Improving productivity for IBM eServer iSeries traditional applications

•_ • • • • • • •

Using WebSphere Remote System Explorer

Garry Kipfer IBM eServer Solution Enablement October 2005



Table of contents

Abstract3
Introduction4
Perspectives and views4
Managing resources5
Subsystems 6
iSeries objects 6
iSeries commands 6
iSeries jobs
IFS files9
Editing and verifying the source code10
Outline view 10
LPEX Editor view 11
PAYROLL example 11
Online manuals 12
Filter views 13
Subroutine views
Source verification
Error correction 16
Compiling the program 17
Summary18
Resources19
About the author19
Trademarks and special notices20



Abstract

Remote System Explorer (RSE), a perspective within IBM® WebSphere® Development Studio Client, provides a visual interface for the developer. It is designed to give access to all of the resources required to develop and maintain a traditional green-screen application on a desktop. As such, developers can manage IBM® iSeries[™] resources, as well as edit, maintain, compile, and debug code. This white paper focuses on introducing RSE's resource management capabilities, as well as editing and verification functions. Thus, this paper serves as an overview of the tool and its ability to deliver increased productivity to WebSphere application developers on the iSeries family.



Introduction

When modernizing an application, one of the first and most important decisions to make is which tools are best suited for the task.

Ideally, the tools will address most, if not all of the stages of the modernizing process. This greatly enhances productivity by giving a common user experience to each of the developer's activities, and it removes the frustrations involved in learning several tool interfaces to address different requirements.

IBM WebSphere Development Studio Client has been designed to address these concerns, and it offers an integrated development environment (IDE) that can be used to build the various types of applications presented in the IBM eServer[™] iSeries Developer Roadmap. This paper addresses the fist step in the modernizing process by discussing how the Remote System Explorer (RSE), a perspective within WebSphere Development Studio Client, provides a better and more productive tool for creating and maintaining traditional green-screen applications.

WebSphere Development Studio Client (IBM product number 5722-WDS) is composed of two parts. One part is installed on the iSeries system, and the other is installed on the developer's workstation. This paper discusses the workstation portion of the tool.

Perspectives and views

As just mentioned, WebSphere Development Studio Client is composed of a number of perspectives, each designed to address a particular type of development effort by delivering access to the resources required for that task. It contains an RSE perspective that provides a visual interface to a more productive development environment for building traditional, green-screen applications.



© Remote System Explorer - PAYROLL.R	PGLE - IBM Rational	Software Developm	ent Platform							
File Edit Source Compile Navigate Search	Project Run Window	Help								
📬 • 🔛 🗁 💷 🏇 • 💽 • 🂁 •] 🔗] 🍫 🔶 🚽	· ·] 🖑 🐤 🖬 🛙	🛛 🕨 🔺 🗛 🛛	ř B		Remote Syste »				
Remote Systems 🛛 🗖 🗖	PAYROLL.RPGLE &	3				🗄 Outline 🛿 👘 🗖				
	Line 1	Column 1	Replace			6				
Rev Connection		1+2.	+3+.		5+6+.	- Clobal Definitions				
iseries	000100	*********	************	*******	*****************	E Co Global Scinitions				
i Operation cancelled	000200	🕂 🏹 MSTDSP : WO								
H-M Windows	000300	000300 F* DESCRIPTION - Time reporting master file maintenance us								
Ξ-Λ Linux	000400	*	externally de	escribed W	orkstation processi	🕀 🏹 PRJMST : DISK				
F-X Power Linux	000500	*******	***********	********	*****	主 🏹 RSNMST : DIS				
Tunix Unix	000600	* INDICATORS U	JSED			🕀 🕂 Fields				
I I I I I I I I I I	000700	* 50 - No reco	ord found on CHA	AIN operat	ion	🕀 🦳 Indicators				
	000800	* 60 - General	error condition	n		🖃 🌆 Main Procedure				
E E Local	000900	* 90 - Protect	display on del	lete reque	Editor view	🗄 🖳 Subroutines				
i ice	001000	* KC - End of	job requested			ACDESR				
🖃 🔐 iSeries Objects	001100	* KD - keturn	to application	selection		E R ADDCDE				
😟 🕌 Work with libraries	001200	* KE - Keturn	to employee sea	lection		🗈 📴 CHGCDE				
🕀 😻 Work with objects	001300	* Kr - Keturn	to project sele	ection		E DELCDE				
🕀 🔰 Work with members	001500	* KG - Keturn	to reason coue	Selection		🗄 🔚 EDITSL				
🗈 🍻 Library list	001500	- TK - Tast te	-coru			EMPTAG				
User libraries	001700	* SUBPOUTINES	USED			INVCDE				
- rselab01	001700	SOBROOTINES	0020			H MAIN				
E IN RSELAB01.*ib.prod			1111			E PRJTAG				
ISeries Commands						Le RSNTAG				
IFS Files	Remote System Details	Tacke iSeries Table Vie	iSeries Commands Los	iSeries Fi	ald Table View X	6 - E				
CAR Qshells	File DSFI ABO1/DD IMST	(11 Fields)	in locites communus coy			су- Ц				
	Name	Record	Type	Length	Text	Alias				
	LACREC	RCPR 1	Character	1	ACTIVE RECORD CODE					
		RCPR 1	Character	8	PROJECT CODE					
	E PRDSC	RCPR 1	Character	50	PROJECT DESCRIPTION					
Properties 🛛 Remote Scratchpad	T PRR SP	RCPR 1	Character	30	PROJECT RESPONSIBILITY					
15 1 1 I I I I I I I I I I I I I I I I I	T PRSTR	RCPR 1	Packed Decimal	6.0	PROJECT START DATE	Table view				
		PCPP 1	Packed Decimal	6.0	PROJECT ESTIMATED END DA					
Property ^		PCPP 1	Packed Decimal	6.0	PROJECT COMPLETION DATE					
Connection-private	IT DEET	PCPP 1	Packed Decimal	0.0	PROJECT ESTIMATED TOTAL HPS					
Name	T DD HDC	DCDD 1	Packed Decimal	7.1	PROJECT LOUDS CURRENT MON	ти				
Number of children	1 ppupy	DCDD 1	Packed Decimal	7.1	PROJECT HOURS YEAR TO DATE					
Parent filter		RCPRJ DCPRJ	Packed Decimal	9.1	PROJECT HOURS TEAR TO DATE					
< >	T-PKUKP	KUPKJ	Packed Decimal	9.1	PROJECT HOORS PRIOR TEAR					

Figure 1: Default RSE perspective

The default perspective for RSE, shown in Figure 1, contains several windows (called views). A view displays a resource and allows the developer to manage and manipulate that resource. The **Editor** view (top center of the screen capture in Figure 1) allows the developer to manipulate the source code. The **Table** view (bottom of the screen capture) shows the characteristics of the fields within a file. A perspective, which is essentially a collection of views, then defines the collection and the actions that are typically required for a particular environment. These perspectives can be modified, allowing the developer to include or exclude views as needed.

The RSE perspective has many functions to manage development resources, as well as a powerful LPEX (live parsing and extensible) editor. The following is a brief review of some of these features and how they are used together to deliver the integrated development environment (IDE).

Managing resources

RSE provides a number of tools that deliver a structured approach to managing resources. One key element of the Remote System view for the developer is subsystems (not to be confused with iSeries subsystems).



Subsystems

- The **Remote Systems** view (see screen capture in Figure 2) shows the following subsystems for various functions:
- iSeries objects
- iSeries commands
- iSeries jobs
- IFS files
- Qshells



Figure 2: Remote Systems view

iSeries objects

With this subsystem, the developer can create, copy, rename, delete, and retrieve information about objects, as well as compile and execute programs. Also, filters can be created for viewing specific objects. This is very similar to the iSeries **Work with libraries using Programming Development Manager** (**WRKLIBPDM**) CL command, except that filters can be saved with custom names and reused later. The developer can also drag-and-drop or cut-and-paste objects, subject to iSeries system rules, greatly reducing the time required to manipulate them.

iSeries commands

This subsystem is used for executing iSeries commands that have been defined by the developer. It also allows for the manipulation of libraries, files, members, and library lists. The example in Figure 3 shows the options available within the subsystem.





Figure 3: Subsystem options



ibrary type:		Name
	*PROD 🔻	
ASP number:	1	1-32
ASP device:	*ASP 💌	Name
Text 'description':	*BLANK	Character value
Advanced	All Parameters	☐ Keywords
Advanced CRTLIB LIB(TESLIB)	All Parameters	Keywords

Wizards are provided for each operation, as shown in Figure 4, for the iSeries **Create Library (CRTLIB)** CL command.

Figure 4: The Create Library (CRTLIB) CL command

iSeries jobs

This subsystem allows the developer to manage jobs on the iSeries system. These actions include the ability to hold, end, and debug jobs, as well as view logs.



IFS files

This subsystem allows for the manipulation of the iSeries integrated file system (IFS). The developer can view, create, delete, move, rename, and open files and folders. The developer can also see properties. All of these functions, as shown in Figure 5, are accomplished with mouse actions as opposed to typing.



Figure 5: IFS mouse actions



Editing and verifying the source code

RSE is extremely efficient for developing and maintaining application code. In this case, a number of views and actions work together. Two of the common views are the **Outline** view and the **LPEX Editor** view.

Outline view

After the application program has been opened with the LPEX editor, and the outline view is refreshed, the information will be displayed as illustrated in Figure 6.



Figure 6: The outline view

The **Outline** view displays the names of all files, fields, indicators, and subroutines that are used in the program. They are displayed in a tree structure, which, when expanded as shown in Figure 6, will also indicate the location where the item is defined and list every line of code that references it. The **Subroutines** tree structure (shown in the right panel of the screen capture in Figure 6) has been expanded to display the name of all subroutines that are used in the program. The structure for the **ACDESR** subroutine has also been expanded to display every line of code where it (the ACDESCR subroutine) is referenced. If the developer clicks any of these line numbers, the editor positions the cursor to that line of code. In Figure 6, the developer clicked **ACDESR** in the outline view, and the cursor is automatically positioned at the line of code where ACDESR is defined in the LPEX editor under the **PAYROLL** tab.

Compared to the typical search features that are currently available, this is a simple yet powerful productivity aid.



LPEX Editor view

Remote System Explorer (RSE) contains the Remote Systems LPEX editor for editing source code directly in the workbench. The interface provides right-click actions for compiling and running programs. With the many functions available with this LPEX Editor, the developer can perform the following operations:

- Cut, copy, and paste operations.
- Block mark lines, characters, or rectangles with copy, move, and delete operations.
- Find and replace character strings quickly and easily.
- Undo and redo operations.
- Highlight various language constructs using different colors and fonts.
- Show the purpose of each column using a source entry utility (SEU)-like format line ruler that is automatically updated to reflect current specifications.
- Utilize SEU-like source line prompting for RPG and DDS source members.
- Employ sequence numbers that allow SEU-style commands in the prefix area.
- Tab between columns for column-sensitive languages.
- Automatically convert to uppercase for languages that expect it.
- Use commands to simplify text insertions and deletions for column-sensitive languages.
- Display specific source member content in the editor using filtered views.
- Display control structures for columnar languages.
- View field details of any database, workstation, or printer files referenced in the source member using a **show fields** function.
- Verify the source code.
- Receive online language reference help.
- Check the syntax for RPG, COBOL, or CL.

In addition, the editor can be customized to meet the developer's requirements.

PAYROLL example

Some of the more pertinent functions that impact the developer's productivity and demonstrate the ease-of-use of the LPEX editor can be demonstrated through a sample RPG program (PAYROLL). Because PAYROLL contains several errors, it will be easy to illustrate LPEX editing features, such as its ability to integrate with the other views, to provide a complete development environment.



In Figure 7, the developer has clicked the program name in the **Remote Systems** view, and the program has been opened and displayed in the **PAYROLL** tab in the **Editor** view. The **Outline** view has been refreshed and all the files and fields have been displayed. In the **PAYROLL** tab of the **Editor** view, the SEU commands can be used for editing by the block copy designated by CC in the sequence number. Hence there are no new commands to learn. Also, the highlighted line contains the MOVE op code. The prompt key (F4) was pressed, and in the bottom panel, the **iSeries Source Prompter** tab displays the prompt required for this op code.

Online manuals

In addition, if the help key (**F1**) is pressed, the RPG manual will open and display in a separate window (see Figure 7) to explain the **MOVE** op code. This removes the need to search printed manuals.



Figure 7: Remote Systems view and options



Filter views

Figure 8 shows what occurs if the developer right-clicks the **PAYROLL** tab window. The resulting pop-up menu offers a number of actions, such as **Prompt** and **Syntax Check Line**. In particular, this menu supplies **Filter view**, which as its name implies, allows the developer to filter the view by date, code, or whatever the situation requires. In this case, **Subroutines** was chosen.

Remote System Explorer - PAYROLL.RI	GLE - IBM Rational Software Development Platform	
File Edit Source Compile Navigate Search	roject Run Window Help	
] 🗈 • 🔛 👜] 🗊] 🏇 • 💽 • 💁 •	〃 ☆ ◇ ・ ⇒ ・ ♡ ♡ ◙ ◎ ▶ ▲ 삶 界 ぼ 陽	😭 🔚 Remote Syste »
Remote Systems 🕅 Team 📃 🗆	Welcome to HATS / PAYROLL.RPGLE ×	🗆 🗄 Outine 🛛 🖓 🖓
🚣 🔊 (> -> 🐼 (= 🔩 👻	Line 368 Column 1 Replace	¢۶
CLR1.*pgm.cle MYCOMPILE.*pgm.cle PAYROLL.*pgm.rgle PAYROLL.*pgm.cble	CLONOIFactor1++++++Opcode(E)+Factor2+++++Result++++ 035900 C PRJAPL ANDEQ 'X' 036000 C EMPAPL OREQ 'X' 0360100 New FEQ 'X'	Global Definitions Global Definitio
PAYROLLG, *pgm.rpgle COMPARE.*file.pf-src EMPMST.*file.pf-dta EVFEVEN.*file.pf-dta Offer.pf-dta Offer.*file.pf-dta Offer.*file.sf-dta	Usecution Prompt F4 0366300 Syntax Check Line E '2' * IN60 0366300 Cut Ctrl+X E ERR(2) EMES 0366500 Cut Ctrl+Nsert E 101 at NS6	⊕ ⊕ PRJMST : DISH ⊕ ⊕ RSIMST : DISH ⊕ ⊕ RSIMST : DIS ⊕ ⊕ RSIMST : DIS ⊕ ⊕
⁶ ⁶ MSTDSP2.*file.dspf ⁶ ⁽¹⁾ PRJMST.*file.pf-dta ¹⁰ ⁽²⁾ QCISLESRC.*file.pf-sr ¹⁰ ⁽²⁾ QCISRC.*file.pf-sr ¹⁰ ⁽²⁾ QCISRC.*file.pf-src ¹⁰ ⁽²⁾ QCISRC.*file.pf-src ¹⁰ ⁽²⁾	Userval Paste Cbf+V E '0' *1N60 0368000 Select > 0 Select > 0 Select > 0 >	east
Billing QDDSSRC, "Mic.pf-arc Discrete Comparison of the processor of the pro- Discrete Comparison of the pr	037300 Fiter view > Date 037400 Show all Ctrl+W Code 037500 Source Comments Control Procedures Procedures	
ISNMST.*file.pt-dta MYCOMPILE.*cmd Series Commands	Save Subroutines Remote System Add Breakpoint Errors source Prompter 🔅	
	Line type: C: Calculation	•
Cyshells Properties Remote Scratchpad	Control Indicator Operation and extender Factor 2 Result field • END •	Field Decimal length positions H
Property	CLON01Factor1++++++Opcode(E)+Factor2++++++Result++++++Len- C END	++D+HiLoEqComments++
		N
		<u>·</u>
Properties 23 Remote Scratchpad Property Property	Control Indicator Indicator 1 Operation and extender Factor 2 Result field Image: Noil Factor 1 Image: State 1 Pactor 2 Pactor	Field Decimal length positions H ++D+HiLoEqComments++

Figure 8: PAYROLL tab options



Subroutine views

Once the **Subroutine** folder is chosen (under the **Main Procedure** folder), the view changes and only the subroutines are displayed (one line for each). The complete subroutine can be displayed by clicking the **+** sign next to the folder. Refer to the illustration below in Figure 9 for an example.

© Remote System Explorer - PAYROLL.R	PGLE -	IBM Rational S	oftw	are Developme	ent Platfo	orm								
File Edit Source Compile Navigate Search	Project	Run Window	Help											
] 📬 • 🔛 🌰 🗐 🎄 • 🔘 • 🗛 •	1 🔗]	*;- ↔ ↔	•]	🤣 😂 🗉 🗉	■ ► Z	₩ 🛱	2 🕅					Ren	note Syste.	»
Remote Systems 🛛 🗖 🗖	🚺 We	come to HATS	1	*PAYROLL.RPGLE	X							E Outline	23	- 8
	L	ine 265	Col	.umn 1 F	Replace	5 cha	nges							Ó
D C D1 See dla			CL0	N01Factor1+	++++++(Opcode (B	C) +Extended	d-fac	tor2+++	++++++	+++	🗆 🙆 Glob	al Definition	
WYCOMPTIE *nom cla	Ð										^	Å Å	Files	~ I
	8	005200	С	MAIN	E	BEGSR							MSTDS	e:wo
PAYROLLD *nom chile	H 🕀 '	010200	С		•	endsr					=			T : DIS
+ PAYROLLG.*pgm.rpgle	<u>⊎</u> '	011000	С	RSNTAG	I	BEGSR						÷.	🦉 PRJMST	: DIS
COMPARE. *file.pf-src	l ⊎ '	017600	С		E	INDsr						+	🦉 RSNMS'	T:DIS
+ 🗐 EMPMST.*file.pf-dta	l H	018300	С	EMPTAG	I	BEGSR						• ÷	Fields	
EVFEVENT.*file.pf-dta	비번	025700	С		I	INDSR						🗉 🖳	Indicators	
⊕ 66 MSTDSP.*file.dspf	8	026400	С	PRJTAG	1	begsr						🗄 🦓 Mair	n Procedure	
+ 60 MSTDSP2.*file.dspf	1	026500	C		1	000	*INKC					i 🔤	Subroutines	3
		026600	C			IOVE	101		*1N60)		÷.	ACDES	٤
⊕ 🗐 QCBLLESRC.*file.pf-sr		026700	C			IOVE	*BLANKS		EMESS	5		÷.	addcd	E
🕀 🗐 QCLSRC.*file.pf-src		026800	2			IOVE	* BLANKS		PRODE			÷.	CHGCD	e
🕀 🗐 QCMDSRC.*file.pf-src		028900	2			IOVE	· DLANKS	60	ACODE			÷	DELCDE	£
QDDSSRC.*file.pf-src		027000	2				not *IN	60	DDDCC			÷	EDITSL	
QRPGLESRC.*file.pf-sr		027100	2			IOVE	* DLANKS		PRDSC	, ,		÷		G
PAYROLL.rpgle		027200	2				* DLANKS		PRESE			÷	INVCDE	£
PAYROLLG.rpgle		02/300	C		-	-ADD	U		PROIP		~	÷.	MAIN	
🕀 🛅 QRPGLESRCP. *file.pf-	<				Ш					>	J	÷.	PRJTAG	
🗈 📳 REFMST.*file.pf-dta											_		RSNTA	3
												<		>
ISeries Commands	Remote	e System Details	Tasks	iSeries Table Viev	w iSeries C	ommands Lo	og 🝳 iSeries Er	rror List	×			X % (*	> -	
Iseries Jobs	<ice></ice>	RSELAB01/QRPGL	ESRC(PAYROLL)										
		ID	Me	ssage				Sev	Line	Location			Connection	1
🖓 Qshells 🗸		RNF5178	EN	DSR operation is n	nissing for s	ubroutine E	DITSL; ENDS	30	1	RSELAB01/0	QRPO	GLESRC(P	MyConnec	tion
	i	RNF7089	RP	G provides Separa	ate-Indicato	r area for fi	le MSTDSP.	0	27	RSELAB01/0	QRPO	GLESRC(P	MyConnec	tion
	i	RNF7031	Th	e name or indicato	r *INO3 is r	ot referenc	ed.	0	1	RSELAB01/0	QRPO	GLESRC(P	MyConnec	tion
Properties 23 Remote Scratchpad	i	RNF7031	Th	e name or indicato	r *INO4 is r	ot referenc	ed.	0	1	RSELAB01/0	QRPO	GLESRC(P	MyConnec	tion
법 🖨 🗷 🔻	i	RNF7031	Th	e name or indicato	r *IN05 is r	ot referenc	ed.	0	1	RSELAB01/0	QRPO	GLESRC(P	MyConnec	tion
Property	i	RNF7031	Th	e name or indicato	r *INO6 is r	ot referenc	ed.	0	1	RSELAB01/0	QRPO	GLESRC(P	MyConnec	tion
Attribute	i	RNF7031	Th	e name or indicato	r *IN07 is r	ot referenc	ed.	0	1	RSELAB01/0	QRPO	GLESRC(P	MyConnec	tion
Name														
Number of children														
Source														
Status 🗠														

Figure 9: Subroutine tab views



Source verification

One of the most powerful features in RSE is the ability to verify source code on the developer's workstation. In the example shown in Figure 10, the **PAYROLL** program was verified, and the results are displayed below.

A new tab in the bottom panel, called **iSeries error list**, is opened and all the compile time errors are listed there. In Figure 10, the RNF7030 error has been double-clicked. The cursor is then positioned at the line of code in error in the **PAYROLL** tab, and the error message text is displayed.

© Remote System Explorer - PAYROLL.RI	PGLE - I	BM Rational	Software Develop	ment Platform						
File Edit Source Compile Navigate Search	Project	Run Window	Help							
] 🖞 • 🖫 👜] 🖳 🏇 • 🔘 • 🌯 • .	1	、 ↔] 🖑 😓 🛛	🗉 🕨 🛆 🎖	🕴 🛒 🐘				🖹 📳 Re	mote Syste
Remote Systems 🕅 Team 🗖 🗖	🚺 Weld	come to HATS	PAYROLL.RPGL	EX				E	🗄 Outline	x -0
(> ⇒ @ [= \$ ▼	Li	ne 94	Column 54	Replace			_			ණ
E CI P1 *nom dle		c	LON01Factor1+	++++++0pcode (E)+Extended-1	factor	2++++	+++++++++++++++++++++++++++++++++++++++	- 🕼 Glo	bal Definitions
H. MYCOMPILE.*pam.dle	009	000 C	*					^	1 <u>-</u> R	Files
E PAYROLL*pgm.rogle	009	100 C		when	PRJAPL =	'X'				A MSTDSP : WO
+ PAYROLLD, *pam.cble	009	200 C		EXSR	PRJTAG					EMPMST : DIS
PAYROLLG,*pam.rpgle	009	300 C	*				_		÷.	RJMST : DISK
COMPARE.*file.pf-src	009	400 C		when	RSNAPL =	'X'			÷	RSNMST : DIS
EMPMST.*file.pf-dta	009	500 C		EXSR	RSNTAX				€	Fields
		RNF701	.8: The operand	1 RSNTAX of B	XSR is not a	subro	utine	name.	📗 🕀 🕰	Indicators
H 6 MSTDSP.*file.dspf		RNF703	0: The name of	r indicator H	SNTAX 15 not	defin	led.		🖻 🦓 Ma	in Procedure
⊕ 66 MSTDSP2.*file.dspf	009	600 C	* : = #0 1	ENDSL					6-9	Subroutines
	009	700 0	* if KC end p:	rogram	* 73770				÷.	ACDESR
🗉 📳 QCBLLESRC. *file.pf-sr	009	800 0		11	*INKC				÷.	ADDCDE
🗉 🗐 QCLSRC.*file.pf-src	009	900 0		Ieave					÷.	CHGCDE
QCMDSRC.*file.pf-src	010	100 0		endii					÷.	DELCDE
	010	200 0		endar						EDITSL
QRPGLESRC.*file.pf-sr	010	200 0		endsr					÷.	EMPTAG
PAYROLL.rpgle	010	300 C							. E	INVCDE
PAYROLLG.rpgle	010	100 0						×		MAIN
QRPGLESRCP.*file.pf-	<							>	₽	PRJTAG
😟 📳 REFMST.*file.pf-dta									i	RSNTAG
RSNMST.*file.pf-dta									<	>
	Remote	System Details	Tasks iSeries Table \	/iew iSeries Commar	nds Log 🍳 iSeries Er	ror List 8	X		X 🖗 <	
🗉 👬 iSeries Jobs	<ice>R</ice>	SELAB01/QRPG	ELESRC(PAYROLL)							
🗄 🔁 IFS Files		ID	Message			Sev	Line	Location		Connection
🚽 🖓 Qshells 💽 🔽		RNF7030	The name or indic	ator RSNTAX is not d	efined.	30	95	RSELAB01/QRF	GLESRC(P	MyConnection
<		RNF7018	The operand RSN	TAX of EXSR is not a	subroutine name.	30	95	RSELAB01/QRF	GLESRC(P	MyConnectior
		RNF5184	Factor 2 must be	'0' or '1' when the Re	sult is an indicator	30	364	RSELAB01/QRF	GLESRC(P	MyConnection
Properties 🛛 Remote Scratchpad		RNF7515	Move operands E	RR and EMES have to	pes that are not	30	365	RSELAB01/QRF	GLESRC(P	MyConnectior =
1 🗄 🔁 💌 🔻		RNF5178	ENDSR operation	is missing for subrout	ine EDITSL; ENDS	30	1	RSELAB01/QRF	GLESRC(P	MyConnectior
Property		RNF7030	The name or indic	ator EMES is not defi	ned.	30	365	RSELAB01/QRF	GLESRC(P	MyConnectior
riopercy	i	RNF7031	The name or indic	ator RSNTAG is not n	eferenced.	0	110	RSELAB01/ORF	GLESRC(P	MyConnection
	i	RNF7031	The name or indic	ator *IN03 is not refi	erenced.	0	1	RSELAB01/ORF	GLESRC(P	MyConnection
	i	RNF7031	The name or indic	ator *IN04 is not refi	erenced.	0	1	RSELAB01/ORF	GLESRC(P	MyConnectior
	i	RNF7031	The name or indic	ator *IN05 is not refe	erenced.	0	1	RSELAB01/ORF	GLESRC(P	MyConnection
	i	RNF7031	The name or indic	ator *IN06 is not ref	erenced.	0	1	RSELAB01/ORF	GLESRC(P	MyConnectior V
< >	<									>

Figure 10: PAYROLL program verified and the iSeries error list



Error correction

Because the subroutine name is incorrect in this instance, the developer will position the cursor on the field and press **CTRL + spacebar**. The editor will then display all the subroutines as shown in Figure 11. The developer then clicks the correct name to place it in the source code. This is much simpler than the existing process of displaying the spool file, finding the error number and line number, and then the actual line of code.



Figure 11: Displaying subroutines



Compiling the program

Once all the errors have been corrected, the developer can click the program name to compile it. This is demonstrated in the following example (Figure 12):

Remote System Explorer - F	PAYROLL.RPGLE - IBM Rat	tional Software Development Platforr	n				
File Edit Source Compile Naviga	ate Search Project Run V	Vindow Help					
📬 • 🔛 🗁 🗾 🏇 • 🕻) - 💁 - 🛛 🛷 🗍 🍫 🗇	• <> •]	¥ R 🛛 🖻			Remote Syste	
Remote Systems × Team	🗆 🗖 🚺 Welcome to I	HATS SPAYROLL.RPGLE				🗄 Outline 🛛 📃 🗖	
▲ 최 (> → @	📄 🔄 🖌 📄 Line 41	Column 1 Replace	5 changes			6	
Ê-∎ CIR1.*pom.c			+4+	+5	+6+.	- Global Definitions	
H MYCOMPILE.	*pgm.cle 002600	F*************************************	************	*******	*********	E C Files	
🐑 💽 PAYROLL.*pg	gm.rpgle 002700	FMSTDSP CF E	WORKSIN		Methen	🕀 🍓 MSTDSP : WO	
🗈 💽 PAYROLLD.*	pgm.cble	FEMPMST UF & E	K DISK	a for file	MSIDSF.	EMPMST : DIS	
PAYROLLG.*	pgm.rpgle 002900	FPRJMST UF A E	K DISK			PRJMST : DISP	
E EMPMET *A	nie.pr-src 003000	FRSNMST UF A E	K DISK			Fields	
	file.of-dta	D*				+ 🔄 Indicators	
+ 6% MSTDSP.*file	.dspf 003200	D* Compile time array co	ntaining error	descripti	ons.	🖻 🍓 Main Procedure	
⊕ 60 MSTDSP2.*fil	le.dspf 003300	D ERR S	50 DI	IM(10) CTD	ATA PERRCE	🖻 🖳 Subroutines	
🕀 🗍 PRJMST.*file	.pf-dta	DEMESS S	50			E ACDESR	
QCBLLESRC.	*file.pf-sr 003600	C****************	************	*********	*****	ADDCDE	
QCLSRC.*file	e.pt-src 003700	C* MAINLINE CALCULATIONS					
	nie.pr-src	C************************	**********	********	*****		
	GO 10	C* This mainline routine	controls the o	display fi	le process	EMPTAG	
PAYROLL	Open With 🕨 🕨	C* editting. Using the	function keys of	described	on each di	🛨 📑 INVCDE	
PAYROLL	Browse With	C* format, you can trans	ter from one ma	aintenance	applicativ	🗄 📑 MAIN	
	Ť Denero	-			>	PRJTAG	
E-UI REFMST.*file	ų Kename	bgram accion compieted with	errors.			E RSNIAG	
	Сору		,				
∃ iSeries Commands	↔ Move	etails Tasks iSeries Table View iSeries Com	mands Log 👰 iSeries Er	rror List 🛙		🗶 🎇 🗇 🔿 🗕 🗖	
🗈 📸 iSeries Jobs	💢 Delete	QRPGLESRC(PAYROLL)					
IFS Files	Registers	Message		Sev Line	Location	Connection	
	W Find String	ENDSR operation is missing for sub-	outine EDITSL; ENDS	30 1	RSELAB01/QRP	GLESRC(P MyConnection	
<pre></pre>	Y Verify	RPG provides Separate-Indicator a	rea for file MSTDSP.	0 27	RSELAB01/QRP	GLESRC(P MyConnection	
Properties & Remote Scratch	🕌 Verify (Prompt)	The name or indicator *IN03 is not	referenced.	0 1	RSELAB01/QRP	GLESRC(P MyConnection	
	Compile 🕨 🕨	✓ ■ CRTBNDRPG	reterenced.	0 1	RSELAB01/QRP	GLESRC(P MyConnection	
<u> </u>	Compile (Prompt)		referenced.	0 1	RSELAB01/QRP	GLESRC(P MyConnection	
Property	User Actions		reierencea. referencea	0 1	RSELABUT/QRP	SLESKU(P MyConnection	
Attribute	Add To iCorios Drojost	A Work With Compile Commands	ererenceu.	0 1	KOLLADU I/QKP	accarce(r Myconnection	
Name Number of children	Make Available Office						
Source	Debug(Service Entry)						
Status	Compare 145th	-					
	Compare with	_					
	Properties						

Figure 12: Compiling the program



Summary

Remote System Explorer (RSE), provided with WebSphere Development Studio Client, uses many familiar commands to help reduce its learning curve, while also offering powerful new functions with a visual interface. The integrated development environment allows further advantages.

Additional functions, such as the **Outline** tab view and the **Verify** function, combined with the LPEX editor, enhance the developer's productivity by greatly reducing the number of steps required to complete a task.

Although RSE takes some discipline to learn, after the initial learning period, developers are much more productive than in traditional programming environments. Programmers find there is often a temptation to rely on the older tools with which they are already familiar. If this temptation is resisted, however, developers will soon discover increased productivity and simplified maintenance for traditional applications. In addition, when developers have mastered WebSphere Development Studio Client and RSE they can use the same tool with the other modernizing technologies on the roadmap such as IBM WebFacing for iSeries, WebSphere Host Access Transformation Services (HATS), Java[™], and WebSphere Portal development.



Resources

For more information regarding Remote System Explorer, eServer, and the eServer i5 and iSeries family of computers, refer to the following links.

- WebSphere Development Studio Client for iSeries ibm.com/software/awdtools/wdt400
- Training courses
 - Web-based training course for WebSphere Development Studio Client ibm.com/developerworks/websphere/library/tutorials/dl/sw738/
- IBM Redbooks™ (ibm.com/redbooks)
 WebSphere Development Studio Client for iSeries V5.1.2 (SG24-6961)
- IBM eServer i5 Information Center <u>http://publib.boulder.ibm.com/infocenter/iseries/v5r3/ic2924/inde</u> <u>x.htm</u>
- IBM eServer p5 Information Center
 <u>http://publib.boulder.ibm.com/infocenter/pseries/index.jsp</u>
- IBM Publications Center
 <u>www.elink.ibmlink.ibm.com/public/applications/publications/cgibin</u>
 /pbi.cgi?CTY=US

About the author

Garry Kipfer

IBM eServer Solution Enablement

Garry is a consulting IT specialist working in the Solutions Enablement group, Canada. He has more than 30 years experience in midrange systems with IBM. During that period, he has worked in traditional application development, client/server applications, data warehousing, application modernization, iSeries performance, and IBM DB2® Universal Database[™] for iSeries.



Trademarks and special notices

© IBM Corporation 1994-2005. All rights reserved.

References in this document to IBM products or services do not imply that IBM intends to make them available in every country.

The following terms are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries, or both: IBM, the IBM logo, eServer, iSeries, WebSphere, DB2, DB2 Universal Database, Redbooks, and ibm.com.

Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Other company, product, or service names may be trademarks or service marks of others.

Information is provided "AS IS" without warranty of any kind.

