition
Owner:
ID          ==> TEAM#_____
TEXT        ==> _____ Descriptive text of application owner
PRIORITY    ==> 5          A digit 1 to 9 , 1=low, 8=high, 9=urgent
VALID FROM  ==> 15/08/21   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
SMOOTHING FACTOR ==> _____ LIMIT ==> _____ Deadline Feedback options

```

You now define the operations.

31. Type the OPER command on the Command line and press Enter. You see the Operations panel.
32. Type in the four operations with their internal dependencies as in the following screen capture. All operations have a duration of 1 minute, and all four run on the workstation U#CP. Operation 020 has a normal internal dependency with operation 005.

```

EQQAMOSL ----- OPERATIONS ----- Row 1 of 4
Command ==> _ Scroll ==> CSR

Enter/Change data in the rows, and/or enter any of the following
row commands:
I(nn) - Insert, R(nn),RR(nn) - Repeat, D(nn),DD - Delete
S - Select operation details, J - Edit JCL
Enter the TEXT command above to include operation text, or,
enter the GRAPH command to view the list graphically.

Application          : T#U11APPL          team # unit 11

Row  cmd  Oper  Duration  Job name  Internal predecessors  Morepreds  No.of
ws   no.   HH.MM.SS  T#JOB11A  005  0 0 0
' ' ' ' U#CP 005   00.01.00  T#JOB11B  005  0 0 0
' ' ' ' U#CP 010   00.01.00  T#JOB11C  010  0 0 0
' ' ' ' U#CP 015   00.01.00  T#JOB11D  005  0 0 0
' ' ' ' U#CP 020   00.01.00  T#JOB11D  005  0 0 0
***** Bottom of data *****

```

Operation 005 has a Special Resource requirement called **T#U11SRES**.

33. You can type an S in the Row cmd column for operation 005 and press Enter. You see the Operation Details panel. Type **3** (SPECIAL RESOURCES) on the Option line and press Enter. You see the Special Resources panel. Or you can type **S.3** on the row command column.

34. Type the Special Resource requirements as follows and press Enter.

- Special Resource: T#U11SRES
- Qty: 1
- Shr Ex: X
- Keep On Error: N
- Avail On Complete: Y



Note: You can ignore any message about the special resource T#U11SRES not being defined.

Your screen looks similar to the following example:

```

EQQAMSRL ----- SPECIAL RESOURCES ----- Row 1 of 1
Command ==>                               Scroll ==> CSR

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

Operation                : U#CP 005

Row  cmd  Special Resource Qty  Shr Ex  Keep On  Avail on
..... T#U11SRES          1    X   N      Y
***** Bottom of data *****

```

35. Press F4 to save your changes and to return to the main panel. You see the message
Application Created in the upper right corner.

In the next few steps, you modify the application to add a conditional dependency for operation 020.

36. Type **1.4.3** on the Option line and press Enter. You see the Specifying Application List Criteria panel.

37. Type in your APPLICATION ID **T#U11APPL** and press Enter. You see the List Of Applications panel.

38. Type the **m** (Modify) row command next to your application and press Enter. You see the Modifying an Application panel.

39. Type the OPER command on the Command line and press Enter. You see the Operations panel.

40. Type the **s** (Select) row command on the line for operation 020 and press Enter. You see the Operation Details panel.

41. Type option **1** (predecessors) and press Enter.

You see the Predecessors panel. Now you create the conditional dependency between operation 020 and operation 010.

42. Type in the COND command on the command line and press Enter. You see the Conditions List panel.

43. Define a new condition 001 and provide a description. Your screen looks similar to the following screen capture.

```

EQQAMCCL ----- CONDITIONS LIST ----- Row 1 of 1
Command ==> Scroll ==> CSR

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

Application      : T#U11APPL                      team # unit 11
Operation        : U#CP 020      T#JOB11D

Row  Condition Text                               Cond Rule
cmd  no.                               Deps
'''  001      error status check
***** Bottom of data *****

```

44. Type an **S** row command on the row for condition 001 and press Enter. You see the Condition Dependencies Definition panel.
45. Define a single internal conditional dependency with operation 010. The condition criteria is for a status equal to error (E). Your screen looks similar to the following image.

```

EQQAMCCP ----- CONDITION DEPENDENCIES DEFINITION ----- Row 1 of 1
Command ==> Scroll ==> CSR

To define a condition dependency enter/change data in the rows, using any
of the following row commands:
I(nn) - Insert, R(nn),RR(nn) - Repeat, D(nn),DD - Delete, T - Dependency
resolution criteria

Application      : T#U11APPL                      team # unit 11
Operation        : U#CP 020      T#JOB11D

Rule:
Specify the number of condition dependencies that need to be verified
to make the condition true 000 . Leave 0 for all of them.

Row  Oper  Application Id  Jobname  StepName  ProcStep  Co  Co  St  Ret.Code
cmd  ws.   no.   (ext Adid only)  Ty  OP  Val  Val1 Val2
'''  u#CP 010  T#JOB11B  ST EQ E
***** Bottom of data *****

```

46. Press F4 to save your changes and to return to the main panel. You see the message Application Modified in the upper right corner.

Creating a variable table

Next you define a new variable table for operation 015 to use.

47. Type **1.9.2** on the Option line and press Enter. You see the Specifying JCL Variable Table List Criteria panel.
48. Type **TEAM#** in the **OWNER ID** field and the clear all the other fields with blanks.
49. Press Enter. You see the List of JCL Variable Tables panel.

50. Type **CREATE** on the command line and press Enter. You see the Creating a JCL Variable Table panel.
51. Name your new variable table **T#U11VTAB** with an Owner ID **TEAM#** and a brief description. Include a single variable entry called **T#U11VAR**. No setup is required, but a value is required. The value is **T#U11**. Your screen now looks similar to the following image:

```

EQQJVCL ----- CREATING A JCL VARIABLE TABLE ----- Row 1 of 1
Command ==>                                     Scroll ==> CSR

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

VARIABLE TABLE      ==> T#U11VTAB_____
OWNER ID              ==> TEAM#_____
DESCRIPTION           ==> Unit 11 table_____

Row  Variable  Subst.  Setup  Val  Default
cmd  Name      Exit      N      req  Value
---  ---      ---      ---      ---  ---
'''  T#U11VAR  _____ N      Y      T#U11
***** Bottom of data *****

```

52. Press F4 to save your changes and to return to the main panel. You see the message Table Added in the upper right corner.
- You are now ready to create the JCL members for your four operations.
53. Press F3 to exit the Tivoli Workload Scheduler for z/OS panels.

Creating EQQJBLIB members

In this section you create the four JCL members for your operations. You can create them from scratch by using the ISPF editor, or you can copy the samples and edit them to meet the requirements. The sample members are provided in the **SYS3.TWS860.TWCJ.JOBLIB** data set. The sample member names are T#JOB11A, T#JOB11B, T#JOB11C, and T#JOB11D.



Note: You cannot modify the original sample members as they are shared by all students.

54. Type in ISPF option **3.4** and press Enter. You see the Data Set List Utility panel.
55. Type in the data set name **SYS2.TWS920.TM405.STUDENT.JOBLIB** in the dsname level field and press Enter. Students have write access to this data set.



Note: You can use the sample members T#JOB11A, T#JOB11B, T#JOB11C, and T#JOB11D in the **SYS3.TWS860.TWCJ.JOBLIB** data set to get started or you can create your members from scratch.

56. Edit the data set and create the new JCL member **T#JOB11A**. Remember to always replace the # with your team number. The JCL for T#JOB11A is shown in the following example.

```

File Edit Edit_Settings Menu Utilities Compilers Test Help
EDIT      SYS2.TWS920.TM405.STUDENT.JOBLIB(T#JOB11A)  Member T#JOB11A copied
Command ==> Scroll ==> CSR_
***** Top of Data *****
000001 // *%OPC SCAN
000002 //&OJOBNAME JOB (%ACCTNUM), 'JOB # 1',
000003 //          NOTIFY=%MYID, MSGLEVEL=(1,1),
000004 //          MSGCLASS=%MSGCLASS, CLASS=%CLASS, REGION=512K
000005 //*
000006 //BR14#1 EXEC PGM=IEFBR14
000007 //
***** Bottom of Data *****

```

Notice that variable substitution is used in the JCL. The job name for instance uses the Tivoli Workload Scheduler for z/OS variable &OJOBNAME. This job does not do anything, but it does have a special resource dependency that might prevent it from running right away.

57. Press F3 to save the member T#JOB11A.

58. Create a second new JCL member **T#JOB11B**. Remember to always replace the # with your team number. The JCL for T#JOB11B is shown in the following image.

```

File Edit Edit_Settings Menu Utilities Compilers Test Help
EDIT      SYS2.TWS920.TM405.STUDENT.JOBLIB(T#JOB11B)  Member T#JOB11B copied
Command ==> Scroll ==> CSR_
***** Top of Data *****
000001 // *%OPC SCAN
000002 //&OJOBNAME JOB (%ACCTNUM), 'JOB # 2',
000003 //          NOTIFY=%MYID, MSGLEVEL=(1,1),
000004 //          MSGCLASS=%MSGCLASS, CLASS=%CLASS, REGION=512K
000005 //JOBLIB DD DISP=SHR, DSN=%JOBLIB
000006 //*
000007 //STEPA EXEC PGM=OPCUTIL, PARM=(' /RC=08 ')
000008 //SYSPRINT DD SYSOUT=*
000009 //*
***** Bottom of Data *****

```

Notice that job T#JOB11B contains a user-defined variable %JOBLIB in the JOBLIB DD statement. This variable is resolved by an entry in a user-defined variable table.

59. Press F3 to save the member T#JOB11B.

60. Create a third new JCL member **T#JOB11C**. Remember to always replace the # with your team number. The JCL for T#JOB11C is shown in the following example:

```

File Edit Edit_Settings Menu Utilities Compilers Test Help
EDIT          SYS2.TWS920.TM405.STUDENT.JOBLIB(T#JOB11C) - 01 Columns 00001 00072
Command ==>   Scroll ==> CSR
*****
***** Top of Data *****
000001 // *%OPC SCAN
000002 //&OJOBNAME. JOB (%ACCTNUM), 'JOB # 3',
000003 //          NOTIFY=%MYID, MSGLEVEL=(1,1),
000004 //          MSGCLASS=%MSGCLASS, CLASS=%CLASS, REGION=4094K
000005 //JOBLIB DD DISP=SHR, DSN=%JOBLIB
000006 // *=====
000007 // *%OPC RECOVER ERRSTEP=S1, STEPCODE=0012, RESSTEP=*, DELSTEP=S1
000008 // *%OPC RECOVER ERRSTEP=S3, STEPCODE=0008, ADDPROC=T#U11PRC, DELSTEP=S3
000009 // *
000010 //S1      EXEC PGM=OPCUTIL, PARM=(' /RC=12 ')
000011 //SYSPRINT DD SYSOUT=*
000012 // *
000013 //S2      EXEC PGM=IEFBR14
000014 // *
000015 //S3      EXEC PGM=OPCUTIL, PARM=(' /RC=08 ')
000016 //SYSPRINT DD SYSOUT=*
000017 // *
*****
***** Bottom of Data *****

```

T#JOB11C implements automatic recovery. There are two RECOVER statements in the JCL. The first RECOVER statement specifies that the job restarts at the first step, whatever that step is, when step S1 completes with a return code of 0012. The second RECOVER statement specifies that the JCL procedure in member T#U11PRC is included when step S3 completes with a return code of 0008. T#U11PRC is shared by all students and no changes that are required for it. T#U11PRC has been created for you in the EQQPRLIB data set used by the controller. This member is **SYS3.TWS860.TWCJ.JOBLIB(T#U11PRC)**.

61. Press F3 to save the member T#JOB11C.

62. Create a fourth new JCL member **T#JOB11D**. Remember to always replace the # with your team number. The JCL for T#JOB11D is shown in the following example: There are many to replace.

```

File Edit Edit_Settings Menu Utilities Compilers Test Help
EDIT          SYS2.TWS920.TM405.STUDENT.JOBLIB(T#JOB11D) - 01 Columns 00001 00072
Command ==>   Scroll ==> CSR
*****
***** Top of Data *****
000001 // *%OPC SCAN
000002 //&OJOBNAME. JOB (%ACCTNUM), 'JOB # 4',
000003 //          NOTIFY=%MYID, MSGLEVEL=(1,1),
000004 //          MSGCLASS=%MSGCLASS, CLASS=%CLASS, REGION=512K
000005 // *
000006 // *%OPC TABLE NAME=(T#U11VTAB)
000007 //STEP1    EXEC PGM=EQQEVPGM
000008 //EQQMLIB DD DSN=TWS930.SEQQMMSG0, DISP=SHR
000009 //EQQMLOG DD SYSOUT=*
000010 //SYSIN DD *
000011 OPSTAT WNAME(U#CP) STATUS(C) JOBNAM(T#JOB11B) ADID(%T#U11VAR.APPL)
000012 SUBSYS(TWTL) TRACE(1)
000013 // *
000014 //
*****
***** Bottom of Data *****

```

T#JOB11D uses the variable T#U11VAR that you defined earlier in this exercise. It forms the first part of the application ID in the OPSTAT command.

63. Press F3 to save the member T#JOB11D.

64. Use the browse row command **B** to browse the member T#U11PRC in the EQQPRLIB data set SYS3.TWS860.TWCJ.JOBLIB(T#U11PRC).

```
Menu  Utilities  Compilers  Help
BROWSE      SYS3.TWS860.TWCJ.JOBLIB(T#U11PRC) - 01.04  Line 00000000 Col 001 080
Command ==> _____ Scroll ==> CSR
***** Top of Data *****
//*
//PRCS1 EXEC PGM=OPCUTIL,PARM=(' /WAIT=01')
//SYSPRINT DD SYSOUT=*
//*
***** Bottom of Data *****
```

65. Type **=E.T** and press Enter to return to the Tivoli Workload Scheduler for z/OS ISPF panels.

Exercise 2 Running the T#U11APPL application manually

In this exercise you run and monitor the application that you defined.

1. From the main Tivoli Workload Scheduler for z/OS panel type **=5.1** and press Enter. You see the Adding Applications to the Current Plan panel.
2. Type in the Application ID **T#U11APPL** and press Enter. You see the Adding an Application to the Current Plan panel.
3. Type a **Y** in the AUTOMATIC DEP and RESOLVE REQUIRED Dependency resolution options. This action ensures that your conditional dependency is included.

- Press enter three times to accept input arrival defaults and the deadline date default. You must enter a deadline time and press Enter. Use a time of 10 minutes later than the input arrival time. Your screen now looks similar to the following image:

```

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      : T#U11APPL          team # unit 11
Owner           : TEAM#
Operations       : 4
External predecessors : 0

Dependency resolution options:
AUTOMATIC DEP    ==> Y                Automatic resolution of Conditional
                                         and External dependencies: Y P S or N
                                         Auto deps must be resolved: Y or N
RESOLVE REQUIRED  ==> Y
Input arrival:
DATE             ==> 15/08/21         DATE ==> 15/08/21 (format YY/MM/DD )
TIME             ==> 11.20           TIME ==> 11.30 (format HH.MM )
VARIABLE TABLE  ==>                JCL variable table to be used
GROUP DEFINITION ==>
PRIORITY         ==> 5                1-9
ERROR CODE       ==>                If this is a rerun
  
```

- Press F3 to add the application to the current plan.
- If the Confirm Add Occurrence panel is displayed, reply **N** on the panel and press Enter. This panel means that you forgot to set the AUTOMATIC DEP to Y. Correct this setting and try again.
- After you see the Occurrence Added message, type **=5.2** and press Enter. You see the Specifying MCP Occurrence List Criteria panel.
- Type in your application ID **T#U11APPL** and press Enter. You see the Modifying Occurrences in the Current Plan panel.
- Select your T#U11APPL application by using the **b** (browse) row command and press Enter. You see the Selecting Application Occurrence Information panel.
- Type option **2** (OPERATION LIST) and press Enter. You see the Browsing Operations panel similar to the following image:

```

EQQSOP1L ----- BROWSING OPERATIONS (left part) ----- Row 1 of 4
Command ==>                                         Scroll ==> CSR

Enter the GRAPH command above to view operations graphically or
scroll right or enter the row command S to select an operation for details.

Row  cmd  Application id  Operation  Jobname  S  Input  Deadline  Latest  Crit
      ws  no.              S  arrival  start    start  path
-----
****  T#U11APPL  U#CP 005  T#JOB11A C  21 11.20  21 11.30  21 11.27 N  N
****  T#U11APPL  U#CP 010  T#JOB11B E  21 11.20  21 11.30  21 11.28 N  N
****  T#U11APPL  U#CP 015  T#JOB11C W  21 11.20  21 11.30  21 11.29 N  N
****  T#U11APPL  U#CP 020  T#JOB11D E  21 11.20  21 11.30  21 11.29 N  N
***** Bottom of data *****
  
```

Notice that operation 005 completed even though the special resource T#U11SRES was never defined in the data base. You see in the next few steps that it was automatically added to the current plan with default values by the controller. Also, notice that operation 020 ran as expected

when operation 010 failed, but operation 020 was not supposed to fail. You investigate this issue also in the next steps.

11. Select operation 020 and press Enter. You see the Selecting Application Occurrence and Operation Information panel. Notice that the error code for the operation is OJVC.

12. Type in option **6** (JCL) and press Enter.

You see the Browsing Operation Input/Output Stream panel. This panel shows the JCL with comments that provide a reason for the OJCV error. The controller cannot find the variable T#U11VAR because you did not provide the variable table to the controller. Scroll through the JCL messages and find the messages. Here is an example: The JCL is repeated, the original JCL comes first, followed by a copy containing information about the error.

```

EQQSJCLB ----- BROWSING OPERATION INPUT/OUTPUT STREAM -----
Command ==> Scroll ==> CSR

Application      : T#U11APPL      team # unit 11
Operation       : U#CP 20
Jobname and jobid : T#JOB11D
Status of operation : Ended in error      OJCV      JCL last updated by: INGC109

***** Top of Data *****
/*%OPC SCAN
//&OJOBNAME. JOB (%ACCTNUM), 'JOB # 4',
//          NOTIFY=%MYID,MSGLEVEL=(1,1),
//          MSGCLASS=%MSGCLASS,CLASS=%CLASS,REGION=512K
/*
//STEP1 EXEC PGM=EQQEVPGM
//EQQMLIB DD DSN=TWS920.SEQQMSG0,DISP=SHR
//EQQMLOG DD SYSOUT=*
//SYSIN DD *
//OPSTAT WSNAM(U#CP) STATUS(C) JOBNAME(T#JOB11B) ADID(%T#U11VAR.APPL)
//SUBSYS(TWTL) TRACE(1)
/*
//
VARIABLE SUBSTITUTION FAILED.
/*%OPC SCAN
//&OJOBNAME. JOB (%ACCTNUM), 'JOB # 4',
//          NOTIFY=%MYID,MSGLEVEL=(1,1),
//          MSGCLASS=%MSGCLASS,CLASS=%CLASS,REGION=512K
/*
//STEP1 EXEC PGM=EQQEVPGM
//EQQMLIB DD DSN=TWS920.SEQQMSG0,DISP=SHR
//EQQMLOG DD SYSOUT=*
//SYSIN DD *
/*%EQQJ535E 08/21 14.44.47
/*%>
//          UNDEFINED VARIABLE T#U11VAR LINE 00010 OF ORIG JCL
//OPSTAT WSNAM(U#CP) STATUS(C) JOBNAME(T#JOB11B) ADID(%T#U11VAR.APPL)
//SUBSYS(TWTL) TRACE(1)
/*
//
***** Bottom of Data *****

```

You correct this problem in the original JCL by using the ISPF editor.

13. Press F2 to split screens.

14. Type **=3.4** and press Enter.

15. Type in the data set name **SYS2.TWS920.TM405.STUDENT.JOBLIB** on the dsname level line and press Enter.

16. Edit the data set and select the member **T#JOB11D**.

17. Modify the JCL by adding the following statement after the comment line following the job card.

```
/*%OPC TABLE NAME=(T#U11VTAB)
```

Your JCL now looks similar to this screen capture:

```

EQQMJCLE ----- EDITING JCL FOR A COMPUTER OPERATION -----
Command ===>                               Scroll ==> CSR

Edit JCL below and press END to finish or CANCEL to reject:

Application      : T#U11APPL                team # unit 11
Operation       : U#CP 20
Status of operation : Waiting
Jobname        : T#JOB11D                  JCL last updated by: INGC103

***** ***** Top of Data *****
000001 // *%OPC SCAN
000002 //&OJOBNAME. JOB (%ACCTNUM), 'JOB # 4',
000003 //          NOTIFY=%MYID, MSGLEVEL=(1,1),
000004 //          MSGCLASS=%MSGCLASS, CLASS=%CLASS, REGION=512K
000005 // *
000006 // *%OPC TABLE NAME=(T#U11VTAB)
000007 //STEP1 EXEC PGM=EQQEVPGM
000008 //EQQMLIB DD DSN=TWSZ860.SEQMSG0, DISP=SHR
000009 //EQQMLOG DD SYSOUT=*
000010 //SYSIN DD *
000011          OPSTAT WSNAM(U#CP) STATUS(C) JOBNAME(T#JOB11B) ADID(%T#U11VAR.APPL)
000012          SUBSYS(TWTL) TRACE(1)
000013 //
***** ***** Bottom of Data *****

```

18. Press F3 until you return to the Tivoli Workload Scheduler for z/OS ISPF panels.



Note: Operation 020 now runs correctly the next time that you add an occurrence to the current plan.

You now look at the special resource that was automatically created for operation 005 in the current plan.

19. Type **=5.7** and press Enter. You see the Specifying Resource Monitor List Criteria panel.

20. Type the special resource **T#U11SRES** and press Enter. You see the Special Resource Monitor panel similar to the following image.

```

EQQMLSL ----- SPECIAL RESOURCE MONITOR ----- Row 1 of 1
Command ===> _                               Scroll ==> CSR

Enter any of the row commands below:
B - Browse, M - Modify, I - In use list, W - Waiting queue

R Special Resource
T#U11SRES
***** Bottom of data *****

```

A	RDM	Adjust	Used	Used	W
	AQD	Qty	Shared	Excl	
Y	NNN	1	0	0	N

The special resource was dynamically added to the current plan by the controller with default values. The resource has a status of available. You change this status with the SRSTAT command from TSO.

21. Type the following TSO SRSTAT command on the command line and press Enter. The Tracker subsystem name is used to ensure the SRSTAT event that is generated by the command goes to the correct Controller subsystem

```
TSO SRSTAT 'T#U11SRES' SUBSYS(TWTL) AVAIL(no)
```

22. Press Enter to refresh the panel. The T#U11SRES special resource should now have an N in the A (Available) column.

You delete the occurrence of T#U11APPL and add a new occurrence into the current plan.

23. Type **=5.2** and press Enter. You see the Specifying MCP Occurrence List Criteria panel.

24. Verify that the application ID is **T#U11APPL** and press Enter. You see the Modifying Occurrences in the Current Plan panel.

25. Type a **d** (Delete) row command on the line for your T#U11APPL occurrence and press Enter.

26. Type a **Y** on the Confirming Deletion of a CP Occurrence panel and press Enter. You see the message `Occurrence Deleted`.

27. Type **=5.1** and press Enter. You see the Adding Applications to the Current Plan panel.

28. Verify that your application ID **T#U11APPL** is specified and press Enter. You see the Adding an Application to the Current Plan panel.

29. Type a **Y** in the AUTOMATIC DEP and RESOLVE REQUIRED Dependency resolution options. This action ensures that your conditional dependency is included.

30. Press Enter three times to accept input arrival defaults and the deadline date default. You must enter a deadline time and press Enter. Use a time of 10 minutes later than the input arrival time.

31. Press F3 to add the application to the current plan.

32. If the Confirm Add Occurrence panel is displayed, reply **N** on the panel and press Enter. This panel means that you forgot to set the AUTOMATIC DEP to Y. Correct this setting and try again.

33. After you see the `Occurrence Added` message, type **=5.2** and press Enter. You see the Specifying MCP Occurrence List Criteria panel.

34. Type your application ID **T#U11APPL** and press Enter. You see the Modifying Occurrences in the Current Plan panel.

35. Select your T#U11APPL application by using the **b** (browse) row command and press Enter. You see the Selecting Application Occurrence Information panel.

36. Type option **2** (operation list) and press Enter. You see the Browsing Operations panel similar to the following image:

```
EQQSOP1L ----- BROWSING OPERATIONS (left part) ----- Row 1 of 4
Command ==>                                         Scroll ==> CSR

Enter the GRAPH command above to view operations graphically or
scroll right or enter the row command S to select an operation for details.
```

Row cmd	Application id	Operation ws no.	Jobname	S	Input arrival	Deadline	Latest start	Crit path
----	T#U11APPL	U#CP 005	T#JOB11A	A	21 11.50	21 12.00	21 11.57	N N
----	T#U11APPL	U#CP 010	T#JOB11B	W	21 11.50	21 12.00	21 11.58	N N
----	T#U11APPL	U#CP 015	T#JOB11C	W	21 11.50	21 12.00	21 11.59	N N
----	T#U11APPL	U#CP 020	T#JOB11D	W	21 11.50	21 12.00	21 11.59	N N

***** Bottom of data *****

This time operation 005 has a status of arriving and the rest of the operations are waiting. This result is expected.

37. Select operation 005 and press Enter.

You see the Selecting Application Occurrence and Operation Information panel. You can see on this panel that operation 005 is waiting for a special resource.

38. Press F3 twice to return to the Selecting Application Occurrence Information panel.

39. Run the following TSO SRSTAT command from the panel option line.

```
TSO SRSTAT 'T#U11SRES' SUBSYS(TWTL) AVAIL(YES)
```

40. Press Enter. You see several messages indicating that your jobs ran. Press Enter to move past these messages.

41. Type option **2** (OPERATION LIST) and press Enter. You see the browsing operations panel similar to the following image:

```
EQQSOP1L ----- BROWSING OPERATIONS (left part) ----- Row 1 of 4
Command ==> _ Scroll ==> CSR

Enter the GRAPH command above to view operations graphically or
scroll right or enter the row command S to select an operation for details.
```

Row cmd	Application id	Operation ws no.	Jobname	S	Input arrival	Deadline	Latest start	Crit path
....	T#U11APPL	U#CP 005	T#JOB11A	C	21 14.52	21 15.00	21 14.57	N N
....	T#U11APPL	U#CP 010	T#JOB11B	C	21 14.52	21 15.00	21 14.58	N N
....	T#U11APPL	U#CP 015	T#JOB11C	S	21 14.52	21 15.00	21 14.59	N N
....	T#U11APPL	U#CP 020	T#JOB11D	C	21 14.52	21 15.00	21 14.59	N N

```
***** Bottom of data *****
```

42. Press F3.

43. Press Enter until all operations are complete.

This process can take slightly over 1 minute. Notice that job T#JOB11C runs three times because of the two recover statements.

44. Type option **2** (OPERATION LIST) and press Enter.

You see the Browsing Operations panel. All four operations are now complete. You can only see the third instance of job T#JOB11C now, the one that ran with return code zero.

45. Select operation 020 and press Enter. You see the Selecting Application Occurrence and Operation Information panel.

46. Type option 4 (dependencies) and press Enter. You see the Predecessors and Successors to an Operation panel.

47. Type COND on the command line and press Enter. You see the Browsing Condition panel. The status of condition 001 should be TRUE.

48. Press F3 until you return to the Browsing Operations panel.

49. Select each operation in turn and review the JCL. Verify that the variable substitution and the recover statements worked correctly.

50. Press F4 until you exit the Tivoli Workload Scheduler for z/OS panels.

51. Type **=S** and press Enter to go to SDSF.

52. Type **H** and press Enter to see held jobs.

53. Type the following command and press Enter to filter for on your jobs.

```
prefix T#JOB11*
```

54. Ensure that job T#JOB11C ran three times and review all of the job outputs.

55. Press F4 to exit SDSF.

56. Type **=E.T** and press Enter to return to the Tivoli Workload Scheduler for z/OS panels.h return code zero.

The following screen capture from Tivoli Workload Scheduler for z/OS shows browsing the JCL in the Current Plan after the automatic recoveries took place.

```
EQQSJCLB ----- BROWSING OPERATION INPUT/OUTPUT STREAM -----
Command ==> Scroll ==> CSR

Application      : T#U11APPL      team # unit 11
Operation        : U#CP 15
Jobname and jobid : T#JOB11C      JOB00725
Status of operation : Completed    JCL last updated by: INGC103

***** Top of Data *****
/*>OPC SCAN
//T#JOB11C JOB (9999),'JOB # 3',
//          NOTIFY=INGC109,MSGLEVEL=(1,1),
//          MSGCLASS=H,CLASS=A,REGION=4094K,
// RESTART=(*)
//JOBLIB DD DISP=SHR,DSN=SYS3.OPC.LOADLIB
//*****
/*>OPC RECOVER ERRSTEP=S1,STEP CODE=0012,RESSTEP=*,DELSTEP=S1
/*>OPC RECOVER ERRSTEP=S3,STEP CODE=0008,ADDPROC=T#U11PRC,DELSTEP=S3
/*
/* OPC MSG:
/* OPC MSG: I *** R E C O V E R Y   A C T I O N S   T A K E N ***
/*
/* OPC MSG:
/* OPC MSG: I *** R E C O V E R Y   A C T I O N S   T A K E N ***
//PRCS1 EXEC PGM=OPCUTIL,PARM=(' /WAIT=01')
//SYSPRINT DD SYSOUT=*
/*
//S2      EXEC PGM=IEFBR14
/*
***** Bottom of Data *****
```

Exercise 3 Using an event trigger

In this exercise, you use event triggered tracking to add your T#U11APPL into the current plan. You create a job start type event trigger and then use it to add the application.

1. Type **1** and press Enter. You see the Maintaining TWSZ Data Bases panel.
2. Type **7** (EDWA) and press Enter. You see the Maintaining Event Driven Workload Automation panel.
3. Type **2** (Modify) and press Enter. You see the Specifying ETT List Criteria panel.

4. Type a trigger name of **T#U11TRG** and press Enter. You see the Modifying ETT Tracking Criteria panel. Remember to replace the # with your team number.
5. Type in the following event trigger information as shown in the screen capture. Use the blank row that is provided by default. The event trigger is a job-type trigger that occurs when the job T#U11TRG starts. The event causes the controller to add your T#U11APPL into the current plan. The other options on the panel are all set to **N**.

```

EQQJMTCL ----- MODIFYING ETT TRACKING CRITERIA ----- Row 1 to 1 of 1
Command ==> _ Scroll ==> 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 - Delete

Row  Name of triggering event  Id of associated  E  J  D  A
cmd                                     application      T  R  R  S
''' T#U11TRG                  T#U11APPL        J  N  N  N
***** Bottom of data *****

```



Note: You specified N for DR (dependency resolution). Check whether this affects the internal conditional dependency that you specified for operation 020.

6. Press F4 to save the event trigger. You see the message *Criteria Updated* in the upper right of the panel.
7. Press F2 to split screens. In the next few steps, you create the trigger job and submit it.
8. Type **=3.4** and press Enter.
9. Type in the data set name **SYS2.TWS920.TM405.STUDENT.JOBLIB** on the Dsname level line and press Enter.



Note: You can use the sample member T#U11TRG in the **SYS3.TWS860.TWCJ.JOBLIB** data set for your JCL or you can type it in from scratch.

10. Edit the data set and select the member **T#U11TRG**. Type JCL for the member similar to the following screen capture.

```

***** Top of Data *****
000001 //T#U11TRG JOB (9999),'TRIG JOB',
000002 //          NOTIFY=&SYSUID,MSGLEVEL=(1,1),
000003 //          MSGCLASS=H,CLASS=A,REGION=512K
000004 //*
000005 //BR1#1      EXEC PGM=IEFBR14
000006 //
***** Bottom of Data *****

```

11. Type **SAVE** and press Enter to save the member.
12. Type **SUB** and press Enter to submit the member. You see this job and several jobs from your T#U11APPL end.

13. Press F3 until you exit split screen.



Note: Because you are now experienced with using the Tivoli Workload Scheduler for z/OS panels, the remaining student exercise steps are not as detailed. Ask your instructor if you need help to complete the steps.

14. Using option **=5.2** verify that the T#U11APPL was added to the plan.
15. Also, using option **=5.2**, check operation 020 details to see whether the conditional dependency was included for operation 020. Remember to use the COND command.
16. Modify the event trigger in the database and set the DR (dependency resolution) to **Y** and save the event trigger.
17. Using option **=3.4** in ISPF submit your T#U11TRG job again.
18. Verify that the T#U11APPL is added to the current plan again but now with the conditional dependency for operation 020.

