

# Maintain an ILE COBOL application using Remote System Explorer

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# Maintain an ILE COBOL application using Remote System Explorer

This tutorial teaches you how to maintain a payroll application written in ILE COBOL using the Remote System Explorer.

## Learning objectives

- Start the product and open the Remote System Explorer perspective
- Use tools and views in this perspective to connect to an iSeries<sup>™</sup> system
- Edit, verify, compile and debug a payroll application
- Customize Remote System Explorer
- Design screens and reports

#### Time required

3 hours

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# Introduction

## Learning objectives

- Start the product and open the Remote System Explorer perspective
- Use tools and views in this perspective to connect to an iSeries system
- Edit, verify, compile and debug a payroll application
- Customize Remote System Explorer
- · Design screens and reports

## Time required

This tutorial should take approximately 180 minutes to finish. If you explore other concepts related to this tutorial, it could take longer to complete.

#### Skill level

Introductory

## Audience

iSeries programmer

#### System requirements

- IBM<sup>®</sup> WebSphere<sup>®</sup> Development Studio Client for iSeries, V7 and all software updates through the IBM Installation Manager.
- i5/OS<sup>®</sup> V5R3 or V5R4

# **Prerequisites**

- Basic Microsoft<sup>®</sup> Windows<sup>®</sup> operations such as working with the desktop and basic mouse operations such as opening folders and performing drag-and-drop operations
- Restore the RSELABXX savefile (RSELABXX.savf) on an iSeries system:
  - Import the RSELABXX project into your workspace.
  - Open the Project Explorer view by clicking Window → Show View → Other → General → Project Explorer.
  - Expand the rselabxx project.
  - Right-click the rselabxx.savf savefile, and select Restore on iSeries.

It will also help if you understand DDS and ILE RPG.

This tutorial is divided into a number of modules, each with its own learning objectives. You can choose to skip the modules on Screen design and RSE introduction and you can complete the modules on Debug, Customizing, Screen Design and RSE Introduction in any order after the module on Verify and compile. Each module contains several lessons that must be completed in order for the tutorial to work properly.

# **Expected results**

Upon completion of this tutorial you will know how to edit, compile and debug an iSeries application from the Remote System Explorer. You will also know how to customize the Remote System Explorer.

## Conventions used in this tutorial

- Bold font for user interface controls
- Mono-spaced font for user input and code blocks
- Italic font for variable names and glossary terms

# Starting the product and the Remote System Explorer

This module teaches you about the workbench, the workspace, a perspective and specifically the Remote System Explorer perspective.

## Learning objectives

- · Start the product
- Set the default workspace
- Access unique tools and views targeted towards iSeries application development tasks

## **Time required**

This module should take approximately 10 minutes to complete.

# Starting the product

If you want to know more about the product before you get started you can read "Introducing the product and Remote System Explorer (optional)" on page 173.

First you must start the product. Follow these steps to start the product:

- 1. Click Start on the task bar of your desktop.
- 2. Select Programs > IBM Software Development Platform> IBM WebSphere Development Studio Client for iSeries> WebSphere Development Studio Client for iSeries



If you are working with the Advanced Edition of the product you will see the words Advanced Edition in the product name.

A dialog will appear. Here you specify the directory of the workspace where your projects and other resources such as folders, subfolders and files that you are developing in the workbench will reside.

🗑 Workspace Launcher	×
Select a workspace	
IBM Websphere Development Studio Client Advanced Edition for iSeries stores your projects Choose a workspace folder to use for this session.	in a folder called a workspace.
Workspace: C:\Documents and Settings\Jdbox\JBM\rationalsdp7.0\rselabxx	Browse
Use this as the default and do not ask again	
	OK Cancel

- 3. (Optional) Change the field in this dialog and use a unique directory name, for example, RSELABxx (where xx is a unique number).
- 4. Click **OK** to open the workbench.



5. Click the X next to the Welcome tab to close the Welcome page



Closing the Welcome page will take you to the Remote System Explorer perspective.

**Tip:** To open the Welcome page again, select **Help** → **Welcome**.

6. Click the maximize button to maximize the workbench.



You have started the product and opened the workbench. The workbench refers to the desktop development environment. The workbench aims to achieve seamless tool integration and controlled openness by providing a common paradigm for the creation, management, and navigation of workbench resources. Each workbench window contains one or more views and an editor.

# Lesson checkpoint

You learned the following:

- About workspaces
- About the workbench
- How to start the product

# **Opening the Remote System Explorer perspective**

Now you are ready to open the Remote System Explorer (RSE) perspective.

1. Check for the name of the perspective.

R	emot	e System	Explore	- iSerie	s RSE	Gettir	ng Starte	d - IBM Web	sphere Dev	elopn	nent Studio C 🗖 🗖 🛛
File	Edit	Navigate	Search	Project	Data	Run	Window	Help	-		
1 53	•		参・0	- 0	•	1	U A	2 [ 28 • ]	0 /	ĒŶ	Remote Syste
] 2	$\tau$	- *5	(n)	*							
H	Remot	e Systems	×T	eam 🗁		iSe	ries RSE G	ietting Started	×		

A perspective defines the initial set and layout of views in the Workbench window. Within the window, each perspective shares the same set of editors. Each perspective provides a set of capabilities aimed at accomplishing a specific type of task or working with specific types of resources. For example, the Java<sup>™</sup> perspective combines views that you would commonly use while editing Java source files, while the Debug perspective contains views that you would use while debugging a program. Perspectives contain views and editors and control what appears in certain menus and tool bars.

If you see a different perspective, not the **Remote System Explorer** open in the workbench or no perspective:

2. Click **Window** > **Open Perspective** > **Remote System Explorer** from the workbench menu.



The Remote System Explorer perspective opens.

You work in the Remote System Explorer perspective in the workbench. This perspective is for an iSeries programmer to display the connections that you have already configured, create a new connection, connect to and disconnect from the connections that you have defined, work with iSeries files, commands, jobs, and integrated file system files.

This perspective will be active when you start the product with a new workspace. If you had used the workspace before then, the workbench would come up with the perspective that you last opened. You will learn more about the Remote System Explorer perspective in the coming exercises as this is where you launch the iSeries programmer tools and use the views from the workbench.

You have opened the Remote System Explorer perspective.

#### Lesson checkpoint

You learned the following:

- · About perspectives
- About the RSE perspective
- · How to open the RSE perspective

## Module summary

You have learned how to start the product, and open the RSE perspective.

#### Lessons learned

By completing this module, you learned about the following concepts and tasks:

- About workspaces
- About the workbench

- About perspectives
- About the RSE perspective
- How to start the product
- How to access unique tools and views targeted towards iSeries application development tasks

#### Assessment

- What is a workspace?
- What is the workbench?
- What are perspectives?
- What is the RSE perspective?
- · How do you start the product?
- How do you open the RSE perspective?

# Configuring a connection to an iSeries system and connecting to an iSeries

This module teaches you how to create a connection to an iSeries server, find a library in your library list, select objects from a library and finally open a member in the Remote Systems LPEX Editor. You also learn about several views such as the Remote Systems view, iSeries Table view, and the Outline view.

# Learning objectives

- Create a connection to an iSeries system
- Connect to an iSeries system
- · Add a library to your library list
- View libraries in your job's library list from the Remote Systems view
- · Find a source physical file in your library
- View members in a source physical file using the iSeries Table view
- Customize the columns in the iSeries Table view
- · Open a member for edit from the iSeries Table view or the Remote Systems view
- Maximize the editor window
- Open another member for edit
- Switch from one edit session to another edit session
- · Open multiple views of the same source member
- · Display a structural outline of items defined in a source member

## **Time required**

This module should take approximately 10 minutes to complete.

# Configuring a connection to an iSeries system

When you first open the Remote System Explorer, you are not connected to any system except your local hard drive on your workstation. To connect to a remote iSeries system, you need to define a connection. When you define a connection, you specify the name or IP address of the remote system and you give your connection a unique name that acts as a label in your workspace so that you can easily connect and disconnect. When you connect to the iSeries system, the workbench prompts you for your user ID and password on that host.

The first time you connect to an iSeries system, you need to specify a profile. All connections, filters, and filter pools belong to profiles. Filters are described in a later lesson. Profiles are discussed when you create your first connection.

Remember you have already opened the Remote System Explorer perspective in the previous module.

1. In the Remote Systems view, **New Connection** is automatically expanded to show the various remote systems types you can connect to through the Remote System Explorer.



Click the plus sign + beside **iSeries** to configure a connection to an iSeries system.

The Name personal profile page opens.



2. Click **Next** to accept the default value. The profile defaults to the name of the workstation. Your profile will be different from the one shown here.

The Remote iSeries System Connection page opens.

🙆 New		×
Remote iSeries	s System Connection	-6-
Parent profile:	pleiades	•
Connection name Host name:	s400a	
Description:		
Verify host na	me	
0	< Back Next >	inish Cancel

On this second page you specify the information for your connection. The cursor on this page is positioned in the **Host Name** field.

- 3. In the **Host name** field, type the IP address or the name of your host system. The Connection name is automatically filled with the host name. Leave it this way. This name displays in your Remote Systems view and must be unique to the profile.
- 4. Leave the Parent profile default value. You don't need to change it.
- 5. Leave the Verify host name check box selected.
- 6. Click Finish to define your system.

You have configured a connection to an iSeries system.

#### Lesson checkpoint

You learned the following:

- About configuring a connection
- · How to configure a connection to an iSeries system

# Connecting to an iSeries system

After you configure a connection to an iSeries system, you can easily connect and expand your new connection to reveal your subsystems. Subsystems are pre-defined filters grouping the various types of remote resources that can be explored in the remote system. There are four subsystems.

#### **iSeries** Objects

A PDM-like group, allowing access to libraries, objects and members.

#### **iSeries Commands**

Contains predefined commands and allows you to create command sets each of which contain one or more often used commands. When run, all commands in a command set are sent to the remote system and executed, and the results are logged in the iSeries Commands log.

#### **iSeries** Jobs

Allow you to see various jobs, subset by job attributes, and to perform a number of operations on those jobs.

#### **IFS Files**

Allow you to explore folders and files in the Integrated File System of the remote iSeries system.



To connect to an iSeries system:

1. In the Remote Systems view, your new connection is expanded to reveal your subsystems. The **iSeries Objects** subsystem is the subsystem you will use most often! It is very similar to PDM, in that it allows you to access objects in the QSYS file system, and perform actions on those objects.

Notice the first three entries under the **iSeries Objects** subsystem are named after the PDM options, because they have similar capabilities:

- Work with libraries (similar to WRKLIBPDM)
- Work with objects (similar to WRKOBJPDM)
- Work with members (similar to WRKMBRPDM)

In addition there are entries for working with library lists and user libraries:

- Library list (to simulate PDMs WRKLIBPDM you can start with the pre-defined Library list filter, that when expanded lists all libraries in your library list.)
- **User libraries** (allows you to work with all user libraries you can access on that iSeries server.)

You also have more entries to work with under the connection itself and you can see from these entries that Remote System Explorer goes well beyond PDM! It allows you to explore iSeries jobs and commands and the IFS file system.

2. Now let's work with a library in your library list and add the library that you'll be using in this tutorial:

a. Right-click **iSeries Objects** and click **Properties** on the pop-up menu.



- b. Select Initial Library List on the left pane.
- c. Type RSELABxx where XX is a unique number in the **Library** field and click **Add**.

pe filter text	Initial Library Li	st	⇔
Command Execution Environment Variables Initial Library List Refactoring History	Library list Library:		(Add(B)
Subsystem	Library RSELABXX	Library Position *LAST	-
			Change
			Remove
			Move Up
			Move Down
	•		1
	Current library:	JSRPRF	
	Initial command:		
	1	Restore Defa	ults Apply
			Cancel

d. Click OK.

This will add the library RSELABxx to your library list every time you use this connection.

**Tip:** You can also change your library list using the pop-up menu items **Add Library List Entry** or **Change Current Library** on the **Library list** folder in the iSeries Objects subsystem. These changes are only valid until you disconnect.

3. Expand the Library list folder.



Now the connection will be activated and you will be prompted for a user ID and password.

System type: Host name:	TORA533B
∐ser ID:	wlabxx
Password:	***
	<ul> <li>✓ Save user ID</li> <li>✓ Save password</li> </ul>

- 4. Enter your user ID and password.
- 5. Select the Save user ID check box.
- 6. Select the Save password check box.
- 7. Click OK.

As you know, you can use the properties of any of the subsystems to set connection information such as adding a library to the library list.

Back in the workbench in the Remote Systems view you will see the libraries in your job's library list.



Notice that the s400a folder now has a small green arrow in the icon to indicate it is an active connection.

For each library, you can right-click and select from a number of actions. For example, there is an action to create a new source file within the selected library. Common actions like delete, move, copy, etc. are valid for all kinds of objects.

You have connected to an iSeries system and used the Remote Systems view to view libraries in the library list.

# Lesson checkpoint

You learned the following:

- About subsystems
- About the iSeries Objects subsystem
- How to connect to an iSeries system

# Viewing and accessing objects in the Remote System Explorer

Now you are ready to view and access objects in your library RSELABxx.

To view and access an object:

1. Expand library RSELABxx.

You will see all objects in this library appear in the Remote Systems view. For each object you can right-click and select from a number of actions. The list of actions depends on the object selected and whether you selected one or multiple objects. For example, for a source file the pop-up menu has an action to create a new member within the selected file.

2. Drill-down through the files in the Remote Systems view until you find QDDSSRC source file and then expand it.

3. Scroll up through the files in the Remote Systems view until you find QCBLLESRC source file and expand it as well.



Now you can see and access the members in these two source files. For each member you can right-click and select from a number of actions. The exact list of actions depends on whether the member is a data file or source file and whether you select one or multiple members. For a COBOL source member, the pop-up menu actions include:

- open with
- browse with
- verify
- compile

Before you go ahead and work with these members, let's see the members in the iSeries Table view as well because that is similar to the view you are used to from PDM. You use this view to display a list of items, for example, members or objects, in a table format similar to PDM. You can also perform actions against these items such as editing and compiling.

4. Right-click the QDDSSRC file and then click **Show in Table** on the pop-up menu.

.F Remote Systems × Team	li≡ copy
	📋 Paste
	+⊕+ Move
e- 🖪 MYCOMPILE.*pgm	💢 Delete
😟 🖾 PAYROLL.*pgm.rp	Show in Lable
È-⊡ PAYROLLD.*pgm.c	Cache File Descriptions
⊡ ⊡ PAYROLLG.*pgm.r ⊡ □ □ □ □ COMPARE.*file.pf-	R0- 1
EMPMST.*file.pf-dl	
EVFEVENT.*file.pf-	
⊕ 🚭 MSTDSP.*file.dspf	
⊕_66 MSTDSP2.*file.dsp	User Actions
E PRJMST.*file.pf-dt	Add To Sovies Dreight
🗈 👘 QCBLLESRC,*file,p	Males Austilable Office
⊡ B QCLSRC.*file.pf-sr	
	FIODELICES

The iSeries Table view takes the selected object in the Remote Systems view as input, and displays the contents in the table. For source physical files, this step displays the members inside, their names, types, attributes, and text descriptions.



The top of the iSeries Table view contains a lock icon that controls the correlation between the Remote Systems view and the iSeries Table view. If the lock is disabled then whenever you click an object or library in the Remote Systems view, the associated contents of that item automatically populate the iSeries Table view. If the lock is enabled then when you click on various items in the Remote Systems view, this view does not change the content of the iSeries Table view. To enable or disable the lock, you can click it once to change its state. You can click on the columns heading to sort the view by column.

5. In the iSeries Table view toolbar make sure the lock/unlock button is in the unlock position. Leave the mouse pointer over the tool button for a second or two to display the flyover help. That way you can check if the view is locked or unlocked.

This means now the table will automatically be updated when a different object is selected in the Remote Systems view. This is a shortcut to open the pop-up menu for an object in the Remote Systems view and to select Show in Table.

You can also modify which specific columns you want to see in the iSeries Table view.

- 6. To modify the iSeries Table properties:
  - a. Click **Window** > **Preferences** from the workbench menu. The Preferences Window opens.

ype filter text	Table View	⇔ • ⇒
Profiling and Logging Remote Systems Communications Debug File Cache	Re-open to previous state     Vise the command line for action p     Specify columns and column order	parameters
Files	Type: Member	×
Cache Command Execution Command Subsystem IFS Files Subsystem Objects Subsystem Objects Subsystem Program Verifiers Table View Logging Passwords Remote Systems LPEX Editor Screen Designer (Technical Pre	Available columns Move Name Type Move Attribute Text Status Last modified Created Add(	Dowin Type Attribute Text
- SSL - Requirement Management S- Dum/Dahun	1	Restore Defaults Apply

- b. In the left pane of the Preferences window, expand Remote Systems.
- c. Expand iSeries under Remote Systems.
- d. Click Table View under iSeries.
- e. In the right pane of the Preferences window, select **Last modified** in the **Available columns** list.
- f. Click the **Add** button.
- g. Click OK.
- h. Now, let's update the iSeries Table view. Click the down arrow on the iSeries Table view title bar.

Remote Syste	m D	lSeries T	able View 🗙	iSeries Command	
File RSELABXX	QDDSSR	: (5 Membe	rs)		V
Name	Туре	Attribut	e Text	Work with	
EMPMST	PF	SRC		-	
G MSTDSP	DSPF	SRC		Subset	
PRJMST	PF	SRC		Show All	
REFMST	PF	SRC	Customized	Show columns 🔸	
	PF	SRC	✓ Default	Position to	
			All	Print	
4				- Export to File	•
•				Hide Commands	
Command				Preferences	
Messages				Details Show Log	9

i. Click **Show columns** > **Customized** in the pop-up menu. Now you'll see the extra column that you've added.

e RSELABXX/	JUUSSRC (S	Members)		· 多志	6	2
Vame	Туре	Attribute	Text	Last modified		
EMPMST	PF	SRC		July 23, 2003 1:28	:22 PM	T
MSTDSP	DSPF	SRC		July 23, 2003 1:28	:25 PM	
PRJMST	PF	SRC		July 23, 2003 1:28	:29 PM	
REFMST	PF	SRC		July 23, 2003 1:28	:33 PM	
RSNMST	PF	SRC	-	July 23, 2003 1:28	:37 PM	
	1		1.		1	10040
1						
Command	-			▼ Prompt.	Rur	

You can also sort the objects in the iSeries Table view by column.

j. To sort the objects in ascending order by Last modified, click on the heading.



 $k. \ \ If you click the heading the second time, it will sort it in descending order.$ 

7. In the Remote Systems view, select QCBLLESRC. The table shows the members in QCBLLESRC.

⊕_66 MSTDSP2.*file.dspf ⊕_	Remote System D	) 🕞 B	Series Table Vi	ew 🖾	ISeries Command	- 0
PRJMST.*file.pf-dta      QCBLLESRC.*file.pf-src	File RSELABXX/Q	BLLESRC (	3 Members)		3 ÷ ÷	Q ~
E QCLSRC.*file.pf-src	Name	Туре	Attribute	Text	Last modified	
E- D QCMDSRC.*file.pf-src	PAYROLLC	CBLLE	SRC	wit	July 17, 2003 3:32:16	PM
E QDDSSRC.*file.pf-src	PAYROLLC2	CBLLE	SRC	wit	July 17, 2003 3:32:20	PM
E QRPGLESRC.*file.pf-src	PAYROLLD	CBLLE	SRC	no	July 17, 2003 3:32:24	PM
E QRPGLESRCP.*file.pf-src						
🕀 📳 REFMST.*file.pf-dta						
🕀 🗍 RSNMST.*file.pf-dta						
MYCOMPILE.*cmd						•

Now you are ready to use the Remote Systems LPEX Editor to edit the member MSTDSP found in QDDSSRC.

8. From the Remote Systems view double-click member MSTDSP in the QDDSSRC source file.

You can do this in the Remote Systems view or in the iSeries Table view.

The Remote Systems LPEX Editor opens. It is built right into the workbench, with rich editing functions and is iSeries aware! It is a superset of SEU! The syntax checker is ported from SEU, and the reference manuals are built-in and F1 cursor sensitive.

- 9. Double-click the MSTDSP tab to maximize the Editor window.
- 10. Double-click the **MSTDSP** tab again to return the view to its original size.

📲 Remote Systems 🗙 🛛 Team 🖓 🗖	MSTDSP.DSPF	x * - D	🗄 Outline 🛛 🗖 🗖
28	Line 1	Column 1 F	🕀 🖺 MSTDSP.DSPF
⊕ 6 MSTDSP2.*file.dspf	000001	.+A*1+2. A*** TS DD 19:*	
🕀 🔲 PRJMST.*file.pf-dta	000002	A* 89/04/10	
QCBLLESRC,*file.pf-src     QCLSRC,*file.pf-src	000003	A************	
D QCMDSRC.*file.pf-src	000004	A* THIS DISPL. A* TIME REPOR	
D QDDSSRC.*file.pf-src	000006	A*	
	•	•	

You have viewed and accessed objects in the RSELABxx library.

# Lesson checkpoint

You learned the following:

- About member actions
- About the iSeries Table view

# Opening a second source member and multiple views

Next let's open a second member in the editor.

To open a second source member:

- 1.
- 2. In the Remote Systems view, double-click member PAYROLLC in the QCBLLESRC source file.
- 3. Click on each tab to switch from one edit session to another edit session.
- 4. a.
  - b. Double-click the **PAYROLLC** tab in the editor to maximize the Editor window.
  - c. Right-click this source in the Editor view and click **View** > **Open new view**.

Tip: You can open a maximum of five views of the same source.

MSTDSP.DSPF	PAYROLLC.CB	LLE ×	
Line 8	Column 11	Replace	
4	-*A-1-B+	-2+	-3+45
000001	PROCESS APC	DST.	
000002	Prompt	F4	
000003			ŀ
000004	Syntax Check L	ine	
000005	Save		OLL.
000006			- rammer Name.
000007	Cut	Ctrl+X	Toronto Lab.
800000	Сору	Ctrl+Insert	ber 12, 1999.
000009	Paste	Ctrl+V	
000010	Select		
000011			
000012	Selected	•	
000013	Deselect	Alt+U	r file maintenance using
000014	Filter view	•	n processing.
000015	Show all	Cbrl+₩	
000016			-
000017	Source	•	1
000018	View	•	Open new view Ctrl+2
000019			Next view 🖸rl+Alt+Right
000020	CONFIGURATI	ION SECTION.	Previous view Ctrl+Alt+Left
000021			
000022	SOURCE-CO	MPUTER. IBM	Horizontal split

Right-click a source view and select View > Next view or View > Previous view to navigate among the views.

RSELABXX/QCB	LLESRC(PAYROLLC): 1		RSELABXX/QCE	LLESRC(PAYROLLC): 2	
Line 1	Column 1 Rep	lace	Line 1	Column 1	Repla
	-+-*à-1-B+2	+3+		-+-*A-1-B+	-2+-
000001	PROCESS APOST.		000001	PROCESS APO	ST.
000002		100	000002		
000003	IDENTIFICATION DI	VISION.	000003	IDENTIFICAT	ION DIV
000004			000004		
000005	PROGRAM-ID.	PAYROLL	000005	PROGRAM-ID.	
000006	AUTHOR.	Program	000006	AUTHOR.	
000007	INSTALLATION.	IBM Tor	000007	INSTALLAT	ION.
000008	DATE-WRITTEN.	October	800000	DATE-URIT	TEN.
000009	DATE-COMPILED.		000009	DATE-COMP	ILED.
000010			000010		
000011	*		000011	*	
000012	* PROGRAM DESCRIPT	NOI	000012	* PROGRAM DE	SCRIPTI
000013	<ul> <li>* - Time reporting</li> </ul>	master f	000013	* - Time rep	orting 1
000014	* described work	station p:	000014	* describe	d works
000015	*		000015	*	
000016			000016		
000017			000017		
000018	ENVIRONMENT DIVIS	ION.	000018	ENVIRONMENT	DIVISI
000019			000019		
000020	CONFIGURATION SEC	TION.	000020	CONFIGURATI	ON SECT
000021			000021		
000022	SOURCE-COMPUTER	. IBM-AS4	000022	SOURCE-CO	MPUTER.
-					

**Note:** Any changes made in one of the views will automatically update all other views of the same source.

e. Right-click a source view and select **View** > **Horizontal split** to change from a vertical split of the views to a horizontal split of the views.



You have opened another member for edit and seen multiple views of a member.

## Lesson checkpoint

You learned the following:

- About multiple views
- · How open a second source member
- How to open multiple views

# Lesson 2.5: Displaying an outline of a source member

The Outline view acts as an excellent resource when you want to edit RPG, COBOL and DDS source in the Remote Systems LPEX editor. The Outline view displays a structural outline of items defined in the file that you currently have open in the Remote Systems LPEX editor window. With the editor active, you can expand the file structure in the Outline view, and click various elements in the view to jump to that location in the source itself.

To see an Outline view of your COBOL source:

 Look at the Outline view to the right of the editor window. If you have closed the Outline view, you can reset the perspective by selecting Window > Reset perspective from the workbench menu or Show view > Other then expand Basic and click Outline in the Show view dialog.

The Outline view contains your source program in a tree view without the lines containing logic.



Now you want to see more details of your source member.

- 2. Expand ENVIRONMENT DIVISION.
- 3. Expand the CONFIGURATION SECTION.
- 4. Expand DATA DIVISION.
- 5. Expand FILE SECTION.
- 6. Double-click on any of the entries in the Outline view. This will position the source editor accordingly.



7. Stay in the **PAYROLLC** tab to get the PAYROLLC Editor window in focus for the next exercise.

You have displayed an outline of a source member while editing COBOL, or DDS sources.

# Lesson checkpoint

You learned the following:

- About the Outline view
- · How to display an outline of a source member

# Module summary

You have learned how to create and configure a connection to an iSeries system and access libraries, files and members in that system. You have also learned about several views such as the Remote Systems view, iSeries Table view and the Outline view.

# Lessons learned

- Create a connection to an iSeries system
- Connect to an iSeries system
- Add a library to your library list
- · View libraries in your job's library list from the Remote Systems view
- Find a source physical file in your library
- View members in a source physical file using the iSeries Table view
- · Customize the columns in the iSeries Table view
- Open a member for edit from the iSeries Table view or the Remote Systems view
- Maximize the editor window
- · Open another member for edit
- Open multiple views of the same source member
- · Switch from one edit session to another edit session
- · Display a structural outline of items defined in a source member

#### Assessment

- · How do you connect to a remote iSeries system?
- What are subsystems?
- · What is the iSeries Objects Subsystem?
- · How do you add a library to your library list?
- How do you find files in your library?
- What is the iSeries Table view?
- What does the lock icon do in the iSeries Table view?
- · How do you view members in the iSeries Table view?
- How do you open a member of edit?
- How do you maximize the Editor window?
- What is the Outline view?
- · How do you display an outline of a source member?

# **Editing source**

This module teaches you how to edit ILE COBOL source member PAYROLLC, which should already be open, and learn about some of the Remote Systems LPEX Editor's language features.

#### Learning objectives

- · Change the default settings of the LPEX Editor Parsers
- · Change the color settings and font used by the Editor
- · Change the default behavior of the Enter key
- · Use SEU commands to edit source
- Undo and redo source changes
- View language sensitive help for the MOVE operation code
- View a list of all help contents
- · Limit the search of help to specific documents
- Search the help
- Use the Find and Replace window to search for an item in your source

- Filter or subset your source
- Filter lines based on line type
- Search through members in a source physical file
- Compare different versions of a program and identify the differences
- Syntax check source by line
- View help on syntax errors
- Use the Application Diagram view to understand your program code

# **Time required**

This module should take approximately 45 minutes to complete.

# Introducing the editor

Your program editing tasks are simplified with the Remote Systems LPEX Editor. The editor can access source files on your workstation or your iSeries system directly. When a compilation results in errors, you can jump from the compiler messages to an editor containing the source. The editor opens with the cursor positioned at the offending source statements so that you can correct them.

Here is a list of some of the basic editor features that you would expect in a workstation editor:

- · Cut, copy, and paste
- Block marking of lines, characters, or rectangles with copy, move, and delete operations
- Powerful find and replace function
- Unlimited undo and redo

In addition there are a few more functions that you may not have seen in a workstation editor:

- Token highlighting where different language constructs are highlighted using different colors to help identify them in a program
- SEU-like format-line rulers to show the purpose of each column for column-sensitive languages like RPG and DDS. These rulers can automatically update themselves to reflect the current specification.
- SEU-like specification prompting for CL, RPG, and DDS
- · Sequence numbers, which allow SEU-style commands in the prefix area
- · Intelligent tabbing between columns for column-sensitive languages
- Automatic uppercasing for languages that expect uppercase
- Settings for column-sensitive languages that simplify text insertions and deletions
- On-line language reference

You have learned about the features of the editor.

## Lesson checkpoint

You learned the following:

• About the LPEX Editor

# Changing default editor settings

The LPEX Editor has predefined settings, but also has an associated preferences page containing settings that you can modify. The name of the category is LPEX Editor and it appears in the left pane of the Preferences window.

You will change the default settings of Appearance and User Key Actions. 1.

- 2. To change the editor appearance:
  - a. In the left pane of the Preferences window, expand LPEX Editor.
  - b. Select Appearance under LPEX Editor.
  - c. Select **formatLine** under the **Styles** list.
  - d. Change the Foreground color to dark green.
  - e. Change Font to 12.
  - f. Change Background color to light green.

Notice how your changes are reflected in the sample edit view.

General     Active Correlation Tec	Palette Font	
E-Agent Controller E-Analysis	white Courier New-regular-12	Change
- Ant Application Diagram	default	Background
Backward Compatibility Crystal Reports	emphasis Effects	
-Data -EMFT JET Transformat	formatLine Inderline	🗖 Squiggle
HATS/WebFacing	parserDefault parserMessage	C Outine
- Importer	Preview	
🛛 Install/Update	Line 1 Column 1	Replace
- Internet	+	-+3+
- iSeries Projects J2EE	Emphasis, current line,	default text
- Java	** ERROO1 Embedded pars	
- Jython	Selection Text in parse	
Logaina	Compare added line text	-
- LPEX Editor	+ Compare deleted line te:	xt
- Appearance		
Block		-
- Compare	1	
Controls Find Text	LPEX 3.2.2 (build 12-Dec-2	2006)
Parsers		
Print T		have Defended 1 at 1
	ResetRes	tore Defaults Apply

g. Select currentLine under the Styles list.

This option highlights the line that the cursor is on. The option applies to all source files opened in the editor area.

- h. Change the Background color to light yellow.
- i. If you don't like the changes you made, you can click **Restore Defaults** to return to the original settings.
- 3. To autosave while editing source:

To enable or disable autosave while editing source in the Remote Systems LPEX Editor, you need to change an editor preference. You use the **Window** > **Preferences** > **Remote Systems** > **Remote Systems LPEX Editor** and click the check box **Autosave**.

The default value for the minutes is set to 5. You can specify a value between 1 and 60 minutes.

- 4. To modify the default behavior of the Enter key:
  - a. Expand LPEX Editor if not already expanded then select User Key Actions.

ype filter text	User Key Actions	⇔ • ⇒
Crystal Reports     Data     EMFT JET Transformat     HATS/WebFacing     Help     Importer     Install/Update     Internet     Jeries Projects     J2EE     Java     Jython     Logging     LPEX Editor     Appearance     Block     Compare     Controls     Find Text     Parsers     Print     Save     Tabs     User Actions     Luser Actions     Luser Actions     Luser Actions     Luser Actions     Luser Actions	Key Action	Set
User Key Actions User Mouse Action User Profile	Reset Restore Defa	aults Apply

b. Type enter in the Key field.

**Tip:** The Key and Action fields are case sensitive. Make sure that the values typed in the Key and Action fields are exactly as shown above.

- c. Type splitLine in the Action field.
- d. Click Set.
- e. Click OK on the Preferences window.
- f. Return to the Editor window.

Next let's see the results of column sensitive editing.

- 5. To see the results of splitLine:
  - a. Place the cursor somewhere on a line and press **Enter**. The text to the right of the cursor is moved to the next line.

You have changed some of the default editor settings.

# Lesson checkpoint

You learned the following:

How to change some of the default editor settings

# **Entering SEU commands**

You can configure the LPEX Editor to adopt the keyboard and command personalities of many popular editors. Most editor profiles differ only in the keys and commands used to perform various editor tasks. Some base editor profiles, listed below, also add prefix information and a command area at the start of each line:

- ispf
- seu
- xedit

The editor recognizes prefix commands used by these editor profiles. Depending on which profile you are using, you can enter SEU, XEDIT, or ISPF commands when the prefix area is active.

If you are an SEU expert you will appreciate the ability to use SEU commands.

To enter SEU commands:

1. Move the cursor into the gray sequence number area to the left of the edit area.

				Replace	lumn 1	<b>14</b> 8 Co	Line
	4+-	+	-3	2+	1-B+	+-*A-	
	А.	PIC			WS-ACODE	01	000145
	х.	PIC			WS-ACREC	01	000146
	X(50).	PIC			WS-EMESS	01	000147
							dd
							<u> </u>
•							4

- 2. On any sequence number type dd.
- 3. Go down a few lines and type dd again and press **Enter**. Notice that the lines have been deleted.
- 4. Now type i5 in the sequence number area.
- 5. Make sure the cursor is within the sequence number area.
- 6. Press **Enter**. Five new lines are inserted.

You have learned how to use SEU commands in the editor.

## Lesson checkpoint

You learned the following:

- About editor profiles
- · How to use SEU prefix area commands

# Requesting undo and redo operations

The editor records each set of changes you make to a file in the Editor window. The number of changes made since the last file save is displayed on the status line. If you want to undo a set of changes made to a file you use the Undo operation. You can also cancel the effects of an Undo operation by using the Redo operation.

Now you are going to undo some of the changes you just made to the file. Then you will cancel the Undo operation by using the Redo operation. Finally you will reload the source so that it is back to its original content.

To undo and redo edit changes:

- 1. Click **Edit** > **Undo** from the workbench menu. Notice that the 5 new lines disappear.
- 2. Press Ctrl+Z to undo the last change. Notice that the deleted lines reappear.
- 3. Click **Edit** > **Redo** from the workbench menu. Notice that the lines are deleted again.

At this point you will reload the source from the iSeries to make sure that it is back in its original form.

4. Click **File** > **Close** on the workbench menu.

Tip: You can also click the X on the PAYROLLC tab.

	۶F	/ *PAVRC	DLLC.CBLLE	×					- 6
Line	144	Co	lumn 1		Replace	1	change		
		-+-*A-3	1-B+-	2	2+	-3	+	- 4	+
000141	<b>—</b>								
000142		01	WS-EM	PNO			PIC	9(6).	
000143		01	WS-PR	CDE			PIC	X(8).	-
000149									
000150		PRO	CEDURI	E DT	TSTON.				

A Save Resource dialog opens asking if you want to save the latest changes.



- 5. Click No.
- 6. Go back to the workbench to the Remote Systems view and open the PAYROLLC member in the QCBLLESRC file.

You have learned how to undo and redo changes that you made to a file.

#### Lesson checkpoint

You learned the following:

- · About undo and redo operations
- How to undo and redo editing changes

# Invoking language-sensitive help

Inside the editor, there is cursor-sensitive language-reference help available.

To receive language sensitive help, press F1 in an Editor window. If the cursor is on an operation code, you receive help for that operation code; otherwise, you receive help for the current specification.

- 1. To access language sensitive help:
  - a. Position the cursor over the word MOVE in line 231 of the ILE COBOL source.
  - b. Press **F1**. Language-sensitive help for the MOVE operation code appears in a Help window.

Text marked in blue in the Help window contains the link to detailed information about the topic in blue.



c. Click the link Format 1- MOVE.

The Help page for Format 1- MOVE is displayed.



- d. Explore the Help window to see what else is available.
- e. Minimize the Help window.
- f. Select Help > Help Contents on the workbench menu and expand WebSphere Development Studio Client for iSeries book to see a list of all help that is available in the product.



- g. In the left pane of the Help window, click **Reference**.
- h. Expand Language Reference.
- i. Expand iSeries programming information.
- j. Expand High-level languages.
- k. Expand ILE COBOL.
- I. Expand Language Reference.



Having the latest version of the manuals at your fingertips will make it easier to find programming information. There is also the option to search the help by specifying a search string. By default, the complete help will be searched.

2. To limit the search scope:

**Tip:** If you are using WDSC Lite, you can limit the search scope, however, you must choose another topic instead of the Reference topic shown.

To limit the search to specific documents:

- a. Click Search scope. The Select Search Scope dialog opens.
- b. Select Search only the following topics radio button.



c. Click New.

The New Search List dialog opens.
list name:	
MyList	
lopics to se	earch:
🗆 🔽 wa	ebSphere Development Studio Client for iSe
	Information Map
	Accessibility features
	IBM and accessibility
	Installing and migrating
	Connecting to Linux, UNIX, Windows, and
	Developing iSeries server applications usin
	Developing iSeries Web applications and se
	Developing HATS applications
	Developing iSeries Java applications
	Developing iSeries database applications
	Detecting and analyzing runtime problems
	Testing and publishing applications to an iS
	Debugging iSeries applications —
Ē	Troubleshooting and support
	Reference
- T	-
	OK Cancel
	Cartor

- d. In the **List name** field, type MyList for example.
- e. Expand WebSphere Development Studio Client for iSeries.
- f. Select the **Reference** check box.
- g. Click OK on the New Search List dialog.

The Select Search Scope dialog reopens again with MyList selected in the topic list.

Rem	ove	
Rem	ove	
		Remove

- h. Click OK on the Select Search Scope dialog.
- i. In the **Search** field, type iSeries and programming for example.

🔞 Help - IBM Websphere Develo	pment	Studio Client Advanced Edition for iSeries	_ 🗆 🗙
Search: iseries and programming	60	Search scope: MyList	

j. Searching requires a help index and it takes approximately 10 minutes to create the index in your workspace. If you want to complete the search query, click **GO**.

The search results display.



You have accessed language sensitive help.

## Lesson checkpoint

You learned the following:

- About language sensitive help
- · How to access language sensitive help

# Finding and replacing text

The LPEX Editor also has a powerful find and replace text feature. You use the Find and Replace window to search for an item. You can search for a word, a partial word, or a sequence of such. You can also enter a pattern you want to match, provided that the pattern follows the rules of regular expression. You can replace the found search item. If the entered text or pattern is found, the cursor moves to either the next or previous occurrence of the search item, according to your chosen search direction, and replaces the found text according to your selections.

To find and replace text:

- 1. Press **Ctrl+Home** to go to the top of the file. **Tip:** When you press **Ctrl+Home** to go to the top of a file or **Ctrl+End** to go to the bottom of a file, a quick mark is set at your cursor position. This allows you to return to that line by pressing **Alt+Q**. **Ctrl+Q** will set a quick mark.
- Click Edit > Find/Replace from the workbench menu or press Ctrl+F. The Find/Replace window opens at the bottom of the Editor window.

MSTDSP.DSPF	PAYROLLC,CBLLE X			-
Line 29	Column 14	Replace		
	-+-*A-1-B- <b>-</b> +	2+3-		-+
000029	* are: (MSTD:	SP - maintena	nce	display file
000030		ST - employee		
000031	* PRJM:	ST - project m	nast	ter file
000032	* RSNM:	ST - reason co	ode	master file
000033	*			
000034				
000035	FILE-CONTRO	DL.		
000036				
000037	SELECT	MSTDSP-FILE		
000038		ASSIGN	TO	WORKSTATION-MSTDSP-
000039		ORGANIZATION	IS	TRANSACTION
000040		ACCESS	IS	SEQUENTIAL.
000041				
000042	SELECT	EMPMST-FILE		
000043				DATABASE-EMPMST
000044		ORGANIZATION	IS	INDEXED
4			_	
Find MSTDSP				Next Previous Al
Replace				Replace Replace al
	Whole word E Regula		Solor	t found tout
	to selection T Restrict sea			

At the bottom of this window, you will notice that you have some options to select from, for example, search only in certain columns, etc. You want to find the first occurrence of MSTDSP.

- 3. In the Find field, enter MSTDSP to find the start of a file section.
- 4. Make sure the **Replace** field is blank.

You would use this field for text replacement.

- 5. Click **Next** to go to the next location of MSTDSP in the file. The Editor moves the active line to line 37, which contains the first MSTDSP phrase in the file.
- 6. Click in the Editor window to close the Find/Replace window.

You have searched for an item in your source using the Find/Replace window.

#### Lesson checkpoint

You learned the following:

- About the Find and Replace window
- How to find text in source

# Filtering lines by string

The editor allows you to filter or subset your source so that you see only lines containing a given string. Filtering lines makes it quick and easy to find lines without having to scroll through your source.

To filter source by string:

- 1. Double-click the variable EMPNO in the Editor window.
- 2. Select Edit > Selected > Filter Selection from the workbench menu.

MS1	TDSP.DSPF	PAYROLLC.CBLLE	×								8
L	ine 142	Column	14	Repl	ace						
	<u>111</u>	+-*A-1-B	+	2	+	-3	+	4	+	5	<u>;</u>
F											
Η.	000142	01 WS	-EMPI	OV			PIC	9(6)			
Ħ	000302		MOVE	EMPNO			то	WS-E	MPNO.		
Æ	000307		M	OVE WS-	-EMPNO	то	EMPNO	OF F	CEMP		
Ħ	000320			MOVE	WS-EM	PNO		TO E	MPNO	OF	EM
Ħ	000353		MOVE	WS-EM	PNO	Т	O EMPN	IO OF	RCEM	IP.	

- 3. Move the cursor down a few lines to line 302.
- 4. Expand line 302. This expands the section up to the next instance of EMPNO.

MSTDSP.DSPF	PAVROLLC.CBLLE ×					- 5
Line 302	Column 1	Replace				
	-+-*A-1-B+	2+-	3	+	4+	5-
世 里。000142	01 WS-EMPN	0		PIC	9(6).	
F 000302	MOVE	EMPNO			WS-EMPNO.	
000303	MOVE	ACODE OF	EMPSEL-I	TO	WS-ACODE.	
000304						
000305	IF IN	D-OFF (INI	-MAINT)	AND	IND-OFF (I	ND-E
000306	SE	T IND-OFE	(IND-NOT	-FOU	JND) TO TR	UE
₽ 000307	MO	VE WS-EMI	NO TO EM	PNO	OF RCEMP	
H 000320		MOVE WS-	-EMPNO		TO EMPNO	OF E
000353	MOVE	WS-EMPNO	TO	EMPN	O OF RCEM	Ρ.

Now you want to show the entire source again.

5. Click Edit > Show all from the workbench menu or press Ctrl+W.

Your cursor is still positioned on the same line that you moved the cursor to, even though all lines are now showing.

You have filtered your source so that you see only lines containing a given string.

## Lesson checkpoint

You learned the following:

- About filtering source
- How to filter source

# Filtering lines by type

To help you navigate quickly through your ILE COBOL source the editor allows you to filter lines based on the line type. Imagine you want to see where all the divisions are defined in your source.

MSTDSP.DSPF	DAYRC	ULC.CBLLE ×		•
Line 1			Repla	
	+-*A-	1-B+	2+	3+4+5
000001	PR	OCESS AP	OST.	
000002				
000003	ID	ENTIFICA	TION DIV	ISION.
000004				_
000005	Р	Prompt	F4	AYROLL.
000006		Syntax Check	Line	rogrammer Name.
000007		Save		BM Toronto Lab.
000008		Cut	Ctrl+X	
000009		Copy	Ctrl+Insert	
000010		Paste	Ctrl+V Ctrl+V	
000011	*-	rapic	COLLEY	
000012	*	Select		
000013	*	Selected		<ul> <li>ster file maintenance usi</li> </ul>
000014	*	Deselect	Alt+U	tion processing.
000015	*-	Filter view		Date
000016		Show all	Ctrl+W	Divisions Ctrl+G
000017	-	Source		Comments
000018	E	View		Outline
000019				Embedded SQL/CICS/DLI
000020	CO	NFIGURAT	ION SECT	IC Errors
000021				Tasks
•				

To filter lines by type:

- 1. Right-click in the Editor window with the PAYROLLC program.
- 2. Click **Filter view** > **Divisions** on the pop-up menu.

All source lines with divisions are displayed allowing you to move quickly and easily to the desired division in your file.



- 3. Move your cursor to the line with the DATA DIVISION (line 64).
- 4. Expand the division to show all lines in this division. Now you could work with the source inside this division.
- 5. Right-click in the Editor window and click **Show all** on the pop-up menu.

You have filtered lines in your source by line type.

#### Lesson checkpoint

You learned the following:

- About filter source by line type
- How to filter source by line type

# Searching multiple files

If you would like to search through the members in a source physical file or through the files in a local directory, you can use the Search tool. The Multi-File Search utility allows you to search for a particular string of text in many members on the host. This function can also be used on local files.

To search multiple files:

1. Click **Search** > **iSeries** from the workbench menu.



The Search window opens.

2. In the Search string field, type ENHRS.

	Case sensit
onnection: s400a	New
Target	
Library: RSELABXX	Browse
File: QDDSSRC	Browse
Member: ALL	Browse
Source members 🗖 Data members	
Columns	
G All ask was	
All columns	
Between     I     and(G)     80	

The **Connection** field should contain your iSeries server name, otherwise enter it there.

- 3. Under Target in the Library field, type RSELABXX.
- 4. Under **Target** in the **File** field, type QDDSSRC to search all members in this source physical file.
- 5. Under Target in the Member field, select \*ALL.
- 6. Click Search.

The Multi-File Search window lists all the lines in all the files that reference ENHRS.



7. Double-click the last line in the list.

А

ENHRS 3 1 TEXT('EMPLOYEE NORMAL WEEK HOURS')

The member REFMST is automatically loaded into the editor and the cursor is placed on the correct line.

- e			PF X	🖌 REFMST.	OLLC, CBLLE	/ PAYR	MSTDSP.DSPF
			lace	Rep	Column 1	(	Line 27
Functions	DpB	1++T	++++RLei	.Name++		A	
COLHDG ( ' I						А	000024
TEXT ('EM)		8		EUSRI		А	000025
COLHDG ('I						А	000026
TEXT ('EM)	1	3		ENHRS		А	000027
COLHDG('T						А	000028
TEXT ('PR	1	5		EPHRC		А	000029
COLHDG('1						А	000030
TEXT ('PR(	1	7		EPHRY		А	000031
COLHDG ( ' 1						А	000032
TEXT ('PRO	1	7		EPHRP		А	000033
COLHDG('Г						А	000034
TEXT ('NON	1	5		EPNRC		А	000035
COLHDG ('1						А	000036
TEXT ('NON	1	7		EPNRY		А	000037
COLHDG ('1						А	000038
TEXT ('NOP	1	7		EPNRP		А	000039
COLHDG('1						A	000040
TEXT ('EM)	1	5		EHWRK		А	000041
COLHDG ('I						А	000042
	LDS	FIE	RELATED	MASTER	PROJECT	A*	000043
TEXT ('PRG		8		PRCDE		А	000044
•							4

8. Click the X in the **REFMST** tab to close the REFMST file.

You have searched through members in a source physical file.

## Lesson checkpoint

You learned the following:

- About search
- · How to search through members in a source physical file

# Comparing file differences from the Remote Systems view

If your product undergoes many changes, you will find the Compare utility useful. It allows you to compare different versions of a program and find the differences. There are two ways to do a compare: use the Compare utility in the workbench or use the Compare utility in the CODE tool. The compare in the CODE tool is more intuitive but requires you to start the CODE Editor outside of the workbench.

Using the compare utility in the workbench you can view the differences between two files by comparing them. You can compare different files, and you can compare versions in the Workbench with versions in the repository or with the local edit history.

After a comparison is carried out, the Compare Editor opens in the editor area. In the compare Editor, you can browse through all the differences and copy highlighted differences between the compared resources. You can save changes to resources that are made in the comparison editor.

Using the compare utility in CODE you can also view the differences between two files by comparing them. You enter a name of a file to compare against the file in the CODE Editor view. You can type the name of a file, or you can select one from the list of files already open in the editor. If you type the name of the file that is not already open in the editor, it is loaded into the editor. If no file is specified, the current file is compared against a new, untitled file. The current file appears on the left side of the Compare view, and the specified file on the right. You use the Compare menu to view the next and previous mismatch and to select options such as ignore case, font, protect view and show mismatches only.

Tip: Make sure all lines show in the source before starting the Compare tool.

To compare files in the workbench:

- 1. Click **Window** > **Preferences** from the workbench menu. The Preferences window opens.
- 2. In the left pane of the Preferences window, expand LPEX Editor.

ype filter text		Compare		$\langle \varphi \star \Rightarrow \Rightarrow$
- Internet - iSeries Projects - J2EE	<b>_</b>	<ul> <li>✓ Ignore leading blanks</li> <li>✓ Ignore trailing blanks</li> </ul>		
∃- Java Jython Logging ⊒- LPEX Editor		Ignore all blanks     Ignore case     Ignore comments		
- Appearance - Block		Ignore sequence numbers		
- Compare - Controls Find Text	_	Column restricted comparison		
🕀 Parsers — Print		End column 80		
Save Tabs User Actions User Commands				
- User Key Actions - User Mouse Actions		Reset	Restore Defaults	Apply

- 3. Click **Compare** under **LPEX Editor**. In the right pane of the Preferences window make sure that the **Ignore blanks** check boxes are selected.
- 4. Click **OK** in the Preferences window.
- 5. Back in the Editor window of the PAYROLLC member double-click the **PAYROLLC** tab.
- 6. Click **Edit** > **Compare to file** on the workbench menu.

-105	Undo Redo	Ctrl+Z Ctrl+Y		@ [ • 5	E	Remote Syste
-	f Cut	Ctrl+X				
	Сору	Ctrl+Insert				
15	Paste	Ctrl+V				
			Replace	Cardeline Construction of the Construction		
3	🕻 Delete	Delete	ame+++++	RLen++T	DpB	Functions
	Select All	Ctrl+A				COLHDG ( ' H
	Find/Replace	Ctrl+F	USRI	8		TEXT ('EMI
	Find Next	Shift+F4				COLHDG ('H
	Find Previous	June 11	NHRS	3	1	TEXT ('EMI
	Find Other					COLHDG ( ' P
	Show All	Ctrl+W	PHRC	5	1	TEXT ( * PRO
		SUTT IV				COLHDG ('I
	Add Bookmark		PHRY	7	1	TEXT ( PRO
	Add Task					COLHDG (1
	Select		PHRP	7	1	TEXT ( ' PRO
	Selected					COLHDG ( 1
	Deselect	Alt+U	PNRC	5	1	TEXT ('NOP
	Disserver.	ALTO.				COLHDG ( ' P
	Mark		<ul> <li>PNRY</li> </ul>	7	1	TEXT ( 'NOP
Δ	Compare to file					COLHDG ('1
-	Keystroke Recorder		PNRP	7	1	TEXT ('NOP
-	Content Assist	Ctrl+Space				COLHDG ( ' P
		tion Ctrl+Shift+Space	HWRK	5	1	TEXT ("EMI
_						COLHDG ( ' H
	00043 A3	* PROJECT	MASTER RELA		LDS	
12000	00044 A		PRCDE	8		TEXT ( ' PRO
4						•

The Compare window opens.

- 7. Expand your connection.
- 8. Expand \*LIBL.
- 9. Expand RSELABxx.
- 10. Expand QCBLLESRC.
- 11. Select member PAYROLLC2
- 12. Click OK



The editor now will show the differences of these two members PAYROLLC and PAYROLLC2 .

You can move from mismatch to mismatch by using the Compare menu under the Edit menu.

Mismatches in PAYROLLC and PAYROLLC2 are highlighted in different colors so that you know where the mismatched lines are in each file.

- 6	-	/ PAYROLLC.CBLLE 🗙 🥖 REFMST.P	MSTDSP.DSPF
	ce	Column 1 Repla	Line 87
-+5		+-*A-1-B+2+	
			000079
		FD RSNMST-FILE.	000080
		01 RSNMST-REC.	000081
	TS OF RSNMST.	COPY DDS-ALL-FORMA	000082
			000083
	CTION.	WORKING-STORAGE SE	000084
			000085
		01 ERROR-MESSAGES.	000086
		05 MSG-TABLE.	000087
VALUE	PIC X(50)	10 MSG-1	000088
VALUE	PIC X50)	10 MSG-1	000088
ODE NOT E(	ENANCE SELECTION C	' MAINT	000089
VALUE	PIC X(50)	10 MSG-2	000090
SELECTED I	N ONE APPLICATION	'MORE THAI	000091
VALUE	PIC X(50)	10 MSG-3	000092
ED FOR MAI	APPLICATION SELECT	' NO .	000093
VALUE	PIC X(50)	10 MSG-4	000094
FO "A", "(	ON CODE NOT EQUAL	' ACTI	000095
VALUE	PIC X(50)	10 MSG-5	000096
ALREADY EX	JESTED BUT RECORD	' ADD REQ	000097
VALUE	PIC X(50)	10 MSG-6	000098
			4

- Click Ctrl + Shift + N to find the next mismatch. Next, end the compare session.
- 14. Right-click the source and select **Compare**  $\rightarrow$  **Clear**.

You have compared different versions of the program and found the differences.

## Lesson checkpoint

You learned the following:

- About compare
- · How to compare files

# **Checking syntax**

One of the powerful features that the LPEX Editor shares with SEU is its ability to syntax check your source. Syntax checking can be done either when the cursor leaves each line of source or all at once on either the currently selected source or on the entire source member.

Now you will create a syntax error and watch for the prompt to correct it.

To syntax check the file:

1. Click the PAYROLLC Editor window, click **Source** and then click **Syntax Check All** on the workbench menu.

o Prompt		F4	8 3.	🕥 👔 🔚 Remote Sys	te
- Syntax	Check All			1 - /	
🗥 📉 Verify		Ctrl+Shift+V			
MSTD: Kerify	(Prompt)		.PF		-
Li 73 Visualiz	e Application Diagra	m	ace		
Show f			+3	+4+	5
000 Copy E	look		•		
000			-		-
000 ILE CO	BOL Help		VISION.		
000 Resequ	uence All Lines				
000 Remov	e Messages		PAYRO	LL.	
000 Refres	h	Ctrl+F5	Progra	ammer Name.	
000 Refres	h Outline View	Ctrl+Shift+F5	IBM T	oronto Lab.	
000008	DAT	E-WRITTEN.	Octob	er 12, 1999.	
000009	DAT	E-COMPILED.			
000010					
000011	*				
000012		RAM DESCRIE			
000013			-	file maintenance	usiı
000014	* de	scribed wor	kstation	processing.	
000015	*				
000016					
000017					
000018	ENVIR	ONMENT DIVI	SION.		
•					•

Error messages appear to draw attention to the errors.

Ξ,	REFMST.PF	OLLC.CBLLE ×	F / PAYR	MSTDSP.DSP
	Replace	Column 1	88 C	Line (
	23-	-1-B+	+-*A-	
	-FILE.	D RSNMST-E	FI	000080
	-REC.	1 RSNMST-F	01	000081
г.	LL-FORMATS OF	OPY DDS-ALI	CC	000082
	ORAGE SECTION.	ORKING-STOP	ស្រ	000084 000085
	ESSAGES.	1 ERROR-MES	01	000086
	TABLE.	05 MSG-TA		000087
C X50) VALUE	sg-1	10 MSC		000088
. Right parenthen not describe val:				
CTION CODE NOT E	MAINTENANCE	•		000089
C X(50) VALUE	sg-2	10 MSC		000090
CATION SELECTED 1	MORE THAN ONE	* MC		000091
C X(50) VALUE	sg-3	10 MSC		000092
SELECTED FOR MA:	NO APPLIC	7		000093
C X(50) VALUE	SG-4	10 MSC		000094
EQUAL TO "A", "(	ACTION COD	,		000095
				4

- 2. Move the cursor onto the pink error message.
- 3. Press F1.



This opens a window with additional help for the error.

- 4. Minimize the Help window.
- 5. Add the required left parenthesis to correct the error.
- 6. Move the cursor off the line you just fixed.

The error message is automatically removed from the editor.

**Tip:** You can toggle automatic syntax checking. Click **Window > Preferences** from the workbench menu and then expand **Remote Systems, iSeries Parsers**. Now, select the language you want to change the settings for in the left pane of the Preferences window, select or deselect the **Automatic syntax checking** check box and then click **OK**.

type filter text	COBOL	$\phi \bullet \Rightarrow \bullet$
Model Validation Modeling Package Naming Preferences Plug-in Development Portal Process Comminations Pobug File Cache Files F	Automatic syntax checki     Automatic syntax checki     Automatic uppercasing     User defined tabs     General    +1+     And eveny; 4	hecking of SQL state
- Spell Check - Team - Test	Restore Defau	lts Apply

In this lesson you'll use the syntax checking feature to check your source.

## Lesson checkpoint

You learned the following:

- About syntax checking
- · How to syntax check your source
- · How to set syntax checking preferences

# Understanding your program code with the Application Diagram

**Important:** This lesson only applies to WebSphere Development Studio Client for iSeries Advanced Edition.

In this lesson, you learn about the Application Diagram view and how to switch to it, how to view the program topology, and using the viewer to locate a subroutine.

The Application Diagram provides a graphical view of the different resources in an i5/OS native application and their relationships to each other. There are two different diagrams that you can look at in the Application Diagram view: a Source Call Diagram and a Program Structure Diagram. The Source Call Diagram takes ILE COBOL source as input and displays a call graph showing subroutine and procedure calls. The Program Structure Diagram takes program and service program objects as input and displays the binding relationships between them as well as the modules bound into each program and service program.

To learn more about how to use the Application Diagram, see Launching the Application Diagram and Using the Application Diagram.

- 1. Open the **PAYROLLD.cblle** source member in the **QCBLLESRC** source file.
- 2. Click Source -> Visualize Application Diagram

Source	Compile(G)	Navigate	Search	Project	Da
New	1				•
Pror	npt		F4		
Syn	tax Check All				
🛒 Veri	fy		Ctrl+	-Shift+V	
Keri	fy (Prompt)	•			
🛨 Visu	alize Applicati	ion Diagram			
Con	vert All To Fr	ee-Form	15		
Sele	ct Format Lin	e			
Sho	w Indentation	1			
Sho	w fields				
/co	PY Member				۲
ILE	RPG Help				٠
Res	equence All Li	nes			
Rem	iove Message	5			
Refr	esh		Ctrl+	HF5	
Refr	esh Outline V	liew	Child	Shift+E5	

The Application Diagram opens.

3. Select the subroutine 0400-PRJMST-SELECT.



Notice that the box is now highlighted and all relationship arrows are highlighted. Arrows pointing away from the subroutine point to subroutines that 0400-PRJMST-SELECT calls and arrows pointing to the subroutine 0400-PRJMST-SELECT indicated calls to 0400-PRJMST-SELECT.

4. Right-click the subroutine 0400-PRJMST-SELECT and select **Show Properties View**.



The Properties view opens, and displays information about the currently selected subroutine.

5. Select the **Calls** tab to view a list of the respective subroutines which the subroutine 0400-PRJMST-SELECT calls and the lines where it is called.

		ECT	🗄 0400-PRJMST-SEL	General
End line Type Li	<ul> <li>Start line</li> </ul>	Location	Name	Calls
481 PROCEDURE C	439	PAYROLLD.CBLLE	0450-PRJMST-MAINT	Called by
485 PROCEDURE C	482	PAYROLLD.CBLLE	0450-EXIT	
608 PROCEDURE C	586	PAYROLLD.CBLLE	0600-VERIFY-ACTION-C	
612 PROCEDURE C	509	PAYROLLD.CBLLE	0600-EXIT	

The list of subroutines can be used to quickly jump to the specified line in the source. Likewise, the **Called by** tab shows the list of subroutines which call the 0400-PRJMST-SELECT subroutine.

6. In the **Calls** tab, double-click the 0450-EXIT subroutine.

This takes you into the source to the call to subroutine 0450-EXIT.

PAYROLLD.	
Line 48	2 Column 1 Replace
-	+-*A-1-B+2+3+4+-
000474	END-REWRITE
000475	WHEN 'C'
000476	REWRITE PRJMST-REC
000477	INVALID KEY SET IND-
000478	END-REWRITE
000479	END-EVALUATE
000480	END-IF.
000481	
000482	0450-EXIT.
000483	EXIT.
000484	
000485	
000486	0500-RSNMST-SELECT.
000487	
000488	**
000489	* Reason code maintenance routine. *

- 7. Return to the Application Diagram view by selecting its tab. You can also save the application diagram as a text or image file.
- 8. Right-click inside the Application Diagram view, and select **File** → **Save as Image File** or **File** → **Save as Text File**

File	•	📔 Save As Image File
Select Change Layout	۲	Print
Arrange All	_	Save As Text File
View	►	
🔍 Zoom	•	
Find Main Entry Point		
Preferences	•	
Show Properties View		
Switch View	►	

Depending on your selection, the application diagram will be saved as either saved as an image file, or a text file in the specified directory.

## Lesson checkpoint

You learned the following:

- The basics of the Application Diagram view
- How to switch to the Application Diagram view
- · How to navigate through the application topology
- How to save the application diagram as an image or text file **Related information**

Launching the Application Diagram Using the Application Diagram

# **Module summary**

In this module, you learned how to use the LPEX editor's different features.

## Lessons learned

- Change the default settings of the LPEX Editor Parsers
- · Change the color settings and font used by the Editor
- · Change the default behavior of the Enter key
- · Use SEU commands to edit source
- Undo and redo source changes
- View language sensitive help for the MOVE operation code
- View a list of all help contents
- · Limit the search of help to specific documents
- Search the help
- · Use the Find and Replace window to search for an item in your source
- Filter or subset your source
- Filter lines based on line type
- Search through members in a source physical file
- Compare different versions of a program and identify the differences
- Syntax check source by line
- View help on syntax errors

#### Assessment

- What does column sensitive editing do?
- Where do you define LPEX Editor settings?
- How do you configure the LPEX Editor to adopt the keyboard and command parameters of many popular editors?
- What operation must you use to undo a set of changes made to a file?
- · How do you cancel the effects of changes of an undo operation?
- What do you use instead of entering or changing code directly in the Editor window?
- What window do you use to search for an item in the current source?
- How do you filter source?
- How do you search multiple source files?
- · How do you compare files?
- How do you syntax check source files?

## Verifying and compiling source

This module teaches you how to verify and compile RPG in the Remote Systems LPEX Editor. When errors are found by either the verify or the compile step, the iSeries Error List appears. The iSeries Error List is a powerful tool that manages errors found by verify and compile utilities. You will become familiar with these tools, the various capabilities of the iSeries Error List and the RPG program that you have created.

### Learning objectives

- Check for semantic errors on your workstation
- Start the Program Verifier tool
- · Use the iSeries Error list to locate each error in the source
- Save your source

- Re-verify source
- Change compile preferences
- Invoke the compile command
- · Change the current library using the Command field in the iSeries Table view
- Start an interactive connection
- Invoke the payroll program

### Time required

This module should take approximately 20 minutes to complete.

# Verifying the source

Now you get to play with one of the most powerful and unique features of the Remote System Explorer – the Program Verifier. Before you compile your code on an iSeries, you can make certain that there are no errors by invoking the Program Verifier. The verifier checks for semantic (compile) errors on your workstation so that you can guarantee a clean compile on the iSeries. Think of the host cycles you'll save. It is especially handy when you are writing code but you are disconnected from an iSeries. You can do this because Remote System Explorer ported the parsing and checking code from the iSeries system compilers to the workstation. The iSeries Error List view lists the errors that are found and their severity, displays the error messages directly within the source and helps you to navigate between the errors.

To invoke the verifier:

 With the focus on the editor, click Source → Verify from the workbench menu. (Similarly, you can also use the pop-up menu for the source member in the Remote Systems View or the Verify tool button — you need the source in the editor for the button to appear.)

You will need to open the COBOL source file named PAYROLLC2 to complete this verify step.

After a moment the verifier will display an iSeries Error List below the Editor window.

Remote	System	iSeries Table View	iSeries Comma	anaa	iSer	ies Indent	Remote Sea	arch 😳 iSeries Error List 🗙 🦵 d
<toras< th=""><th>533B&gt;RSELA</th><th>ABXX/QCBLLESRC(P/</th><th>AYROLLC2)</th><th></th><th></th><th></th><th></th><th>×××+</th></toras<>	533B>RSELA	ABXX/QCBLLESRC(P/	AYROLLC2)					×××+
	ID	Message		S.,	L.,	Location	Con	
	LNC1904	Program PAYRO	LL syntax	4	1	RSELABXX	s400a	
	LNC1463	'EMPNO' is not u	inique in thi	3	3	RSELABXX	s400a	
	LNC1326	'PRCD OF PRJSE	EL-I' not de	3	4	RSELABXX	s400a	
122	LNC1329	Subscript value	'14' excee	3	6	RSELABXX	s400a	
0	LNC0407	AT END phrase	missing fro	2	1	RSELABXX	s400a	
0	LNC0407	AT END phrase	missing fro	2	2	RSELABXX	s400a	
0	LNC0407	AT END phrase	missing fro	2	3	RSELABXX	s400a	
0	LNC0407	AT END phrase	missing fro	2	3	RSELABXX	s400a	
0	LNC0407	AT END phrase	missing fro	2	4	RSELABXX	s400a	
0	LNC0407	AT END phrase	missing fro	2	4	RSELABXX	s400a	
0	LNC0407	AT END phrase	missing fro	2	5	RSELABXX	s400a	

The error list shows you:

- The error message itself
- The severity
- The line number
- The source location

- The connection name
- 2. To fix an error in your source go to the error list:
  - a. Double-click the error LNC1463. You are automatically brought back into the Editor window to the line where the error occurred. The error is caused by EMPNO not being uniquely defined. Go to line 302 where EMPNO is defined. The variable EMPNO should be EMPNO OF EMPSEL-I.
  - b. Make the change. The next error is LNC1326.
  - c. Double-click LNC1326. Fix it in the editor.
  - d. PRCD should really be PRCDE. Make the appropriate change on line 402.
  - e. Double-click LNC1329. This error is because the array was declared with 4 elements. Go to line 606.
  - f. Change the index of the array from 14 to 4.

The next errors are LNC0407. You can ignore these errors as they are severity 20.

All severity 30 errors and above are now fixed. You can filter out different severities by using the filter menu.

Remote	System	iSeries Table View	iSeries Comma	an	iSer	ies Indent	Remo	te Search	h 🐉 iSeri	es Error List 🗙 🔪	
<toras< th=""><th>33B&gt;RSELA</th><th>BXX/QCBLLESRC(P/</th><th>AVROLLC2)</th><th></th><th></th><th></th><th></th><th></th><th></th><th>x 🙀 🗇</th><th>-</th></toras<>	33B>RSELA	BXX/QCBLLESRC(P/	AVROLLC2)							x 🙀 🗇	-
	ID	Message		S.,	L	Location	~	i Infor	mation	Show Severity	
	LNC1904	Program PAYRO	LL syntax	4	1	RSELABXX		A Warr	nina	Messages	•
<□	LNC1463	'EMPNO' is not u	nique in thi	3	3	RSELABXX	_	@ Error			_
<□	LNC1326	PRCD OF PRJS	EL-I' not de	3	4	RSELABXX					
Image: 1 million of the second sec	LNC1329	Subscript value	'14' excee	3	6	RSELABXX	· ·	Seve	re		
0	LNC0407	AT END phrase	missing fro	2	1	RSELABXX	🗸	🔳 Term	inating		
0	LNC0407	AT END phrase	missing fro	2	2	RSELABXX		s400a		-	
0	LNC0407	AT END phrase	missing fro	2	3	RSELABXX		s400a			
0	LNC0407	AT END phrase	missing fro	2	3	RSELABXX		s400a			
0	LNC0407	AT END phrase	missing fro	2	4	RSELABXX		s400a			
0	LNC0407	AT END phrase	missing fro	2	4	RSELABXX		s400a			
0	LNC0407	AT END phrase	missing fro	2	5	RSELABXX	3	s400a			

- g. Click the arrow in the iSeries Error List title bar.
- h. Click Show Severity on the pop-up menu.
- i. Clear the severities you don't want to see in the list (Warning for example). Now before you loose any of your changes, it's a good idea to save them. Make sure the member is selected. You then verify the source again to make sure that all the errors are fixed.
- 3. You can save the member using one of these ways:
  - a. Click File > Save from the workbench menu.
  - b. Click the Save icon  $\blacksquare$  in the workbench toolbar.
  - c. Press Ctrl+S.

Changes are uploaded to the iSeries.

d. Verify your source again.

Remo	te System	. iSeries Table View	iSeries Comman	iSerie	es Indent	Remote Search	곟 iSeries	Error List 🗙 📟
TOR	AS33B>RSE	LABXX/QCBLLESRC(P	AYROLLC2)	_				XXON
	ID	Message		Severity	Line	Location	Con	
6	LNC0407	AT END phrase	missing fro	20	184	RSELABXX	s400a	
6	LNC0407	AT END phrase	missing fro a	20	299	RSELABXX	s400a	
E	LNC0407	AT END phrase	missing fro	20	348	RSELABXX	s400a	
6	LNC0407	AT END phrase	missing fro	20	399	RSELABXX	s400a	
e	LNC0407	AT END phrase	missing fro	20	448	RSELABXX	s400a	
e	LNC0407	AT END phrase	missing fro 3	20	499	RSELABXX	s400a	
e	LNC0407	AT END phrase	missing fro	20	548	RSELABXX	s400a	

Everything should be ok. You should see only severity 20 messages. You are ready to compile the program.

You have verified your source and fixed any errors.

#### Lesson checkpoint

You learned the following:

- About program verifier
- How to verify programs

# Compiling source remotely

The remote compile capability is part of the Remote System Explorer. It gives you a workstation interface to submit requests to compile, bind, or build objects on the iSeries host. It allows for easy access to all the compile options available for all the supported CRTxxx commands.

If you used the local program verifier, then your host compiles should be successful -- no wasted iSeries cycles. However, if there are errors, the host compiler will send the error information back to the workstation and they will be loaded into the iSeries Error List view, which behaves just as it did when you did a program verify.

The default for compiling programs is to submit the compile to the batch job queue. Here in this exercise you can run the compile interactive.

- 1. To change the preferences to run the compile interactive:
  - a. Click **Window** > **Preferences** from the workbench menu.

type filter text	Command Execution	⇔ • ⇒
Model Validation     Modeling     Package Naming Preferences     Plug-in Development     Process     Process     Profiling and Logging     Remote Systems	Preferences for compiles and u Object library: *SRCLIB Replace object Compile in batch	
- Communications		-
⊕ Debug	Job description library:	*LIBL
- File Cache - Files	Job description:	*USRPRF
⊡-iSeries	SBMJOB additional parameters	:
Cache	Add batch compiles to the i	Series Job Status view
Command Execution     Commands Subsystem     IFS Files Subsystem	Add batch commands to th	
<ul> <li>Jobs Subsystem</li> <li>Objects Subsystem</li> <li>Program Verifiers</li> <li>Table View</li> </ul>	Preferences only for compile of Compile member types in this of	
- Logging	PF	Move Up
- Passwords	DSPF	move.op
🖃 - Remote Systems LPEX Edit	PRTF	
iSeries Parsers	RPGLE	Move Down
⊕ c/c++	CLLE	<u> </u>
E-COBOL →DDS		
FI-ILE RPG	Preferences only for user actio	on variables
	Run in batch	
- Screen Designer (Technical		
SSL		
Requirement Management	Restore D	efaults Apply

- b. In the left pane of the Preferences window, expand Remote Systems.
- c. Expand iSeries under Remote Systems.
- d. Click Command Execution under iSeries.
- e. In the right pane of the Preferences window, clear the **Compile in batch** check box.
- f. Click **OK** to return to the Remote System Explorer perspective.

#### 2. Invoking the compile command

You will now use the prompt for the CRTBNDCBL command to specify your compile parameters. All entry fields pertaining to names are already filled in with the correct information.

To compile source:

a. Right-click the PAYROLLC2 member in QCBLLESRC.

Remote Systems X Team	Compile (Prompt) User Actions		
<ul> <li>⊕ ☐ COMPARE.*file.pf-sr</li> <li>⊕ ☐ EMPMST.*file.pf-dta</li> <li>⊕ ☐ EVFEVENT.*file.pf-dta</li> </ul>		Mork With Cor AUTH INST.	mpile Commands
日子の語 MSTDSP.*file.dspf 日子の語 MSTDSP2.*file.dspf 日子語 PRJMST.*file.pf-dta 日子語 OCBLLESRC.*file.pf-g	Compare With	, DATE- DATE-	1
PAYROLLC.cble     PAYROLLC2.cble     PAYROLLC2.cble     PAYROLLC2.cble     PAYROLLD.cble	Properties(H)	2 8 i5erie Remo	t iSerie

- b. Click **Compile (Prompt)** > **CRTBNDCBL** on the pop-up menu. The Create Bound COBOL Program (CRTBNDCBL) dialog opens.
- c. In the **Debug view** list, select the \***ALL** parameter.

-	n (CRTBNDCBL)	×
Program:	> PAYROLLC2	Name
Library:	> RSELABXX 💌	Name
Source file:	> QCBLLESRC	Name
Library:	> RSELABXX	Name
Source member:	> PAYROLLC2	Name
Source stream file:		191
Generation severity level:	30	0-30
Text 'description':	*SRCMBRTXT	💌 Chara
	Advanced Parameters	
Compiler options:		Add
	*EVENTF	emove
	1970	ove up
	May	ve down
Debua view option:		
Debug view:	> *ALL	
Compress listing view:	*NOCOMPRESSDBG	
Replace program:	> *YES 💌	
<b>x</b> [		
	:ers(2) 🗖 Keywords(3)	<u>&gt;</u>
Advanced(1) All Paramet	LC2) SRCFILE(RSELABXX/QCBLLESRC) SRCMBR(F	

If you want to see the other parameters available, click Advanced.

d. Click **OK** when you are finished.

The progress bar on the workbench (bottom right corner) will indicate that the compile runs. Then the error list will be shown, with no errors, just information messages.

If you are not sure that the compile was successful, you can check the iSeries Commands log.

CRTBNDCBL PGM(RSEL	ABXX/PAYROLLC2) SRCFILE	E(RSELABXX/QCBLLE	ESRC) SRCMBR(PA	VROLLC2) OPTION	(*EVENTF)
DBGVIEW(*ALL) REPLA AUT and USRPRF para	ACE(*YES) meter values were ignored.				neerine endarite i
Cause : The A	UT and USRPRF parameter				
attribute and the USEA	g object was used as the sou ADPAUT attribute were copie	ed from the existing	object to the new	object PAYROLLC2	type *PGM
	ecovery: Display the VROLLC2 type *PGM in libra				
(GRTOBJAUT command	<ol> <li>or revoke object authority in library RSELABXX if need</li> </ol>	(RVKOBJAUT comr			
Replaced object PAYR	OLLC2 type *PGM was move	ed to QRPLOBJ.			
	ced object PAYROLLC2 type	e *PGM from the RSI	FLABXX library wa	repared to O2264	4261D4 and
	Jlibrary. Recovery: I	if the replaced obje	ct is needed, you	an use the Move O	bject
(MOVOBJ) command to	J library. Recovery: I move the object from the O program load (IPL) of the sys	If the replaced object QRPLOBJ library into	ct is needed, you another library.	an use the Move O The QRPLOBJ librar	bject y is cleared
(MOVOBJ) command to during the next initial p primary auxiliary stora	move the object from the ( program load (IPL) of the system ge pool (ASP)) is cleared dur	if the replaced object QRPLOBJ library into stem, The QRPLxxx ring the next vary o	ct is needed, you o another library. xx library (where on of the ASP device	an use the Move O The QRPLOBJ librar xxxxx' is the numbe	bject y is cleared
(MOVOBJ) command to during the next initial p primary auxiliary stora: Program PAYROLLC2 c Cause : The p	move the object from the ( program load (IPL) of the sys	If the replaced object QRPLOBJ library into stem. The QRPLXXX ring the next vary o on 12/27/06 at 20:2	ct is needed, you another library. xx library (where on of the ASP device 20:57.	tan use the Move O The QRPLOBJ librar xxxxx' is the number te.	bject y is cleared er of a
(MOVOBJ) command to during the next initial p primary auxiliary stora Program PAYROLLC2 c	move the object from the ( program load (IPL) of the sys ge pool (ASP)) is cleared dur reated in library RSELABXX (	If the replaced object QRPLOBJ library into stem. The QRPLXXX ring the next vary o on 12/27/06 at 20:2	ct is needed, you another library. xx library (where on of the ASP device 20:57.	tan use the Move O The QRPLOBJ librar xxxxx' is the number te.	bject y is cleared er of a
(MOVOBJ) command to during the next initial p primary auxiliary stora: Program PAYROLLC2 c Cause : The p	move the object from the ( program load (IPL) of the sys ge pool (ASP)) is cleared dur reated in library RSELABXX (	If the replaced object QRPLOBJ library into stem. The QRPLXXX ring the next vary o on 12/27/06 at 20:2	ct is needed, you another library. xx library (where on of the ASP device 20:57.	tan use the Move O The QRPLOBJ librar xxxxx' is the number te.	bject y is cleared er of a
(MOVOBJ) command to during the next initial p primary auxiliary stora: Program PAYROLLC2 c Cause : The p	move the object from the ( program load (IPL) of the sys ge pool (ASP)) is cleared dur reated in library RSELABXX (	If the replaced object QRPLOBJ library into stem. The QRPLXXX ring the next vary o on 12/27/06 at 20:2	ct is needed, you another library. xx library (where on of the ASP device 20:57.	tan use the Move O The QRPLOBJ librar xxxxx' is the number te.	bject y is cleared er of a

e. Click the **iSeries Commands log** tab from the view at the bottom of the workbench.

This log shows a list of all commands run on the remote system and the messages returned for each command.

You have set compile preferences, invoked the compile command, checked for a successful compile.

## Lesson checkpoint

You learned the following:

- About compile preferences
- · How to invoke the compile command and check for a successful compile

# Submitting iSeries commands in the iSeries Table view

You can use the iSeries Table view inside the Remote System Explorer to submit commands to the iSeries. You can run commands from the **Commands** field beneath the iSeries Table view, and view messages in the **Messages** field. After you populate the table, you can enter a command and click either **Prompt** to specify parameters and then **Run** or just click **Run**. When you run a command, the **Messages** field is populated with the messages from the command. When you select a message, the **Details** button is enabled. When you click this button, the message and its help is displayed.

Also note that besides the iSeries Table view, you can also use the Remote Systems view to run commands and programs. Which one you choose depends on your personal preference. In the iSeries Table view, you can see the properties of all

items at the same time; they are displayed as rows across the table. In the Remote Systems view, you have greater ease of navigation; you can work from your Library list in the iSeries Objects subsystem, and you can see the contents of many items before selecting the one you want to run.

In the **Commands** field, you select where you want to run the command. The choices are Normal, which means that the command will run in the RSE communication server job, Batch or Interactive.

To change the library list:

Remote System	iSeries Cor	mman	iSeries Indent	Remote Search	iSeries Error List	🕞 iSeries Table View 🗙 🦵 🗗
File RSELABXX/QCBI	LESRC (3 M	1embers)				# & + → @ ▼
Name	Туре	Attri	Text	Last modified		
PAYROLLC	CBLLE	SRC	with synt	July 17, 200		A REAL PROPERTY OF A
PAYROLLC2	CBLLE	SRC	with verif	December 2		
C PAYROLLD	CBLLE	SRC	no errors	July 17, 200		
Command Norn	nal		chgcurlib rs	elabxx		Prompt Run     Details Show Log

- 1. Click the **iSeries Table View** tab from the views at the bottom of the workbench.
- 2. In the **Command** field type, CHGCURLIB RSELABxxfor example.

Tip: Use a library that is on your iSeries system.

3. Click Run.

If you haven't used the iSeries Table view to show iSeries objects in this view you will see an error message because the iSeries Table view is not linked to an active connection.

If you see this message, click OK.

a. In the Remote Systems view, right-click QCBLLESRC.



b. Click **Show in Table** on the pop-up menu. The iSeries Table view is now populated with the member in the selected source file.

c. Run the CHGCURLIB command again.

The command will run on the iSeries and after completion you will see the completion message on the bottom of the iSeries Table view.

Remote System	iSeries Cor	mman	iSeries Indent	Remote Search	Series Error List	🕞 iSeries Table View 🗙 🖓 🗗
ile RSELABXX/QCBLL	LESRC (3 M	iembers)				
Name	Type	Attri	Text	Last modified		
PAYROLLC	CBLLE	SRC	with synt	July 17, 200		
PAYROLLC2	CBLLE	SRC	with verif	December 2	1	
©_ PAYROLLD	CBLLE	SRC	no errors	July 17, 200		
Command Norma			a			Prompt Run

4. Back in the workbench in the Remote Systems view, right-click **Library list** and click **Refresh**.

E Remote Systems 🗴 Team	- 0
	⇒ ⊽
🕀 📽 New Connection	
😟 😅 Local	
🖻 📲 \$400a	
🖻 📲 🖆 iSeries Objects	
⊕ <sup>1</sup> → <sup>1</sup> → Work with libraries	
⊕ 🎝 Work with objects	
😟 🖄 Work with members	_
🖨 🚔 Library list	
😟 🔜 QSYS2924.*lib.prod-sys	
😟 🔜 QSYS.*lib.prod-sys	
😟 🔜 QSYS2.*lib.prod-sys	
😟 🛋 QHLPSYS.*lib.prod-sys	
😟 🛋 QUSRSYS.*lib.prod-sys	
😟 🚞 WFLABXX.*lib.test-usr	
ADTSLAB.*lib.prod-usr	
RSELABXX.*lib.prod-usr	
E d CLBATCH.*pgm.clle	-1
E CICI *nom alla	_

- 5. You will see a small green asterisk beside the RSELABxx library to indicate it as your current library.
- 6. You can also connect to other than iSeries systems with the Remote System Explorer and launch commands for these systems as well, for example, your local system, or Linux<sup>®</sup>.

You have submitted a command to change the current library in the command line of the iSeries Table view.

## Lesson checkpoint

You learned the following:

- About submitting commands in the iSeries Table view
- · How to submit a CL command in the iSeries Table view

# **Running commands and programs**

As you know, you can run programs and commands from the Remote Systems view or the iSeries Table view in three ways:

- 1. In the Remote System Explorer communications server job. (Your current method)
- 2. In a batch job.
- 3. In an interactive job (to test 5250 applications).
- 4. In a server job

Using the first option lets you run the program in the same job as the communications server. With batch and interactive jobs, you cannot monitor the status as easily, however, you do not tie up your communications server and you are notified when the program command ends. Batch jobs work as you would expect and do not require any initial setup. Running an application as multi-threaded, interactive programs require a 5250 emulator, and you need to first run a STRRSESVR connectionName command to associate the emulator with a particular connection in the Remote System Explorer communications server. A multi-threaded debug session creates a new server job and this way keeps the RSE communications server job free for other tasks.

- 1. To start an interactive connection:
  - a. Start a 5250-emulation session.
  - b. Sign-on to the iSeries with your User ID and password.

**Tip:** Instead of the **Enter** key, you may have to use the **Ctrl** key in your 5250-emulation session.

d RR & R			0   4		
IAIN	0\$74	400 Main Menu			TODOCS
Select one of the fol	lowing:			System:	TORAS544
1. User tasks					
<ol> <li>Office tasks</li> <li>General system</li> </ol>	m tacks				
4. Files, librar		ers			
5. Programming 6. Communication					
7. Define or cha	inge the system				
8. Problem hand) 9. Display a mer					
10. Information A	ssistant optic	ons			
11. Client Access	/400 tasks				
90. Sign off					
election or command					
==> <u>strrsesvr name(s</u>	400a)				
3=Exit F4=Prompt	F9=Retrieve	F12=Cancel	F13=Info	rmation Ass	istant
23=Set initial menu					

- c. In the command line, type the command STRRSESVR connectionName
- d. Press **Enter**. The connectionName parameter is the name of your connection defined in the Remote Systems view. This associates the interactive job with the Remote System Explorer communications server.

Now you are ready to run the program that you just compiled. Return to the workbench. 2. To run the program:

F Remote Systems × Team	Run As	🚺 🛐 iSeries application in RSE Job
	Run(Prompt)	Batch
\$_ ( + ⇒ ≤	Debug(Service Entry)	Interactive
	Debug As(F) Debug (Prompt)(J)	Multi-threaded
tine I CLR1.*pgm.clle tine I MYCOMPILE.*pg	군 Visualize Application Diagram	F* PROG
🗄 🗄 PAYROLL.*pgm.r		F★ İ 🛱 🖓 Main I
PAYROLLC2.*pgr		F*****
😟 🗟 PAYROLLD.*pgm.	.cblle 000600	F* INDI

- a. In the Remote Systems view, locate the PAYROLLC2 program that you created.
- b. Right-click the PAYROLLC2 program.
- c. Click **Run As > Interactive** on the pop-up menu.
- d. Switch to your 5250-emulation session.





- e. Type x beside Employee Master Maintenance.
- f. Press Enter.
- g. Type 234 for the Employee Number.
- h. Type A for the Action Code to add employee 234.
- i. Press Enter.
- j. Type any information you like about the employee.
- k. Press Enter.
- I. Play in the application as much as you like.
- m. Press F3 to end the applications.
- n. To get control of the interactive job, right-click **iSeries Objects** and click **Release Interactive Job** on the pop-up menu.

You can also choose to disconnect a session. You would right-click the connection and click **Disconnect** on the pop-up menu.

You ran programs and commands from the Remote Systems view or the iSeries Table view.

## Lesson checkpoint

You learned the following:

- About run commands
- How to run programs

# Module summary

In this module you learned how to verify and compile RPG in the Remote Systems LPEX Editor. When errors were found by either the verify or the compile step, the iSeries Error List appears. The iSeries Error List is a powerful tool that manages errors found by verify and compile utilities. You became familiar with these tools, the various capabilities of the iSeries Error List and the RPG program that you created.

## Lessons learned

- · Check for semantic errors on your workstation
- Start the Program Verifier tool
- Use the iSeries Error list to locate each error in the source
- Use content-assist to fix an error
- Save your source
- Re-verify source
- Change compile preferences
- Invoke the compile command
- · Change the current library using the Command field in the iSeries Table view
- Start an interactive connection
- Invoke the payroll program

## Assessment

- What tool checks for semantic (compile) errors on your workstation?
- · What view identifies each error from a compile?
- How do you sort the entries in the iSeries Error List view?
- What can you do in the iSeries Table view?
- What are the different ways to run a program?
- How do you verify source?
- How do you compile source?

## Debugging a program

This module teaches you how to debug a CL and ILE COBOL program.

You will learn how to start the debugger, set breakpoints, monitor variables, run and step into a program, view the call stack in the Debug view, remove a breakpoint, add a memory monitor, and set Watch breakpoints and all from the Debug perspective.

#### Learning objectives

- Inroduce the debug features
- · Start a debug session using a service entry point

- · Add a breakpoint
- · Add a conditional breakpoint
- Edit a breakpoint
- · Monitor a variable through the Monitors view
- Step into your payroll program
- Show a Listing view
- · List the call stack entries in the Debug view
- View all breakpoints
- Remove a breakpoint
- · Monitor memory
- Set a Watch breakpoint
- Close the debugger
- Invoke the debugger from the Launch Configurations window

## **Time required**

This module should take approximately 60 minutes to complete.

# Introducing the Integrated iSeries Debugger

The Integrated iSeries Debugger is a source-level debugger that enables you to debug and test an application that is running on an iSeries system. It provides a functionally rich interactive graphical interface that allows you to:

- View source code or compiler listings, while the program is running on the iSeries system.
- Set, change, delete, enable and disable line breakpoints in the application program. You can easily manage all your breakpoints using the Breakpoints view.
- Set Watch breakpoints to make the program stop whenever a specified variable changes.
- View the call stack of your program in the Debug view. As you debug, the call stack gets updated dynamically. You can view the source of any debug program by clicking on its call stack entry.
- Step through your code one line at a time.
- Step return, step into or step over program calls and ILE procedure calls.
- Suspend program execution and get control back to the debug session.
- Display a variable and its value in the Monitors view. The value can easily be changed to see the effect on the program's execution.
- Locate procedure calls in a large program quickly and easily using the Modules/Programs view.
- Debug multi-threaded applications, maintaining separate stacks for each thread with the ability to enable and disable any individual thread.
- Load source from the workstation or a different iSeries system than the program runs on useful if you don't want the source code on a production machine.
- Debug client/server and distributed applications.

The Debugger supports  $\text{RPG}/400^{\ensuremath{\circledast}}$  and ILE RPG, COBOL and ILE COBOL, C, C++ and CL.

Now you know the basic features of the debugger.

## Lesson checkpoint

You learned the following:

• About the Debugger

# Starting a Debug session using a service entry point

You will be working with the COBOL program PAYROLLD.

**Note:** PAYROLLD is the same COBOL program as PAYROLLC2 but without compile errors. You are using it instead of PAYROLLC2 in this lesson, to accommodate anyone who decided to skip right to this exercise without completing the lessons in "Verifying and compiling source" on page 50.

To make the lesson interesting you will use CL program CLC1 to call PAYROLLD and you will pass one parameter to CLC1.

In this lesson, you will use a service entry point to start a debug session for your application. The service entry point feature is designed to allow easy debugging of applications that invoke business logic written in RPG, COBOL, CL, or even C or C++. The service entry point is a special kind of entry breakpoint that can be set directly from the Remote System Explorer. It is triggered when the first line of a specified procedure is executed in a job that is not under debug. Service entry points allow you to gain control of your job at that point. A new debug session gets started and execution is stopped at that location.

**Tip:** To use a service entry point to start a debug session for your application and to allow updating of files in production libraries while debugging, the **Update Production Files** must be checked in the preferences of iSeries Debug (**Window** > **Preferences** then expand **Run/Debug** and select **iSeries Debug**).



Since you are using test libraries for the exercises, you don't have to check this iSeries Debug preference.

To start a debug session using a service entry breakpoint:

1. In the Remote Systems view expand the **Library list** filter, if it isn't expanded already

📲 Remote Systems 🗙 🛛 Team	- 0
¢   + ⇒   0   0	
😟 🕋 QUSRSYS.*lib.prod-sys	
😟 🛋 WFLABXX.*lib.test-usr	
😟 🔜 ADTSLAB.*lib.prod-usr	
E-B RSELABXX.*lib.prod-usr	
中一团 CIBATCH.*pgm.clle	
E CLC1.*pgm.clle	
표- ᆁ CLR1.*pgm.clle	
⊞ MYCOMPILE.*pgm.c	lle
	e
. ■ B PAYROLLC2.*pgm.c	blle
E B PAYROLLD.*pgm.cb	le
E B PAYROLLG.*pgm.rp	AV-97
E- COMPARE.*file.pf-s	
EMPMST.*file.pf-dta	
EVFEVENT.*file.pf-d	
⊕ 6% MSTDSP.*file.dspf	
⊕ 6 MSTDSP2.*file.dspf	
DO MACT #File of alter	•

- 2. Expand library RSELABxx, if it isn't expanded already.
- 3. Right-click program CLC1 in library RSELABxx.

Remote Systems X Team	Run As Run(Prompt)	+	×2 □ □ = 0%
18 8 R	Debug(Service Entry)	•	😻 Set Service Entry Point
E - ■ QUSRSYS.*lib.prod- E - ■ WFLABXX.*lib.test-i	Debug As(F) Debug (Prompt)(J)	+	Show View
ADTSLAB.*lb.prod-     RSELABXX.*lb.prod-	C Visualize Application Diagram		F* PROG. F* DESC:
⊡ ⊡ CLBATCH.*pgm ⊕ ⊠ CLC1.*pgm.clle	Properties(H)(K)		F*

4. Click **Debug (Service Entry)** > **Set Service Entry Point** on the pop-up menu to set a service entry point.

A message displays indicating the service entry point was successfully set.

iSer	ies Debug Message
(j)	Service entry point is set successfully.
4	The service entry point can be refreshed through iSeries Service Entry Point(s) view if you recompile or update the program or service program later.
🗖 Doi	n't show this message again.
	OK

The Service Entry Points view is automatically added to the notebook at the bottom right. It lists all the service entry points. You use this view to delete, activate, de-activate, modify and refresh service entry points.

Remote Syste	em Details   iS	eries Command	is Log 🝋	iSeries Servi	ce Entr	y Points 🗙 🔪				8
						9 0	/ = 🗹	中 1	3	V
Library	Program	Program	Module	Proce	U	Connection	Enabled			
RSELABXX	CLC1	*PGM	*ALL	*ALL	5	s400a	Yes			
	-			-						_

5. Switch to the 5250 emulation session.

**Tip:** If your 5250 session is still associated with the RSE server job, you need to release the interactive session. To do so, in the Remote Systems view, right-click **iSeries Objects** and click **Release Interactive Job** on the pop-up menu.

- 6. Click anywhere in the workbench to give it focus.
- On the command line of the 5250 screen, add the library RSELABxx to the library list and invoke the CLC1 program: ADDLIBLE RSELABxx and then CALL PGM(RSELABxx/CLC1) PARM('XX')

As soon as the program enters the system, the service entry point is hit and the debug session is started on the workstation and the perspective displays with the CLR1 source code in the editor. The Debug perspective gives you access to all available debugger features. Let's look at some of them.

You have started a debug session with a service entry point.

## Lesson checkpoint

You learned the following:

- · About service entry points
- · How to start a debug session with a service entry point

# Setting breakpoints

You can only set breakpoints at executable lines. One way to set a breakpoint is to right-click on the line in the Source view.

To set a breakpoint:

- 1. Position the cursor on line 11.
- 2. Right-click anywhere on line 11.

1	PAYROLLC2.CBLL	Selected Deselect Alt+U	
	Line 11	Filter view Show all Ctrl+1	ace Brows
*	000100 000200 000300	Source View	PARM(#) VAR(#) TYPE(*char) LEN Aname *char 10
	000400	Add Breakpoint Add Watch Breakpoint	<pre>\$lib *char 10 /AR(&amp;count) TYPE(*DEC) LE</pre>
	000600 - 000700 L	Run To Location	VAR(&NAME) VALUE('Claus W yar(&count) value(&count+
	000800	Monitor Expression Monitor Memory	<pre>tlt 100) then(goto loop) VAR(&amp;NAME) VALUE('Claus')</pre>
	001000 001100 -	Switch View	<pre>var(&amp;lib) value('RSELAB'</pre>
	001200 001300	ENDPGM	

3. Click Add breakpoint on the pop-up menu.

A dot with a checkmark in the prefix area indicates that a breakpoint has been set for that line. The prefix area is the small grey margin to the left of the source lines.

Now you add a conditional breakpoint to stop in the loop when it loops the 99th time.

- 4. Adding a conditional breakpoint
  - a. Select line 8.
  - b. Right-click on line 8.
  - c. Click the **Breakpoints** tab in the upper right pane of the Debug perspective. The Breakpoints view opens.

Variables	°o Breakpoints	Registers	Monitors	Programs	
				x	3
	CLC1.CLLE [line: CLC1.CLLE [line:				
- C14	Subdivisit for month Subjects	今 Go to File			
		Add Breakp	oint		•
		Edit Breakp	oint		

- d. Right-click anywhere within the Breakpoints view.
- e. Click **Add Breakpoint** → **Line** on the pop-up menu. The Add a Line Breakpoint window opens.

Required informatio	n	-	5
Sets a breakpoint to stop	execution at a specific sourc	e line )	Qr.
Executable (Optional)			
1			
Object (Optional)			
Source:			
CLC1.CLLE			
Line:			
8			
(?)	Back Next >	Finish C	ancel

**Tip:** You can select an existing breakpoint by right-clicking it and selecting **Edit Breakpoint**.

f. Click Next.

Const. Const.	ne Breakpoint parameters	2 
Make the br	eakpoint conditional upon the following p	barameters
Frequenc	<u>_</u>	
-	99	
To:	infinity	
Every:		
. 10° (14m)		
Expression		
Expression		

You only want to stop in the loop when it executes for the 99th time or more. You can do that by setting the **From** field of the **Frequency** group to 99.

- g. Under **Frequency** in the **From** field, type 99.
- h. Click Finish.

You have added a breakpoint including a conditional breakpoint to your debug session.

## Lesson checkpoint

You learned the following:

- · About breakpoints
- · How to add a breakpoint and a conditional breakpoint

# Monitoring variables

You can monitor variables in the Monitors view. Now you will monitor the variable &count.

To monitor a variable:

1. In the Source view, double-click the variable &count.

	IBM Websphere Development Stud	syneak eneerselen	. DI ×
	pile(G) Navigate Search Project Da	Cut Cbrl+X	
da · ☆ · O · 9	••••••	• Paste Ctrl+V	
j b - A - + - ↔ Ø Debug ⊠ Serve	• -> - rs	Select Selected	;
× ► I ■ .:	3. (8e. =   +	Filter view Show all Ctrl+V	• <u>• •</u>
	: aci 🔺	Source View	•
-≡_a_ 	PEP : CLC1 : CLC1	Add Breakpoint Add Watch Breakpoint	
PAYROLLC2.CBLLE	PAYROLLC.CBLLE	C Run To Location	
Line 7 -2	Column 49 Rep.		ি ∳ ds
0006003	VAR(&NAME) VALUE('C var(&count) value(&		• .00P
0009002	and the second se	Claus') —	
001000:	var(&lib) value('RS	SELAB' *CAT &	

- 2. Right-click &count.
- 3. Click **Monitor Expression** on the pop-up menu. The Monitors view opens.

Variables	Breakpoints	Registers	D Monitors	×	Programs
	COUNT = 00	000.			

The variable appears in the Monitors view. Its current value is zero.

**Tip:** If you quickly want to see the value of a variable without adding it to the Monitor, leaving the mouse pointer on a variable for a second or so will display its value in a pop-up window.

Now that some breakpoints and a monitor are set, you can start to run the application.
> Debug 3 🎲 tr	mp [iSeries: D	802.00			-Y- 1	3 <u>e</u> 15	40 10 1	
	Platform: is		Connection: T	ORAS33B:3	825			
Ē	n Thread	:1 (stopped)						
		1 : CLC1 : C						
		_PEP : CLC1						
		-	MD : QUICME	)				
		김 비가 같은 것은 것이라. 같이?	JIMGFLW : QI					
	-= QL	IMNDRV ; QL	IMNDRV : QU	JIMNDRV				
		ICMENU : QU	ICMENU : QU	JICMENU				
		MD : QCMD :	QCMD					
1.	Process: 0		the second s	OB Program	e CI CI			

4. Click the **Resume** icon from the Debug toolbar.

The program starts running and stops at the breakpoint at line 8. (Be patient, the Debugger has to stop 98 times but because of the condition continues to run until the 99th time.) Notice in the Monitors view, that *&count* now has the value 99.

5. Click the **Resume** icon again.

The program stops at the breakpoint at line 8 again and *&count* now has the value 100.

6. Click the **Resume** icon once more so that the program runs to the breakpoint at line 11.

**If you do not see the error message below, go to** "Stepping into a program" on page 71.

#### **Error Handling**

If you forget to add the parameter to the CALL program command when you call the program, you will see this error message.



a. Click OK.

b. Click the **Terminate** icon on the Debug toolbar.

The debug session terminates on the workstation but the exception waits for input from the 5250 emulation session.

If you closed the Debug view by mistake, you will need to re-open the Debug view and then terminate the debug session on the workstation.

o Debug - CLC1.CLLE - IBM Websphe	ere Development Studio Client Advanced Edition for iSeri 💻 🔳
File Edit Source Compile(G) Navigat	te Search Project Data Run Window Help
■ • 및 ▲   ↔ \ ● ●	🕞 🛆 👌 📅 🔂 🔂 🔂
· · · · · · · · · · · · · · · · · · ·	
19-3	
C .	P D Var. Bre. Re. D Mo. X Pro. P D
All Servers 🛛	
\$ O \$	
Server	Status 8COUNT = 00100.
WebSphere Application Server ve	
WebSphere Application Server vt	ŧ
CLC1.CLLE X CLR1.CLLE	PAYROLLG.RPGLE "1 C DUtine 2 C
Line 10 Colu	mn 1 Replace
+1	+2+3 🗉 🕞 Labels
000600	CHGVAR VAR (&NAME
000700 LOOP:	<u>chgvar</u> var (&cour
P 000800	<u>if</u> (&count *1t 100)
000900	CHGVAR VAR (&NAME
• 001000	chgvar var(&lib)
<u> </u>	
Console 🛛 Tasks iSeries Comm	hands Log Debug Console Memory
Process: 028387/STECKHAM/QPADEV000\	W Program: CLC1 🛛 🖉 🔆 🙀 👘 📑 🖻 🖻 🖓 👘
21	
	<u>.</u>
∫ <b>□</b> °	

Click Window > Show View > Debug.

File Edit Source Compile(G	5) Navigate Search	Project Data Ru	un Window Help	
間・日 △ ] ジ \> 週・☆・Q・8:・			New Window New Editor	
5-5-6-			Open Perspective	•
	— 患 Ant		Show View	
해 Servers X	🔄 💁 Breakpoints	Alt+Shift+Q, B Alt+Shift+Q, C	Customize Perspective Save Perspective As	· 6 6
Server	🐐 Debug	_	Reset Perspective	
WebSphere Applicatio     WebSphere Applicatio     WebSphere Applicatio	n : 🕵 Debug Console n : 🗊 Display		Close Perspective Close All Perspectives	

Remember to terminate the Debug session if you haven't done so already.

c. Go to your 5250 emulator and press **Enter** until the program messages complete.



d. In the workbench, click the **Remove all terminated launches** icon on the Debug toolbar to clean up the Debug view.



e. From a 5250 command line, call the CLC1 program with the parameter XX. CALL PGM(RSELABxx/CLC1) PARM('XX')

You have monitored the variable &count.

### Lesson checkpoint

You learned the following:

- About the Monitor Expression view
- How to monitor a variable
- How to run a program

# Stepping into a program

The Debugger allows you to step over a program call or step into it. When you step over a program call, the called program runs and the Debugger stops at the next executable statement in the calling program.

You are going to step into the PAYROLLD program.

To step into a program:

1. Click the **Step into** icon on the Debug toolbar.

10 Debug 🗙 Servers	- 0
	~
in	

The source of PAYROLLD is displayed. Depending on the option you used to compile the program (\*SRCDBG or \*LSTDBG for RPG, or \*SOURCE, \*LIST, or \*ALL for ILE RPG), this window displays either the Source or Listing View.

If you specified an incorrect parameter for the CALL program command, or your library list does not include RSELABxx, you will see this error message.

o Debi	ig Engine Message	×
(j)	DBGP0003E Program received unmonitored on CALL command.	exception CPF0001: Error found
		OK

Make sure your library list is correct and complete the same steps as covered in the section called **Error Handling** in "Monitoring variables" on page 68.

2. Right-click anywhere in the Source view and click **Switch view** > **Show** \***LISTING** on the pop-up menu.

Line 1	59 Column	Run To Location Brow
	+-*A-1-B+_	4+
000150	PROCEDUF	Monitor Expression
000151		Monitor Memory
000152	1AM-0000	Switch View Show *SOURCE
000153	_	Show *LISTING
000154	OPEN	I-O MSTDSP-FILE Show *STATEMENT
000155		EMPMST-FILE
000156		PRJMST-FILE
000157		RSNMST-FILE.
000158		
000159	SET	IND-OFF (IND-ERROR) TO TRUE.
000160	INIT	IALIZE MSTDSP-REC.
000161		
000162	* Display 1	Maintenance Selection until end
000163		
000164	PERF	ORM 0100-PROCESS-MAIN THRU 0100.
000165	UN	TIL IND-ON (IND-EOJ).
000166		
000167	CLOS	E MSTDSP-FILE
000168		EMPMST-FILE
•		

- 3. Page down in the source and take a look at the expanded file descriptions. You don't have any /Copy member in your PAYROLLD program but these would also be shown in a Listing view. Switch back to the Source view.
- 4. Right-click anywhere in the Source view.
- 5. Click **Switch view** > **Show** \***SOURCE** on the pop-up menu.

You have stepped into PAYROLLD program, switched the view from source to listing and back to source

## Lesson checkpoint

You learned the following:

- About step commands
- · How to step into a program

# Listing call stack entries

The Debug view in the upper left pane, lists all call stack entries. It contains a tree view for each thread. The thread can be expanded to show every program, module, and procedure that is on the stack at the current execution point. If you double-click on a stack entry you will display the corresponding source if it is available. Otherwise the message No Debug data available appears in the Source view.

In the Debug view, expand the stack entry of Thread1 if it is not expanded already.



The stack entry allows you to work with and switch between different programs and/or ILE modules.

You have viewed the call stack entries of your program.

#### Lesson checkpoint

You learned the following:

- About call stacks
- · How to display source from entries

# Setting breakpoints in PAYROLLD

Now you add some breakpoints in PAYROLLD.

To add breakpoints:

- 1. Select PAYROLLD in Thread1.
- 2. In the source view (also called the iSeries default editor) scroll to line 201.
- 3. Double-click the prefix area of line 201.

A breakpoint icon is added to the prefix area of this line to indicate that a breakpoint is set.

4. Repeat the above step for line 206.

1	CLC1.CLLE	/ P	AVROLLD.CBLLE 🗙						- 5
	Line	218	Column	1	R	eplace			Brows
		+	-*A-1-B	+	2	+3	3+		-+
	000200	) -	IF	INI	O-OFE	(IND-ERF	ROR)		
ø	000201			IF	(EMI	PAPL OF S	SELECT-J	= 'X'	)
	000202	2			INI	TIALIZE	EMPSEL-	-0	
	000203	3			PER	REORM 030	DO-EMPMS	ST-SELE	CT TI
	000204	ł			Į	UNTIL INI	D-ON (INI	-MAINT	) OR
	000205	i		ELS	SE				
P	000206	5			IF	(PRJAPL	OF SELF	SCT-I =	'X' 🗐
	000207	?				INITIAI	LIZE PRO	JSEL-O	
	000208	}				PERFORM	1 0400-1	RJMST-	SELE
	000209	9				UNTII	L IND-ON	J(IND-M	AINT
	000210	)			ELS	SE			
	000211	<u>.</u>				INITIAI	LIZE RSN	ISEL-O	
	000212	2				PERFORM	4 0500-H	RSNMST-	SELE
	000213	3				UNTII	L IND-ON	J(IND-M	AINT
	000214				ENI	D-IF			
	000215	i i		ENI	)-IF				
	000216	5	EN	D-IE					
	000217								
9	000218	3	IF	INI	NO-O	(IND-MAIN	(TV		-
	4					1			Þ
		-							_
	1								

5. Repeat the above step for line 218.

To view all breakpoints, select the **Breakpoints** tab from the top left pane.



This view shows all breakpoints currently set in your Debug session. This is a convenient place to work with breakpoints. You can remove, disable/enable, add, or edit a breakpoint. These tasks are available from the pop-up menu when you right-click in the view area. Double-click any entry to show the source where the breakpoint is set.

You have added several breakpoints to PAYROLLD.

### Lesson checkpoint

You learned the following:

· How to add breakpoints

# Removing a breakpoint in PAYROLLD

It is also easy to remove breakpoints from the Source view.

To remove a breakpoint:

- 1. Right-click the prefix area of line 206.
- 2. Click **Remove Breakpoint** on the pop-up menu.

CLC1.CLLE	Syntax Check Line		
Line 21	Cut Copy Paste	Ctrl+X Ctrl+Insert Ctrl+V	lace Brows +3+4+
000200 000201 000202 000203	Select Selected Deselect	Alt+U	
000204 - 000205 000206 -	Filter view Show all	Ctrl+₩	TT THE ON (THE MATHE) OF
000207	Source View	)	NITIALIZE PRJSEL-O PERFORM 0400-PRJMST-SELE
000209 000210 000211	Edit Breakpoint Remove Breakpoint Disable Breakpoint	72	UNTIL IND-ON (IND-MAINT)
000212 000213 000214 -	Add Watch Breakpoin Run To Location	it	PERFORM 0500-RSNMST-SELE UNTIL IND-ON (IND-MAINT)
000215 000216 000217	Monitor Expression Monitor Memory Switch View		
⊳ 000218 -	1 E	, LIND-ON(I	ND-MAINT)
4			

The icon is removed from the prefix area indicating that no breakpoint is set on that line. The breakpoint is also removed from the list in the Breakpoints view. Now you are ready to run the PAYROLLD program.

3. Click the **Resume** icon from the Debug toolbar.

The program waits for input from the 5250-emulation session.



- 4. Type an X beside the Project Master Maintenance option.
- 5. Press **Enter** in the emulation session. The program runs to the breakpoint at line 201.

You have removed a breakpoint from PAYROLLD.

#### Lesson checkpoint

You learned the following:

· How to remove a breakpoint

# Monitoring variables in PAYROLLD

Now lets monitor variables and change them in PAYROLLD.

To monitor variables:

- 1. In the source view, double-click the variable EMPAPL on line 201.
- 2. Right-click the variable.
- 3. Click Monitor Expression on the pop-up menu.

0	CLC1.CLLE	Pre- acceleration	ROLLD.CBLLE	-				- 6
	Line 2		Column		Repl			row
		+-	-*A-1-B	+	-2+	3	+4	+
	000200		IE	' INE		ID-ERROR)		100
	000201			IF	(EMPAP	Syntax Check Sele	m -	
	000202				INITI	Syntax check see	scuon	_
	000203				PERFC	Cut	Ctrl+X	Tl
	000204				UNI	Сору	Ctrl+Insert	R
	000205			ELS	E	Paste	Ctrl+V	
9	000206				IF (I	Select		▶ T =
	000207				I	Selected		
	000208				F	Deselect	Alt+U	E(
	000209				-			T
	000210				ELSE	Filter view Show all	and some	* [ ]
	000211				I_	5now.ali	Cpri+W	_
	000212				I	Source		• E(
	000213					View		► [T]
	000214				END-1	Edit Breakpoint		
	000215			END	-IF	Remove Breakpoin	nt .	
	000216		EN	ID-IF		Disable Breakpoint		
	000217					Add Watch Break		
	000218		IF	' INE	-0N (IN-	Run To Location		
	<u> </u>	_				Monitor Expression	n	
	r					Monitor Memory		•

- 4. Click the **Monitors** tab in the upper right pane. The variable appears in the **Monitors** view. Its value is blank because you did not select the **Employee Master Maintenance** option.
- 5. In the same way add the variables PRJAPL on line 206 and RSNAPL on line 244 to the monitor. Variable PRJAPL equals X because you did select the **Project Master Maintenance** option.
- 6. In the Monitors view, double-click the variable RSNAPL. The value changes into an entry field.
- 7. In the entry field, type in the new value X for the variable.

Variables	Breakpoints	Registers	CO: Monitors	× Programs							
	1				2 <sup>77</sup> 2	x	-	್ತು	↓a <sub>z</sub>	*	Ĉ d
	kCOUNT = 00	100.									
® E	Empape =										
1.1	PRJAPL = X										
	SNAPL= X										

8. Press Enter. The variable is successfully changed.

You have monitored several variables in PAYROLLD.

### Lesson checkpoint

You learned the following:

- About monitoring variables
- How to monitor variables

# Adding a memory monitor

Adding a memory monitor for a variable allows you to view the memory starting with the address where the variable is located. The memory can be displayed in different formats, for example hexadecimal and text.

To add a memory monitor:

- 1. In the Source view, double-click the variable IND-ERROR in line 219.
- 2. Right-click and select Monitor Memory > EBCDIC on the pop-up menu.

- 6	+		Selected	I.CLLE
Brow	ace	Alt+U	Deselect	ine 219_
+	+3-		Filter view	
0500-RSNMST-SELE	RFORM	Ctrl+W	Show all	0212
IND-ON (IND-MAINT)	, UNTIL		Source	0213
	•		View	)214 )215 -
			Add Breakpoint	1215
		int	Add Watch Breakpo	0210
-	-MAIN1		Run To Location	0218
ERROR) TO TRUE	F (IND-		Monitor Expression	0219 -
d Character	1 Hex an		Monitor Memory	0220
	2 Hex		Switch View	)221 - )222
	3 ASCII 4 EBCDIO	IT.	0100-EX	0223
	5 Signed	IT.	EX	0224
ed Integer				0225
-	7 Map			0226
•	T-OPTION	ECK-SELEC	0200-CH	1227
				0228
play fields and :	clear dis	eeping, d	* Housek	0229
				0230

This will open the Memory view in the notebook at the bottom of the perspective. The tab shows the name of the variable.

Monitors	Denderings	Ü		
Monitors 🕂 🖗 🕷 🙀	Kendenings			
	IND-ERROR <ebcdic></ebcdic>			
	Address	0 - 3	4 - 7	8 - B _
	СС32СВ89970021		7000	ö⊡ôi
	CC32CB899 🐨 Add	Rendering		
	CC32CB899 💥 Ren	nove Rendering	x1000000	00000000141
	CC32CB899	11.0	1000	
	CC32CB899	et to Base Address	1000	öDôi
	CC32CB899 G01	to Address	1000	0000
	CC32CB899 For	mat	1000	öDôi
	CC32CB899			0000
	CC32CB899 Resi	ize to Fit	1000	
	CC32CB899 Hide	e Address Column	1000	ö⊟ôi
	CC32CB899	w. To Clink and	1000	ö⊟ôi
	CC32CB895	y To Clipboard	1000	
	CC32CB899 🖆 Prin	it	1000	0000
	CC32CB899 Pro	perties	1000	Dzx
	CC32CB899			UuW≁≤
	CC32CB899 Def	ault Text Rendering	1000	0000
	CC32CB899 Cha	ange Display Mode	<ul> <li>acc</li> </ul>	0000
	CC32CB89970023	00 0001	0101	0000

- 3. Use the scroll bar on the right of the Memory view to scroll down. You can see the current content of the memory.
- 4. Right-click in the view area.
- 5. Click **Reset to Base Address** on the pop-up menu to return to the starting address.
- 6. To get the hex content of the memory starting with the selected variable, click **Monitor Memory** > **Hex**. A new page with the hex values is added to the Memory view.
- 7. Click the Toggle Split Pane icon to display the character values as well.

You have added a memory monitor for the variable IND-ERROR.

### Lesson checkpoint

You learned the following:

- About memory monitors
- · How to add a memory monitor

# Setting Watch breakpoints

A Watch breakpoint provides a notification to the user when a variable changes. It will suspend the execution of the program until an action is taken.

To set a Watch breakpoint:

1. Go to the **Line number** field at the bottom of the source area. In this field enter 118 to go to that line.

CLC1.CLLE 💋	PAYROLLD.CBLLE ×	- 6
Line 219	Column 37 Replace	Brows
	+-*A-1-B+2+3	+
000212	PERFORM	0500-RSNMST-SELE
000213	UNTIL	IND-ON (IND-MAINT
000214	END-IF	
000215	END-IF	
000216	END-IF.	
000217		
000218	IF IND-ON (IND-MAIN	T)
000219	SET IND-OFF (IND	-ERROR) TO TRUE
000220	INITIALIZE MSTD	SP-REC
000221	END-IF.	
000222		
000223	0100-EXIT.	
000224	EXIT.	
000225		
000226		
000227	0200-CHECK-SELECT-OPTIO	N.
000228		
000229	* Housekeeping, clear di	splay fields and :
000230		
4		
118		

- 2. Double-click variable IND-TABLE to highlight it.
- 3. Right-click and click Add Watch Breakpoint on the pop-up menu.

The Add a Watch Breakpoint window opens. The **Expression** field is pre-filled with the highlighted variable IND-TABLE.

By default the **Number of bytes to watch** field is set to zero, which means the variable will be watched in its defined length.

Address or expression:	IND-TABLE		
Number of bytes to watch:			_

- 4. Click Finish. The Watch breakpoint is now set.
- 5. Click the **Resume** button on the Debug toolbar.

The application waits for input from the 5250-emulation session.

🕫 🛛 Ses	sion A - [	24 x 80]			_ 🗆 ×
File E	dit View	Communic	ation Actions Wi	ndow Help	
	DD	ð. 96			1
PRO	61		Time Report Project Master	ing System Maintenance	2/05/04 15:00:39
			Project Code	123	
			Action Code	D A-Add C-Change D-Delete	
_	3-End of	Job	F4-Maintenance S	election	
		and and and a state of the second	1916		06/044
Col Col	nnected to	remote ser	ver/host toras pd10	1 on psprint1:pd101	11.

- 6. In the 5250 emulation session, type 123 for **Project Code** and D (for delete) in the **Action Code** field.
- 7. Press **Enter**. A message is displayed indicating that the variable IND-TABLE has changed.

O Debi	ug Engine Message	×
ţ)	DBGB0009I Variable IND-TABLE has changed in PAYROLLD, which is running in job QPADEV000V	
		OK

- 8. Click OK.
- 9. In the Breakpoints view, right-click the Watch breakpoint and click **Disable** on the pop-up menu.

You have added a Watch breakpoint for the variable IND-TABLE and run the program to see the notification that the variable has changed.

### Lesson checkpoint

You learned the following:

- About Watch breakpoints
- · How to set a watch breakpoint and see the results

# Terminate a debug session

To close the debugger:

- 1. Click the **Resume** icon on the Debug toolbar. The application waits for input from the 5250-emulation session.
- 2. Switch to the 5250 emulation session.
- 3. Press F3 to end the program. A message Program terminated appears:



4. Click OK.

## Lesson checkpoint

You learned the following:

· How to terminate a debug session

# Starting the Integrated Debugger using the Debug action

You will be working with the COBOL program PAYROLLD.

Besides using service entry points to start a debug session, you can start the Debugger in several ways: directly from the pop-up menu of a program or service program in the Remote Systems view, or from a Launch Configurations window. Starting directly from the Remote Systems view without prompt doesn't allow you to specify parameters to be passed to the program. The Launch Configurations window allows you to modify how the program is invoked and to specify parameters.

CLC1 requires a parameter.

To start the debugger:

- 1. In the **Name** field, type the program name CLC1. This gives your debug configuration a unique name so you can use it again when you debug this program.
- 2. You can leave the **Step into** and **Terminate debug session on program completion** check boxes selected and **Update production files** check box deselected, since you are working with a test library.
- 3. Click the How To Start tab.

		Ť
		ł
Source 🔲 <u>C</u> o	mmon	
		*
		w.
Prompt		
<u> </u>		
	Apply	Revert

By default, the page contains a call for the program specified in the **What To Debug** tab.

4. Click Prompt.

The Call Program (CALL) window opens.

Call Program Program: Library: Parameters:	m (CALL) > CLC1 > RSELABXX [XX]	Name Name	÷	Add
CALL PGM(RSEL	All Parameters F ABXX/CLC1) PARM('XX')	Keywords		×
		ОК	Restore defaults	Cancel

- 5. In the **Parameters** field, type 'XX' where 'XX' is your workstation number.
- 6. Click OK.

The complete start command for the program appears.

My iSeries program	
dify attributes and launch.	Ŕ
ame: CLC1	
What To Debug How To Start 4 Source	
Command to start application:	
CALL PGM(RSELABXX/CLC1) PARM('XX')	
	*
Prompt	
	Apply Revert
	Debug Close

### 7. Click Debug.

The Debug perspective opens. If not, you may see this error message.

D EVFC50011		2
No interactive job associated will job with this connection to conti		interactive
	Cancel	< C Details
A request to run an interactive commany connection s400a, but no interactive job connection. To associate an interactive 1. Open a 5250 emulator, 2. Run the CL command STRRSE	is currently associated with this job with this connection:	

The interactive connection has been shut down in the meantime. Go to your 5250 emulator and restart the interactive connection following the instructions in the message. You don't have to cancel the message. It will be removed as soon as the connection between the Remote System Explorer communications server and the interactive session has been established. The Debug perspective is displayed in the workbench.

Now that the program is active on the iSeries and stopped at the first executable statement, the debugger displays the source.

O Debug - CLC1.CLLE - IBM Webspher File Edit Source Compile(G) Naviga			Edition for iSeri 🗖 🗖 🗙 Help
□ • □ ≞   ~ ~   □ • ⊨   Δ ÷ ÷   µ • ☆ • Q • 9: • 9: • 9: • 1   2 • 3 • ~ ← • → •		/ 6	🖹 🍄 Debug 🖥 Remote Syste
Debug 🛛 Servers		(M= Var 8 Bre R	e Mo Pro
	~		2 🕫 🖻 🎽
📲 🕪 🗉 🔳 🔄 🔍 🕰 🔿R		Name	Value
8 ± •		SLOCALVARS	FOR ALL CL, NON-ILE RP
E 🔐 Thread:1 (stopped)	-		
_= aci:aci:aci		<u>K</u>	E E E E E E E E E E E E E E E E E E E
	BLLE	- 0)	E Outline 🕱 🖳 🗖
Line 1 Colu	mn 1	Replace	e.
+1	+2-		E Cabels
+ 000100	PGM	PARM (&nun 🔺	- G LOOP
000200	DCL	VAR (#)	
000300	dcl	&name *cł	
•	-	<u>×</u>	
Console X Tasks iSeries Comm	ands Log Debug	Concola Mamoru	
Process: 028387/STECKHAM/OPADEV000			
	w riogram. ctcl		
			<u>^</u>
			*
			<u>}</u>
] <b>□</b> °		J	

You have started an interactive debug session.

8. Remove all breakpoints. In the Breakpoints view, click the Remove All Breakpoints button in the toolbar or select **Remove All** from the pop-up menu.



9. Click Resume.

PAYROLLD is called and waits for input from the 5250 session. Only Terminate and Suspend buttons are available on the Debug view toolbar.

To get control back to the Debug session, click Suspend U
 You can now set breakpoints and use all the Debug features.

Tip: Suspend is a valuable feature to debug a looping program.

11. Click **Terminate** to end the Debug session.

The Debug session is terminated, but this does not end the program.

12. Switch to the 5250 emulation session and press F3 to end the program.

**Tip:** You can edit, delete and create debug configurations by clicking the arrow beside the **Debug** icon on the workbench toolbar and selecting from the list.

You can also click Run on the workbench menu and select Debug.



The Debug Launch Configurations window opens.

R     CLC1       R     CLR1       Programs or service programs to be debugged	New
Image: Host C/C++ A         Image: Host Java App	New
Image: Series: Debug       Connection:       s400a         Image: Series: Debug       Image: Series: Debug         I	New
Rest CLC1         Programs or service programs to be debugged	
CLR1 Programs or service programs to be debugged	
Series: Debug Library Program Type	Add
🕼 iSeries: Debug 🛛 🗹 RSELABXX CLC1 *PGM	
Java and Mixe     Java Applet	Edit,
Java Applicatic	Remove
🖥 Java Applicatic	
U Junit  Step into  Step into	
-Ju JUnit IV Step into Ju JUnit Plug-in Ti IV Terminate debug session on program completion	
Remote Java 4 V Update production files	
SWT Applicatic	
-E Test	
WebSphere Ac	
👻 WebSphere Ap	

Here you can see the CLC1 configuration that you just created. This is your saved configuration to debug CLC1 as an interactive application. You could now modify this configuration to use a different parameter, copy this configuration, or create a new one. Notice the list of configurations you can choose from.

You are now ready to remove the service entry point you created earlier and close the debug perspective.

- 13. To remove the service entry point and close the launch configuration:
  - a. In the Remote System Explorer perspective, expand library RSELABxx, if it isn't expanded already.
  - b. Right-click program CLC1 in library RSELABxx.and click Debug (Service Entry) > Remove Service Entry Point

Remote Systems × Team	Paste Move Delete			Co +-*A-1		NMENT I
● E Local ● ■ \$400a ● ■ Iseries Objects ● ■ Uork with libraries ● ■ Work with objects	Change Save Restore User Actions		÷	_	<ul> <li>DATA D</li> <li>DATA D</li> <li>PROCEE</li> </ul>	
田 道 Work with members 日 盐 Library list 日 리 QSYS.*lib.prod-sy 日 리 QSYS2.*lib.prod-s	Run As Run(Prompt) Debug(Servic Debug As(F)	e Entry)		Remove Servi Show View	ce Entry Poir	nt
QHLPSYS.*lib.prot     QUSRSYS.*lib.prot     QUSRSYS.*lib.prot     RSELABXX.*lib.tes     CLBATCH.*pg	Debug (Prom Visualize Appl Properties(K)	lication Diagram	<b></b>		•	F
teres CLC1.*pgm.cl eres CLR1.*pgm.cle eres MYCOMPILE.*pg		Remote 5	iSeries C	∫ iseries S	and the second second	
	1997-1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1	Library RSELABXX	Program CLC1	Program *PGM	Module *ALL	Proce *ALL

The service entry point is removed.

You have started the debugger using a debug action, and removed a service entry point.

### Lesson checkpoint

You learned the following:

- About other ways to start the debugger
- How start the debugger using a debug action
- How to remove a service entry point

# **Debugging a Job**

In addition to being able to debug a program, you can also debug a job.

To debug a job:

- 1. Open the Remote System Explorer perspective by selecting Window → Open Perspective → Remote System Explorer
- 2. Under your active server connection, s400a, expand **iSeries Jobs** → **My Active Jobs** → **QINTER**.



3. Right-click the active job under QINTER, and select **Debug As** → **iSeries Job**.



The debug session begins. From here you can set breakpoints, monitor variables, and memory in the same way that you did with a program.

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	-

4. Terminate the debug session by right-clicking **My iSeries job** and selecting **Terminate**.

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Console X Process: 263969/S	Tasks iSeries Com CHWABEA/QPADEV00	Properties ✓ ⇒ Show Running Threads © Step-by-Step Debug		

The debug session is terminated.

## Lesson checkpoint

You learned the following:

• How to debug an iSeries Job

# **Module summary**

In this module, you learned how to debug a program using the Integrated iSeries Debugger.

## Lessons learned

- Start a debug session using service entry points
- · Add a breakpoint
- · Add a conditional breakpoint
- · Edit a breakpoint
- Monitor a variable in the Monitors view
- Step into your payroll program
- · Show a Listing view
- Display source from call stack entries
- View all breakpoints
- Remove a breakpoint
- Monitor memory
- Set a Watch breakpoint
- · Close the debugger
- · Invoke the debugger from a Launch Configurations window

#### Assessment

- · How do you start a debug session using service entry points?
- Where can you only set breakpoints?
- How do you set a breakpoint?
- What is the Monitors view?
- How do you change variables and indicators?
- How do you step over or into a program?
- What actions can you perform on breakpoints?
- What is the Memory Monitor?
- What type of breakpoint provides a notification to a user when a variable changes.

# Customizing the Remote System Explorer

This module teaches you how to use the Remote System Explorer perspective to work with the iSeries objects that you used in the previous modules. You will learn how easy it is to define filters, perform actions and define your own actions. In short, you'll see how Remote System Explorer can organize and integrate your work and make that work easier.

This module also teaches you how to move, re-size or close existing views. You learn how to open other views that you want to add to the perspective. You then save the customized layout as a new perspective.

### Learning objectives

- · Know the features of Remote System Explorer
- · Move, dock, rearrange, resize, hide, close, reopen and add views
- Save and reset a customized perspective
- · Create a filter to show specific iSeries libraries
- Change the filter to add more iSeries libraries
- · Create a filter to show all the source files in a library
- · Access members to edit from your filter

- Create a user action that copies a source file with data to a new source file in the same library
- Specify user action parameters
- · Specify a restriction on a user action
- Try the user action
- · Create a user action for iSeries jobs
- Create a user action for IFS folders and files
- · Create your own compile command
- Edit an existing compile command
- Using run configurations

#### Time required

This module should take approximately 60 minutes to complete.

## More about the Remote System Explorer

The Remote System Explorer is replacing PDM (Program Development Manager) on the workstation. It currently doesn't have all the function of PDM but will over time eventually be a full replacement for PDM.

Remote System Explorer allows you to:

- 1. Simplify your work by giving you quick access to lists of iSeries libraries, objects, members, IFS files, UNIX<sup>®</sup> files, and local files.
- 2. Use the context-sensitive pop-up menus on these lists to perform actions such as start the Remote Systems LPEX Editor, CODE Designer, or Integrated Debugger or other common iSeries actions.
- 3. Use the Work with User Actions option to create and manage your own user-defined actions and have them appear in the pop-up menus.
- 4. Use the command support to increase your productivity by allowing you to enter and repeat iSeries or local commands without switching to an emulator session.

You have read the list of Remote System Explorer capabilities.

#### Lesson checkpoint

You learned the following:

About Remote System Explorer

## Customizing the perspective

Perspectives can be modified to fit your work style. You can move, resize, or close existing views. You can open other views that you want to add to the perspective.

This is the familiar default appearance of the Remote System Explorer perspective.

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- 1. To move the Outline view:
  - a. From the Remote Systems view double-click member MSTDSP in the QDDSSRC source file.

The Remote Systems LPEX Editor opens.

b. In the Remote Systems view, double-click member PAYROLLC in the QCBLLESRC source file.

This member will be loaded into the editor as well.

Your perspective will look something like:

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	MSTDSP2.*file.ds     MSTDSP2.*file.ds     PRIMST.*file.pfc     QCBLLESRC.*file.     QPAYROLLC.cb     QPAYROLLC.cb     QPAYROLLC.cb     QCMDSRC.*file.pf     QCMDSRC.*file.pf	PAROLECULI Line 1 000001 A* 000002 A* 000003 A* 000005 A* 000005 A* 000005 A* 000006 A* 000006 A* 000007 A* 000008 A*	89/04/10 16:28:41 THIS DISPLAY FILE FF TIME REPORTING MASTE	3.
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Notice the two tabs in the Editor window.Now let's customize the perspective.

- c. Click the title bar of the Outline view in the workbench window and drag the view across the Workbench window. Do not release the left mouse button yet.
- d. While still dragging the view around on top of the workbench window, note that the various drop cursors appear. These drop cursors indicate where the view will dock in relation to the view or editor area underneath the cursor when you release your mouse button. To see the drop cursor change, drag the view over the left, right, top, or bottom border of another view or editor.

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e. Dock the view in any position in the Workbench window, and view the results of this action.

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- f. Click and drag the view's title bar to re-dock the view in another position in the Workbench window. Observe the results of this action.
- g. Finally, drag the Outline view over the Remote Systems view. You will see a stack cursor.

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h. When you release the mouse button the Outline view will be stacked with the Remote Systems view into a tabbed notebook.

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	000003	A*************************************
	000004	A* THIS DISPLAY FILE PROVIDES MAINTENANCE 1
-	000005	A* TIME REPORTING MASTER FILES - EMPLOYEE !
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	000007	A* - REASON COI
	000008	A*************************************
	000009	A***EC
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You can also move a view by using the pop-up menu for the view. Left-click on the icon at the left of the views title bar, or right-click anywhere else in the view's title bar.



**Tip:** A group of stacked views can be dragged using the empty space to the right of the view tabs.

You can rearrange the order of views in the tabbed notebook.

i. Click on the Outline view tab and drag it to be in front of the Remote Systems view tab.

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∃ 400 Global Definitions		
<ul> <li>Fields</li> <li>Indicators</li> </ul>		
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j. Release the mouse button when the Outline view tab is in the desired location. The view that you selected is now moved.

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		G.
🕀 🕼 Global Definitions		
Files     Fields		
E Indicators		
🛨 🎯 Main Procedure		

- 2. To resize the Outline view:
  - a. To resize the Outline view, select the right border and drag the mouse pointer to the right to increase the size of the Outline view. Notice that the Editor and iSeries Commands Log got smaller.



b. Click on any of the other tabbed views such as Remote Systems view and you will see this view has the same size as the Outline view.

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ۍ <u>۴</u>	Line 2 Column 15 Re
⊕ 65 MSTDSP2.*file.dspf	+A*1
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PAYROLLD.cble	000006 A*
QCLSRC.*file.pf-src	000007 A*
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REFMST.pf	
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3. To hide a view:

You can create fast views to quickly open and close frequently used views. They work like other views except they do not take up space in your Workbench window.

To create a fast view:

- a. You can dock views on the shortcut bar at the bottom of the workbench. Click the title bar of the Outline view.
- b. Hold the mouse button down.
- c. Drag the view to the shortcut bar at the bottom left of the window and release the mouse button. A toolbar button for that view that you dragged now appears on the shortcut bar.



d. Click the toolbar button on the shortcut bar to look at the view.

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e. Click somewhere else outside the view to hide the view again.

**Tip:** You can also create and restore fast views by selecting Fast View from the context menu of the view's title bar.



- f. Right-click the toolbar button on the shortcut bar and click **Fast View** on the pop-up menu to deselect it. This will show the view again for the next lesson.
- 4. To dock a perspective: By default, the shortcuts for the open perspectives are displayed at the top right of the workbench. You can dock these shortcuts somewhere else in the workbench.
  - a. To dock the shortcuts, right-click in the top right area of the workbench and select **Dock On > Left**.



The view is docked on the left of the workbench.



Once you are familiar with the short cut icons for the open perspectives, you can remove the text to save space.

b. Right-click the shortcut for an open perspective and deselect **Show Text** on the pop-up menu.



The text for all shortcuts for the open perspectives disappears.



- 5. To close, reopen and add other views:
  - You can remove views, reopen views and add new views to a perspective.
  - a. To remove the Outline view from the Remote System Explorer perspective, click the Close icon in the top right-hand corner of the tab.



- b. Reopen the Outline view by clicking Window > Show View > Other. The Show Views dialog opens.
- c. Expand General and select Outline.

🗉 🗁 General	
- Dookmarks	
- A Classic Search	
- 🗐 Console	
🎯 Internal Web Bro	wser
🖏 Navigator	
- 🚯 Palette	
Problems	
C Progress	
Project Explorer	
Properties	
- 🖾 Quick Edit	
- A Search	
- 🛅 Snippets	
Tasks	

d. Click **OK**. The Outline view opens in the workbench at the location where it resided last.

You can add views to the perspective.

e. To add the Breakpoints view, click **Window** > **Show View** > **Other**. Expand **Debug** and select **Breakpoints** 

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PAYROLLD.CBLLE [line: 218]												

- f. To add more iSeries views, click Window > Show View > Other.
- g. In the Show View dialog, expand **iSeries** and choose a view from the list of views, for example iSeries Job Status.

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1 1 1 1	Series Commands Log	
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@= i	Series Job Log	
····· 01	Series Job Status	
	Series Listings	
	Series Project Navigator	-
	Series Service Entry Points	
- 17 c	Series Source Prompter	
- Ga i	Series Table View	
E 🕞 Java		-
	Series Service Entry Points Series Source Prompter Series Table View	

h. Click OK.

The iSeries Job Status is added to the perspective.

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Now you know how to add, move, hide, and close views. Manipulating the RSE perspective allows you to work with a highly flexible, and customized workbench. For example, you could change the perspective so that the editor takes up most of the space, the iSeries Table view resides below the editor and all other views are either closed or moved to the bottom as fast views, as shown here:

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000001	PROCESS APOST.		
000002			3
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000005	PROGRAM-ID. PAYROLL.		
000006	AUTHOR. Programmer Name.		
000007	INSTALLATION. IBM Toronto Lab.		
800000	DATE-WRITTEN. October 12, 1999.		
000009	DATE-COMPILED.		
000010			
000011	*	**	
000012	* PROGRAM DESCRIPTION		
000013	* - Time reporting master file maintenance us	sing externally *	
000014	<ul> <li>described workstation processing.</li> </ul>	*	
000015	*	*****	
000016			
000017			
000018	ENVIRONMENT DIVISION.		
	w X ISeries Commands Log ISeries Job Status SRC (5 Members) al		
		al public Lation	
Messages		▼ Details Show	LO

You have customized the Remote System Explorer perspective.

## Lesson checkpoint

You learned the following:

- · About customizing the Remote System Explorer
- · How to customize the Remote System Explorer

# Saving the perspective

If you have modified a perspective by adding, deleting, or moving (docking) views, you can save your changes for future use.

1. Click Window > Save Perspective As.
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|--------------------------|--|--------------------------|--------------|
| MSTDSP.DSPF              | PAYROLL.RPGLE                          | Open Perspective         | c            |
| Line 1                   | Column 1 Replac                        | Show View                | _            |
|                          |  | Customize Perspective    | .+           |
| 000100                   | F************************************* | Save Perspective As      | ********     |
| 000200                   | F* PROGRAM NAME - Pay                  | Reset Perspective        |              |
| 000300                   | F* DESCRIPTION - Time                  | Close Perspective        | r file maint |
| 000400                   | F* exte                                | Close All Perspectives   | workstation  |
| 000500                   | F******                                | Navigation •             | *******      |
| 000600                   | F* INDICATORS USED -                   | Navigation               | -            |
| 000700                   | F* 50 - No record fou                  | 🗄 Working Sets 🔹 🕨       | ation        |
| 000800                   | F* 60 - General error                  | Web Browser              |              |
| 000900                   | F* 90 - Protect displ                  | Web Browser              | uest         |
| 001000                   | F* KC - End of job re                  | Preferences              |              |
| -                        |  |                          | -            |

2. Type a new name for the perspective into the Name field.

Enter o	e Perspective As r select a name to save the current ctive as.	×
Name;	Remote System Explorer 2	
Existing	) Perspectives:	
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	OK Cancel	

3. Click OK.

The name of the new perspective is added to the Select Perspective window**Window > Open Perspective** menu then select **Other**.



You have saved the perspective.

**Tip:** You can also make the new perspective the default by selecting **Window** > **Preferences**, expanding **Workbench** and then clicking **Perspectives**. You then select the new perspective and make it the default by clicking **Make Default**. The next time you open the workbench, this will be your default perspective.

### Lesson checkpoint

You learned the following:

- About saving a perspective
- · How to save a perspective

# Resetting the perspective

If you have modified a perspective and don't like the changes that you have made you can reset the perspective to its original layout.

1. Move some views around in the current perspective.

File RSELABXX/QDDSSRC (5	Members)				
IIB ROELADAA/QDDOORC (0	(members)				
	- Digital				
MSTDSP.DSPF 🖾 🔪					
Line 1	Column 1				
+	A*1+	2+3	+ 4	+5.	+
					=
4					- F
PAYROLL.RPGLE					
Line 1	Column 1	Replace			
			+ 4	+5.	+
		Replace 2+3	+ 4	+5.	+
			+ 4	+5.	· · · + · · =
			+ 4	+5.	+
	1+		+4		-
Series Commands Log (	1+		+4		۰۰۰+. چې ۳ و
•••••	1 + iSeries Job Status 🕺	2+3		a g	-
Series Commands Log (	1 + iSeries Job Status 🕺	2+3		a g	-
Series Commands Log (	1 + iSeries Job Status 🕺	2+3		a g	-
Series Commands Log (	1 + iSeries Job Status 🕺	2+3		a g	-
5eries Commands Log ( )	1 + iSeries Job Status 🕺	2+3		a g	-
Series Commands Log (	1 + iSeries Job Status 🕺	2+3		a g	-
Series Commands Log (	1 + iSeries Job Status 🕺	2+3		a g	-
Series Commands Log (	1 + iSeries Job Status 🕺	2+3		a g	-

2. Click Window > Reset Perspective.

The following message dialog appears.

Rese	t Perspectiv	e			×
?	Do you want defaults?	to reset the cur	rent Remote :	System Explorer 2	perspective to its
				ОК	Cancel

3. Click OK.

The perspective returns to its original layout.

4. Click **Window** > **Open Perspective** and select **Remote System Explorer**. This opens the default Remote System Explorer perspective, ready for the next exercise.

You have reset the perspective.

### Lesson checkpoint

You learned the following:

- About resetting the perspective
- How to reset the perspective

# Expanding files and folders

Typically you start using the Remote System Explorer by just expanding libraries, then objects, then source files and then members. You can also expand the Home

directory to see folders in  $\$ home in IFS. But sometimes this produces lists that are too big. You really want to keep lists small, to a few hundred at most.

One very quick way to reduce the amount of items in a list is to use the Expand To object for libraries. It allows you to expand a library to see only objects of a particular type. This subsetting remains in effect forever, even when you expand with the plus sign, until you subsequently choose All or any other expand-to criteria.

To expand files and folders:

- 1. In the Remote Systems view, right-click library RSELABxx.
- 2. Click **Expand To** > **Source Files** from the pop-up menu.

le Edit Source Com [1월 • 등 쇼 ] 선 성 • 형 • 두 수		and the second	ct Data Run Wir		<b>&amp;</b> - ∣₿∣,
🖞 🔝 Remote System	S 🗙 Team	- 0	PAYROLL.RPGL	e 🕄 👋	- D BE Outline
B _& 3	$  \phi \Rightarrow \phi  $	回街~	Line 1	Co	lumn
中本 Wa 中述 Wa 日 一 世 日 一 世 一 間 Wa 日 一 初 Wa Wa Wa Wa Wa Wa Wa Wa Wa Wa Wa Wa	rk with libraries rk with objects rk with members ary list QSYS.*lib.proc	New Go To	000100 000200 000300 000400 000500 000600	F* 1 F* F* F* F* F* F*	****
	QUSRSYS.*IIb. RSELABXX.*IIb WSSLABXX.*IIb er libraries Commands Jobs Is	Expand To Refresh Rename Copy Paste Delete	,	Data Files	
Properties 23	Remote Scra	Add Library Lis Remove From I Move Up In Lib Move Down In	Library List rary List	Data Queur	95

All the source files display.

📲 Remote Systems 🗙 Team 🖳 🗆
<b># %</b>   ← ⇒ @   ⊟ ⊈ ▽
RSELABXX.*lib.prod-usr
🕀 🔁 CLBATCH. *pgm.dle
🕀 🛃 CLC1.*pgm.dle
🕀 🔣 CLR1.*pgm.dle
🕀 🛃 MYCOMPILE.*pgm.cle
🕀 🔀 PAYROLL.*pgm.rpgle
🕀 🔁 PAYROLLD.*pgm.cblle
🕂 🖪 PAYROLLG.*pgm.rpgle
🕀 🛅 COMPARE.*file.pf-src
EMPMST.*file.pf-dta
EVFEVENT.*file.pf-dta
⊕6 MSTDSP.*file.dspf
⊕ 6 MSTDSP2.*file.dspf
🕀 🗐 PRJMST.*file.pf-dta 🚽
🕀 📳 QCBLLESRC.*file.pf-src
🕀 🛅 QCLSRC.*file.pf-src
🕀 🛅 QCMDSRC. *file.pf-src
🕀 🛅 QDDSSRC.*file.pf-src 💌

3. Right-click RSELABxx and click **Expand To** > **Data Files** on the pop-up menu. All the data files display.



4. Right-click RSELABxx and click **Expand To** > **All** on the pop-up menu. All the files display.

4 S	+ + kg	∎ \$ <sup>&gt;</sup>
🖯 🛋 R	ELABXX.*lib.test	-usr 🔺
÷-8	CLBATCH.*pgn	n.clle
÷-8	CLC1.*pgm.dle	
+-E	CLR1.*pgm.clle	
	MYCOMPILE.*p	
+- B	PAYROLL.*pgm	rpgle
<b>⊕</b> -₽	PAYROLLD.*pg	m.cblle
	PAYROLLG.*pg	
	COMPARE.*file	
	EMPMST.*file.p	
	EVFEVENT.*file	
	MSTDSP.*file.d	승규는 눈물을 가지 않는 것이 없다.
+ 60	MSTDSP2.*file.	dspf
	PRJMST.*file.p	3 o 3 6 3 6
	QCBLLESRC.*f	
	QCLSRC.*file.p	Construction of the
	QCMDSRC.*file	
	QDDSSRC.*file	Construction of the second
	DODGERSON H	

You have learned how to expand source files, data files and all files in the RSELABxx library.

### Lesson checkpoint

You learned the following:

- About expanding files
- · How to expand files

## **Introducing filters**

Eventually you will find the need to see a subset list. That is what filters offer and the Remote System Explorer has extensive filter support. On each subsystem you can create filters. In the iSeries Objects subsystem you can create a library filter, an object filter and a member filter. In the iSeries Commands subsystem you can create a command set filter. In the iSeries Jobs subsystem you can create a job filter. In the IFS Files subsystem you can create a filter.

You can also use the Work with libraries, Work with objects and Work with members prompts under iSeries Objects to create filters.

There are several predefined filters as shown below under the Remote Systems view.



You have learned what predefined filters exist in each subsystem and how to create a filter.

### Lesson checkpoint

You learned the following:

- About predefined filters
- How to create a filter

# Creating a library filter

In the Remote System Explorer perspective, you now need to get to the iSeries objects you want to work with.

In the previous modules you have worked with the Library list. Now you will create your own library filter. Library filters list a set of libraries from your iSeries system in the Remote Systems view. But first let's understand what filters are all about.

Filters allow you to easily organize elements within your system. You use the filter function to list iSeries native file system objects (such as libraries, objects, or members).



To create a library filter:

- 1. In the Remote Systems view expand the connection that connects to your iSeries system if its not already expanded.
- 2. Expand iSeries Objects if its not already expanded.
- 3. Expand Work with Libraries. (You can also right-click iSeries Objects and click New > Library Filter on the pop-up menu).

Expanding Work with libraries corresponds to the WRKLIBPDM command, plus creates the filter in the Remote Systems view.

The Create a new iSeries library filter page opens:

lo New				×
Library Filter Create a new iS	r eries library filter			
Library: RSE*			<u> </u>	Browse
0	< Back	Next >	Finish	Cancel

You are going to create a filter to specify the libraries you want to work with, so they will show in iSeries Objects. You want to create a filter that shows all libraries on the iSeries with the name **RSExxxxxx** and **VARxxxxxx**, xxx being any character.

**Note:** You may need to select different libraries that appear on your system if libraries with the above names do not exist.

You specify the first filter string that selects the libraries starting with RSE.

4. Type RSE\* into the Library field, using the \* wild card character.

5. Click Next.

The Name the new filter page opens.

lo New		×
Library Filter Name the new filter		
Filters are saved for easy re-use Remote Systems view, and will be Filter name:		his filter. This name will appear in the
Only create filter in this conne Select a profile to own the new fi be placed in the default filter poor	ilter. This determines if it is uni	ique to you, or sharable by the team. It will
Select the profile whose default fi	ilter pool is to contain the new	filter: pleiades

**Tip:** You can choose between creating the filter for all connections or for this specific one only.

6. In the Filter name field, type All RSE and VARPG libraries.

You give your filters a name because the Remote System Explorer saves them for future use, unlike PDM, which does not save filters.

7. Click Finish.

Back in the Remote Systems view under iSeries Objects you will see the new filter. Expand it to see the list of all RSE\* libraries.

Now you need to add the VARPG libraries.

- 8. To change the library filter:
  - a. Right-click the filter All RSE and VARPG libraries and click Change.



The Change Library Filter window opens.

Change Library Filte	All RSE and VARPG libraries
Parent filter pool:	Pleiades Filter Pool
Filter strings: New filter string RSE*	New filter string: Library: VAR*  Browse  Test Create Revert
	OK Cancel

- b. Select New filter string from the Filter strings list.
- c. In the Library field, type VAR\*.
- d. Click Create.

The **VAR**<sup>\*</sup> filter string is added to the list.

e. Click OK.

You are now back in the Remote Systems view.



You will see the list expanded to include your filter. Now you can work with the libraries directly and can drill down to the object you want to work with.

You have created a filter to show a specific iSeries library and changed that filter to add more iSeries libraries.

#### Lesson checkpoint

You learned the following:

- About library filters
- · How to create and change a library filter

# Creating an object filter

Now create an object filter. Object filters list a set of objects from your iSeries host in the Remote Systems view.

To create an object filter:

1. In the Remote Systems view, expand your connection and then expand **iSeries Objects** if not already expanded.



 Expand Work with objects. You can also right-click iSeries Objects and click New > Object filter on the pop-up menu.

**Tip:** Expanding Work with objects corresponds to the WRKOBJPDM command.

The Create a new iSeries object filter page opens:

Now create a filter to show all your source files in your RSELABxx library.

0 New				
<b>Object Filter</b> Create a new iSeri	es object filter			
Library:	RSELABXX		▼ ▲	Browse
Object:	*		••	Browse
Object type:	*		•	Browse
Object attribute:	*		•	Browse,
	Mor	re Types>>		
0	< Back	Next >	Finish	Cancel

- 3. In the **Library** field, type RSELABxx.
- 4. Click **Browse** beside the **Object type** field. The Select Object Type window opens.

*CHTFMT *CLD			-
*CLS			
*CMD			
*CNNL			
*COSD			
*CSI			
*CSPMAP			
*CSPTBL *CTLD			
*CRG			
*CRQD			
*DEVD			
*DOC			
DTAARA			
*DTAQ			
*EDTD			
*EXITRG			
*FCT			
*FILE			
*FLR			
FNTTBL			
*FNTSRC			-
*EORMDE			-

- 5. Select **\*FILE** under the **Select an object type** list.
- 6. Click OK.

The Create a new iSeries object filter page displays with the object type updated.

Library: RSELABxx	
	Browse
Object: *	▼ ▲ Browse
Object type: FILE	▼ ▲ Browse
Object attribute: *	Browse
More Types>>	>

- Click Browse beside the Object attribute field. The Select Object Attribute window opens.
- 8. Select **PF-SRC** from the **Select an object attribute** list.
- 9. Click OK.

BSCF38			
CMNF38			
DDMF			
DFUEXC			
DKTF			
DSPF			
DSPF38			
ICFF			
LF			
LF38			
MXDF38			
PF-DTA			
PF38-DTA			
PF-SRC			
PF38-SRC			
PRTF			
PRTF38			
SAVE			
TAPE			

10. Click Next.

The Name the new filter page opens.

bject Filter				$\rightarrow$
ame the new filter				-
Filters are saved for easy re Remote Systems view, and	e-use. Specify a unique name will be expandable.	for this filter. This na	me will appea	ir in the
Filter name:		My sou	rce files	
	new filter. This determines if it	is unique to you, or s	sharable by th	he team. It wil
Select a profile to own the r be placed in the default filte	new filter. This determines if it ir pool for that profile.			he team. It wil
Select a profile to own the r be placed in the default filte	new filter. This determines if it			he team. It wi
Select a profile to own the r be placed in the default filte	new filter. This determines if it ir pool for that profile.			he team. It wi
Select a profile to own the r be placed in the default filte	new filter. This determines if it ir pool for that profile.			he team. It wil
Select a profile to own the r be placed in the default filte	new filter. This determines if it ir pool for that profile.			he team. It wi

- 11. In the **Filter name** field, type My source files.
- 12. Click Finish.

The new object filter displays in the Remote Systems view under iSeries Objects:



**Note:** If you end up with too many filters, you can create filter pools. They allow you to group filters. You will learn about filter pools later.

Now you know how to create filters and tailor your development environment. Filters can also be specified for non iSeries servers and your local system.

Now you can work with the objects you have in your Remote Systems view like you worked in PDM with a subset of libraries, objects, or members.

Let's assume you want to edit the member PAYROLL in the source file QRPGLESRC using this object filter.

- 13. To edit a member from your own object filter:
  - a. Expand QCBLLESRC.
  - b. Right-click member PAYROLLC.
  - c. Click Open With > Remote Systems LPEX Editor on the pop-up menu. This will download the source member and open the editor with this member. After you have edited the member you could save it and then compile it from the Remote Systems view by using the pop-up menu options on this member. You can also create your own actions in addition to the default actions. You will learn about creating user actions later.

You have created a filter to show all the source files in your library and accessed members to edit from your filter.

### Lesson checkpoint

You learned the following:

- About object filters
- How to create an object filter

# **Showing Filter Pools**

If you have been using the Remote System Explorer for some time, your workspace might contain too many filters to navigate easily. Or, you might just want to keep groups of filters separate if, for example, you need to represent two distinct iSeries environments in the Remote System Explorer, regardless of how many filters you have. In either case, you can group filters into filter pools. Without filter pools, all of your filters appear together in all connections. When you create filter pools, however, any filter you create within that filter pool is distinct to that connection, and will not appear in any other connections.

- 1. Create a connection to the same host. (Expand New Connection then iSeries). Give your new connection the name s400b.
- 2. To illustrate the use of filter pools, Click the menu button on the toolbar for the Remote Systems view, and select **Show Filter Pools**.



3. Under iSeries Objects you can now see your filters listed under Connection name Filter Pool.



4. Right-click iSeries Objects and select New > Filter Pool.

🖫 Remote Systems 🗙 🛛 Team	PAYROLL.RPGLE	"1
€ → @	□ 🕸 🏹 🛛 Line 1	(
E Local	000100 F	7**
🖻 📸 \$400a	000200 8	7 *
🛓 🕌 iSeries Objects	1000200 1	7 ×
E-Pleiades Fi New	Library	
Go Into	🖈 Filter Pool	
🕀 🚏 Pleiades Fi 🛛 Go To	Filter Pool Reference	:e )
🕀 🎒 iSeries Jobs 🥒 Open M	ember 00700 E	7*
보 유° Pleiades Fi 등을 Open to	New Window 00800 B	**
the up the files	100900 5	*
Generation Show in □ Show in	Table 01000 E	r <del>×</del>

5. Enter a pool name and click **Finish**. (You do not need to change your profile selection.) Your new filter pool displays underneath your connection.

New Filte	r Pool		×
System Filt Define a new	ter Pool pool for filters		
Pool name	myfilterpool		
Profile	pleiades		•
(?)		Finish	Cancel

The filter pool is added only to the connection from which it was created.

- 6. Right-click your new filter pool and select New > Library filter.
- 7. Complete the wizards as you did before. Use \*LAB\* as the generic library name for the library filter. Give your filter any name you like. Click **Finish**.
- 8. When you are finished, you can see your new library filter displayed underneath the new filter pool.

📳 Remote	Systems 🗙 Team	
	⊕   + →	< □ \$
🗄 📲 Ne	w Connection	
E E Lo	cal	
🖻 📸 s4	00a	
- B	iSeries Objects	
	Pleiades Filter Poo	6
E	nyfilterpool	
	🖻 📸 MYLIB	
	E ADTSLAB.	*lib.prod
	E ADTSLAB	(UA.*lib.prod
	🗄 🚎 ADTSLAB1	.*lib.prod
	E BLWSSLA	3.*lib.prod
	😟 🛋 EWRSELA	B01.*lib.test
	E 🛋 EWRSELA	B02.*lib.prod
	E 🛋 LABUSERS	5.*lib.prod 🚽

If you decide not to work with filter pools anymore, click the menu button on the toolbar for the Remote Systems view, and select **Show Filter Pools** again to clear the check mark.

For each filter pool, you can right-click and select from a number of actions. For example, you can rename, copy, move or delete a filter pool.

You have learned how to group filters into filter pools and how to create a new filter pool.

### Lesson checkpoint

You learned the following:

- About filter pools
- How to create a new filter pool

## Sharing filter pools

You can share filter pools among many connections through the use of a filter pool reference. A filter pool reference is a mechanism that displays a filter pool from one connection in any other connection, so that when you make a change to the original filter pool, your change is reflected in your filter pool reference. Before you create a filter pool reference, ensure that you have already completed the following: You have defined more than one connection to the same iSeries server You have defined more than one filter pool You have enabled Show Filter Pools from the Remote Systems view toolbar .

To use filter pool references:

- 1. Make sure you have another connection established.
- 2. In the Remote Systems view, expand the connection where you want to display a filter pool that exists in another connection.
- Right-click iSeries Objects and select New > Filter Pool Reference > your profile > pool name.

+ + + + = 55 ×	Line 1	C	Column	
			1000	Global Definition
Connection created successfully. I	000100		****	
E Δ Linux	000200	F*	PRO	E Fields
	000300	F*	DESI	🗄 🕞 Indicators
• Unix Unix	000400	F *		🗄 🎯 Main Procedure
王 儒x AIX	000500	F××	****	😟 🕞 Subroutines
🗄 🚍 Local	000600	F×	IND:	
E Local	000700	F×	50 ·	
🕀 📫 s400a	00800	F×	60 ·	
🖻 🧰 s400aa	000900	F×	90 -	
iSeries Objects     New	Library		KC -	
Beiades Fill     Go Into     Go Into	불은 Filter Pool			
Go To	Filter Pool Re	eference ▶	pleiades	▶ ≝ myfilterpool

4. Look under iSeries Objects again and you will see the filter pool reference.



Next, you make a change to the filter pool in order to see that change also occur in the filter pool reference.

5. Add new object filter called RPG. Right-click your new filter pool and select **New > Object** filter. Complete the wizards. When you are finished you will see the referenced filter is available in both connections.



6. To delete a filter pool reference, right-click it and select Remove reference.

	New	•
	Go Into	
	Go To	•
1	Open in New Window	
	Show in Table	
60	Refresh	
Ĩ.	Rename	
1	Сору	
4	Move	
21 <sup>60</sup>	Remove Reference	
×	Delete	
Û	Move Up	
÷	Move Down	
	Properties	

7. You can also move your filter pools up and down with the pop-up menu.

	New	•
	Go Into	
	Go To	•
	Open in New Window	
3	Refresh	
the second	Change	
Ţ	Rename	
1	Сору	
4	Move	
×	Delete	
t	Move Up	
÷	Move Down	
	Show in Table	
影	Find String	
F	Visualize Application Diagram	
	Properties	

You have learned how to share filters.

### Lesson checkpoint

You learned the following:

- About sharing filters
- How to share filters

## Creating a user action

In PDM you can create user actions in addition to using the pre-supplied system actions. In Remote System Explorer you can do the same. You define user actions through the Work With User Actions window. User actions can be defined for iSeries libraries, objects, members and jobs as well as folders and files in any remote UNIX, Windows, Linux, Local, or IFS system.

To open the Work with User Actions wizard:

1. Expand your iSeries connection and expand **iSeries Objects** if not already expanded.



- 2. Expand the Library list filter if not already expanded.
- 3. Right-click RSELABxx.
- 4. Click **User Actions** > **Work with User Actions** on the pop-up menu. The Work with User Actions window opens.

Work With User Actions	×
Parent profile: plejades	
Diject action	
	Close

5. In the right pane of the Work with User Actions window, expand **New** in the list, if it is not expanded already.

6. Select Object action.

You want to create a user action that copies a source file with data to a new source file called QJUNKSRC in the same library.

E New	Action name:	Copy source file	
Contraction	Comment:	Copy source file with	h data
	Command:	Normal command	
			-
	त		F
	Insert variable	Edit	Browse
	Prompt	Refresh after	Show action
	Prompt first	/ 🗖 Invoke once	
	Prompt first Single selection only Resource types for whi Defined Types	/ 🗖 Invoke once	ar
	Prompt first Single selection only Resource types for whi Defined Types ALL CMD FILE	r 🗖 Invoke once	ar Selected Types
	Prompt first Single selection only Resource types for whi Defined Types ALL	<ul> <li>Invoke once</li> <li>this action will appendix Add&gt;</li> </ul>	ar Selected Types
	Prompt first Single selection only Resource types for whi Defined Types ALL CMD FILE FILE FILE_DATA	Add>	ar Selected Types
	Prompt first Single selection only Resource types for whi Defined Types ALL CMD FILE FILE_DATA FILE_DATA FILE_DATA FILE_DSPF FILE_MBRS	Add>	ar Selected Types

- 7. In the Action name field, type Copy source file for the user action name.
- 8. In the **Comment** field, type Copy source files with data.
- 9. In the **Command** field, type CRTDUPOBJ for the command to execute.
- 10. Click **Prompt** to open the command prompter for this command.

From library: 84. Vani	e, generic*
Object type:     &T     #       To library:     *FROMLIB     Name       New object:     QJUNKSRC     Name       From ASP device:     *     Name       To ASP device:     *     Name       Duplicate data:     YES     YES       Duplicate triggers:     *YES     YES	
To library: *FROMLIB Name New object: QJUNKSRC Name From ASP device: * Name To ASP device: *ASPDEV Name Duplicate data: *ASPDEV Name Duplicate constraints: *YES Duplicate triggers: *YES	
New object:     QJUNKSRC     Name       From ASP device:     *     Name       To ASP device:     *ASPDEV     Name       Duplicate data:     **     Name       Duplicate constraints:     **YES     *       Duplicate triggers:     *YES     *	Add
From ASP device:     *     Name       To ASP device:     *ASPDEV     Name       Duplicate data:     YES     Image: Constraints:       Duplicate constraints:     *YES     Image: Constraints:       Duplicate triggers:     *YES     Image: Constraints:	•
To ASP device: *ASPDEV Name Duplicate data: *YES V Duplicate triggers: *YES V	e.
Duplicate data:	e
Duplicate constraints: *YES  Duplicate triggers: *YES	÷
Duplicate triggers: *YE5	
Advanced 🔽 All Parameters 🗖 Keywords	
Advanced 🔽 All Parameters 🔽 Keywords	
CRTDUPOBJ OBJ(&N) FROMLIB(&L) OBJTYPE(&T) NEWOBJ(QJUNKSRC) DATA(*YES)	×
	×
OK Restore defaults	Cancel

This is the command you will be running:

CRTDUPOBJ OBJ(&N) FROMLIB(&L) OBJTYPE(&T) NEWOBJ(QJUNKSRC) DATA(\*YES)

- 11. To specify user action parameters:
  - a. In the **From Object** field, type &N to indicate to use the name of the selected object in the Remote Systems view.
  - b. In the **From Library** field, type &L to pick up the library name from the selected object.
  - c. In the **Object Type** field, type &⊤ to pick up the object type from the selected object.
  - d. In the New Object field, type QJUNKSRC.
  - e. Select the **All parameters** check box to see the additional Duplicate data parameter.

Now the Duplicate data parameter is also shown on the prompt window.

- f. Select \*YES from the Duplicate data list.
- g. Click OK.

You return to the Work with User Actions window.

**Tip:** You can use the **Prompt** button to enter the variables or you can type the command directly and when you type &, you see a pop-up selection list, or you can use **Ctrl+Space** or press the **Insert Variables** button. From the list, you can then double click to insert the selected variable, at the cursor position.

🗞 Work With User Actions			×
Parent profile: pleiades			
E New	- Action name:	Copy source file	Dutline 🔀
Cipiect action	Comment:	Copy source file with data	
	Command:	Normal command	🗾 🗐 Global
		G - Job description library, from Comm	
	र ह	M - Job description name, from Comma ASJ - SBMJOB additional parameters. F J - Job description library/name, from	rom Command Execut
		L - Object or member library name MF - File name of temporary member,	containing selected re
	Prompt	ML - Library name of temporary memb MM - Member name of temporary mem	er, containing selecter
	Prompt first	N - Name of selected resource O - Object library, from Command Exe	cution properties
	🗌 🗌 Single selectic 💆		• //

h. Select the **Refresh after** check box, so that the Remote Systems view gets refreshed after the action has been run.

Action name:	Copy source file	
Comment:	Copy source file with	data
Command:	Normal command	
CRTDUPOBJ OBJ(&N)	FROMLIB(&L) OBJTYPE(8	
	1 1	-
Insert variable	Edit	Browse
	A.27	Selected Types
FILE_DSPF	Add>	FILE_SRC
FILE_MBRS	<remove(g)< td=""><td></td></remove(g)<>	
(FILE_SRC	Edit(H)	
LIB MSGF 🗨		
and the second sec		
FILE_SRC: *FILE:PF*	SRC	
	Comment: Command: CRTDUPOBJ OBJ(&N) Insert variable Prompt Prompt first Single selection on Resource types for wh Defined Types FILE_DSPF FILE_DSPF FILE_SRC ILE	Comment: Copy source file with Command: Normal command CRTDUPOBJ OBJ(&N) FROMLIB(&L) OBJTYPE(& Insert variable Edit Prompt Prompt first Single selection only Resource types for which this action will appear Defined Types FILE_DSPF FILE_DSPF Add> FILE_MBRS EDIF OR TE FILE MBRS FILE SPT Edit(H)

**Tip:** Clicking the **Insert variable** push button displays a list of valid replacement variables with the explanation of what they do.

This user action is only valid for Source physical files. You need to specify this restriction so this user action will only show in pop-up menus when you right-click on a source physical file.

- 12. To specify a restriction on a user action:
  - a. Under the **Defined Types** list box, click **FILE\_SRC**.

- b. Click Add beside the Defined Types list box.
   FILE\_SRC is now one of the selected types. Actually since you only selected this one it is the only one.
- c. Click **Create** then **Close**.

Now, only when you right-click on a source file, will this user action appear on the pop-up menu. For any other object type it will not appear. Back in the workbench and the Remote System view, give it a try.

Tip: Remember to close all the source members if you opened any earlier.

- 13. To try a user action:
  - a. Locate your filter My source files.



- b. Expand the filter My source files, if it is not already expanded.
- c. Right-click the QCBLLESRC file.
- d. Click **User Actions** > **Copy source file** on the pop-up menu.

The file gets duplicated and the list gets refreshed. Your new source file will show in the list. You can check the messages of the CL commands you are running in the RSE communications server job by looking at the iSeries Commands log view in the bottom right of the workbench.

Remote System Details	Tasks	iSeries Table View	💀 iSeries Commands Log 🗙		
s400a					
CRTDUPOBJ OBJ(QR Object OJUNKSRC in			ABXX) OBJTVPE(*FILE) NEWOBJ(QJUNKSR)	C) DATA(*YES)	-
1 objects duplicated.		ww.cype Titte die	ateu.		
Cause : All t	he objec		object types specified on the Create Duplic termine if any objects were not duplicated.		

e. Try other objects such as \*pgm or \*lib. Notice that the action that you just created is not there.



f. To delete the source file QJUNKSRC that you just created, right-click QJUNKSRC.



g. Click **Delete** on the pop-up menu.

The Delete Confirmation dialog opens.

h. Click Delete.

You have created a user action that copies a source file with data to a new source file, specified user action parameters, specified restrictions on the user action and tried the user action.

#### Lesson checkpoint

You learned the following:

- About user actions
- How to create a user action

## Creating user actions for jobs

You can also create user actions for Jobs, which will appear in the User Actions popup menu for jobs in the iSeries Jobs subsystem under a connection. The substitution variables include variables for the selected job's number, user and name.

To create a job action:

1. In the Remote Systems view, expand your iSeries connection, if not already, right-click iSeries Jobs, and select **Work with** > **User actions**.

You can also right-click on a file in one of your filters, and select **User Actions** > **Work With User Actions**.

📲 Remote Systems 🗙 🕇	eam 🗖 🗖	M MS	STDSP.DSPF 2	3
4 S -	-> <= (= (⊈ <		Line 1	С
E - To OCMD	SRC.*file.pf-src			+A*
and the second sec	SRC.*file.pf-src	0	00001	A* % %
😟 🔚 QJUN	(SRC.*file.pf-src	0	00002	A*
😟 🐻 QRPG	LESRC.*file.pf-src	0	00003	A***
🕀 🐻 QRPG	LESRCP.*file.pf-src	0	00004	A+
	JCD.*file.pf-src	0	00005	A*
± = to myfilterpool		0	00006	A*
🗄 📑 iSeries Commands		0	00007	A*
E-iiii iSeries Jobs     IFS Files     Control Contro Control Control Control Cont	New Go Into Go To	119000	0008 0009 0010	A*** A*%% A
iSeries Objects ⊕ - ∰ Pleiades Filter ⊕ - ∰ myfilterpool	Open in New Windo	W		
⊕ 🚔 MYLIB	Work With	1	2 * Filter Po	ols
	🖑 Refresh		🎄 User Act	ions
Properties 🛛 Remote	PR. Select Filter Pools		1	

- 2. Select New Job action.
- **3**. Type the text to display in the **Action name** field. For example, ENDJOB. This is a brief label for the action.
- 4. Type a longer, more descriptive text description for the action in the **Comment** field. For example, End Job Immediately.
- 5. Type the actual workstation or iSeries command string to run when a user selects this action. For example, ENDJOB JOB(&IJR/&IJU/&IJN) OPTION(\*IMMED).

This command can use action substitution variables when you run the action. These variables are used when defining the command string to run for a particular action. Substitution variables keep you from having to explicitly code command parameter values.

6. Click Insert variable to view and select valid variables.

Here is your completed job action:

Comment:	End job immedi	ately
	and the second se	acory
Command:	Normal comman	ıd
4	1	1
Insert variable	Edit	Browse
Prompt		
Prompt first     Single selection		after 🔽 Show a nce
1	Create	Revert(D)
	ENDJOB JOB(&IJN/	ENDJOB JOB(&JJN/&JJU/&JJR) OPTIC

7. Click **Create** then **Close**.

Now let's try this job action that you just created.

- 8. Make sure you have a 5250 session. Expand iSeries Jobs. Expand My active jobs. Expand QINTER.
- 9. Right-click the 5250 job and then select **User actions** > **ENDJOB** from the pop-up menu.

	🗙 Team 🗖		MSTDSP.DSPF	- 0	E Outline 🕅
- <b>4</b> - 9		$\overline{\nabla}$	Line 1	Column	i 🕀 🖺 MS
-	QCMDSRC.*file.pf-src			.+A*1	
	ODDSSRC.*file.pf-src		000001	А*%%Т5 🔺	1
	QJUNKSRC.*file.pf-src		000002	A* 89/	3
	QRPGLESRC.*file.pf-src		000003	A*****	
1 1 4 1 4 1 4 1 4 1 4 1 4 1 4 1 4 1 4 1	ORPGLESRCP.*file.pf-src		000004	A* THI	
	QSQLUCD.*file.pf-src		000005	A* TIM	
± ≩° myfi			000006	A*	
🗄 📲 iSeries C			000007	A*	
🗄 🎒 iSeries J			000008	A*****	
E So Pleia	ides Filter Pool		000009	A*%%EC	
. ÷	Active jobs		000010	A	
	My active jobs	_ =	1		1
<b>0</b>	QINTER		<u> </u>	Þ	
	028387/STECKHAM/Q				
	QUSRWRK	Go T	o 🕨	•	1
	My jobs	Refr	esh	Series Table	iSeries Comm
•		0 1.011		=	
Properties 23	Remote Scratchpad	End	,	1	
		Hold			
	日春日	Rele	ase		
Property	Value	Add	To Job Status View	LESRC) FROMLIB	RSELABXX) OBJTYP
Current user ider		Disp	lay job log	ATA(*YES)	
Entered system		User	Actions 🕨	ENDJOB	
Job type	Interactive				
Name	QPADEV000W		vert job log 🕴	' ــــــــــــــــــــــــــــــــــــ	r Actions
Number	028387	Debi	Jg As 🔰		T Prom

10. Switch to a 5250 session to verify that the job has ended.

**Tip:** Similar to user actions for objects and jobs, you can also create user actions for IFS.

You have created a user job action.

#### Lesson checkpoint

You learned the following:

- About user job actions
- · How to create a user job action

# Customizing compile commands for iSeries Objects

In additional to user actions, there is specific support for creating compile commands too. You use the Work with Compile Commands window from the iSeries Objects subsystem under an iSeries connection to change IBM or vendor supplied compile commands or your own compile commands.

To create your own command:

📕 Remote Systems 🗙 🛛 Team		nstdsp.ds/	PF	: 22 - 0
	<b>∃ ⊈</b> , ⊽	Line 1	Column 8	Replace
			+-* <mark>A</mark> -1-B+	28
EMPMST.*file.pf-dta		000001	PROCESS APOS	r. 🔺
EVFEVENT.*file.pf-d	a	000002		
⊞66 MSTDSP.*file.dspf		000003	IDENTIFICATI	ON DIVISI
⊕ MSTDSP2.*file.dspf		000004		
		000005	PROGRAM-ID.	PZ
🖃 🔐 QCBLLESRC.*file.pf	src	000006	AUTHOR.	Pr
PAYROLLC.cble		000007	INSTALLATI	
PAYROLLC2.dlle		000008	DATE-WRITT	
Go T	0	•	DATE-COMPI	LED.
			-	
E. QCMDSRC. Oper		•	*	<b>.</b>
🗄 👘 QDDSSRC. Brow	se With	•		لشر ال
🕀 💼 QRPGLESR				
🗎 📳 💀 💀 🕀 REFMST.*f			m 🕅 Tasks iSeries	Table View Serie
🗈 🗐 RSNMST.*1 💥 Dele	te			
SAVFTST.*			-	🏻 🚰 🖑 🤆
	Services	•		
: : _ →L	String			
Properties 🕮 🛝 Remote Scra 📶	-			
Verif	-			
	y (Prompt)			
Property Value Com	pile	+		
Attribute SRC Com	pile (Prompt)	•	✓ → CRTBNDCBL	
Name PAYROLLD User	Actions	+	CRTCBLMOD	
Number 0			<u></u>	
Add	To iSeries Proje		Anx Work With Compile Co	ommands 📐
☐ <sup>◆</sup> Prompt and then run Make	e Available Offlir	ne	1 .	

- 1. In the Remote Systems view, expand RSELABxx, expand QCBLLESRC and right-click PAYROLLD.cblle.
- 2. Click **Compile (Prompt)** > **Work with Compile Commands** in the pop-up menu.

The Work with Compile Commands dialog opens.

🙆 Work With Compile (	Commands		×
Parent profile:	aschwabe		•
Source type:	CBLLE	•	Add Remove
Compile Commands: New command CRTBNDCBL CRTCBLMOD	New compile command: Label: Command: Insert variable Prompt	:   Edit	Browse
,			
			Close

**Tip:** You can also work with compile commands from the Compile option (**Compile > Work with Compile Commands**).

3. New command is already selected for you in the list of commands.

**Tip:** To edit an existing command, first find it by selecting the member type it applies to (or add a new member type if necessary) at the top of the Work with Compile Commands dialog, and select the command in the list of commands on the left. Edit the command and apply the changes. You can also right-click on a command to delete it, copy and paste it or re-order it. You cannot delete IBM-supplied commands, but after editing them, you can restore them to their shipped value.

- 4. In the Label field, type CRTBNDCBL no debug command.
- 5. In the **Command** field, type CRTBNDCBL command.
- 6. Click **Prompt**.

The Create Bound COBOL Program (CRTBNDCBL) dialog opens.

🔞 Create Bound COBOL Progra	m (CRTBNDC	BL)			×
Program:	>	8N	•	Name	
Library:	>	80	•	Name	
Source file:	>	8F		Name	
Library:	>	8L	•	Name	
Source member:	>	8N	•	Name	
Source stream file:			100	1	
Generation severity level:		30		0-30	
Text 'description':		*SRCMBRTXT	2	Character value	
Court and the second		Advanced Parameters			
Compiler options:	>		- Add		
		*EVENTF	Remov	e	
			Moveu	P.	
			Move do	WITH	
Debug view option:	>				
Debug view:	>	*SOURCE	•		
Compress listing view:		*NOCOMPRESSDBG	-		
Replace program:	>	*YES	•		
Advanced(1) All Param	eters(2) 🗆 Ki	eywords( <u>3</u> )			
CRTBNDCBL PGM(&O/8N) SRCFILE	(8L/8F) SRCMB	R(&N) OPTION(*EVENTF) DBGVIEW(*	SOURCE) REPLACE	(*YES)	
					4
		QK	Restore de	faults Cancel	
		24	Testore de	<u>Zalice</u>	

- 7. Change the Debugging Views option to \*NONE.
- 8. Click OK.

The Work with Compile Commands displays.

🔞 Work With Compile Co	ommands		×
Parent profile:	aschwabe		•
Source type:	CBLLE	<b>_</b>	Add Remove
Compile Commands: New command CRTBNDCBL CRTCBLMOD CRTBNDCBL - no debug	Selected compile comm Label: Command: CRTBNDCBL PGM(&O/	CRTBNDCBL - no	
			Close

- 9. Click **Create** to create this new command.
- 10. Click Close.
- 11. Right-click PAYROLLG.rpgle.

The new command is added to the list of available compile commands for members of the type specified in this command. The checkmark appears beside the last used compile command for the selected member's type.

12. Click **Compile** > **CRTBNDRPG** - **no debug** on the pop-up menu and change the program name to PAYROLLN.

The member is compiled and the program object is created.

Any errors produced by the compile are displayed in the Error List window, where you can double-click to open the editor and position it at the error.

13. Right-click the program PAYROLLN and click **Debug As > Batch**. If you don't see the program in the list, click the **Refresh** icon in the Remote Systems view. An error message displays indicating that PAYROLLN cannot be added to debug since it does not have debug data.

6 Erro	or and a second s
8	DBGP0004I Program PAYROLLN could not be added to debug since it does not have debug data.
	OK

#### 14. Using predefined commands

For some of the frequently used commands, the Commands subsystem provides you with a number of predefined command sets. You can use these command sets or create new ones of your own. For example, to run the ADDLIBLE command set:

- a. In the Remote Systems view, expand the iSeries Commands subsystem.
- b. Right-click Add library to library list and click Change.



The Change Command Set window opens.

Name:	Add library to library list	
Command p	oool: Pleiades Filter Pool	
Commands New comm	nand Selected command:	
?ADDLIBLE	Command:	
	ADDLIBLE	<b>T</b>
	Browse	Prompt
	Specify if the command should run in the Re Normal C Batch	emote System server job, be submitted C Interactive
		Apply Revert

From here you can now modify the existing command or create a new one.

c. Click Cancel.

**Tip:** There is a Preferences dialog that has many preferences which effect substitution variables for user actions and compile commands. Click **Window** > **Preferences** and then expand **Remote Systems**, then expand **iSeries** and select **Command Execution** 

type filter text	Command Execution	<⊳ - ⇒
Java     Jython     Logging     LPEX Editor     Model Validation	Preferences for compiles and user action variable Object library: *SRCLIB ✓ Replace object &R var Compile in batch	s &O var
<ul> <li>Modeling</li> <li>Package Naming Preference:</li> <li>Plug-in Development</li> <li>Portal</li> <li>Process</li> <li>Profiling and Logging</li> <li>Remote Systems</li> <li>Communications</li> <li>Debug</li> <li>File Cache</li> <li>Files</li> </ul>	Preferences for batch compiles, commands, and u Job description library: *LIBL Job description: *USRPRF SBMJOB additional parameters: Add batch compiles to the iSeries Job Status	&H var &G var //www. &ISJ var
- Series - Cache - Command Execution - Commands Subsyste - IFS Files Subsystem - Jobs Subsystem - Objects Subsystem - Table View - Logging - Passwords - Passwords - Commands -	Preferences only for compile commands Compile member types in this order: PF LF DSPF PRTF ICFF RPGLE CLLE	Move Up Move Down
Remote Systems LPEX E     Screen Designer (Techni-     SSL     Requirement Management     Compiled Debug     Compiled Debug     Console     DB2 Stored Procedure D     Debug Daemon     External Tools     Series Debug	Preferences only for user action variables	store Defaults Apply

You have created a new CRTBNDRPG command and looked at predefined command sets.

### Lesson checkpoint

You learned the following:

- About predefined command sets
- How to create a new command

# **Using Run configurations**

Run configurations are for powerful re-use. If you want to run a program that takes a number of parameters, or is not straightforward to launch, you can predefine this information into a named configuration. Once created, the configuration appears in the configuration list, and can be selected from there. Every configuration defined can be accessed from the pull down menu of the Run tool bar button through the Run option. Clicking the Run tool bar button will run the previous configuration again.

To change an existing run configuration:

1. Right-click CLR1 then Run (Prompt) > Interactive on the pop-up menu.



The Run configurations window opens.

dify attributes and launch.	
ame: My iSeries program for run	
ow To Start 🔲 Common	
Connection: s400a	
Command to start application:	
CALL PGM(RSELABXX/CLR1)	<u> </u>
	<u></u>
Promp	t
	Apply Revert

**My iSeries program for run** is the default name assigned to a configuration created on the fly when you select **Run** from the pop-up menu of a program. To save a configuration for later use, you would change this default name.

- 2. Change the name of the configuration to CLR1Run.
- 3. Click Prompt.

The Call Program (CALL) window opens.

A00	ogram:	>	CLR1		Name	
Advanced All Parameters Keywords	Library:	>	RSELABXX	•	Name	
	arameters:		'XX'			Add
CALL PGM(RSELABXX/CLR1) PARM('XX')	Advanced		All Parameters	Keywor	ds	
				as.		
	ALL PGM(RSELA	BXX/C	LR1) PARM('XX	()		
	ALL PGM(RSEL4	ABXX/C	(XX) PARM	()		1
	ALL PGM(RSELA	ABXX/C	(XX) PARM(XX			 ļ
OK Restore defaults Cance	ALL PGM(RSEL4	ABXX/C	(XX) PARM(XX			 ]

- 4. In the **Parameters** field, type 'XX', where XX is your workstation number.
- 5. Click OK.

The complete start command for the program appears.

1y iSeries program for run		
dify attributes and launch.		
ame: My iSeries program for run		
ow To Start 🔲 Common		
Connection: s400a	×	New
Command to start application:		
LALL PGM(RSELABXX/CLR1) PARM('XX')		4
		-
I Prompt		
Prompt		
	Apply	Revert

6. Click Run.

The program runs.

If not, you may see this error message.



The interactive connection has been shut down in the meantime. Go to your 5250 emulator and restart the interactive connection following the instructions in the message. You don't have to cancel the message. It will be removed as soon as the connection between the interactive connection and the interactive session has been established.

The program runs and waits for input from the 5250-emulation session.



7. Press F3 to end the program.

**Tip:** You can edit, delete and create run configurations by clicking the arrow beside the icon on the workbench toolbar and selecting from the list.

🗞 Remote System Explorer - MSTDSP.DSPF - IBM We	bsphere Development Studio Client Advanced Edit	tion
File Edit Source Compile(G) Navigate Search Project	t Data Run Window Help	
113 • 13 ▲   ジン   0 0 ≥   A ÷	EREIŞ+OPQ+ IUI	A?
] ½ → 3 → · · · · ·	💦 1 My iSeries program for run	
🗄 📑 Remote Systems 🗙 Team 🗮 🗖	MSTDSP.DSPF 🖾 Run As	.,
★ 200 + - 0 E E	Line 1 🜔 Run	
E iSeries Objects	Organize Favorites	

You can also click Run on the workbench menu and select Run.


The Run Launch Configurations window opens.

) Run	w configurations		
reate, manage, and r	un contigurations		
type filter text	Name: CLR1Run How To StartCommon		
Generic Server Generic Server Host C/C++ A Host Java App Series: Run Ar	Connection: s400a		▼ New
iSeries: Run Ba iSeries: Run In CLR1Run iSeries: Run M Java Applet Java Applicatic Java Applicatic	CALL PGM(RSELABXX/CLR1) PARM('XX')		*
Java Bean JET Transform JU JUnit JU JUnit Plug-in To SWT Applicatic	Prompt		<u>×</u>
E Test WebSphere Ac WebSphere v5 WebSphere v6 WebSphere v6 XSL Transform		Apply	Revert
• <b></b> •		Run	Close

Here you can see the CLR1Run configuration that you just created. This is your saved configuration to run CLR1 as an interactive application. Notice the list of configurations you can choose.

You have created and saved a run configuration.

#### Lesson checkpoint

You learned the following:

- About run configurations
- How to create a run configuration

# **Module summary**

In this module, you learned how to work with some of the many features of the Remote System Explorer perspective.

#### Lessons learned

- · Know the features of Remote System Explorer
- · Move, dock, rearrange, resize, hide, close, reopen and add views
- · Save and reset a customized perspective

- · Create a filter to show specific iSeries libraries
- · Change the filter to add more iSeries libraries
- · Create a filter to show all the source files in a library
- · Access members to edit from your filter
- Create a user action that copies a source file with data to a new source file in the same library
- Specify user action parameters
- · Specify a restriction on a user action
- Try the user action
- Create a user action for iSeries jobs
- · Create your own compile command
- Using run configurations

## Assessment

- What is the Remote System Explorer?
- What filters list a set of libraries?
- What is the purpose of a filter?
- Can you create filters for all connections or a specific connection?
- Can you give filters a specific name for future use?
- What filters list a set of objects?
- What is the purpose of a filter pool?
- · Can you define filters for non iSeries servers and your local system?
- What is the purpose of a user action?
- Can you specify a restriction on a user action?

## **Designing screens and reports**

This module teaches you about the various aspects of the CODE Designer while modifying a display file to add a screen and creating a simple printer file. You will step through each part of the CODE Designer tool interface and update some DDS as well. In the workbench, in the Remote System Explorer perspective you will use the connection that you used in the module before.

## Learning objectives

- Open a DDS member for edit with CODE Designer
- Show file-level keywords and record keywords
- · View the details of records, record-level keywords and field-level keywords
- View the design of the payroll application main menu
- · Create a group from an existing record format
- · Create a new group and add a subfile record and a subfile control record
- · Add columns to the subfile record
- Add fields to the subfile control record
- Copy existing fields
- Set indicators to handle field errors
- View and update record and field properties
- View keywords and the properties of a keyword
- · Insert a keyword

- View help for a keyword
- Check there are no semantic errors in the DDS source
- View help for an error
- · Launch the editor in read mode from the error list
- Launch the editor in write mode to fix the error
- Find a keyword in the source
- Save source changes
- Compile your source changes
- Create a printer file report
- Close the Designer

## **Time required**

This module should take approximately 30 minutes to complete.

# Opening a DDS member in the Remote Systems view

Using an editor to create and maintain DDS source for your display, printer and physical files can be a frustrating and difficult task. What would be great is a graphical design tool that let's you design your screens and reports visually and then generate the DDS source for you. Well, that's exactly what CODE Designer does for you.

CODE Designer helps the novice DDS programmer create screens, reports and databases quickly and easily without worrying about the details of the DDS language, while at the same time letting the expert DDS programmer get access to all the features and power of the language.

Tip: Make sure MSTDSP is closed from the previous LPEX Editor lessons.

To open a DDS file member from the Remote Systems view:

- 1. Expand the Library list filter if it is not already expanded.
- 2. Expand the QDDSSRC file in library RSELABxx.



- 3. Right-click the MSTDSP member.
- 4. Click **Open with > CODE Designer** on the pop-up menu.

The member MSTDSP will be downloaded to the workstation and loaded into CODE Designer. CODE Designer is a separate tool not integrated into the workbench.

You have opened the DDS source member MSTDSP in the Remote Systems view using CODE Designer.

#### Lesson checkpoint

You learned the following:

- About CODE Designer
- · How to open a source member in CODE Designer

## Viewing the DDS tree

What you are looking at now is basically an Explorer view of the DDS. The DDS tree view on the left-hand side of the Designer displays the DDS source in its file, record, field, and keyword hierarchy. It is a familiar and intuitive way to see the overall structure of the DDS source and to navigate through it quickly. Don't worry if you're not a DDS expert, everything will be explained to you.

The DDS tree shows groups of records, which represent the screens or reports you are designing, as peers of the file in the tree hierarchy.

In this view, you can create groups, and copy or move keys, keywords, fields, and records. If any DDS object contains an error, the icon representing it displays a red X.

To show file-level keywords and the record SELECT in the DDS tree:

- 1. Expand the <Servername>RSELABxx/QDDSSRC(MSTDSP) folder.
- 2. Expand the File Keywords folder.
- 3. Expand the SELECT record.
- 4. Expand the Record Keywords folder.
- 5. Expand the EMESS field.



The DDS tree now shows you a summary of the file-level keywords and of the record SELECT.

You have seen the file-level keywords and the record SELECT in the DDS tree.

## Lesson checkpoint

You learned the following:

- About file-level keywords
- · How to view file-level keywords

# Selecting the DDS object

In the upper right-hand side of the Designer is the Workbook with several different tabbed pages. The Workbook is the area of the CODE Designer where you design display files, printer or physical files. You can view this notebook on the top right-hand side of the CODE Designer window. The top page is called Details and it provides a detailed view of the DDS objects selected by the DDS tree. You can view this page in either details mode or list mode by clicking View > List from the CODE Designer menu.

In the Details page columns display information about the selected DDS object. You can use this page to display for example, details of all the fields in the record SELECT or keywords and conditions of a field or record.

The Listing page is a listing of the source statements generated by the Program Verifier.

In the bottom right-hand side of the Designer is the Utility notebook. This notebook contains several pages: Selected DDS, Web Settings, Comments and Error List. The Selected DDS page in the notebook shows the actual DDS source for the currently selected item.

**Tip:** The Web Settings page allows you to specify attributes that are used by the WebFacing tool.

To work with the DDS record SELECT:

1. In the DDS tree click the SELECT record.

The Details page lists all the fields in the record SELECT and summarizes some of their properties. The Selected DDS page shows the DDS for the SELECT record.

Record SELECT fields							
Field	Positi	Len	Туре	Shift	Usa	Sample 🔺	
A 'PRG01'	2,5	5	Text const			PRG01	
A 'Time RSystem'	2,30	21	Text const			Time Reporting Syste	
🔁 "DATE	2,70	6	Date const			MM/DD/YY	
A 'Mainteection'	3, 30	21	Text const			Maintenance Selectic	
*TIME	3,70	6	Time const			HH:MM:SS	
A 'Enterintain'	6,14	54	Text const			Enter an X beside the	
EMPAPL	9,25	1	Alphanumeric	A - Alphanum	Both	В	
A 'Employenance'	9,28	27	Text const			Employee Master Mai	
PRJAPL	10, 25	1	Alphanumeric	A - Alphanum	Both	В	
A 'Projecenance'	10, 28	26	Text const			Project Master Mainte	
RSNAPL	11,25	1	Alphanumeric	A - Alphanum	Both	в	

2. In the DDS tree click Record keywords immediately below SELECT.

The Details page shows the current record-level keywords. The Selected DDS page still shows the DDS for the SELECT record.

Keyword       Conditioni         Selected DDS       Create keywords         Web Settings       Comments         Error list         Image: Selected DDS       Create keywords         Web Settings       Comments         Error list         Image: Selected DDS       Create keywords         Web Settings       Comments         Error list       Image: Select Se	∞BLINK ≪ALARM 60	
ALARM 60 Selected DDS Create keywords Web Settings Comments Error list A* 89/03/02 12:07:25 DOUG REL- A* THE SELECT FORMAT ALLOWS SELECTION OF A* MASTER FILE THE OPERATOR WANTS TO MAIN	⊶ALARM 60	
Selected DDS Create keywords Web Settings Comments Error list  A* 89/03/02 12:07:25 DOUG REL- A* THE SELECT FORMAT ALLOWS SELECTION OF A* MASTER FILE THE OPERATOR WANTS TO MAIN	₽,	
Selected DDS Create keywords Web Settings Comments Error list A* 89/03/02 12:07:25 DOUG REL- A* THE SELECT FORMAT ALLOWS SELECTION OF A* MASTER FILE THE OPERATOR WANTS TO MAIN		
Selected DDS Create keywords Web Settings Comments Error list A* 89/03/02 12:07:25 DOUG REL- A* THE SELECT FORMAT ALLOWS SELECTION OF A* MASTER FILE THE OPERATOR WANTS TO MAIN		
Selected DDS Create keywords Web Settings Comments Error list A* 89/03/02 12:07:25 DOUG REL- A* THE SELECT FORMAT ALLOWS SELECTION OF A* MASTER FILE THE OPERATOR WANTS TO MAIN		
Selected DDS Create keywords Web Settings Comments Error list A* 89/03/02 12:07:25 DOUG REL- A* THE SELECT FORMAT ALLOWS SELECTION OF A* MASTER FILE THE OPERATOR WANTS TO MAIN		
A* 89/03/02 12:07:25 DOUG REL- A* THE SELECT FORMAT ALLOWS SELECTION OF A* MASTER FILE THE OPERATOR WANTS TO MAIN	Selected DDS Create keywords Web Settings Comments Error list	
A* 89/03/02 12:07:25 DOUG REL- A* THE SELECT FORMAT ALLOWS SELECTION OF A* MASTER FILE THE OPERATOR WANTS TO MAIN	Selected DDS Create keywords   Web Settings   Comments   Error list	
A* 89/03/02 12:07:25 DOUG REL- A* THE SELECT FORMAT ALLOWS SELECTION OF A* MASTER FILE THE OPERATOR WANTS TO MAIN	Selected DDS Create keywords Web Settings Comments Error list	
A* 89/03/02 12:07:25 DOUG REL- A* THE SELECT FORMAT ALLOWS SELECTION OF A* MASTER FILE THE OPERATOR WANTS TO MAIN	Selected DDS Create keywords Web Settings Comments Error list	_
A* 89/03/02 12:07:25 DOUG REL- A* THE SELECT FORMAT ALLOWS SELECTION OF A* MASTER FILE THE OPERATOR WANTS TO MAIN	2	
A* THE SELECT FORMAT ALLOWS SELECTION OF A* MASTER FILE THE OPERATOR WANTS TO MAIN		
A* THE SELECT FORMAT ALLOWS SELECTION OF A* MASTER FILE THE OPERATOR WANTS TO MAIN	1. 00.000 10 00 00 DONO	TTT .
A* MASTER FILE THE OPERATOR WANTS TO MAIN		
A BLJ A 60 AL/ A 2 5'PF		1000000
А БО АЦ/ А 2 5'PF	Å	
	Α 50	
e / 311 13	A 2 30	

3. In the DDS tree click the EMESS field.

The Details page shows its field-level keywords. The Selected DDS page now shows the DDS for the EMESS field.



Even this relatively small and simple DDS source member demonstrates how much easier it is to use the Designer to navigate through your DDS source. The syntax is being interpreted in intuitive graphical ways making it an ideal tool for learning DDS. But to get orders of magnitude improvement in your productivity what you really need is to work with your screens and reports in a WYSIWYG fashion, completely independent of the DDS required to make things appear the way they do. You need the Design page.

You have seen the details of the record SELECT, the record-level keywords and the field-level keywords.

## Lesson checkpoint

You learned the following:

- About viewing the details of a record
- How to view the details of a record

# **Designing the DDS screen**

You will spend most of your time creating, updating, and designing your DDS screens and reports in the Design page. The Design pages allow you to design your screens or reports visually using an intuitive graphical user interface. The Design page shows the DDS source as it would appear on either a screen (for display files) or a printed page (for printer files). It allows you to design your application's screens or reports by laying out records and fields in a graphical user interface.

On the Design page, you can easily create, edit, resize, and move DDS objects graphically. You can create new records, fields, and constants directly on the Design page by using the palette push buttons to the left of the Design area or from the pop-up menus. The toolbar above the Design area allows quick access to many of the editing features as well as information about the currently selected object.

Click the MAIN-MENU tab in the workbook.



In order to understand where MAIN\_MENU came from, you need to understand the concept of a group. A group is simply a collection of one or more DDS records that represent how a screen or report would be assembled at runtime. It allows you at development time to work with screens or reports as they would appear when they get assembled by your programs at runtime. To work with groups in CODE Designer you need to tell CODE Designer which record formats make up a screen. In this case this has been done for the screen you see in the Design page. A group MAIN\_MENU has been created for you and CODE Designer has saved this information in the DDS source in comment lines. Any groups that you create are persisted as comment lines in the DDS so you can re-use these groups in subsequent CODE Designer sessions.

The groups you create will appear in the tree view as well as in the workbook as a Design page tab for each group defined, to allow quick access to each group of records.

You have seen the concept of a group, specifically the MAIN\_MENU group.

## Lesson checkpoint

You learned the following:

- About groups
- How to see a group in CODE Designer

# Creating groups from existing records

If you are working with existing DDS, you will want to create groups that will correspond to how the records are being used. In this example you will create a group for the next screen, where the user selects which employee in the payroll database to maintain. The screen is made up of the record format EMPSEL.

To create a new group:

1. Scroll to the bottom of the DDS tree and expand the MAIN\_MENU group. The SELECT record appears as the only record in this group.

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	-	I ECO	1
	Side		R .
		• • •	े 🚷 इंसल्य

2. Right-click the MAIN-MENU group.

3. Click Insert group on the pop-up menu.

A Group Properties notebook opens and a blank Design page for the group SCREEN1 also opens.



The Properties notebook lets you view and update the properties of the currently selected DDS object. You can open this notebook from any view, pop-up menu, or menu of the CODE Designer. The Properties notebook is modeless. When you change an object's properties, the selected object changes immediately.

4. In the Group Properties notebook, select the EMPSEL record from the **Available** list and click the >> button.

For simplicity this is the only record you will add for now. The Design page now shows you what the record EMPSEL looks like.



5. In the group field, type EMPL\_SELCT over SCREEN1 to rename the group.

📺 Group prop	erties	NO DESCRIPTION	? X
Basics Styles	1		
Group	EMPL_	SELCT	
Ave	ailable	Sel	ected
SELECT EMPMNT PRJSEL PRJMNT RSNSEL RSNMNT		EMPSEL 	

6. Close the Group Properties notebook. Click the **X** in the top right corner of the Group Properties notebook.

You have finished creating a group. You could now work in the Design page with the record formats contained in this group. Instead you'll create a new record format.

It appears that this is one of those unusable applications where you have to know the employee number ahead of time instead of being able to browse what is in the database. What we really need is a subfile. But aren't those difficult to code, you ask? Not with CODE Designer.

You have inserted a new group using the existing record EMPSEL.

#### Lesson checkpoint

You learned the following:

- About inserting groups
- How to insert a new group

## Creating new screens

To create a new record screen on the Design page you need to create a group that will create an empty page you can work with.

To create a new group:

- 1. Right-click the new EMPL\_SELCT group in the DDS tree.
- 2. Click **Insert group** on the pop-up menu.

A Group Properties notebook appears and a blank Design page for the group SCREEN1 also appears.

Details   MAIN_MENU   EMP_SELCT	SCREENT Source Listing	
		"man "man "man " man " man " man " man " man "
Ignore all indicators	I daba I o d ( d ( d )	
		+6+7
2	Group properties	? ×
	Basics Styles	
	Group SCREEN1	
āš ļ	Available Selected	
	EMPSEL EMPNNT	
	PRJSEL >>	
	RSNSEL RSNMNT	
Selected DDS Web Settings Comme		
	1	N
A A		
н		

- 3. Rename the group to EMPL\_LIST and close the Group Properties notebook.
- 4. You can create things on the Design page by selecting the appropriate tool from the palette on the left-hand side and then click on the Design page where you want it to be created. Right now, most things are disabled in the palette because there is no record in which to create fields. The only two buttons available are **Create standard record** and **Create subfile record**. If you leave the mouse over a button for a second or two, flyover help will appear describing the indicated button.



5. Click the **Create subfile** record button and then click in the dark gray area. A subfile and a subfile control record pair are created.

Details MAIN_MENU EMP_SELCT EMPL_LIST Source Listin	a
│ Ignore all indicators 💽 소금불관 室	
	+
2 E 2	

You have created a new record screen.

## Lesson checkpoint

You learned the following:

- About new screen records
- · How to create a new screen record

## Adding fields to the subfile record

Now you add some columns to the subfile using the Design page. The subfile should be positioned on row eight. You use the cursor to specify the location of the part you want to put on the screen, in this case your subfile.

To add fields on the subfile:

- Click the Create named field button and then click somewhere on row 8. Six fields appear in a vertical column. This is because the subfile you created, currently specified a SFLPAGE (visible list size) of six.
- 2. Click the top field and **hold** the mouse button down and **move** it to **row 8**, **column 5**.

Note the current row and column appear just above the field as you move it.



3. Move the cursor over to the **right edge** of the field. It turns into a double-headed arrow. Hold down the mouse button and **move** it to the **left**. The size of the field will be reduced. The current size will appear just above the field. When the size is **3**, let go of the mouse button.



The toolbar at the top of the Design page is a very convenient place to monitor and manipulate the currently selected parts.

4. Rename the record from RECORD1 to EMPLSTSFL and the field from FIELD1 to OPCODE by typing over the text in each list.

MEMPLSTSFL		OPCODE				
1/0 Ignore all indicators	•	A#5.08	•	0	※ I=I ※	<b>BA</b>

- 5. Click the Color palette button and select pink to change the color of the field.
- 6. Click the 🔳 button to change the usage of the field to input.



Now you will create an additional column in the subfile.

- 7. To create an additional output column:
  - a. Position the cursor at row 8, column 9.

**Tip:** The bottom right of the CODE Designer window shows the current cursor position 8.9 .

If you can't see the field with the cursor position on your screen, click the **Maximize** button in the top right corner of the screen. You can use the cursor keys or the mouse to move the cursor.

b. If you are creating a long field with an exact length, the SDA syntax can be easier. Type: +0(30) and then press the **back arrow** (not Backspace!) to select the text you created.

Notice from the Selected DDS page that you have created a text constant containing +0(30).

c. Click the **Convert string to field** button on the toolbar or press **F11** to convert the SDA syntax into a character output field of length 30.

+++	000000000000000000000000000000000000000
÷÷÷	
÷÷÷	000000000000000000000000000000000000000
÷÷÷	
+++	
111	000000000000000000000000000000000000000

EMPLSTSFL	▼ \$ <u>**</u>	'+O(30)' <b>–</b>	6 <u>4.45</u>	6	•	
Ignore all indicators	•	4363	-	0		×====

d. Rename the new field to ENAME using the toolbar. This will show the name of the employee.

Details   MAIN_MENU   EMP_SELCT	EMPL_LIST Source Listing
EMPLSTSFL .	
1/0 Ignore all indicators	▾ ◢◾◾◚×▾ ▫ ◻ ▨▯▦ ◾ֿਲ਼◢ど וּש
□ 🕞1	+5+6+7

- e. Position the cursor to **8**, **41**.
- f. Now you will add a field for the employee's salary. Type \$666,666.66 and then press the back arrow.

Now wouldn't it be better if we could just tell the Designer what we wanted the number to look like and then have Designer generate all the cryptic EDTCDEs to make it happen?

g. Press **F11** to convert this field into an output numeric field with comma delimiters, two decimal positions, a currency symbol and no sign. Look at the Selected DDS page to see what was generated for you. Impressive!

	+	123+	4+ <mark>-</mark> -5+
3			
8	III	000000000000000000000000000000000000000	\$666,666.66
() 9	III	000000000000000000000000000000000000000	\$666,666.66
<b>1</b> 0	III	000000000000000000000000000000000000000	\$666,656.66
L 11	III	000000000000000000000000000000000000000	\$666,666.66
12	III	000000000000000000000000000000000000000	\$666,666.66
13	III	000000000000000000000000000000000000000	\$666,666.66

- h. Rename the field to SALARY and change its color to yellow, using the toolbar.
- i. The subfile seems compacted to the left. It would be better to space it out evenly. Just select a field and click the space horizontally  $\coprod$  button on the far right side of the toolbar. The other alignment buttons will align fields, left, right, center and top.

EMPLSTSFL	• 6 <u>111</u> • •	SALARY		8 🗄 I O B	
1/0 Ignore all indicators	•	A#60	BY -	2 📑 蒸開影	BIAD QUI)

III	000000000000000000000000000000000000000	\$666,666.68
III	000000000000000000000000000000000000000	\$666,666.66
III	000000000000000000000000000000000000000	\$666,666.66
III	000000000000000000000000000000000000000	\$666.666.66
III	000000000000000000000000000000000000000	\$666.666.66
	000000000000000000000000000000000000000	\$666,666.66

Just below the palette on the left there are three spin buttons. The top one, **Subfile size**, specifies the total number of entries in the list that will be filled in by the application. The second one, **Subfile page size**, is how many entries appear on the screen.

- j. In the **Subfile size** field, type 300.
- k. In the Subfile page size field, type 9.
- I. Click in the Design page.

EMPLSTS			j Metter Zoigen
	+		
3			
(a) 4			
<b>S</b> 5			
8		000000000000000000000000000000000000000	\$666,666.66
		000000000000000000000000000000000000000	\$666,666.66
S Sector S	III	000000000000000000000000000000000000000	\$666,656.55
	III	000000000000000000000000000000000000000	\$666,666.66
12	III	000000000000000000000000000000000000000	\$666,666.66
13	111	000000000000000000000000000000000000000	\$666,666.66
1 14	111	000000000000000000000000000000000000000	\$555,555.55
月15	III	000000000000000000000000000000000000000	\$666,666.66
16	III	000000000000000000000000000000000000000	\$555,565.55
117			

The Design page is updated accordingly.

You have added some columns to the new subfile record screen.

#### Lesson checkpoint

You learned the following:

- · About adding fields to a subfile record
- · How to add fields to a subfile record

## Switching between multiple records

Now let's fix up the subfile control record. The group you created contains 2 records. You can verify this by looking at the record list in the toolbar:

EMPLSTSFL	-
EMPLSTSFL	
RECORD1CTL	

1. Change the current record by selecting RECORD1CTL from the record list or click next record **>** or press **Alt+End**.

The fields in the subfile still appear so that column heading can be lined up, but they appear at half-intensity so that they can be distinguished from the fields of the current record.

000000000000000000000000000000000000000	\$666,666.66
000000000000000000000000000000000000000	\$666,666.66
000000000000000000000000000000000000000	\$666,666.66
000000000000000000000000000000000000000	\$666,666.66
000000000000000000000000000000000000000	\$666.666.66
000000000000000000000000000000000000000	\$666,666.66
000000000000000000000000000000000000000	\$565,566.68
000000000000000000000000000000000000000	\$666,666.66
000000000000000000000000000000000000000	\$666.666.66

- 2. Rename the record to EMPLSTCTL using the toolbar. Let's provide a 'Position to' entry in the subfile control header.
- 3. Position the cursor at 4, 9 and type: Position to:

Details MAIN MENU EMP_SEL	CT EMPLLIST Source Listing	
□ 🕞	-+2 <mark>-</mark> +3+4+5	+8
		<b>^</b>
Posit	ion to:	
Common Common State		
A 🖺 8 🛛 🛄		\$656,665.65
9 9	000000000000000000000000000000000000000	\$656,655.66
	000000000000000000000000000000000000000	\$666,666.66
		\$556,556.66
12 12		\$656,666.66
300 - 13	000000000000000000000000000000000000000	\$555,655.55
14	000000000000000000000000000000000000000	\$656,665.66
9 🗄 15		\$666,666.66
0 16		\$656,665.65
17		-

Now you need an employee name field.

You could create a named field with the right characteristics like you did in the subfile, or you could create a source reference using the Create source reference field button in the palette, or you could reference the original database field using either the Create database reference field button or the D Create database reference field(s) by selection button. But there is an even simpler way. Use copy and paste!

- 4. To copy the employee name field:
  - a. In the DDS tree expand the EMPMNT record.
  - b. Click the ENAME field and press Ctrl+C.



(The pop-up menu or Edit menu shows the Copy menu item as well).

- c. Position the cursor to 4, 23 and press Ctrl+V. Now that was easy!
- d. Click the field and change the name from ENAME to POS\_TO.

EMPLST			
-	-+1+-		6
	Position	to: (DEBEBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB	
			\$566,666.65
			\$666,566.66
			\$666,666.66
			\$565,565.66
12			\$666,566.66
00 - 13			\$656,665.65
9 14			\$666,666.66
15			\$555,555.65
0 16			\$566,656,65

You have fixed up the subfile records to add an employee name field with a position to entry opposite this field.

## Lesson checkpoint

You learned the following:

· How to fix up the subfile records to add an employee name field

# Adding field error handling

Let's put in some error handling for the 'position to employee name' field. If the employee name is not found in the database, the program will set on indicator 60.

In this case the field should turn red, reverse image and position the cursor to it. Now wouldn't it be better if you had something easier to remember than some arbitrary number from 1 to 99.

To set indicators:

1. Click the Change named indicator sets **1** button on the Design page toolbar (or press **F7**.)

The Named indicator sets window opens.

- 2. In the Settings name field, type: Not Found.
- 3. Click **Create**.

Named indicator sets			x		
Indicators					
10       20         01       11       21         02       12       22         03       13       23         04       14       24         05       15       25         06       16       26         07       17       27         08       18       28         09       19       29	31         41         51           32         42         52           33         43         53           34         44         54           35         45         55           36         46         56           37         47         57           38         48         56           39         49         59	61       71         62       72         63       73         64       74         65       75         66       76         67       77         68       78         68       79	80         90           81         91           82         32           83         93           84         94           85         95           86         96           87         97           88         98		
Checked in Settings name Not Fou	dicators are: © 0 nd	n C Off	<u>C</u> reate		
Ignore all indicators All indicators are off			<u>B</u> ename		
			Delete		
	<u> </u>	ply Cancel	Help		

4. Select the check box next to 60 and click OK.

The Not found indicator set is now in effect. The Design area is shown as if indicator 60 was on and all other indicators were off. The Design page toolbar shows the current indicator set in the **Select named indicator set** list on the bottom left.

EMPLSTCTL	• ( <u>***</u> ) • >	POS_TO 💌 🍓	]
1/2 Not Found	•	A#EPBA-	-

- 5. Now select the **POS\_TO** field.
- 6. On the toolbar, select the color **red** and the display attributes **reverse image** and **position cursor**. (The set of toolbar buttons representing the current display attributes is found just below the Color button).

The toolbar should look as follows:

		IOB		
• <b>2#5</b> 08	AT O E	山谷言美	( The	

7. Examine the DDS generated in the Selected DDS page.

A A A	60	POS_TO	R	В	4	23 COLOR(RED) REFFLD(RCEMP/ENAME *LIBL/E
A	90					DSPATR(PR)
AA	60 60					DSPATR(RI) DSPATR(PC)

Notice that all the new keywords were created with a condition of 60. (The DSPATR(PR) was pasted with the field originally).

8. Now let's try it out! From the **Select named indicator sets** list, select **All indicators are off**.

EMPLSTCTL	of Pos_to		IOB □· ® ※□₩─₽∭de
		+4+5+- 388888888888888888888888	б+
	000000000000	000000000000000000000000000000000000000	\$666,666.66 \$666,666.66 \$666,665.66
	✓  < ▶ POS_TO		IOB 📑
All indicators are	off 🗾 🛃 📇		
		388888888888888888888888888888888888888	\$666,666.66
	000000000000		\$666,666.66 \$666,666.66

9. From the **Select named indicator sets** list, select **Not found**. The field appears red and reverse imaged.

You have added error handling to the position to employee name field.

## Lesson checkpoint

You learned the following:

• How to add error handling

# Accessing field properties

Second to the direct manipulation and the toolbar on the Design page, the easiest and quickest ways of getting access to the properties of a field, record, or entire file is the Properties notebook. The Properties notebook lets you view and update the properties of the currently selected DDS object. You can open this notebook from any view, pop-up menu, or menu of the CODE Designer.

The Properties notebook is modeless. When you change an object's properties, the selected object changes immediately.

You can get to a Properties notebook from the **Selected** menu, by pressing **F4**, or double-click on anything in the DDS tree or the Details page or Design page.

To open the Properties notebook:

1. In the DDS tree, click the record SELECT and press **F4** to see the Record properties.

Basics CA/CF	Styles		
Record	SELECT		
Туре	Standard		
Modified	06/29/92		
Number of fields	14	🔲 In a <u>w</u> indow	
Description			

As you select different items, the Properties notebook will continuously update itself to show you the properties of the selected item.

2. Click the **\*DATE** field in the SELECT record. (You may have to move the Properties notebook out of the way.) This field has a different set of pages describing its properties.

⊡-m <r1s400a>RSELABXX/C</r1s400a>
😑 🔙 File Keywords
- ORINT
- INDARA
- 🗫 CA03
CA04
E SELECT
🚊 📻 Record Keyword:
BLINK
- Constant ALARM
TIME

- 3. Change the year from 2 to 4 digits. Select the **Length of year** check box.
- 4. Select **4** digits from the list.

Field	propertie	5			?
Basics	Attributes	Color	Editing   Ind	icators	
Sample		Г	Source of	date	-
-	D/MM	0	Length of	year 4 digi	s 🖻
- Posit	ion	-		-	
Size		Column			
24X8		70			
27X1					

Notice how the sample is updated on the Properties notebook.

- 5. To test the Design page, click the **MAIN\_MENU** tab in the workbook and look at the upper right corner of the screen. The year now has 4 digits.
- 6. Click the EMPAPL field in the SELECT record. On the Field properties notebook click the **Basics** tab. On this page you can change the field's name, usage, length, type, and screen position. The other pages give you quick access to other properties of this field.

Field	Indicators   Styles   Type	
	Shift A - Alphanumeric	-
Length Total Dec	Position Size Row Column	
Continued (CNTFLD)	27%132	
Description		

You have seen the record properties for the record SELECT and changed the length of year to 4 digits.

## Lesson checkpoint

You learned the following:

- · About the record properties for the record SELECT
- · How to change the length of year to 4 digits

# Adding new keywords

CODE Designer helps you manage the visual aspects of your displays and reports. But you also need to access the full power of DDS. You need to access keywords.

To add keywords:

1. Click the EMPAPL field in the DDS tree.

2. Press F5 or right-click and click Insert keywords on the pop-up menu.



You see the Details page for the EMPAPL field and the **Create keywords** tab is added to the Utility notebook. This page shows you the subset of keywords that are allowed for the selected file, record or field and it takes into account the field's type, usage, shift and what record it is in. It is very powerful to know exactly what your options are. This information cannot be quickly ascertained from the Reference manual.

Selected DDS Cr	eate keywords   Web	Settings Comments	Error list	
Insert Subset	All			•
Swalias	CHECK(M11)	See CHRID	Service States FLDCSRPRG	Swww.RDWRAP
Service BLANKS	CHECK(M10F)	COLOR>>>	Second Contract Second	Swinknown>
See CHANGE	Service CHECK(M11F)	COMP	∞INDTXT>>>	
CHECK(AB)	CHECK(RB)	Sw DFT	See MSGID>>>	
CHECK(ER)	CHECK(RL)	S DFTVAL	Service Noccold	
CHECK(FE)	CHECK(RZ)	DSPATR>>>	∞ ovratr	
Service CHECK(LC)	CHECK(VN)	Ser DUP	Second Se	
CHECK(ME)	CHECK(VNE)	STENTFLDATR	Service PUTRETAIN	
CHECK(MF)	CHGINPDFT	See ERRMSG>>>	Service RANGE	
CHECK(M10)	See CHKMSGID	Service Contraction Contractio	Servalues	
•			in the second	Þ

3. With the EMPAPL Properties notebook at the **Basics** page, click the numeric field 🛃 button to change the field to numeric type.

Field properties           Basics         Attributes         Color	Indicators Styles	<u>? ×</u>
Field EMPAPL Usage Length Total Dec <u>Continued (CNTFLD)</u> Wridth	Type Shit A - Alphanumeric Position Size Row Column 24×80 9 25 27×132 2 2	•
Description		

Notice that the list of keywords in the Create keywords page has changed.

4. Click the  $\mathbf{\underline{d}}$  button to change the field back to alphanumeric.

Notice that the list of keywords in the Create keywords page has changed again.

5. Click the ALIAS keyword and press F1.

The DDS Reference help for the ALIAS keyword appears.

**Tip:** CODE Designer has lots of on-line help. Press F1 anywhere you want to see help for an item, icon or notebook. You will see help relevant to what you are currently trying to do. From the Help menu you have quick access to the DDS Language Reference as well as several other useful sources of information.



- 6. Minimize the Help window.
- 7. In the Create keywords page, double-click the INDTXT keyword. (You may have to scroll to the right to find it).

The keyword is created with default values which can be changed when you want.

8. Double-click the INDTXT keyword again.

The keyword is created with the same default values creating a conflict.

 Keyword
 Parame...

 SweDTCDE
 3

 SweINDTXT
 01 '?'

 SweINDTXT
 01 '?'

9. Close the Keyword Properties dialog.

You have seen the help on the ALIAS keyword and added INDTXT keywords.

#### Lesson checkpoint

You learned the following:

- About DDS keywords
- · How to see help on a DDS keyword

# Verifying the source changes

You have just added a new record and some new fields to your DDS source. Everything that the CODE Designer adds to your DDS source is certain to have the correct syntax. Now you need to make sure that there are no semantic errors. You just introduced one in the last exercise by creating two INDTXT keywords describing the same indicator.

To verify your source:

1. Click **Tools** > **Verify file** (or click the verify  $\blacksquare$  button on the main toolbar) on the CODE Designer menu.



The DDS source is checked using the same verifier that the CODE Editor or LPEX Editor uses. A message appears on the status line at the bottom of the Designer stating that the verify process completed with errors.

2. In the DDS tree, there is a trail of red X's leading to the problem.



The file icon has a red X, as does the SELECT record, the EMPAPL field and finally the second INDTXT keyword.

- 3. Click the **MAIN\_MENU** tab in the workbook.
- The EMPAPL field is highlighted in red.
- 4. Click the **Listing** tab in the workbook.

This page shows you the listing generated by the most recent program verify. A warning message is buried somewhere in the listing but it's not easy to find.

- 5. If there are problems, they will show up in the Error list page in the Utility notebook. It behaves exactly like the Error list in the CODE Editor or LPEX Editor. Click the **Error list** tab.
- 6. Double-click the warning **DDS7861** in the Error list. (Press **F1** to see detailed help on the message).

The Source page appears and the cursor is placed exactly where the error is in the source. The Source page is a tokenized read-only view of the current state of the DDS source. Read-only? Wouldn't it be great if you could just clear the error right here. There are some things that are just plain faster in the editor and many others that are faster in the visual environment. It would be great to switch between the two modes at the push of a button. Well, let's just do that.

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You have verified your DDS source and have identified an error in the source.

## Lesson checkpoint

You learned the following:

- · About program verifier
- How to verify DDS source

# Switching between designing and editing the screen

To switch between the Design mode and the Edit mode:

1. Click the Edit DDS source **□** button or click **File** > **Edit DDS source** from the Editor menu.

You now have access to the full power of the editor.

- 2. Explore the Edit and View menu items.
- 3. Press Ctrl-F to open the Find/Replace window.
- 4. In the **Find** field, type INDTXT and click **Find**.

ind INDTXT	<b>•</b>
Replace with	
Replace this occurrence	
○ Replace, then find <u>n</u> e×t	Pattern match
Replace <u>a</u> ll occurrences	⊡ <u>W</u> rap

- 5. Press Ctrl-N to find the next occurrence.
- 6. Delete the second INDTXT line. Type D in the number column and press Enter.

You have edited the source to fix the error by switching to the editor.

## Lesson checkpoint

You learned the following:

- · About switching between design and edit mode
- · How to edit the source to fix an error

## Compiling your source changes

Now you will compile the source on the iSeries just as you did in the Remote Systems LPEX Editor.

To compile your source:

- 1. Click File > Save from the Designer menu to save your source to the iSeries.
- Click Tools > Compile from the Designer menu and then click No prompt (or click the compile button on the CODE Designer toolbar).
- 3. A message indicates when the compile is complete. Click **OK** in the Message dialog. If you re-compile and run the payroll program, you will see the 4 digit year change you made to the opening screen of the program.

**Tip:** You will also see the message CPD7886W Field overlaps another field with no conditions specified. You can ignore this message.

You have compiled your source changes.

#### Lesson checkpoint

You learned the following:

· How to compile source changes

## Creating a report and closing the Designer

Now you create a simple printer file as well as explore checkpoints, which can be used for all DDS created or maintained with CODE Designer. You will begin by looking at the physical file specification for the database file that the printer file you will create will use in CODE Designer.

To create a printer file:

- 1. In CODE Designer open the member REFMST in file QDDSSRC in library RSELLABxx.
- 2. Take some time to explore the fields and information for this physical file. You may want to refer back to this information as you work through the exercise. Now that you are familiar with the file REFMST, its time to begin creating a printer file.
- 3. In CODE Designer, click the Create new PRTF file button in the toolbar. An initial printer file is created and the design page in the workbook is blank.
- 4. Click the Create absolute record button 💌 at the left of the design page and then click on the first line of the Design page.

The Design page will now change to a white background and you will also see the text "Start of page 1" at the top of the Design page.

- 5. Press F4 to bring up the record properties. Change the record name to Title. This will help you when you create additional records for this printer file.
- Close the properties dialog. You will see your change both in the tree view and in the design page of the workbook.
- 7. Now you will add some fields. On the first line, enter the text Employee Information. To easily center the text, select the field by clicking on the text

with the left mouse button, then click on the Center horizontally button  $\blacksquare$  .

8. On line 1, column 122, enter the text Page.

**Tip:** You can always use your mouse to drag and drop a field wherever you'd like it. And when you do this, you will see the current position of your field next to your pointer. You could also use the properties dialog for the field to position a field to your desired location.

- Select the Create a page number constant button and point to the empty space after the text field you added in the previous step (about column 128). The page number constant will be added to your Title record.
- 10. On line 2, column 110, add a date field by selecting the Create a date constant button and then clicking on the appropriate column. Bring up the properties for the date constant (F4) and change the date to a 4 digit year. You will see your changes appear immediately in the Design page.
- 11. On line 2, column 122, add a time field by selecting the Create a time constant button 🙆 .

	SSRC(REPORT1) - CODE Designer edcolsteip		×
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		¥ 111	

Your report should look something like this.

At this point it is a good time to save your source.

- 12. Press Ctrl-S. The Save As dialog should appear.
- 13. Save your changes so far to "<>RSELABxx/QDDSSRC(REPORT1)" You will now see a dialog indicating that the source is being saved. You

You will now see a dialog indicating that the source is being saved. You will also see a dialog indicating that a checkpoint is being saved. Because this is the first time you save this source, a checkpoint is created which you could revert to if you would like to. We will manually create a checkpoint later in this exercise.

14. To add another record:

The record that you have added so far doesn't really do much except set up the header for our report. You will now add a couple more records so that this report design makes much more sense.

a. Click on the Create relative record button 🔯 and click somewhere after line 3.

The record will be added and you will see it in your DDS tree (if the group is expanded).

b. Press F4 to bring up the properties dialog. Change the record name to COLHEAD.

You will use this record to design the column headers for the report.

c. Close the properties dialog.

You should see your change in the design page in the record name field at the top in the toolbar section of the design page. You will also see a new field at the left toolbar with a numeric spin box. You will use that later.

- d. In row 5, column 2 add the text Number.
- e. In row 5, column 12, add the text Employee.
- f. In row 4, column 54, add the text Normal.
- g. In row 5, column 54, add the text Hours worked.
- h. In row 4, column 77, add the text Actual.
- i. In row 5, column 77, add the text Hours worked.

Your design page should look something like this:



15. To create a manual checkpoint and revert to a checkpoint:

You've done quite a bit of work at this point. Rather than just save your source, it would be a good idea to create a checkpoint so that you can go back to exactly this point in your design.

- a. To create a manual checkpoint, click on the Design page and press Ctrl-M.
- b. Name your checkpoint COLHEAD record. Click OK.

Your checkpoint will now be created. To see what happens when you revert to a checkpoint, try to revert to the checkpoint that was created when you first saved your source. To do this, select File -> Revert to checkpoint.

- c. The checkpoint dialog will appear. Select the **Initial load** checkpoint, and click the**Revert** button.
- d. Go to the report Design page.

You will now see none of the record you just previously added. Saving checkpoints is a good idea so that you can go back to a design that you liked.

- e. Now that you have explored checkpoints, revert back to the checkpoint you created in step 2.
- 16. To change automatic checkpoints:

Much like autosave in LPEX Editor, CODE Designer has automatic checkpoints which are triggered by elapsed minutes. You can also configure the maximum number of user checkpoints.

a. Select **Tools** > **Settings**.

The Application Settings notebook appears.

General Saving	Workbo	iok
Checkpoints		
Minutes betwe	en automat	tic checkpoints 10 📮 0-6
Maximum num	ber of user of	
		checkpoints 50 📑 0 · 1
Sequence num	nbers	
Start at	1.00	0000.01 + 9999.99
Increment by	1.00	00.01 - 99.99
- Automatical	v save char	nges on exit

b. Select the **Saving** notebook tab.

You will now see the default settings for checkpoints.

- c. If you like, change the number of minutes between automatic checkpoints.
- 17. To add another record:

Now you will add the record which will be the important part of the report.

- a. Add a new relative record on line 5 called EMPDET.
  - This record will contain the employee detail information.
- b. In row 7, column 2 add a database reference field by selecting the Create database reference field button from the toolbar at the left, and then clicking on the appropriate location in the Design page.
- c. Press F4 to change the settings for the field. Enter RSELABxx as the library, REFMST as the file name and RCREF as the record name. Select EMPNO from the combobox for the field name.
- d. Keep the properties dialog open, but move it out of your way to add more fields to the Design page.
- e. Add another reference field to row 7, column 12, with the following information: library RSELABxx, REFMST as file name, RCREF as record name and ENAME as field name.

- f. Add another reference field to row 8, column 12, with the following information: library RSELABxx, REFMST as file name, RCREF as record name and EUSRI as field name. For proper spacing, select SPACEA and leave the spinbox at 1.
- g. Add another reference field to row 9, column 12, with the following information: library RSELABxx, REFMST as file name, RCREF as record name and ELOCN as field name.
- h. Add another reference field to row 9, column 44, with the following information: library RSELABxx, REFMST as file name, RCREF as record name and EDEPT as field name. Ensure that the relative column checkbox is selected.
- i. Add another reference field to row 7, column 54, with the following information: library RSELABxx, REFMST as file name, RCREF as record name and ENHRS as field name.
- j. Add another reference field to row 7, column 77, with the following information: library RSELABxx, REFMST as file name, RCREF as record name and EHWRK as field name.

📆 <05400>CODELA8XX/QDD5SRC(REPORT1) - CODE Design - 0 × File Edit View Insert Selected Tools Help 570280 A 9 VV 895 0 V 4 <05400>CODELA8(0)/QD Details REPORT1 Source Listing REPORT1 I NOO ▲ 8 COUHEAD • 12 % Ignore all indicators 500 E 0 E 8 d == =x U • 6 Г ----12 Salessi Bertal Actual Horizof P001 9095 00 へ同 \* Selected DDS Comments Error list 3 REF(OGPL/OINVREC INVREC) -R TITLE AAAA 57'Employee Information 1122'Page 1128PAGNER -1:1.1

Your design page should look something like this:

- k. You may want to create another checkpoint now and save your source.
- 18. To increase the number of sample records:

Sometimes it is hard to get a good idea of how a report will really look like. To get a better idea, you can increase the number of sample records.

- a. Select the record EMPDET from the combo box on the toolbar in the design page.
- b. On the left of the design page at the bottom of the palette, you will see a numeric spinbox, which is set at 0. Increase the number here to see what your report might look like with many records.

At this point you should ensure that you save your source and create the printer file for this report.

c. Press **Ctrl-S** to save.

Your changes will be save to the host.

d. Click the compile button to compile with the default options.

- 19. To close the Designer:
  - a. Click **File** > **Exit** from the Designer menu.

You have now successfully created a printer file. You should be familiar with using checkpoints and you should be able to create your own report layouts using CODE Designer.

## Lesson checkpoint

You learned the following:

- About checkpoints
- · How to create a printer report

## Module summary

In this module, you learned how to design screens and reports using the CODE Designer.

## Lessons learned

- · Open a DDS member for edit with CODE Designer
- Show file-level keywords and record-level keywords
- · View the details of records, record-level keywords and field-level keywords
- · View the design of the payroll application main menu
- · Create a group from an existing record format
- · Create a new group and add a subfile record and a subfile control record
- · Add columns to the subfile record
- · Add fields to the subfile control record
- · Copy existing fields
- Set indicators to handle field errors
- · View and update record and field properties
- · View keywords and the properties of a keyword
- · Insert a keyword
- View help for a keyword
- · Check there are no semantic errors in the DDS source
- View help for an error
- · Launch the editor in read mode from the error list
- · Launch the editor in write mode to fix the error
- Find a keyword in the source
- Save source changes
- Compile your source changes
- Create a printer file report
- Close the Designer

#### Assessment

- What is CODE Designer?
- What is the utility notebook?
- What is the Design page?
- What is the Properties notebook?

- What is a group?
- What can you do in the utilities notebook?
- What can you do on the Design page?
- · Why do you want to group records?
- What verifier is used to check DDS source?
- Can you switch between Design mode and Edit mode in CODE Designer?
- · How do you open a DDS member for edit with CODE Designer?
- · How do you show file-level keywords and record-level keywords?
- How do you view the details of records, record-level keywords and field-level keywords?
- · How do you view the design of an application main menu
- · How do you create a group from an existing record format
- How do you create a new group and add a subfile record and a subfile control record
- · How do you add columns to the subfile record
- How do you add fields to the subfile control record
- · How do you copy existing fields
- · How do you seet indicators to handle field errors
- · How do you view and update record and field properties
- · How do you view keywords and the properties of a keyword
- How do you view and insert a keyword
- How do you check there are no semantic errors in the DDS source
- · How do you launch the editor in read mode from the error list
- How do you launch the editor in write mode to fix the error
- How do you find a keyword in the source
- How do you save and compile source changes
- How do you create a printer file report
- How do you close the Designer

# Introducing the product and Remote System Explorer (optional)

This modules teaches you about IBM WebSphere Development Studio for iSeries and its relationship to IBM WebSphere Development Studio Client for iSeries. You learn which product makes up the host components and which product makes up the workstation components. You recognize the iSeries application development tools included with Development Studio Client for iSeries programmers. You then are introduced to Remote System Explorer the launching point for iSeries application development tools.

# Learning objectives

- Know the goals of the product
- Know the editions of the product
- Identify the host tools and the client tools
- List and describe the iSeries application development tools

# Time required

This module should take approximately 15 minutes to complete.

# Introducing Development Studio and Development Studio Client

Development Studio Client is the ideal set of workstation development tools for creating, testing, deploying and maintaining traditional and e-business applications for your iSeries server. Development Studio Client is included with the compiler-based server product, WebSphere Development Studio. The following diagram illustrates the interaction between host and client tools:



Development Studio Client is designed to help you:

- 1. Develop and maintain iSeries applications using the Remote System Explorer.
- 2. Develop Web-enabled front-ends to iSeries business logic.
- 3. Create GUI front-ends to iSeries business logic.

Both Development Studio Client and Development Studio Client Advanced Edition are built on the Rational<sup>®</sup> Software Development Platform. This platform offers a fresh look and feel for the Eclipse workbench, and helps make it easier for you to build, integrate, and extend your applications. The Rational Software Development Platform offers a tutorials gallery and a samples gallery, to help you get up and running with the product as quickly as possible. The platform also offers user roles, which you can select from bottom-right corner of the Welcome view, (and from **Window**  $\rightarrow$  **Preferences**  $\rightarrow$  **Workbench**  $\rightarrow$  **Capabilities**) that customize and simplify the user interface according to your programming role. These are just some of the new features provided in the IBM Software Development Platform.

The product comes in two editions for iSeries programmers. Both editions of the product are packaged with an additional base Rational product:

• WebSphere Development Studio Client for iSeries inherits and extends the robust, easy-to-use IBM Rational Software Delivery Platform (RSDP) and a subset of IBM Rational Application Developer for WebSphere Software to deliver an integrated development environment (IDE) with tools for developing Web, Web services, client/server, and i5/OS server applications using programming languages like RPG, COBOL, CL, and Java.

 WebSphere Development Studio Client Advanced Edition for iSeries contains all of the development tools included in WebSphere Development Studio Client, plus it inherits and builds on additional premium Web, Enterprise Java Bean (EJB), and J2EE development capabilities from IBM Rational Application Developer. In addition, it provides specific advanced System i<sup>™</sup> tools including Navigation support, ClearCase<sup>®</sup> integration, and a Eclipse-based Screen designer technology preview.

You have reviewed the goals of the product and the product editions.

# **Introducing iSeries Application Development Tools**

Now, you know what the two flavors are of Development Studio Client and why you would want to use each one. Next let's look at those next generation iSeries server application development tools. What are they and what do they do?

#### **Remote System Explorer**

You can manage your development tasks in the Remote System Explorer. This is an enhanced and more flexible workstation version of Program Development Manager (PDM). You can create and manage development projects on your iSeries system from your Windows-based workstation with the Remote System Explorer and iSeries projects. With these tools, you can connect to an iSeries remote host, view iSeries libraries, files, and members. You can also launch the host compilers, the workstation editor, a program verifier and various debuggers all from the Remote System Explorer. This tool also supports other system types, such as UNIX(R), Linux, and Windows.

#### **LPEX Editor**

Your program editing tasks are simplified with the Remote Systems LPEX Editor. This is a powerful language-sensitive editor that you can customize. Token highlighting of source makes the various program elements stand out. It has SEU-like specification prompts for RPG and DDS to help enter column-sensitive fields. Local syntax checking and semantic verification for your RPG, COBOL and DDS source makes sure it will compile without errors on an iSeries system. If there are verification errors, an Error List lets you locate and resolve problems quickly. On-line programming guides, language references, and context-sensitive help make finding the information you need just a keystroke away.

#### Shells and commands in the Remote Commands view

You can use the Remote Commands view to run and interact with commands and command shells on universal systems. A universal system includes Windows, Linux, and UNIX system types. Specifically, you use the view to:

- · Run commands in a command shell
- · Display and interpret the output of a program
- Enter input to a program
- Display and manage different commands and shells from the same view. Multiple commands can be run in a single shell (one command at a time per shell), multiple shells may be run on a single system, and multiple systems may be running shells.

Whenever a command shell is launched or a command is run from the Remote System Explorer, the Remote Commands view displays the output and provides a way to work with that output.

#### **Program Verifier**

One of the most powerful and unique features of the Remote System Explorer is the Program Verifier. Before you compile your code on an iSeries system, you can ensure that there are no errors by invoking the Program Verifier. The verifier checks for semantic (compile) errors on your workstation so that you can guarantee a clean compile on the iSeries. Think of the host cycles you'll save. It is especially handy when you are writing code but you are disconnected from an iSeries system. You can do this because Remote System Explorer ported the parsing and checking code from the iSeries host compilers to the workstation. The Error List window lists the errors that are found and their severity, display the error messages directly in the source and helps you to navigate between the errors.

#### **iSeries Debugger**

With the Integrated iSeries Debugger you can debug an application that is running on an iSeries system. It provides an interactive graphical user interface that makes it easy to debug and test your iSeries programs. It is fully integrated into the workbench. You can also set breakpoints before running the debugger, by inserting breakpoints directly in your source while editing. The Integrated iSeries Debugger client user interface also enables you to control program execution. For example, you can run your program, set line, watch, and service entry point breakpoints, step through program instructions, examine variables, and examine the call stack. You can also debug multiple applications, which may be written in different languages, from a single debug window. Each session you debug is listed separately in the Debug view.

#### **CODE Designer**

Using an editor to create and maintain DDS source for your display and printer files can be a frustrating and difficult task. What would be great is a graphical design tool that lets you design your screens and reports visually and then generate the DDS source for you. Well, that's exactly what the CODE Designer does for you.

The CODE Designer interface was designed to help the novice DDS programmer create screens, reports and databases quickly and easily without worrying about the details of the DDS language, while at the same time letting the expert DDS programmer get access to all the features and power of the language. CODE Designer is not fully integrated into the workbench, but you can launch it as a separate tool from the workbench.

## Summary

This tutorial has taught you how to maintain a payroll application using the Remote System Explorer. You learned how to start the product and open the Remote System Explorer perspective and how to use tools and views in this perspective to connect to an iSeries system and edit, verify, compile and debug the payroll application.

## Lessons learned

If you have completed all of the modules, you should now be able to:

- Start the product and open the Remote System Explorer perspective
- · Create a connection to an iSeries and select iSeries objects from this connection
- Use the Remote Systems LPEX Editor to edit source
- Verify and compile source in the Remote Systems LPEX Editor
- Debug your interactive payroll application from the workstation
- Customize the Remote System Explorer
- · Modify a display file
- Create a printer file
- · Recognize the product features and packaging

#### Additional resources

#### More information

For more information on the product and the Remote System Explorer, see http://ibm.com/software/awdtools/iseries.

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