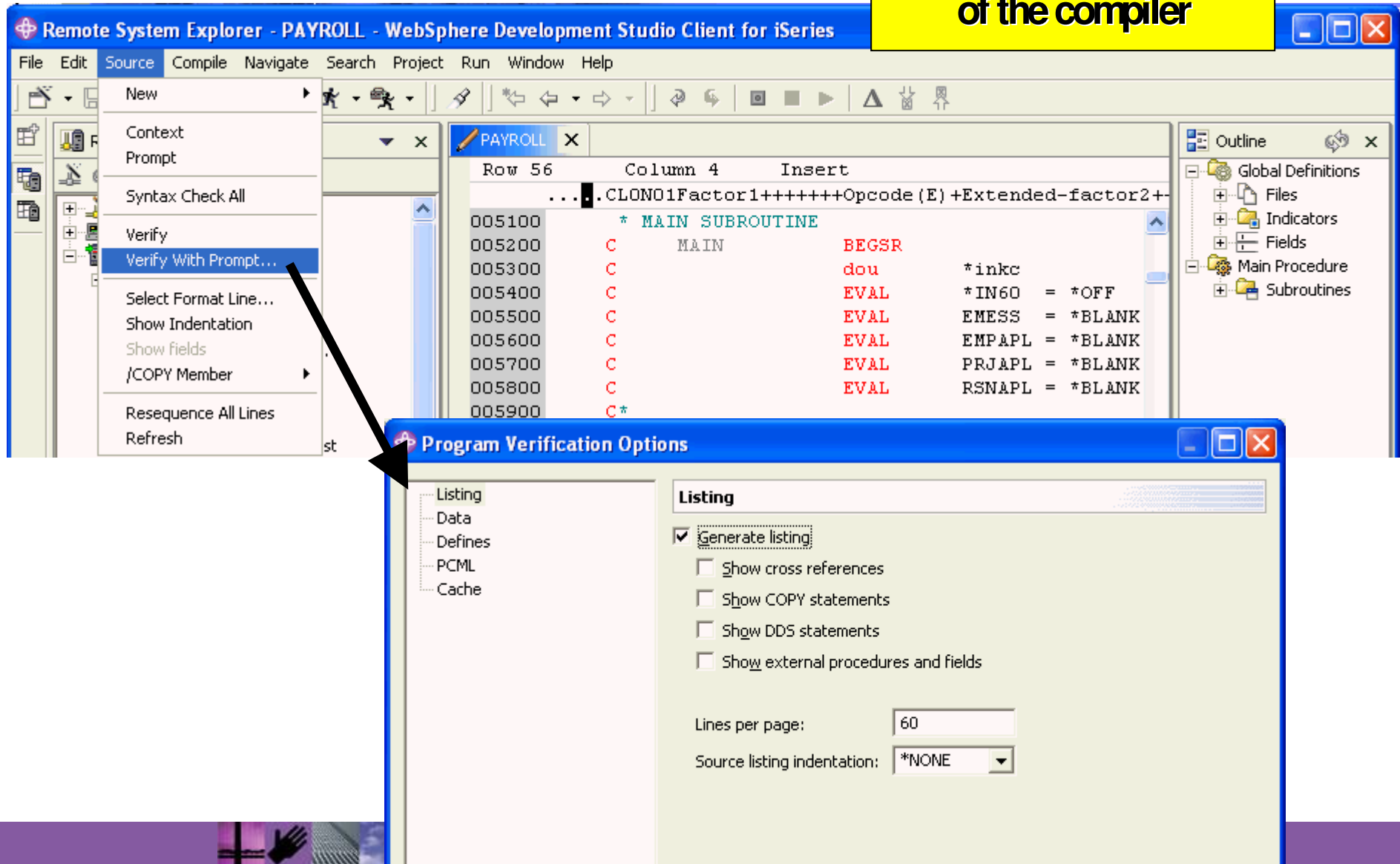


Verifying

**Verify runs built-in copy
of the compiler**



Verify – Error List

The screenshot shows the WebSphere Development Studio Client for iSeries interface. The main window displays the source code for a program named PAYROLL. The error message is: "Move operands ERR and EMES have types that are not compatible. The name or indicator EMES is not defined." This error is highlighted in pink. A yellow callout box with the text "Double clicking on error takes you to error in source" has two arrows: one pointing to the error message in the source code and another pointing to the corresponding entry in the iSeries Error List at the bottom.

Source Code Snippet:

```
Row 365 Column 50 Insert
Factor1++++++Opcode (E) +Factor2++++++Result+++++
036500 MOVE ERR(2) EMES
036600 ELSE
036700 MOVE '0' *IN60
036800 END
036900
037000 following IF AND combination ensures that at
037100 application has been selected.
037200
037300 CMPAPL IFEQ
```

iSeries Error List - <TORAS07M>RSELAB01/QRPGLE5RC(PAYROLL)

ID	Message	Se...	Line	Location	Cor
RNF5184	Factor 2 must be '0' or '1' when the Result is an i...	30	364	RSELAB01/QRPGLES...	My
RNF7515	Move operands ERR and EMES have types that ...	30	365	RSELAB01/QRPGLES...	My
RNF7089	RPG provides Separate-Indicator area for file M...	0	27	RSELAB01/QRPGLES...	My
RNF7031	The name or indicator RSNTAG is not referenced.	0	110	RSELAB01/QRPGLES...	Mv

Attribute SRC
Name PAYROLL
Number of ... 0
Source RSELAB01/QRPGLE5RC

Remote System Details | Tasks | iSeries Table View | iSeries Commands Log | iSeries Source Prompter | iSeries Error List

Listing View

Remote System Explorer - PAYROLL - WebSphere Development Studio Client for iSeries

File Edit Source Compile Navigate Search Project Run Window Help

Remote Systems

- User libraries
 - My Library
 - RSELAB01.*lib.test
 - COMPARE.*file.pf-src
 - QCBLLSRC.*file.pf-sr
 - QCLSRC.*file.pf-src
 - QCMDSRC.*file.pf-src
 - QDDSSRC.*file.pf-src
 - QRPGLSRC.*file.pf-s
 - PAYROLL.rpgle
 - PAYROLLG.rpgle
 - QRPGSRC.*file.pf-src
- iSeries Commands
- iSeries Jobs
- IFS Files

PAYROLL

Row 368 Column 26 Insert

```

`actor1++++++Cpcode (E) +Factor2++++++Result+++++
03 6800                                     END
03 6900
  
```

Verify program action completed with errors.

iSeries Listings

Name	Date	Time
PAYROLL.RPGLE	Sep 6, 2003	11:11:35 AM

191 C*****
 192 C*
 193 C* Housekeeping, clear display fields and reset indicators.
 194 C*

IBM WebSphere Development Studio Client for iSeries PAYROLL

Line <----- Source Specifications -----
 Number1....+....2....+....3....+....4....+....5....+....6....+

Remote System ... Tasks iSeries Table View iSeries Command... iSeries Source Pr... iSeries Error List iSeries Listings

Verify with Prompt, select Generate Listing

Compile with prompt

...

Create Bound RPG Program (CRTBNDRPG)

Program:	PAYROLL	Name
Library:	RSELAB01	Name
Source file:	QRPGLESRC	Name, QRPGLSRC
Library:	RSELAB01	Name
Source member:	PAYROLL	Name
Generation severity level:	10	0-20
Text 'description':	*SRCMBRTXT	Character value...
Default activation group:	*YES	

Compiler options:

Advanced Parameters

	Add
*EVENTF	Remove(B)
	Move up
	Move down

Debugging views:

*SOURCE

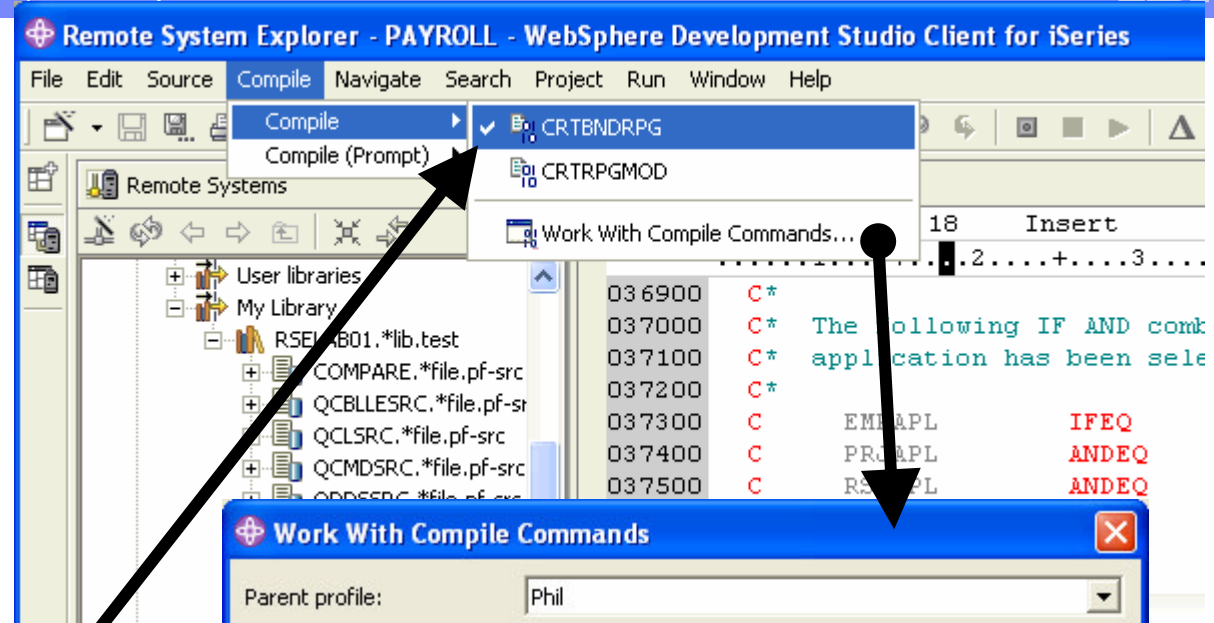
☐ Advanced (X) ☐ All Parameters(Y) ☐ Keywords(Z)

CRTBNDRPG PGM(RSELAB01/PAYROLL) SRCFILE(RSELAB01/QRPGLESRC) SRCMBR(PAYROLL) OPTION(*EVENTF) DBGVIEW(*SOURCE)

OK Restore defaults Cancel

Compiling

- To compile a member, use Compile pulldown when editing, or right-click menu on the member



Choose from existing
compile commands
or

Create or modify
compile command

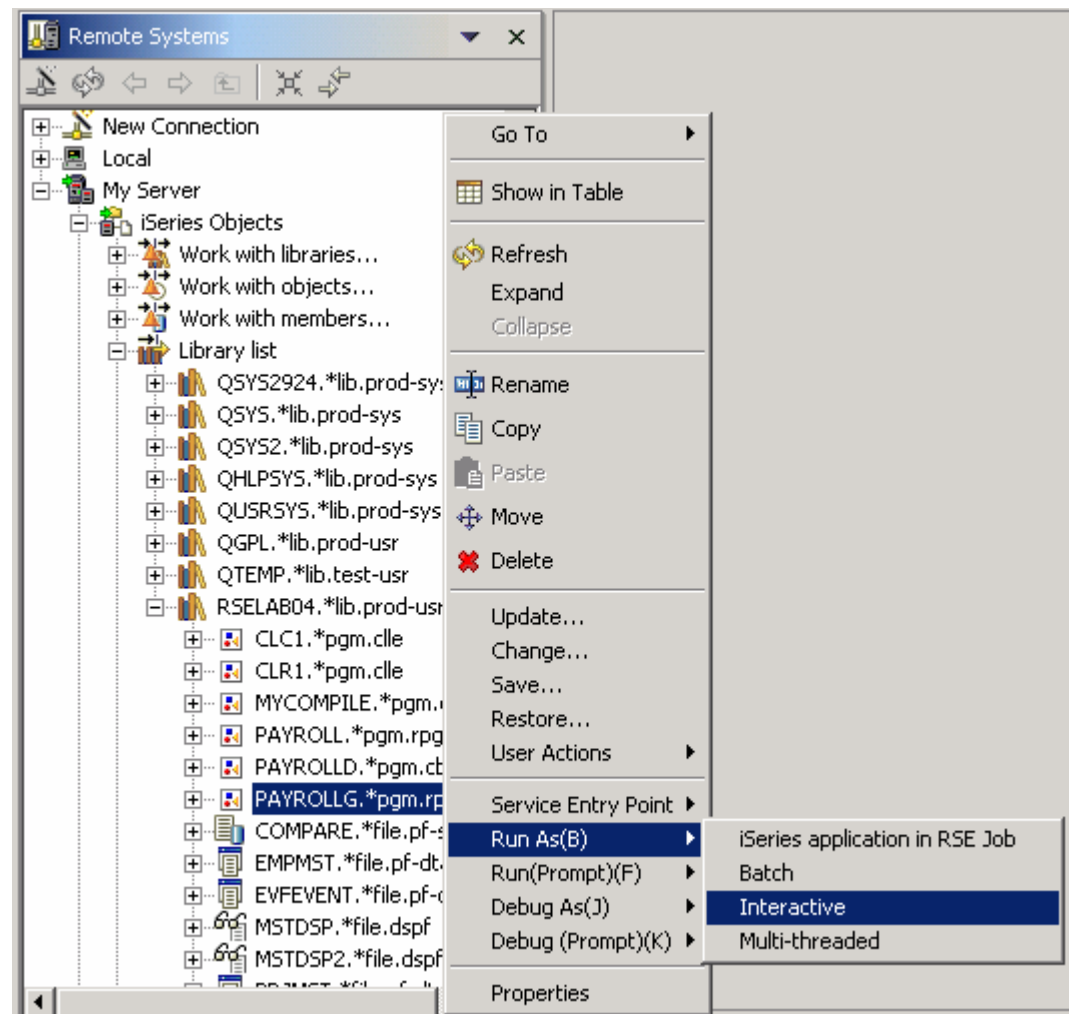
Run: from popup menus

Run from Popup menu of *PGM

- ✓ iSeries appl. in RSE job
- ✓ Batch
- ✓ Interactive
- ✓ Multi-threaded

Run As

Run(Prompt)



Run Configurations: for easy re-use!

The image displays two screenshots from the WebSphere Development Studio. The top-left screenshot shows the 'Remote System Explorer' window with a tree view of 'My Server' containing 'iSeries Objects' and a 'Library list'. A black arrow points from the 'Run As' button in the toolbar to the 'Run' dialog box. The top-right screenshot shows the 'Run' dialog box with the 'Configurations' list on the left and the 'Common' tab selected on the right. The 'Name' field is 'My iSeries program for run', the 'Connection' is 'My Server', and the 'Command to start application' is 'CALL PGM(RSELAB04/PAYROLLG)'. A yellow callout box at the bottom right contains the text: 'Existing run configurations are easily accessible in run pulldown!'. The bottom-left screenshot shows the 'Run' dialog box with the 'Run As' button highlighted in the toolbar.

Remote System Explorer - WebSphere Development Studio Client

File Edit Navigate Search Project Run Window Help

Remote Systems

New Connection

Local

My Server

iSeries Objects

Work with libraries...

Work with objects...

Work with members...

Library list

QSYS2924.*lib.prod-sys

QSYS.*lib.prod-sys

QSYS2.*lib.prod-sys

QHLP5YS.*lib.prod-sys

QUSRSYS.*lib.prod-sys

QGPL.*lib.prod-usr

QTEMP.*lib.test-usr

RSELAB04.*lib.prod-usr

CLC1.*pgm.cle

CLR1.*pgm.cle

MYCOMPILE.*pgm.cle

PAYROLL.*pgm.rpgle

PAYROLLD.*pgm.cbile

PAYROLLG.*pgm.rpgle

COMPARE.*file.pf-rc

Run As

Run...

Run

Create, manage, and run configurations

Configurations:

Name: My iSeries program for run

How To Start: Common

Connection: My Server

Command to start application:

CALL PGM(RSELAB04/PAYROLLG)

Prompt...

New Delete Apply Revert Run Close

Existing run configurations are easily accessible in run pulldown!

Indent View

The screenshot displays the IBM WebSphere Development Studio Client interface. The 'Remote System Explorer' pane on the left shows a project structure with files like QGPL.*lib.prod-usr, QTEMP.*lib.test-usr, and RSELAB04.*lib.prod-usr. The 'Source' pane on the right shows the code for the file *PAYROLL. The 'Show Indentation' menu option is highlighted in the 'Source' menu. The 'iSeries Indent' view at the bottom shows the code with indentation applied, using vertical lines to indicate the structure of the code blocks.

Source Menu:

- New
 - Prompt F4
 - Syntax Check All
 - Verify Ctrl+Shift+V
 - Verify With Prompt...
 - Convert All To Free-Form
 - Select Format Line...
 - Show Indentation**
 - Show fields
 - /COPY Member
 - ILE RPG Help
 - Resequence All Lines
 - Refresh Ctrl+F5

***PAYROLL Code:**

```

Row 72      Column 12      Replace 1 change.
.....1.....2.....3.....4.....5.....6.....7.....
006000      C*  Write the SELECT format to display.  If end of job requested,
006100      C*
006200      C*
006300      C          DOU          not *IN60
006400      C          EXFMT        SELECT
006500      C          *INKC        IFEQ          '1'
006600      C          LEAVESR
006700      C          ELSE
006800      C          EXSR          EDITSL
006900      C          END
007000      C*
007100      C*  IF the general error indicator *IN60 is on (equal to 1), the
  
```

iSeries Indent View:

```

Row 69      Column 12      Browse
-----+-----1-----2-----3-----4-----5-----6-----7-----8-----
C*  Write the SELECT format to display.  If end of job requested,
C*
C*
C          DOU          not *IN60
C          EXFMT        SELECT
C          *INKC        IFEQ          '1'
C          LEAVESR
C          ELSE
C          EXSR          EDITSL
C          END
C*
C*  IF the general error indicator *IN60 is on (equal to 1), the
  
```

Show Fields

The screenshot shows the 'Remote System Explorer - PAYROLL - WebSphere Development Studio Client Advanced Edition for iSeries' interface. The 'Source' menu is open, and the 'Show fields' option is highlighted. An arrow points from this menu item to a table titled 'RSELAB04/MSTDSP (71 Fields)'.

The table displays the following fields:

Name	Record	Type	Length	Text
*IN03	SELECT	Character	1	
*IN04	SELECT	Character	1	
*IN60	SELECT	Character	1	
EMPAPL	SELECT	Character	1	
PRJAPL	SELECT	Character	1	
RSNAPI	SELECT	Character	1	

The background code editor shows a snippet of RPG code with comments describing the program's use of external files:

```

.....FFilename++IPEASFRlen+LKlen+AIdevice+.Keywords+++++
F* ACDESR - Edit action code for all maintenance
F* *****
F* This program uses all externally described fil
F* used are - MSTDSP - maintenance display file
F*           - EMPMST - employee master file
F*           - PRJMST - project master file
F*           - RSNMST - reason code master file
F* *****
MSTDSP      CF      E      WORKSTN
FEMPMST     UF      A      E      K DISK
FPRJMST     UF      A      E      K DISK
  
```

Integrated Compare

Remote System Explorer - PAYROLL - WebSphere Development Studio Client for iSeries

File Edit Source Compile Navigate Search Project Run Window Help

Undo Ctrl+Z
Redo Ctrl+Y
Cut Ctrl+X
Copy Ctrl+C
Paste Ctrl+V
Delete
Select All Ctrl+A
Find/Replace... Ctrl+F
Find Next Ctrl+N
Find Previous Ctrl+U
Find Other
Show All
Add Bookmark...
Add Task...
Select
Selected
Deselect Alt+U
Mark
Compare
Keystroke Recorder
Content Assist Ctrl+SPACE
Number of ... 0
Source RSELAB01/QRPGLES

Row 52 Column 1 Insert

Row	Column 1	Insert
005000	C	eval *INLR = *on
005100	* MAIN SUBROUTINE	
005200	C MAIN	BEGSR
005300	C	dou *INKC
005400	C	dou *inkc
005500	C	EVAL *IN60 = *OF
005600	C	EVAL EMESS = *BL
005700	C	EVAL EMPAPL = *BL
005800	C	EVAL PRJAPL = *BL
005900	C	EVAL RSNAPL = *BL

One or more mismatches found.

File RSELAB01/INNMST (6 Fields)

Name	Record	Type	Length	Text
ACREC	RCRSN	Character	1	ACTIVE RECORD CODE
		Character	8	REASON CODE
		Character	50	REASON CODE DESCRIPTION
		Packed Decimal	7.1	REASON CODE HRS CURR MONTH

Compare...
Next Mismatch
Previous Mismatch Ctrl+Shift+P
Refresh Compare Ctrl+Shift+R
Clear

Filtering

Right click in editor
to filter view

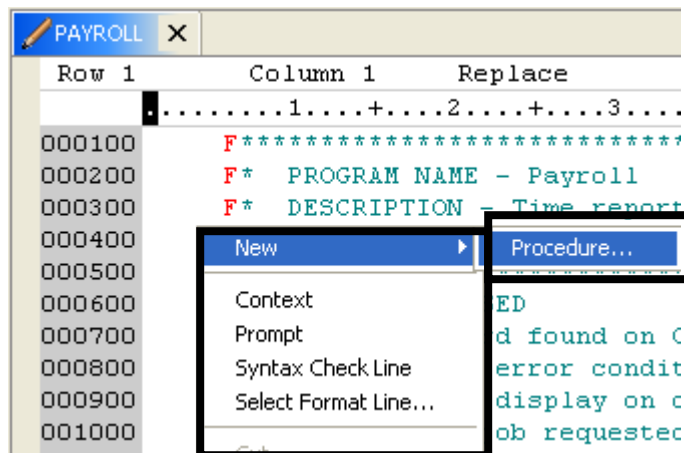
Only lines meeting
filter criteria are
shown

Use + / - to expand
or collapse filtered
sections

The screenshot illustrates the filtering process in the IBM System i5 Tools Remote System Explorer. The main editor window, titled '*PAYROLL', shows a list of rows (005900 to 008000) and a code snippet. A right-click context menu is open, with 'Filter view' selected. A sub-menu is also visible, showing options like 'By Date...', 'Code', 'Comments', 'Control', 'Procedures', 'SQL Statements', 'Subroutines', and 'Errors'. A second window, titled 'PAYROLL', shows the filtered results, with rows 005200 to 044600. The filtered results are displayed in a table format, with columns for Row, Column, and Insert. The table shows various subroutines and their associated codes. A black arrow points from the 'Subroutines' option in the context menu to the filtered results window. Another black arrow points from the '+' and '-' icons in the filtered results window to the text 'Use + / - to expand or collapse filtered sections'.

Row	Column	Insert
005200	C	MAIN BEGSR
010200	C	endsr
011000	C	RSNTAG BEGSR
017600	C	ENDsr
018300	C	EMPTAG BEGSR
025700	C	ENDSR
026400	C	PRJTAG begsr
033500	C	endsr
034700	C	EDITSL BEGSR
040800	C	ACDESR BEGSR
042700	C	ENDSR
043100	C	ADDCDE BEGSR
044000	C	ENDSR
044400	C	CHGCDE BEGSR
044500	C	IF *IN50
044600	C	EVAL *IN60 = *C

New Procedure wizard



**Procedure wizard
generates
prototype and
body stub**

The 'RPG Procedure Wizard' dialog box is shown. It has a title bar with a plus icon and a close button. The main title is 'RPG Procedure' with a subtitle 'Create RPG procedure'. There are settings for 'Procedure type' (Subprocedure), 'Procedure name' (max), 'External name (EXTPROC)' (Maximum), and 'Purpose' (determine maximum of two numbers). There are checkboxes for 'Exportable for use with other code (EXPORT)' (checked) and 'Generate free-form calculations' (unchecked). Below these is a table for 'Parameters created for this procedure:' with columns 'Name', 'Type', and 'Text'. The table contains two rows: 'firstNbr' (Integer) and 'secondNbr' (Integer). At the bottom, there are buttons for 'Add...', 'Change...', 'Remove', 'Move Up', and 'Move Down'. There are also checkboxes for 'Pass the operational descriptors with the parameters' (unchecked) and 'Return a value' (checked). At the very bottom are buttons for '< Back', 'Next >', 'Finish', and 'Cancel'.

New Procedure wizard

**Procedure wizard
helps with
complexity of RPG
language**

**Flyover help
describes each
option**

Change Procedure Parameter

Parameter name: firstNbr

Parameter description:

Attributes

☐ Defined like another field:

☒ Field
 ☐ Data Structure
 ☐ Record Format

Type: Integer

Length: 5 3, 5, 10, 20

Decimals: 0

The class of the object:

☐ CCSID number: *DFT 0 - 65535, *DFT

DATEFMT:

Separator:

Sample:

Array entries (DIM):

Other keywords

☐ ALTSEQ
 ☐ ASCEND
 ☐ DESCEND
 ☐ NOOPT

Parameter passing options

☐ Pass copy of contents (VALUE)
 ☒ Pass read-only reference (CONST)

Parameter options (OPTIONS)

Parameter is passed by value.

☐ Optional (*NOPASS)
 ☐ Optional (*OMIT)

☐ Variable size (*VARSIZE)
 ☐ Null-terminated string (*STRING)

☐ Right adjusted string (*RIGHTADJ) (>=V4R4)

Remote System Explorer

Integrated iSeries
Debugger

Integrated iSeries Debugger - Overview

- Supports many languages
 - RPG, COBOL, CL, C, and C++
 - ILE and non ILE
 - Java
- Supports many views
 - Source and Listing
- Supports many applications
 - Batch and Job
 - Interactive
 - Multi-Threaded Applications
 - Client/Server Applications
 - Distributed Applications



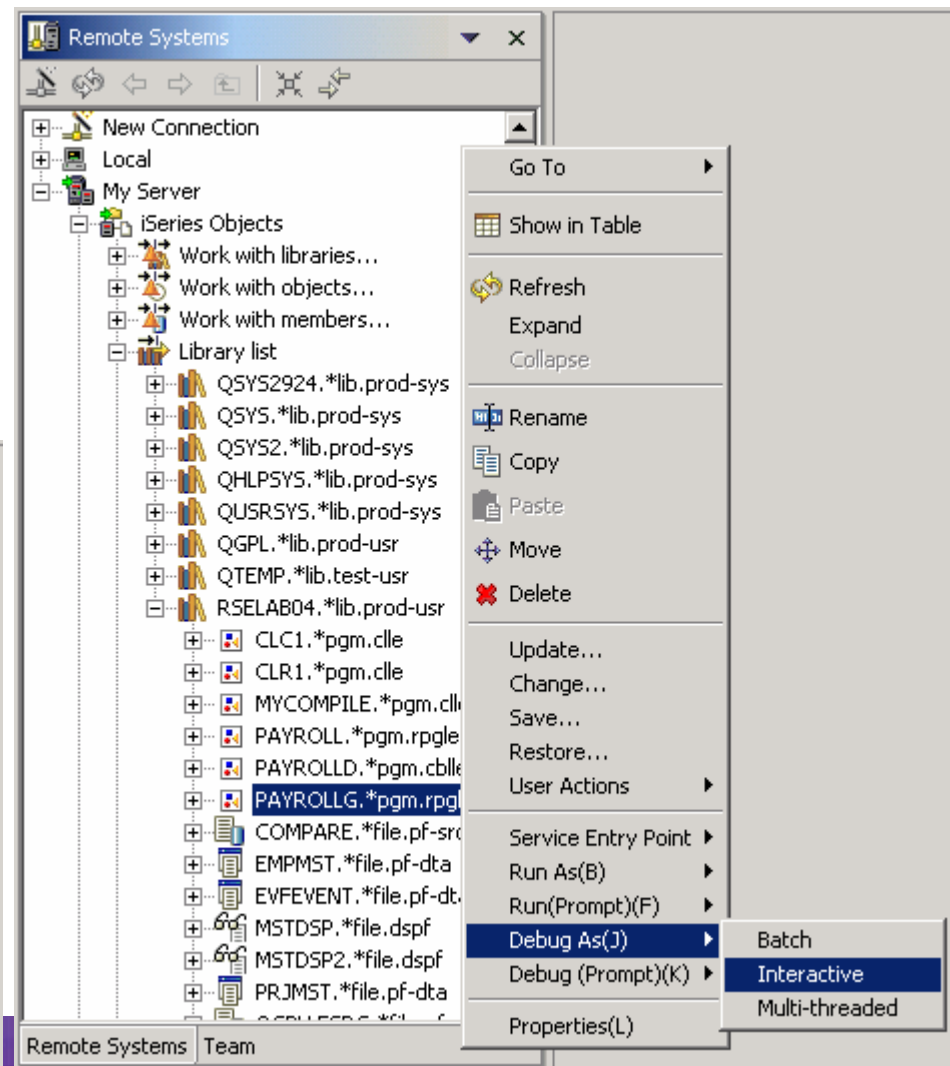
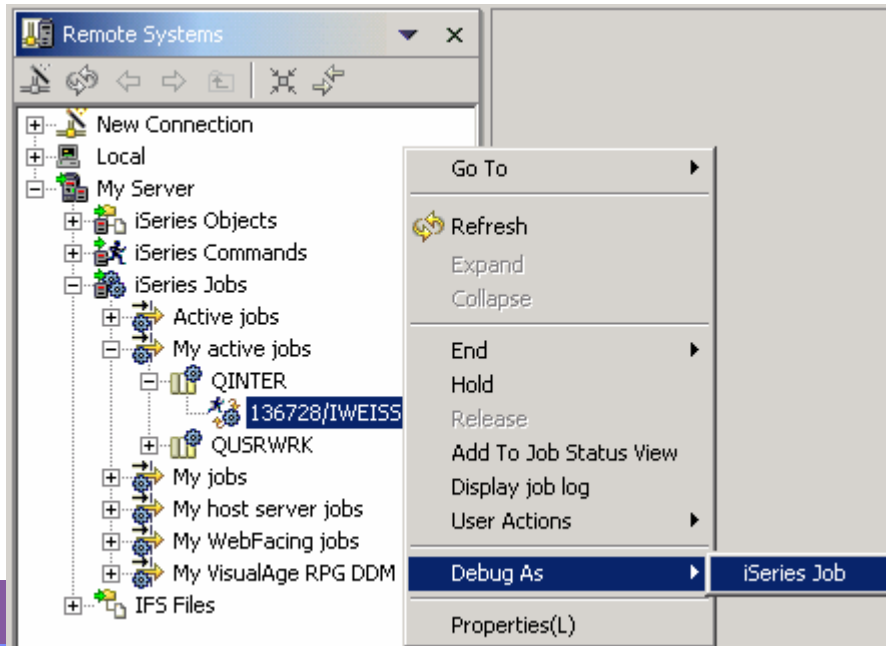
Debugger Invocation: from popup menus

Debug As... from Popup menu of:

*PGM, *SRVPGM, job

Debug As...

Batch, Interactive,



Debugger Configurations: for easy re-use!

The image shows two screenshots of the WebSphere Development Client interface. The top-left screenshot shows the 'Remote System Explorer' window with the 'Debug As' menu item circled. The top-right screenshot shows the 'Debug' window with the 'My iSeries program' configuration selected in the 'Configurations' list. The bottom-left screenshot shows the 'Remote System Explorer' window with the '1 My iSeries program' configuration selected in the 'Remote Systems' list. A yellow callout box at the bottom right states: 'Existing debug configurations are easily accessible in debug pulldown!'.

Remote System Explorer - WebSphere Development Client

File Edit Navigate Search Project Run Window

Remote Systems

Local

My Server

iSeries Objects

Work with libraries...

Work with objects...

Work with members...

Library list

User libraries

My Library

RSELAB01.*lib.test

CLC1.*pgm.clle

CLR1.*pgm.clle

MYCOMPILE.*pgm.clle

PAYROLLD.*pgm.cbllc

PAYROLLG.*pgm.rpgle

Debug As

Debug...

Debug

Create, manage, and run configurations

Configurations:

Compiled Application

EGL Listener

EGL Program

HTML Script Application

iSeries: Debug Batch

iSeries: Debug Inter

My iSeries program

New_configuration

iSeries: Debug Job

iSeries: Debug Multi-T

Java+ Application De

Java Applet

Java Application

Java Application in iS

Java Bean

JUnit

Remote Java Applicat

Run-time Workbench

Script Host Application

Server

SQLJ Application

Stored Procedure Del

WebSphere Applicat

WebSphere v5.1 App

Name: My iSeries program

What To Debug

How To Start

Advanced

Common

Connection: My Server

Program or Service Program

Library: RSELAB04

Program:

PAYROLLG

Service Program:

Step into

Terminate debug session on program completion

Update production files

1 My iSeries program

Debug As

Debug...

Existing debug configurations are easily accessible in debug pulldown!

Debug Perspective

Resume, Suspend, Terminate, Step Into,
Step Over, Step Return

Call Stack

Resume, Suspend, Terminate, Step Into, Step Over, Step Return

Examine / Change Fields

Current Line

Break Point

Debug Perspective

- ✓ Debug view
- ✓ Source view (debug editor)
- ✓ Numerous other views

Debug - PAYROLLG.RPGLE - WebSphere Development Studio Client Advanced Edition for iSeries

File Edit Navigate Search Project Profile Run Window Help

Debug

New_configuration (4) [iSeries: Debug Interactive Application]

State: <stopped> Connection: iSeries (R05400A:18732)

Thread:1 (stopped)

PAYROLLG : PAYROLLG

ORNP_PEP : PAYROLLG : PAYROLLG

CLR1 : CLR1 : CLR1

_CL_PEP : CLR1 : CLR1

QCMDEXC : QCMDEXC : QCMDEXC

executeCommand : QRSEMAIN : RSEMAIN

main : QRSEMAIN : RSEMAIN

_C_pep : QRSEMAIN : RSEMAIN

QUICMD : QUICMD : QUICMD

Monitors

*IN60 = 0

EMPAPL =

Debug Servers

PAYROLL CLR1.CLE PAYROLLG.RPGLE

Row 64 Column 1 Replace Browse

...+...1...+...2...+...3...+...4...+...5...+...6...+...7...+...8...+...9...+...0

61 C*

62 C*

63 C DOU not *IN60

64 C EXFMT SELECT

65 C *INKC IFEQ '1'

66 C LEAVESR

ELSE

EXSR EDITSL

END

Properties

Property	Value
Call Level	13
Call Le...	1122
Library	RSELAB01
Module	PAYROLLG
Proced...	PAYROLLG
Program	PAYROLLG

Console Tasks iSeries Commands Log Properties

Setting Breakpoints

Setting Breakpoints:

- ✓ Double click in prefix area
- ✓ Prefix area popup menu
- ✓ Source popup menu
- ✓ Breakpoints view popup menu

The screenshot shows the 'Debug - PAYROLLG.RPGLE - WebSphere Development Studio Client Advanced Edition for iSeries' window. The 'Thread:1 (stopped)' pane on the left shows the call stack. The main editor displays the source code of 'PAYROLLG.RPGLE'. Line 64 is highlighted in blue, and a context menu is open over it, with 'Add Breakpoint' selected. The 'Breakpoints' pane on the right shows the list of breakpoints: Line [CLR1.CLE:11], Line [CLR1.CLE:8], Line [PAYROLLG.RPGLE:64], and Line [PAYROLLG.RPGLE:68]. The 'Properties' pane at the bottom shows the current state of the program.

Property	Value
Call Level	13
Call Le...	1680
Library	RSELAB01
Module	PAYROLLG
Proced...	PAYROLLG

Editor breakpoint:

- ✓ Double click in prefix area or
- ✓ Use prefix area popup menu

Editor**Breakpoint**

Enter the name of the corresponding program and module.

Library:

Browse...

☒ Program:

Browse...

☐ Service Program:

Browse...

Module:

Browse...

OK

Cancel