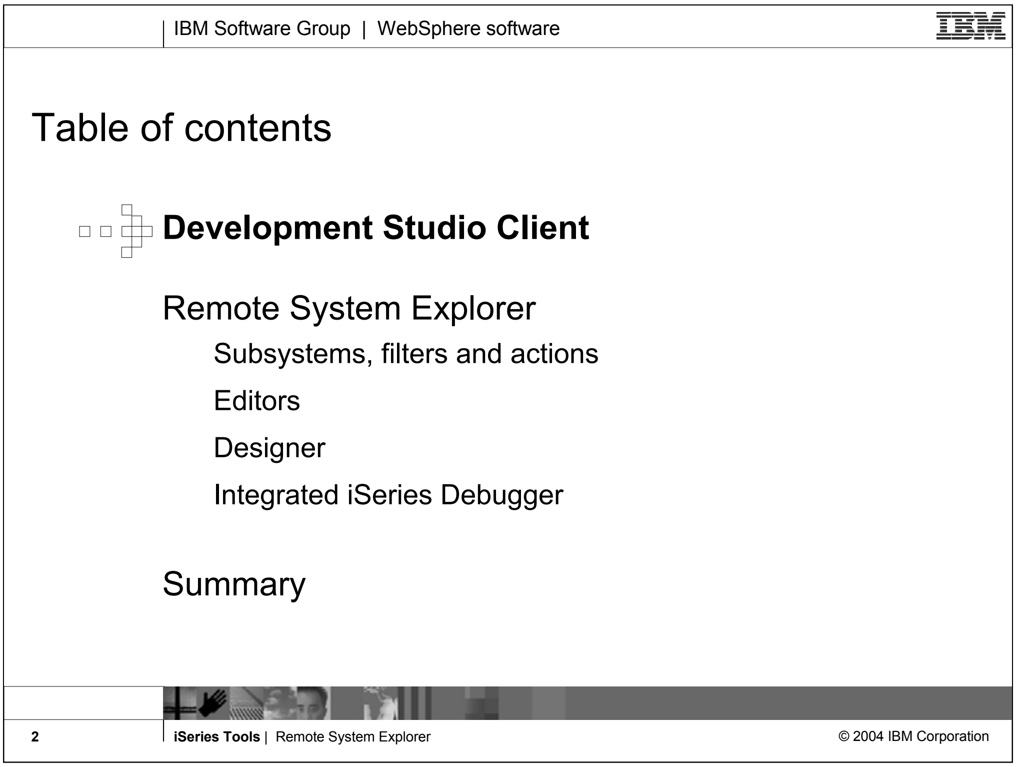
Remote System Explorer in IBM WebSphere Development Studio Client for iSeries

iSeries AD Team. IBM Toronto Lab
www.ibm.com/software/awdtools/wds400



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Development Studio Client

Remote System Explorer

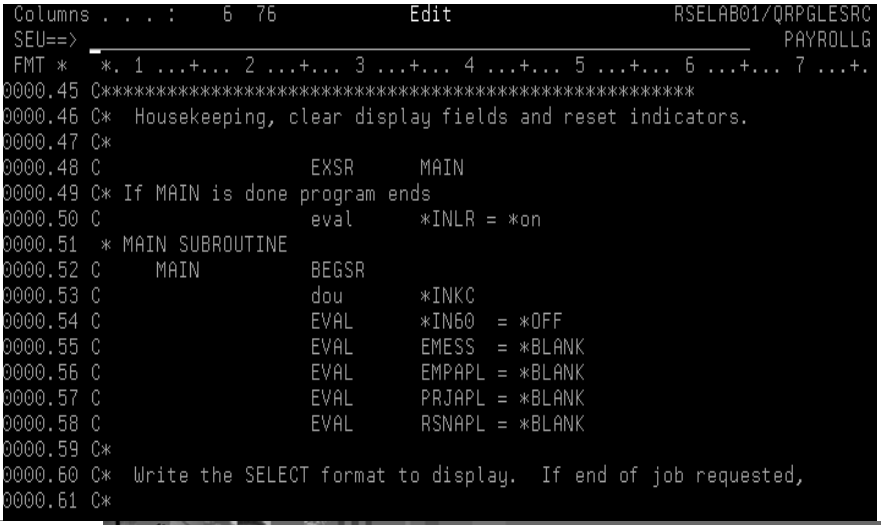
- Subsystems, filters and actions
- Editors
- Designer
- Integrated iSeries Debugger

Summary

This presentation covers first the strategy behind Development Studio Client and is then followed by a review of the Remote System Explorer in Development Studio Client Version 5.1

1988

In the beginning, there was PDM and SEU

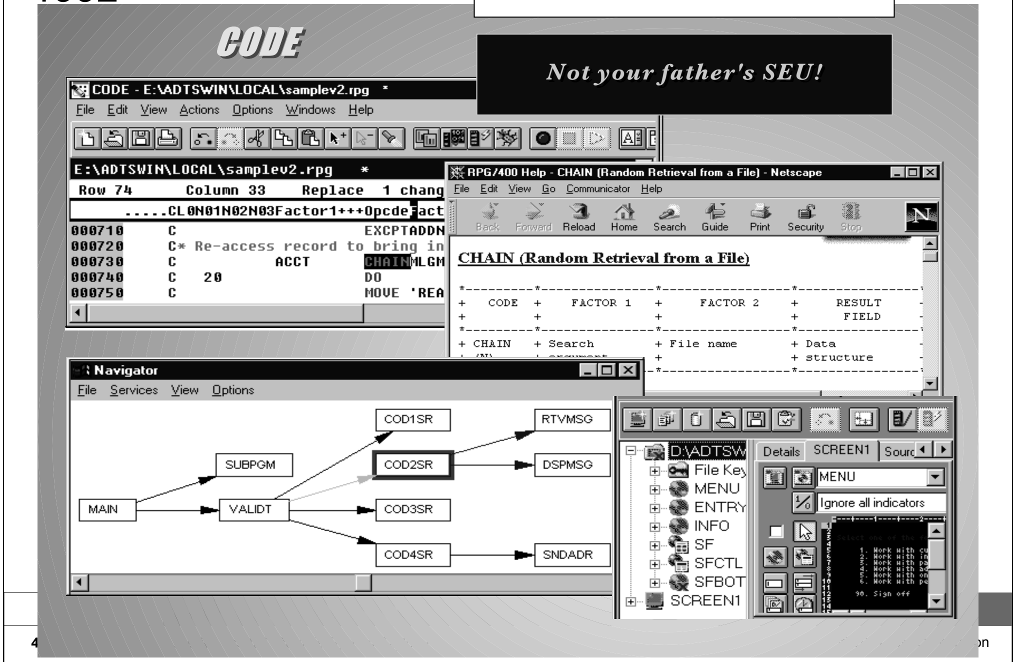


```
 Columns . . . :    6  76            Edit                  RSELAB01/QRPGLESRC
 SEU==> ____________________________________________________________  PAYROLLG
 FMT *   *. 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+.
0000.45 C***************************************************
0000.46 C*  Housekeeping, clear display fields and reset indicators.
0000.47 C*
0000.48 C                   EXSR      MAIN
0000.49 C* If MAIN is done program ends
0000.50 C                   eval      *INLR = *on
0000.51  * MAIN SUBROUTINE
0000.52 C     MAIN          BEGSR
0000.53 C                   dou       *INKC
0000.54 C                   EVAL      *IN60  = *OFF
0000.55 C                   EVAL      EMESS  = *BLANK
0000.56 C                   EVAL      EMPAPL = *BLANK
0000.57 C                   EVAL      PRJAPL = *BLANK
0000.58 C                   EVAL      RSNAPL = *BLANK
0000.59 C*
0000.60 C*  Write the SELECT format to display.  If end of job requested,
0000.61 C*
```

In the beginning, there was SEU, PDM, SDA, etc

1992

And then came CODE/400!



CODE
Not your father's SEU!
CODE - E:\ADTSWIN\LOCAL\samplev2.rpg *
File Edit View Actions Options Windows Help
RPG/400 Help - CHAIN (Random Retrieval from a File) - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Guide Print Security Stop
Navigator
File Services View Options
MAIN
SUBPGM
VALIDT
COD1SR
COD2SR
COD3SR
COD4SR
RTVMSG
DSPMSG
SNDADR
D:\ADTSW
File Key
MENU
ENTRY
INFO
SF
SFCTL
SFBOT
SCREEN1
Details SCREEN1 Sourc
MENU
Ignore all indicators

```
E:\ADTSWIN\LOCAL\samplev2.rpg    *
 Row 74       Column 33    Replace   1 chang
     .....CL0N01N02N03Factor1+++OpcdeFact
000710      C                  EXCPTADDN
000720      C* Re-access record to bring in
000730      C            ACCT       CHAINMLGM
000740      C    20                 DO
000750      C                       MOVE 'REA
```

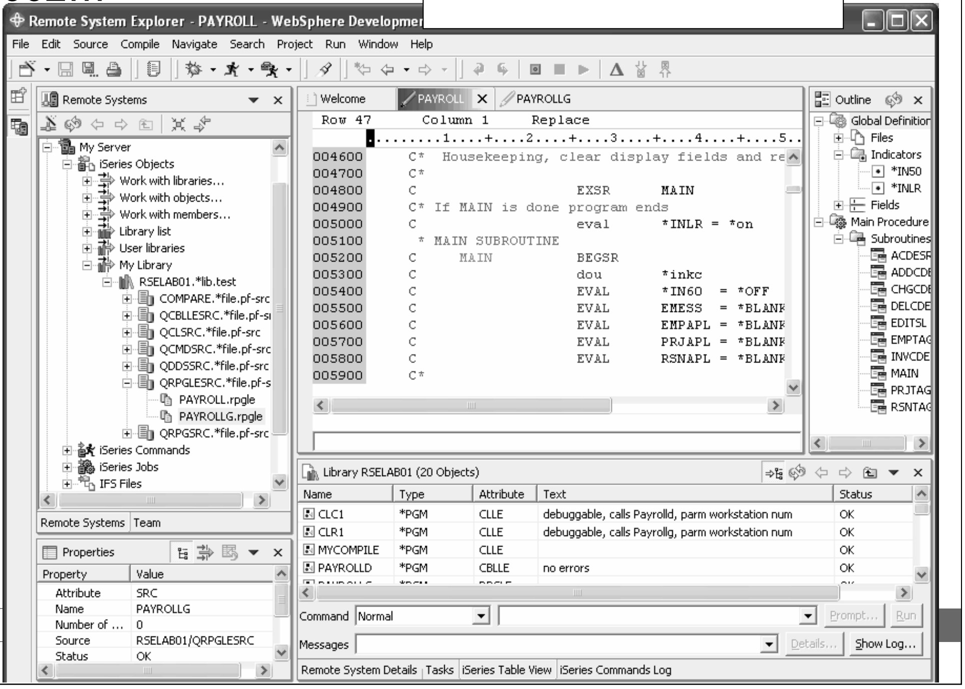
CHAIN (Random Retrieval from a File)

```
*---------*---------------*-----------------*---------------
+   CODE  +    FACTOR 1   +     FACTOR 2    +     RESULT
+         +               +                 +      FIELD
*---------*---------------*-----------------*---------------
+ CHAIN   + Search        + File name       + Data
                          +                 + structure
```

Then came CODE/400, in 1992 on OS/2 and in 1997 on Windows.

2002…

Now, there is RSE in WDSc!



```
 Row 47       Column 1      Replace
      .........1....+....2....+....3....+....4....+....5..
004600     C*  Housekeeping, clear display fields and re
004700     C*
004800     C                   EXSR      MAIN
004900     C* If MAIN is done program ends
005000     C                   eval      *INLR = *on
005100      * MAIN SUBROUTINE
005200     C     MAIN          BEGSR
005300     C                   dou       *inkc
005400     C                   EVAL      *IN60  = *OFF
005500     C                   EVAL      EMESS  = *BLANK
005600     C                   EVAL      EMPAPL = *BLANK
005700     C                   EVAL      PRJAPL = *BLANK
005800     C                   EVAL      RSNAPL = *BLANK
005900     C*
```

Property	Value
Attribute	SRC
Name	PAYROLLG
Number of …	0
Source	RSELAB01/QRPGLESRC
Status	OK

Library RSELAB01 (20 Objects)

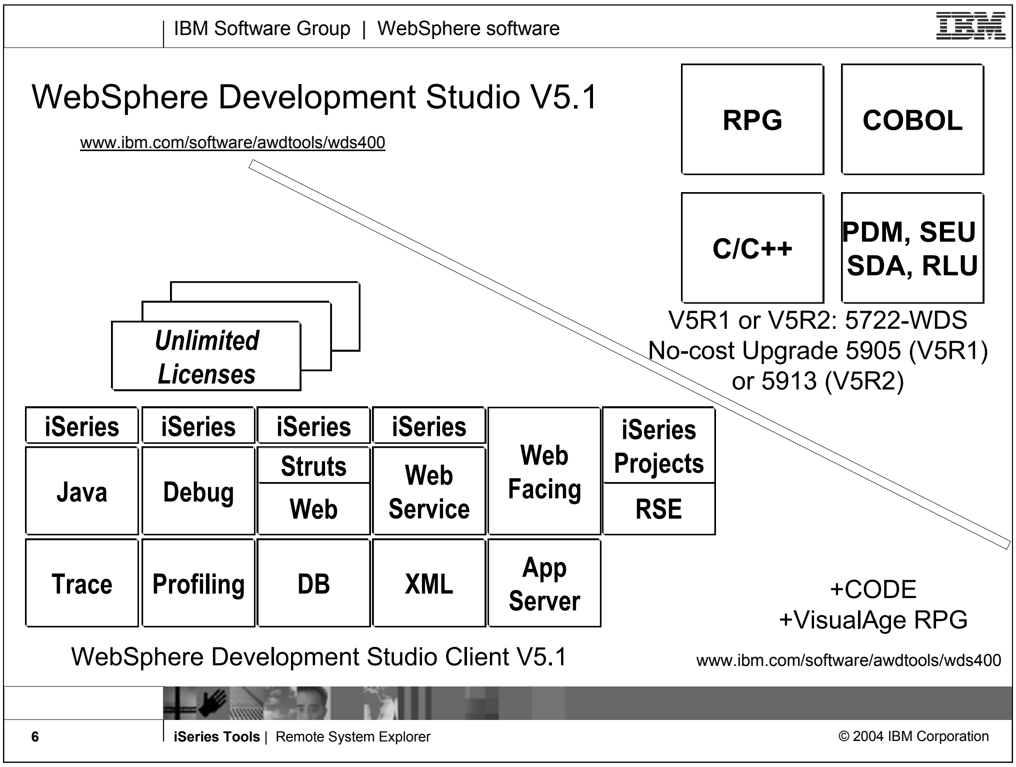
Name	Type	Attribute	Text	Status
CLC1	*PGM	CLLE	debuggable, calls Payrolld, parm workstation num	OK
CLR1	*PGM	CLLE	debuggable, calls Payrollg, parm workstation num	OK
MYCOMPILE	*PGM	CLLE		OK
PAYROLLD	*PGM	CBLLE	no errors	OK

Command Normal

Messages

Prompt… Run Details… Show Log…

Today, we have the follow-on to CODE… the Remote System Explorer in WebSphere Development Studio Client.



WebSphere Development Studio V5.1

www.ibm.com/software/awdtools/wds400

V5R1 or V5R2: 5722-WDS
No-cost Upgrade 5905 (V5R1)
or 5913 (V5R2)

+CODE
+VisualAge RPG

WebSphere Development Studio Client V5.1

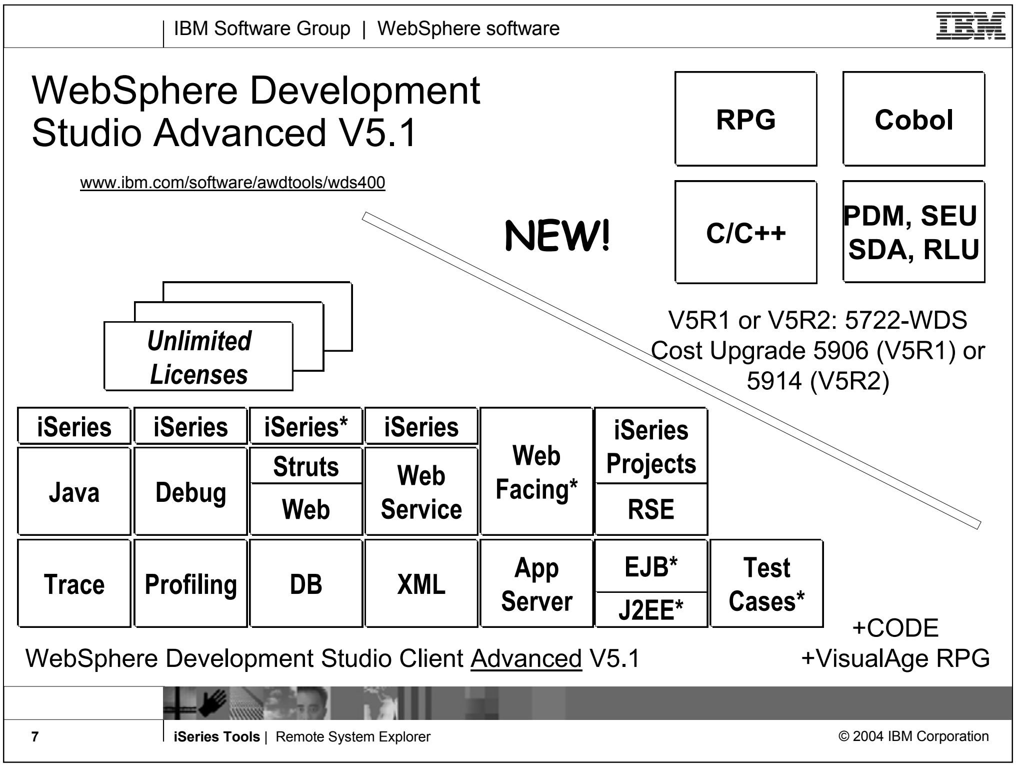
www.ibm.com/software/awdtools/wds400

There is now only one application development product sold by IBM, for iSeries, as of V4R5. This is WebSphere Development Studio (Development Studio), which includes all four host compilers, all traditional tools (ADTS = PDM+SEU+SDA+RLU+DFU+AFP+CGU), and unlimited licenses of the workstation-based toolset named WebSphere Development Studio Client (formerly WebSphere Development Tools).

If you are an existing customer who has a subscription, you can upgrade to Development Studio free of charge. Without a Software Subscription, there is an upgrade fee. New licenses of Development Studio are priced very competitive compared to the combined prices of all constituent products. As of V5R1, there is no way to purchase the compilers or tools individually. So if you have RPG at V5R1 or higher, you must have Development Studio and hence are entitled to Development Studio Client.

For consultants who do not have an iSeries of their own, but still wish to have the client tools, Development Studio Client is also made available as a passport advantage product so it can be purchased "off the shelf" from IBM Direct.

Development Studio has been a huge success, with over 80,000 licenses sold. Just as every development machine used to have PDM and SEU, every development machine will now have all the modern Application Development tools from IBM. This ubiquity is especially important for business partners who build and sell software. These Business Partners are now free to build software using any of the technologies or tools in Development Studio, and can assume their customers will have the tools required to tailor everything from RPG to Java and Web user interfaces. This effectively raises the lowest common denominator to a level unparalleled by any other operating system.



WebSphere Development Studio Advanced V5.1

www.ibm.com/software/awdtools/wds400

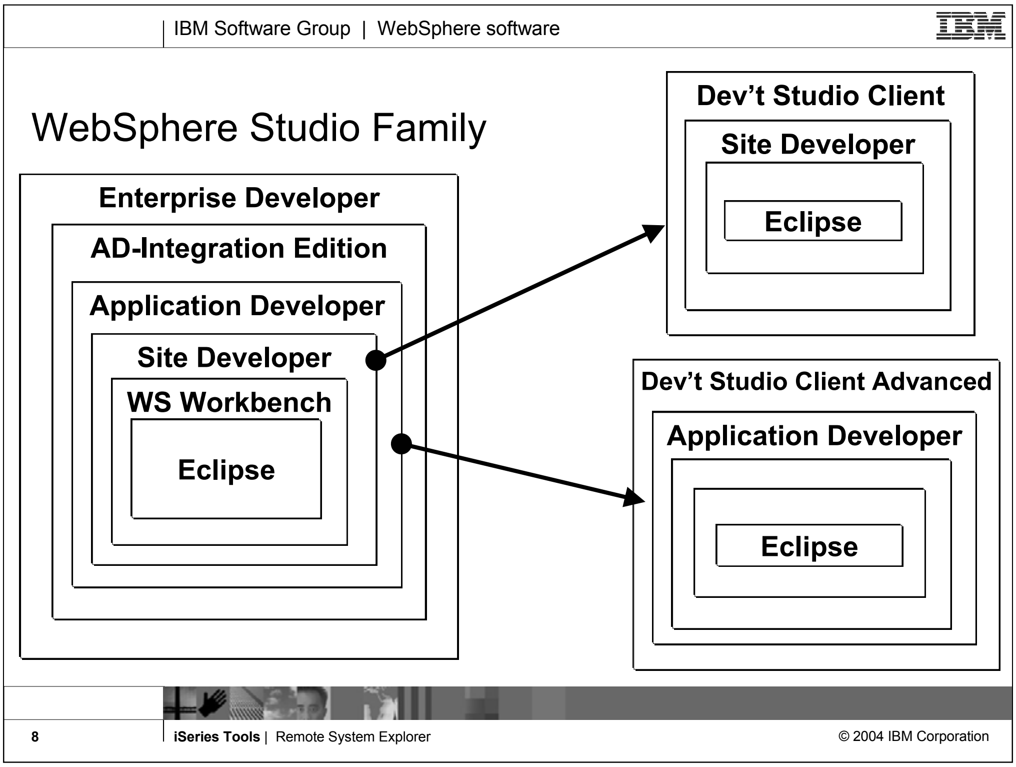
V5R1 or V5R2: 5722-WDS
Cost Upgrade 5906 (V5R1) or 5914 (V5R2)

+CODE
+VisualAge RPG

WebSphere Development Studio Client Advanced V5.1

The Advanced edition of Development Studio Client, and Development Studio, is new as of April 25th 2003. Development Studio Advanced is currently the same as Development Studio, except the customer is entitled to unlimited licenses of Development Studio Client Advanced versus just Development Studio Client. Version 5.1 became available on October 17, 2003.

The difference of Development Studio Client Advanced over Development Studio Client is that it has additional tools (blue boxes with asterisks) and some enhancements to existing iSeries tools (green boxes with asterisks) which will be discussed later in this presentation. The majority of the new tools are related to Enterprise Java Bean (EJB) development. You'll see later that Development Studio Client Advanced is based on WebSphere Application Developer (Application Developer) versus WebSphere Studio Site Developer (Site Developer).



WebSphere Studio Family

Enterprise Developer

AD-Integration Edition

Application Developer

Site Developer

WS Workbench

Eclipse

Dev’t Studio Client

Site Developer

Eclipse

Dev’t Studio Client Advanced

Application Developer

Eclipse

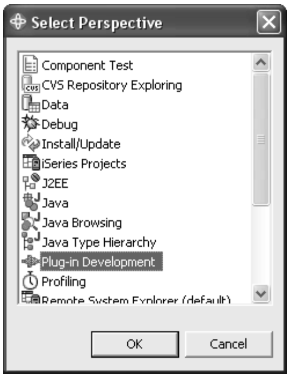
Here you see that Development Studio Client is based on WebSphere Studio Site Developer, while Development Studio Client Advanced is based on WebSphere Studio Application Developer.

The Workbench is based on the open-source Eclipse technology about to be discussed. It is not for sale, but is the basis of all IBM WebSphere Studio products, and is available to business partners.

Site Developer is IBM’s entry level offering based on eclipse, and it is for building dynamic Web sites out of non-EJB Java. Application Developer extends Site Developer and adds support for EJBs. Application Developer-Integration Edition extends Application Developer and adds support for JCA Connectors and for Workflow. Enterprise Developer extends Application Developer-Integration Edition and adds support for S/390 and Enterprise Generation Language (EGL), the follow-on to VisualAge Generator.

Eclipse User Interface – Select Perspective

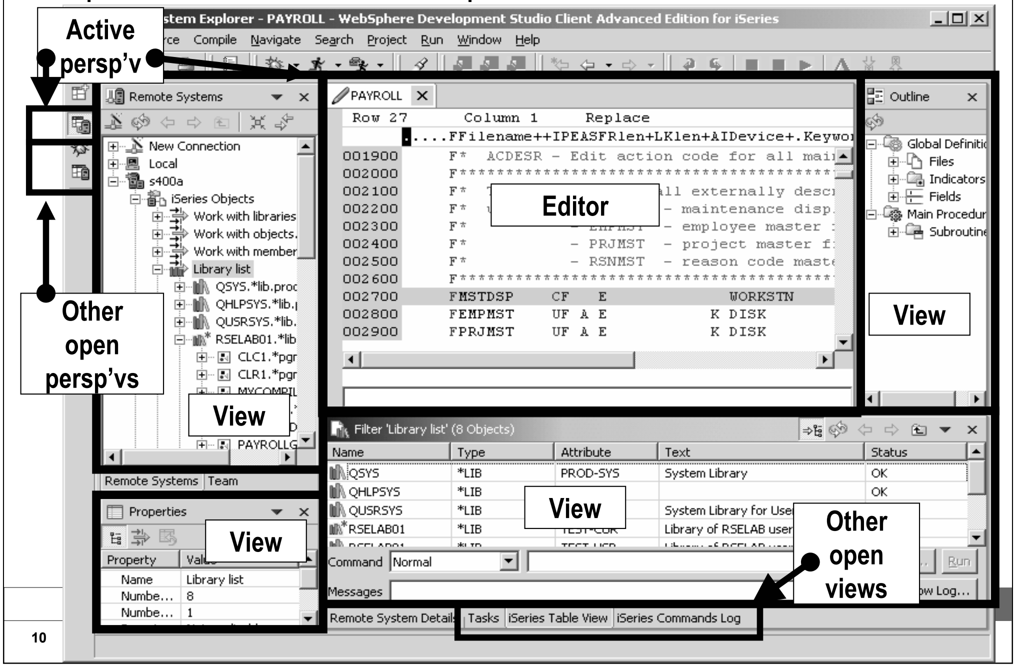
- Users work with **perspectives**
  - –Collection of **editor** and **views**
    - –Tools for a particular task
    - –Allows for role-based development
  - –Many perspectives are pre-supplied for specific tasks like Java, Web, XML, RPG/CBL
  - –Users can create their own perspectives



- The user interface is very Windows-like
  - –Eg: views can be re-sized and re-positioned through drag ‘n drop

The core features of the Eclipse user interface include perspectives which is a collection of views and tools. Perspectives allow role based development. For example, if you are a Java developer you would use the Java perspective which includes tools and views for Java development. You can also create your own perspectives. Naturally, the Eclipse user interface applies to all Eclipse-based products, like Development Studio Client.

Eclipse User Interface – Perspective



```
Row 27      Column 1      Replace
     ....FFilename++IPEASFRlen+LKlen+AIDevice+.Keywo
001900    F*  ACDESR - Edit action code for all mai
002000    F******************************************
002100    F*                         ll externally desc
002200    F*                       - maintenance disp.
002300    F*                       - employee master
002400    F*              - PRJMST - project master f
002500    F*              - RSNMST - reason code maste
002600    F******************************************
002700    FMSTDSP   CF   E             WORKSTN
002800    FEMPMST   UF A E           K DISK
002900    FPRJMST   UF A E           K DISK
```

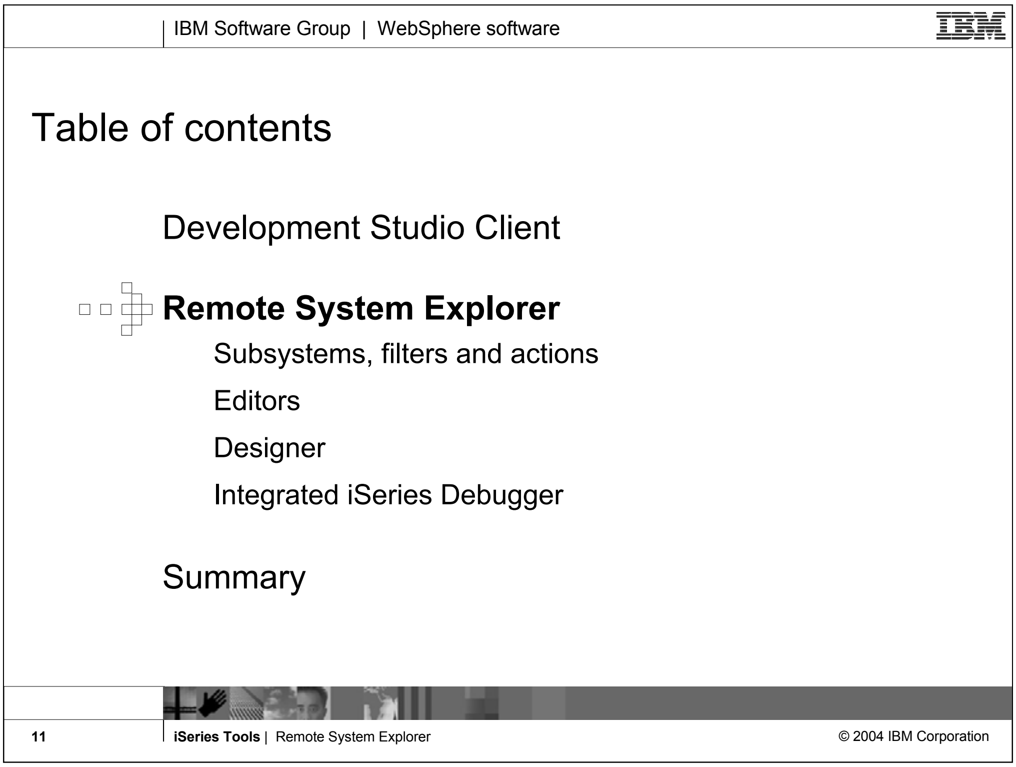
Property	Value
Name	Library list
Numbe...	8
Numbe...	1

Name	Type	Attribute	Text	Status
QSYS	*LIB	PROD-SYS	System Library	OK
QHLPSYS	*LIB			OK
QUSRSYS	*LIB		System Library for Use	
RSELAB01	*LIB	TEST-CUR	Library of RSELAB user	

Command Normal

Messages

An example of an eclipse perspective… the active one contains the editors and views you see. Other perspectives can be open simultaneously, but not active. These are shown in the tray on the left, and can be made active by simply clicking on them. To open new perspectives, use the Window pulldown.



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Development Studio Client

Remote System Explorer

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- Editors
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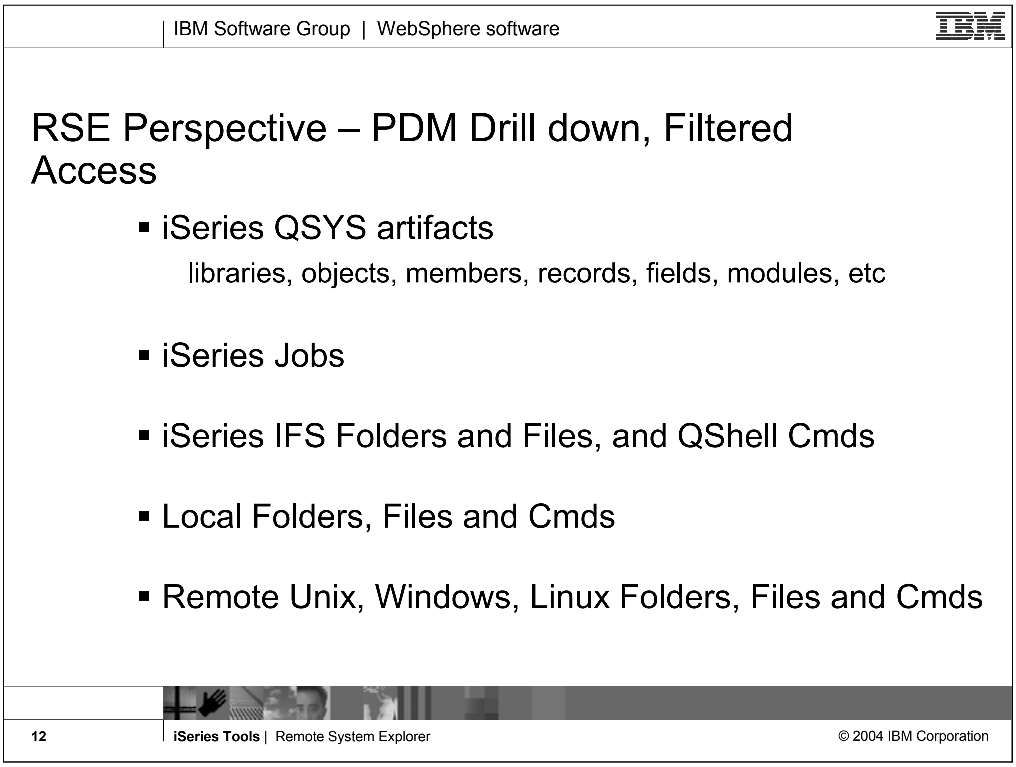
- Integrated iSeries Debugger

Summary

Now you know the story behind Development Studio Client. Lets look at the Remote System Explorer, the tool for iSeries application development and maintenance.



RSE Perspective – PDM Drill down, Filtered Access

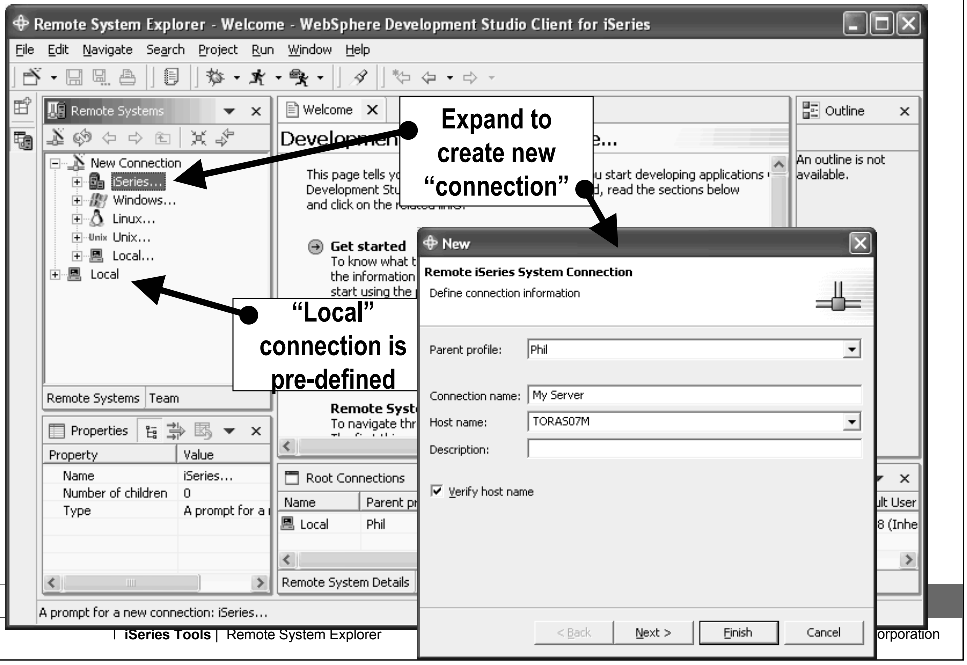
- iSeries QSYS artifacts

  libraries, objects, members, records, fields, modules, etc

- iSeries Jobs
- iSeries IFS Folders and Files, and QShell Cmds
- Local Folders, Files and Cmds
- Remote Unix, Windows, Linux Folders, Files and Cmds

The Remote Systems Explorer goes well beyond PDM! It also allows exploration of iSeries jobs and commands, and the IFS file system. Further, it can also be used to explore the file system of remote Linux, Unix and Windows systems. The Linux support works for any Linux, including Linux in an iSeries Logical Partition.

RSE Perspective



Remote System Explorer - Welcome - WebSphere Development Studio Client for iSeries
File Edit Navigate Search Project Run Window Help
Remote Systems
New Connection
iSeries...
Windows...
Linux...
Unix...
Local...
Local
Remote Systems Team
Properties
Welcome
Outline
An outline is not available.
Root Connections
Remote System Details
A prompt for a new connection: iSeries...
New
< Back
Next >
Finish
Cancel

Property	Value
Name	iSeries...
Number of children	0
Type	A prompt for a

Remote iSeries System Connection

Define connection information

Parent profile: Phil

Connection name: My Server

Host name: TORAS07M

Description:

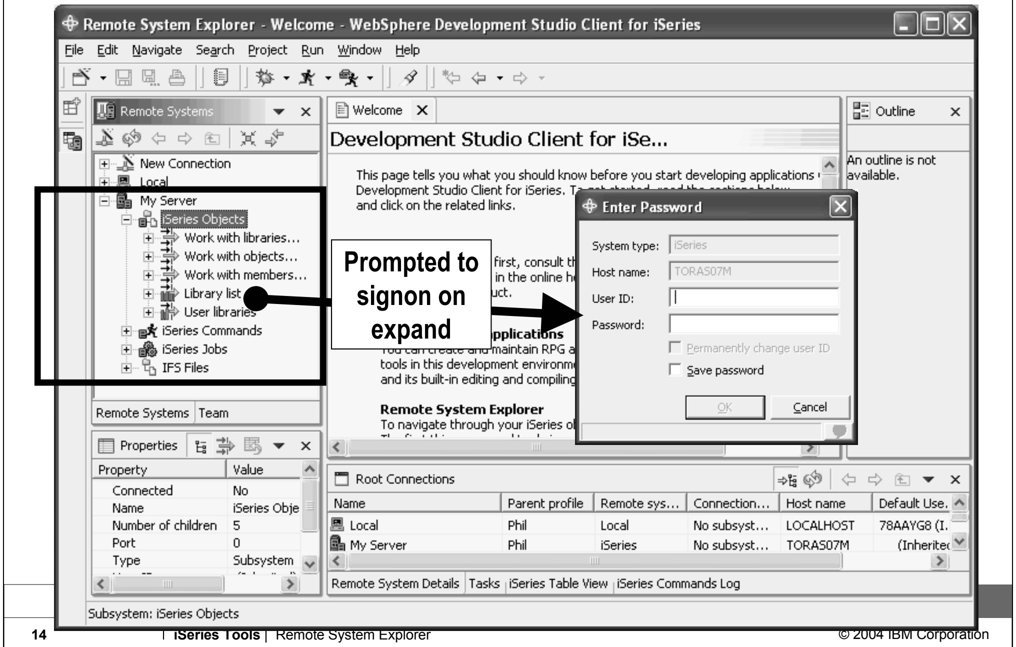
☑ Verify host name

Expand to create new “connection”

“Local” connection is pre-defined

When you first open the Remote System Explorer, you are not connected to any system except your local hard drive on our workstation. To connect to a remote iSeries host, you need to define a connection. In the Remote Systems view you use the New Connection wizard to configure a connection to your iSeries host. You can also use the Remote Systems view to explore the file system of remote Linux, UNIX and Windows systems. The Local connection is pre-defined.

RSE Perspective


Remote System Explorer - Welcome - WebSphere Development Studio Client for iSeries
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
User libraries
iSeries Commands
iSeries Jobs
IFS Files
Remote Systems Team
Welcome
Outline
An outline is not available.
Prompted to signon on expand
Enter Password
OK
Cancel
Remote System Details Tasks iSeries Table View iSeries Commands Log
Subsystem: iSeries Objects

Development Studio Client for iSe…

This page tells you what you should know before you start developing applications … Development Studio Client for iSeries. … and click on the related links.

System type: iSeries
Host name: TORAS07M
User ID:
Password:
□ Permanently change user ID
□ Save password

Properties

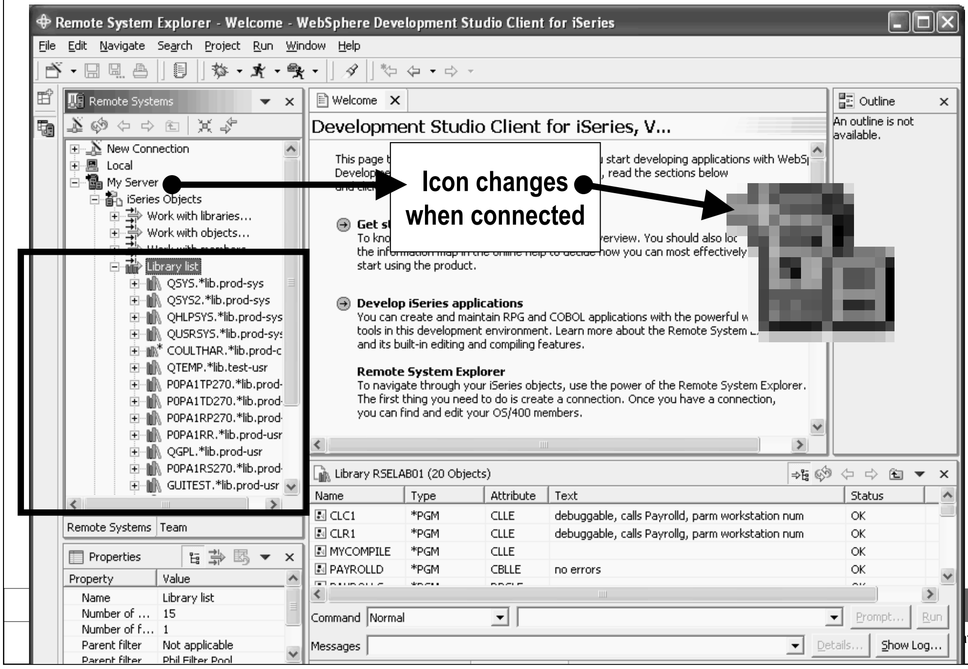
Property	Value
Connected	No
Name	iSeries Obje
Number of children	5
Port	0
Type	Subsystem

Root Connections

Name	Parent profile	Remote sys…	Connection…	Host name	Default Use…
Local	Phil	Local	No subsyst…	LOCALHOST	78AAYG8 (I…
My Server	Phil	iSeries	No subsyst…	TORAS07M	(Inheritec

After creating an iSeries connection, and then expanding it to the point where stuff from the iSeries is to be shown, you are asking to signon to the iSeries. You can optionally choose to remember the user ID and password, such that you won’t be prompted again for them.

RSE Perspective



Icon changes when connected

Development Studio Client for iSeries, V...

This page t... start developing applications with WebS... Develop... , read the sections below

Get st... To kno... the inf... erview. You should also loc... how you can most effectively start using the product.

Develop iSeries applications
You can create and maintain RPG and COBOL applications with the powerful w... tools in this development environment. Learn more about the Remote System ... and its built-in editing and compiling features.

Remote System Explorer
To navigate through your iSeries objects, use the power of the Remote System Explorer. The first thing you need to do is create a connection. Once you have a connection, you can find and edit your OS/400 members.

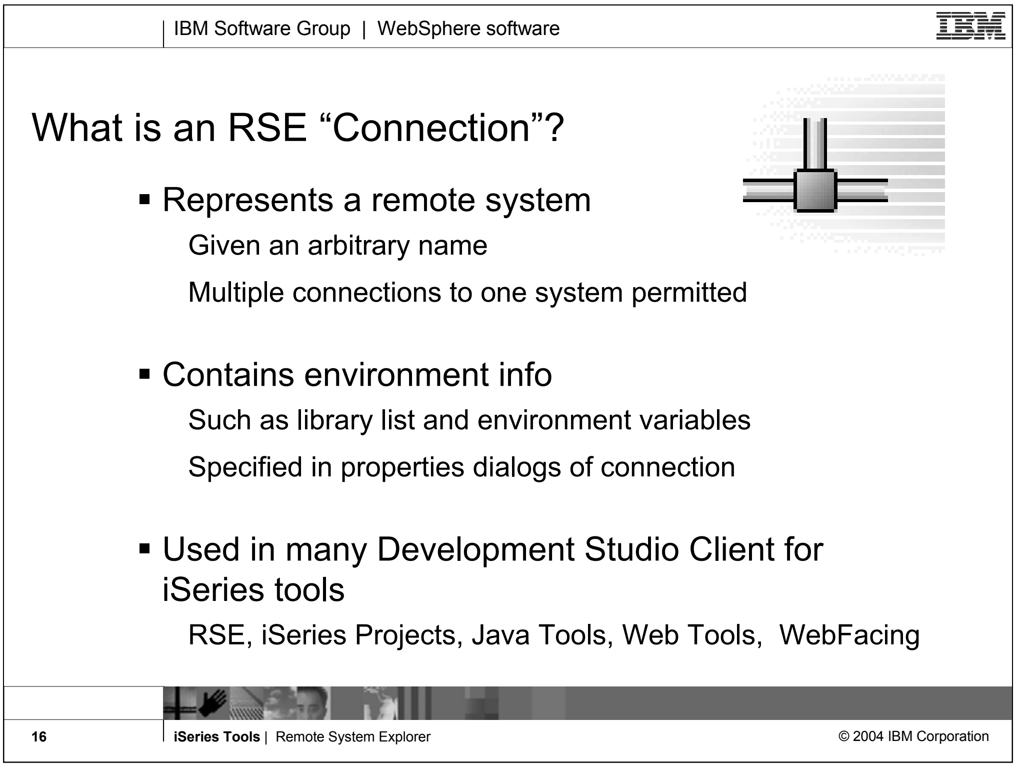
Library RSELAB01 (20 Objects)

Name	Type	Attribute	Text	Status
CLC1	*PGM	CLLE	debuggable, calls Payrolld, parm workstation num	OK
CLR1	*PGM	CLLE	debuggable, calls Payrollg, parm workstation num	OK
MYCOMPILE	*PGM	CLLE		OK
PAYROLLD	*PGM	CBLLE	no errors	OK

Properties

Property	Value
Name	Library list
Number of ...	15
Number of f...	1
Parent filter	Not applicable
Parent filter	Phil Filter Pool

Once a communication session is established with the target iSeries system, the icons for the connection, and the nodes immediately underneath it, change to have a small green arrow indicating you are connected. Of course, you also then can expand to see resources from that iSeries.



What is an RSE “Connection”?

- Represents a remote system
  - Given an arbitrary name
  - Multiple connections to one system permitted
- Contains environment info
  - Such as library list and environment variables
  - Specified in properties dialogs of connection
- Used in many Development Studio Client for iSeries tools
  - RSE, iSeries Projects, Java Tools, Web Tools, WebFacing

A very central concept to all of Development Studio Client for iSeries is that of connections. A connection defines information needed to access a remote system. Each connection is given an arbitrary name by you, and so multiple connections to the same system are permitted. Each connection also captures information that is applied when connecting to that remote system, such as the initial library list for iSeries connections. All iSeries tools within Development Studio Client for iSeries use connections to access a remote iSeries system. Connections are created and managed in the Remote Systems Explorer.

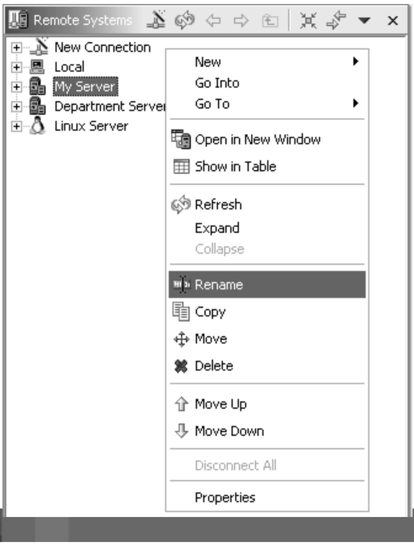
Working with RSE Connections

- Remote Systems view manages connections

  Create connections here (using wizard)

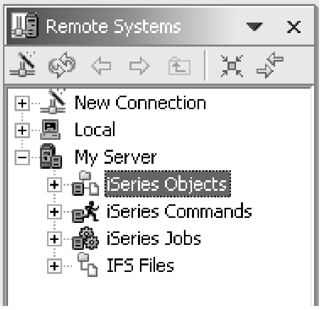
  Change, rename, copy, delete them here

  Expand them to work with resources here



The Remote Systems view is the primary view for managing connections, via right click actions. While this view is normally accessed in the Remote Systems Explorer perspective, you can open any view in any perspective.

iSeries Connections



- Connections expand to
  - –“subsystems”
    - –Named grouping of functionality
- Subsystems for iSeries connections:

1. **–iSeries Objects**
   - –For working with Libraries, Objects and Members
2. **–iSeries Commands**
   - –For pre-defining and running QSYS command sets
3. **–iSeries Jobs**
   - –For working with jobs
4. **–IFS files**
   - –For working with Integrated File System files and commands

Once connections are defined they can be expanded within the Remote Systems Explorer. On expansion, the user sees subsystems, which are merely a functional grouping of the various types of remote resources that can be explored in the remote system

For iSeries connections, there are four subsystems:

•iSeries Objects is the PDM-like grouping, allowing access to libraries, objects and members

•iSeries Commands allows developers to predefine 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 Commands view.

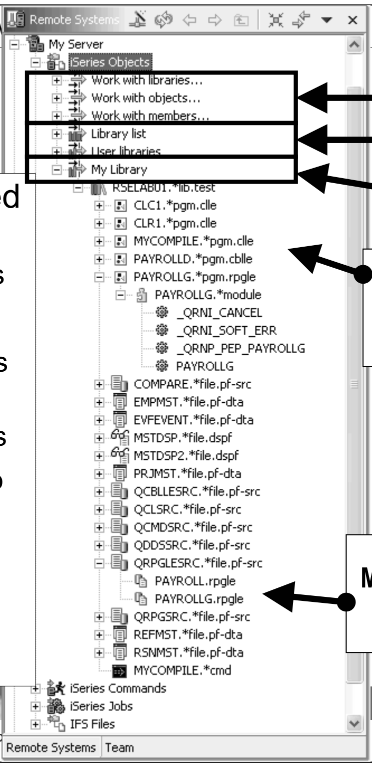
•iSeries Jobs allows developers to see various jobs, subsettable by job attributes, and to perform a limited number of operations on those jobs

•IFS Files allows developers to explore folders and files in the Integrated File System of the remote iSeries system

1

iSeries Objects

- For drill-down or filtered access to QSYS
  - ✓Libraries, objects, mbrs
  - ✓Expand lib to see objs
  - ✓Expand file to see mbrs
  - ✓Expand device file to see record fmts, then flds
  - ✓Expand pgm/srvpgm to see modules
  - ✓Expand msgf to see messages
- Similar to PDM



Create new filters

Supplied filters

User filter

Objects within expanded library

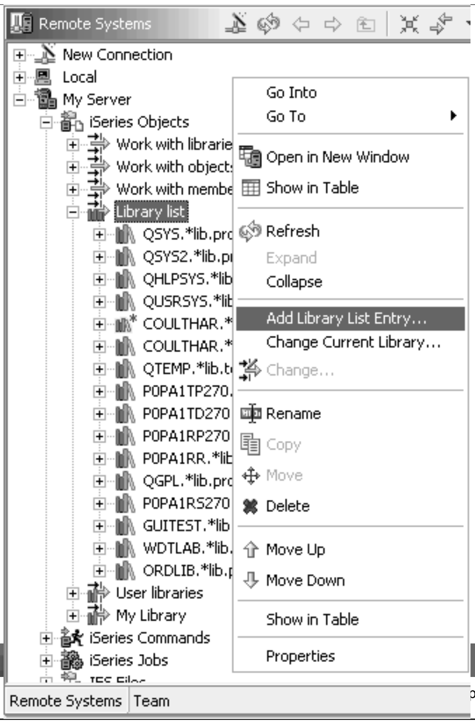
Members within expanded file

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.

1

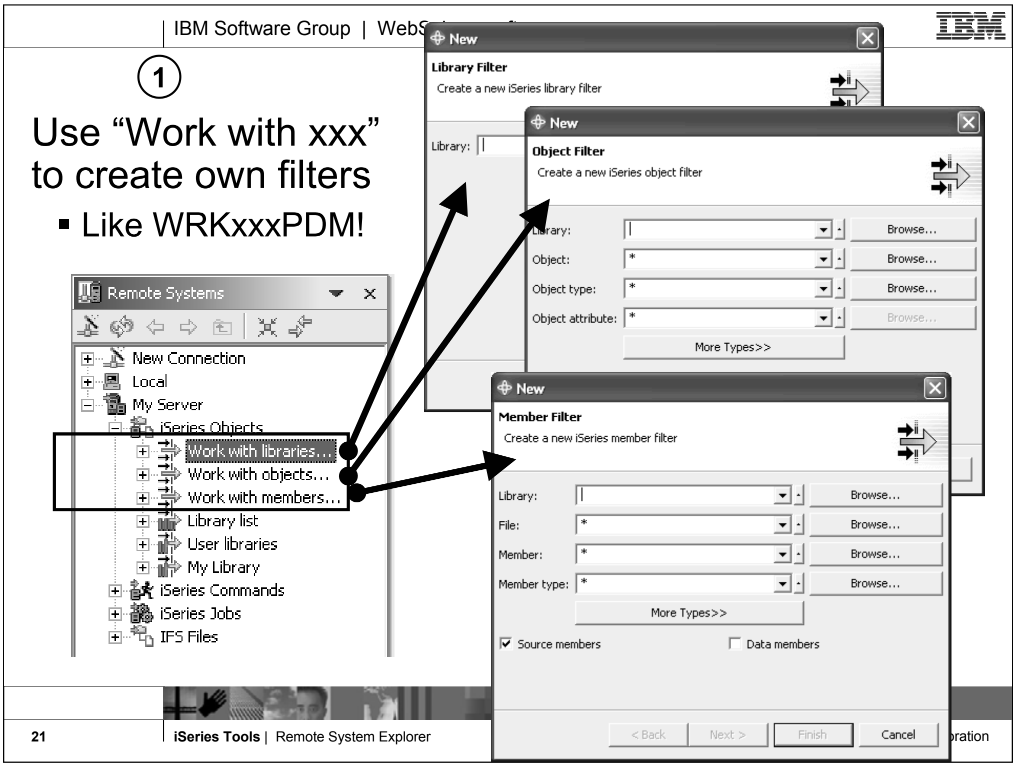
"Library list" is a pre-defined filter

- For accessing and manipulating libl
  - ✓Like WRKLIBPDM with *LIBL
  - ✓Filter actions to add to library list, change current library
  - ✓Library actions to move within libl, remove from libl, add to libl, change curlib



When the pre-defined library list filter is expanded, and the connection is successful, you will see the libraries on your library list. For each library, you can right-click and select from a number of useful actions. There is an action to create a new source file within the selected library, to refresh the contents of the library if it is expanded, to rename the library, copy the library or delete the library. These last three actions remotely run the appropriate iSeries command and you will see it logged in the Command Log view.

If you expand a library, you will see all the objects in that library...



1

Use “Work with xxx” to create own filters

- Like WRKxxxPDM!

New

Library Filter

Create a new iSeries library filter

Library:

New

Object Filter

Create a new iSeries object filter

Library: | Browse...
Object: * | Browse...
Object type: * | Browse...
Object attribute: * | Browse...

More Types>>

New

Member Filter

Create a new iSeries member filter

Library: | Browse...
File: * | Browse...
Member: * | Browse...
Member type: * | Browse...

More Types>>

☑ Source members ☐ Data members

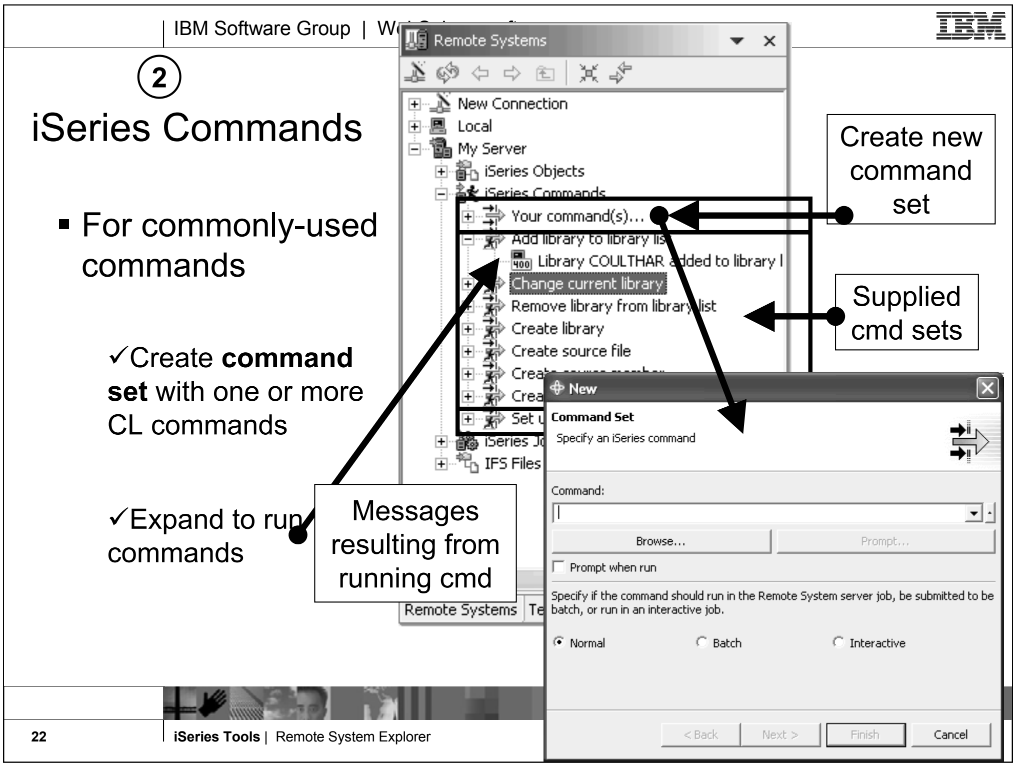
< Back Next > Finish Cancel

The three child items at the top of the list are for creating filters, much like in PDM:

-Work with libraries... prompts you for a simple or generic library name, and lists all matching libraries. It is similar to WRKLIBPDM.

-Work with objects... prompts you for a simple or generic library name and simple or generic object name, as well one or more object type and attribute pairs. It lists all matching objects in all matching libraries. it is similar to WRKOBJPDM.

-Work with members... prompts you for a simple or generic library name, simple or generic file name, and simple or generic member name, as well as one or more member types which can also be generic. It lists all matching members in all matching files in all matching libraries. It is similar to WRKMBRPDM. Unlike PDM, the filters you create are permanently remembered and displayed in this list for easy re-use. We will have more to say about filters. To simulate STRPDM's option 12, you can start with the pre-defined Library list filter, that when expanded lists all libraries in your library list. With any filter, once it is expanded you can subsequently expand a library to see all objects in the library, and expand files to see all members in the file. When you expand your first filter, such as the pre-defined Library List filter, you are prompted for your password and then connected to the remote iSeries. Then, the results of resolving the filter are shown...



2

iSeries Commands

- For commonly-used commands

✓Create **command set** with one or more CL commands

✓Expand to run commands

Create new command set

Supplied cmd sets

Messages resulting from running cmd

Command Set

Specify an iSeries command

Command:

□ Prompt when run

Specify if the command should run in the Remote System server job, be submitted to be batch, or run in an interactive job.

● Normal ○ Batch ○ Interactive

The iSeries Commands subsystem is merely a place for creating often-used commands. The commands are created in a Command Set, which is simply a named list of commands. By default you are only prompted for a single command, but after creating the command set you can use the Change action to add more commands.

Once a command set is created it appears in the tree. There are a number of command sets pre-supplied by IBM. When a command set is expanded, the commands in it are run and any messages are shown as children of the command set. The commands are also logged in the command log view.

This is only one way to run commands in the RSE. There is also a Command Log where you can enter commands just like a command line on the iSeries. You will see that you can also create user-defined actions that appear in the menu for selected objects and members, just like PDM user defined options.

3

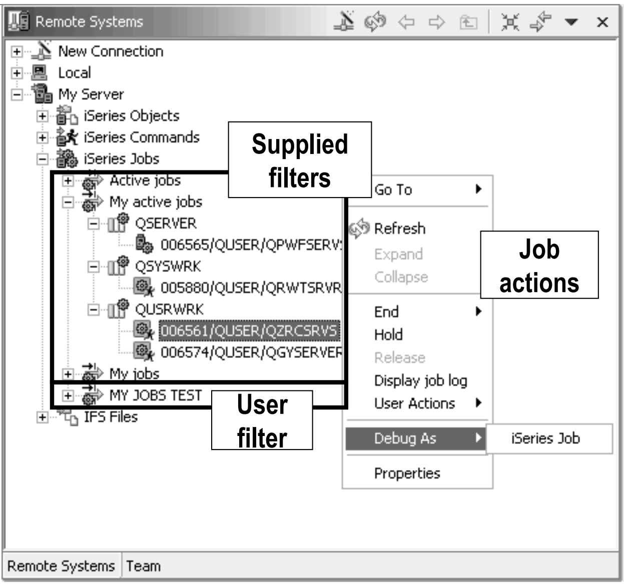
iSeries Jobs

- For accessing jobs

✓Like WRKxxxJOB

✓Create filters to see jobs with specific attributes (right click)

✓Use predefined filters to see your own jobs



The iSeries Jobs subsystem is for working with jobs.

As with all subsystems, you can create filters (by right clicking on iSeries Jobs) to see just the jobs you want to see. There are three pre-defined filters for you to see all active jobs, only your active jobs and all your jobs.

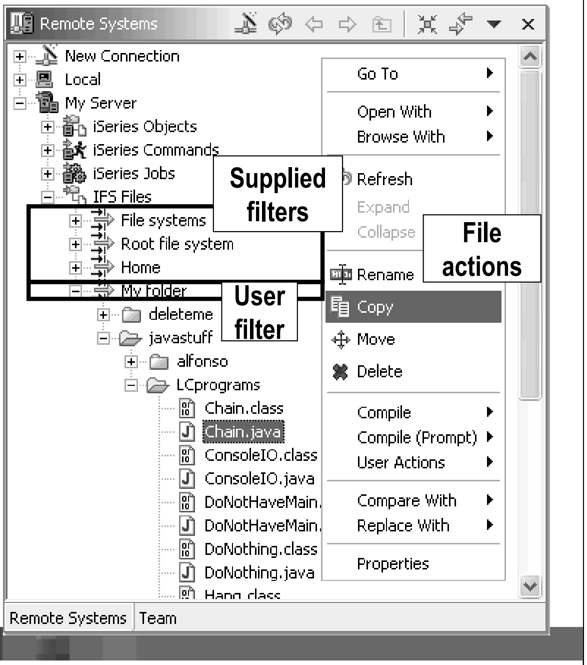
The job’s icon indicates if it is active, done or queued.

Right clicking on a job allows you to work with the job.

4

IFS Files

- For accessing folders and files
  - ✓Like WRKLNK
  - ✓Create filters to see files in specific folders (right click)
  - ✓Use predefined filters to drill down
  - ✓Open command console (right click on IFS Files) for QShell



The IFS Files subsystem allows you easy access to IFS folders and files.

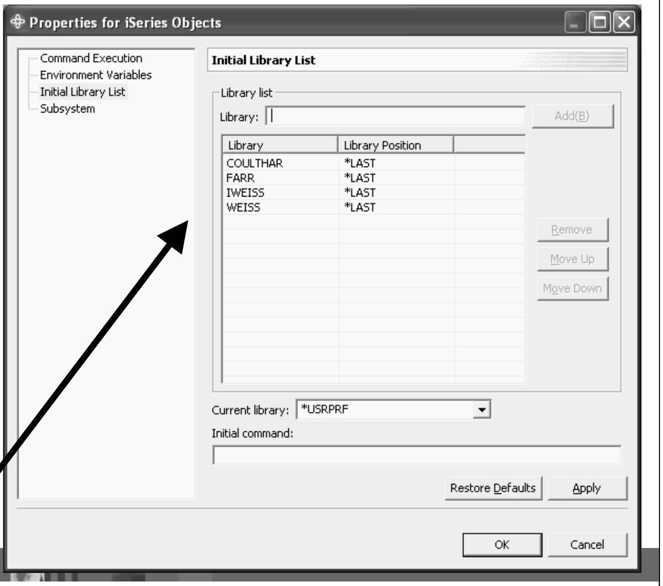
Like all subsystems, you can define your own filters and there are some pre-defined. In this case, the filters allow access to files within a particular folder.

Right-clicking offers access to a very rich set of actions you can perform against the selected folders and files. You can even create your own user actions, as can for the iSeries Objects and iSeries Jobs subsystems.

To run QShell commands, right click on the IFS Files subsystem object and select the Launch Shell action. This opens a command console that is also very rich in function.

SubSystem Properties

- Right click on any subsystem in an iSeries connection to configure it via Properties
  - ✓Specify compile preferences
  - ✓Specify environment variables
  - ✓Specify library list



Initial Library List

Library list

Library:

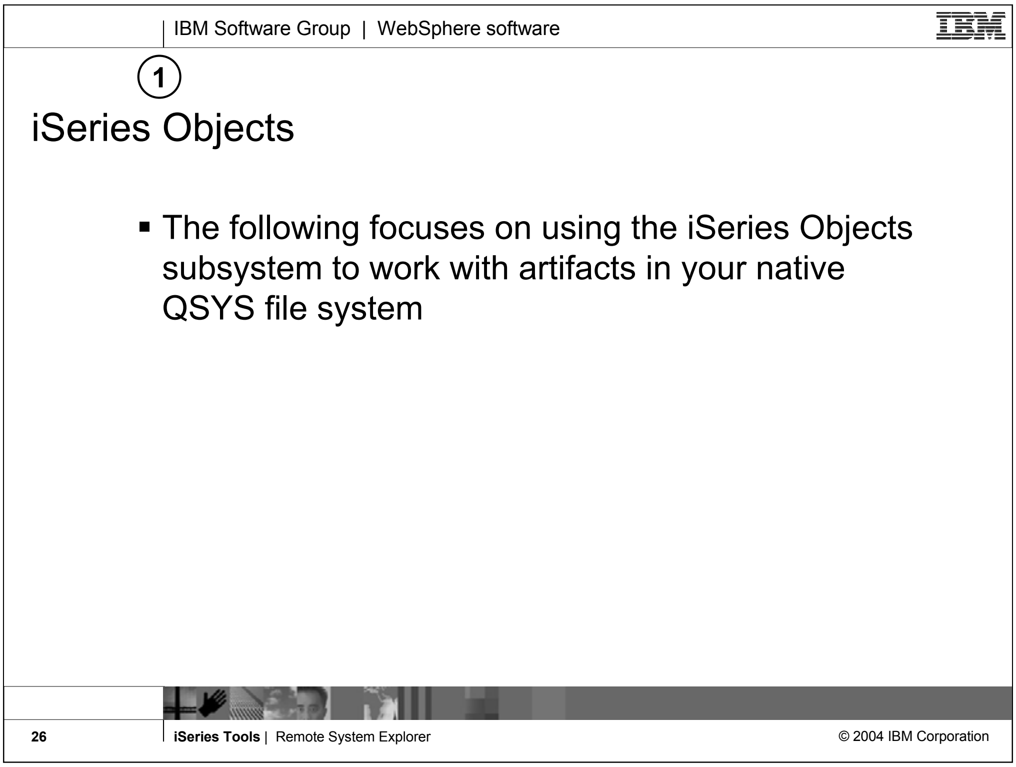
Library	Library Position
COULTHAR	*LAST
FARR	*LAST
IWEISS	*LAST
WEISS	*LAST

Current library: *USRPRF

Initial command:

All iSeries subsystems allow you to configure properties via the Properties action in the right-click menu. These properties are run-time properties that are applied when the connection is connected to the remote server.

A popular question is how to setup the library list such that it is set every time, without manual intervention. This is where to do that.



1

iSeries Objects

- The following focuses on using the iSeries Objects subsystem to work with artifacts in your native QSYS file system

Now we drill down on the iSeries Objects subsystem, which is by far the most heavily used.

Creating New Things

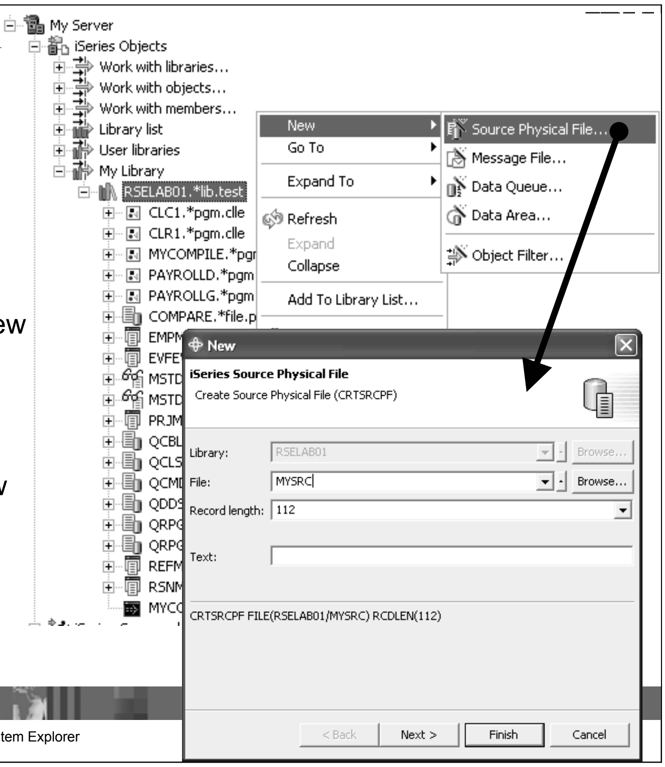
- Right click for “new” actions

  ✓On library filter for new library

  ✓On library object for new objects

  ✓On file object for new member

  ✓On msgf object for new message



iSeries Source Physical File

Create Source Physical File (CRTSRCPF)

Library: RSELAB01

File: MYSRC

Record length: 112

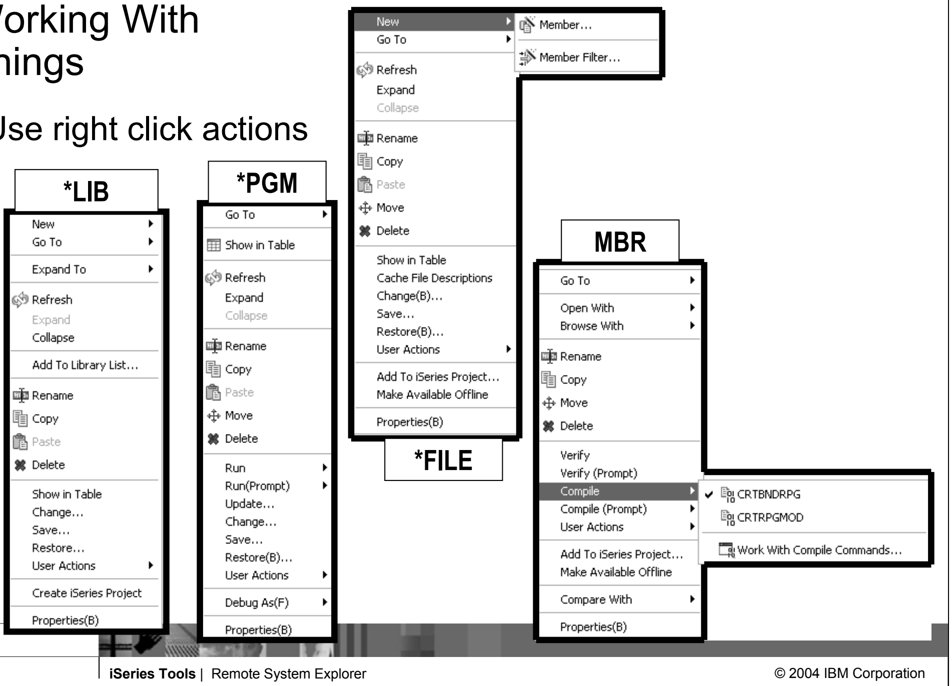
Text:

```
CRTSRCPF FILE(RSELAB01/MYSRC) RCDLEN(112)
```

To create new objects, right click on a library to get access wizards for creating some of the more popular objects for developers. Of course, you can also use the command log or a command set to do this, but these wizards help by simplifying the command.

Working With Things

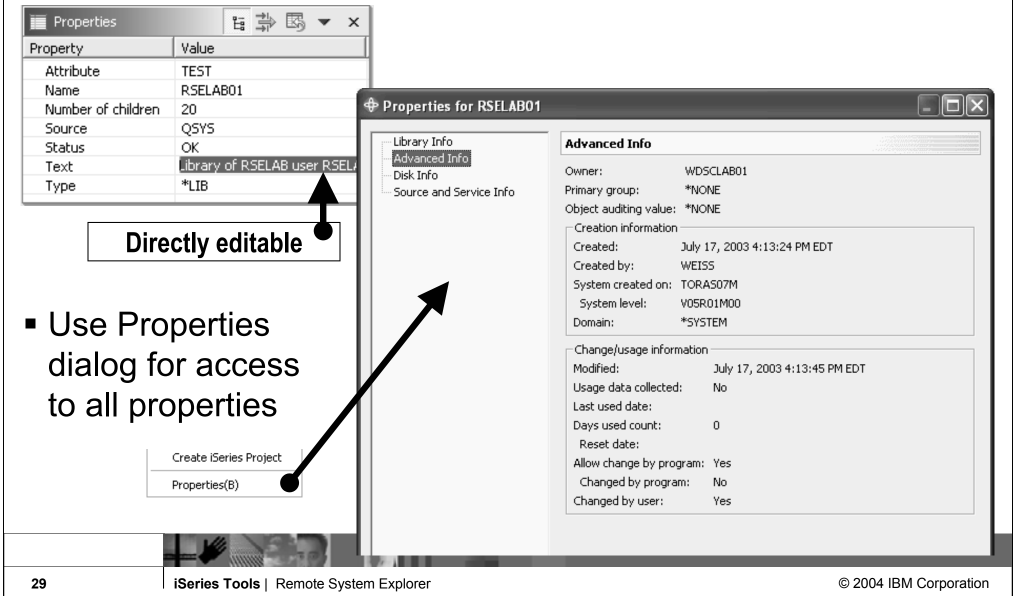
- Use right click actions



These are some of the right-click popup menus, based on object type. This shows how rich the functionality is. Indeed, it is a superset of PDM’s functionality.

Properties

- Use Properties view for quick access to common properties
- Use Properties dialog for access to all properties



Properties

Property	Value
Attribute	TEST
Name	RSELAB01
Number of children	20
Source	QSYS
Status	OK
Text	Library of RSELAB user RSEL
Type	*LIB

Directly editable

Properties for RSELAB01

Advanced Info

Owner: WDSCLAB01
Primary group: *NONE
Object auditing value: *NONE

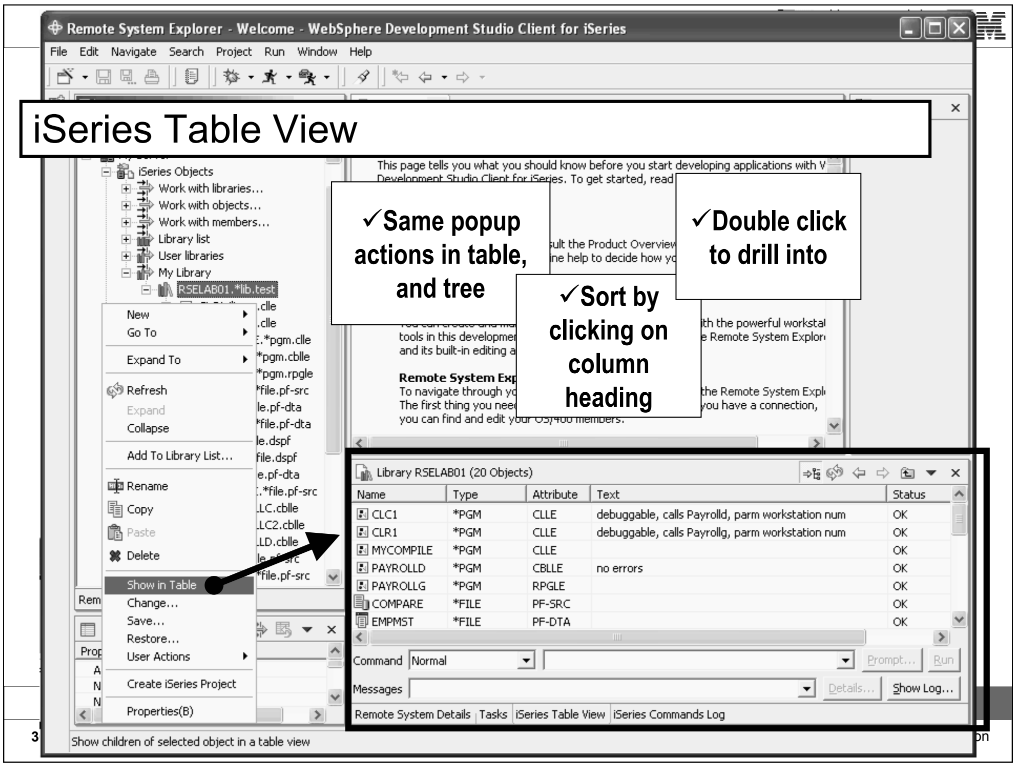
Creation information
Created: July 17, 2003 4:13:24 PM EDT
Created by: WEISS
System created on: TORAS07M
System level: V05R01M00
Domain: *SYSTEM

Change/usage information
Modified: July 17, 2003 4:13:45 PM EDT
Usage data collected: No
Last used date:
Days used count: 0
Reset date:
Allow change by program: Yes
Changed by program: No
Changed by user: Yes

The Properties view is normally in the lower left of your RSE perspective. It is where common information about the selected object is shown, some of which is directly editable, such as the Text property, which changes the text of the object on the iSeries.

For a full set of all the properties, right click and select Properties from the bottom of the object’s popup menu

iSeries Table View



✓Same popup actions in table, and tree

✓Sort by clicking on column heading

✓Double click to drill into

Library RSELAB01 (20 Objects)

Name	Type	Attribute	Text	Status
CLC1	*PGM	CLLE	debuggable, calls Payrolld, parm workstation num	OK
CLR1	*PGM	CLLE	debuggable, calls Payrollg, parm workstation num	OK
MYCOMPILE	*PGM	CLLE		OK
PAYROLLD	*PGM	CBLLE	no errors	OK
PAYROLLG	*PGM	RPGLE		OK
COMPARE	*FILE	PF-SRC		OK
EMPMST	*FILE	PF-DTA		OK

Command: Normal

Show children of selected object in a table view

For libraries and files we can use a pop-up menu action to open table views to see the contents of the library or file. In these tables, the columns are attributes for the object or member in each row. The table can be sorted by an attribute by simply clicking on the column heading.

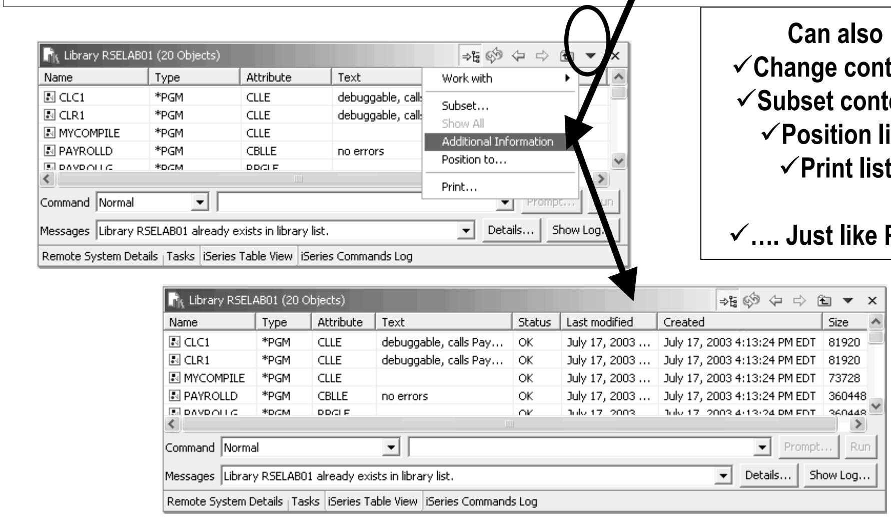
The Show In Table action is available for every tree node that has children.

iSeries Table View

✓Use local pulldown to see additional columns

Can also
✓Change contents
✓Subset contents
✓Position list
✓Print list

✓…. Just like PDM!



Library RSELAB01 (20 Objects)

Name	Type	Attribute	Text
CLC1	*PGM	CLLE	debuggable, call
CLR1	*PGM	CLLE	debuggable, call
MYCOMPILE	*PGM	CLLE	
PAYROLLD	*PGM	CBLLE	no errors
PAYROLLG	*PGM	RPGLE	

Command: Normal

Messages: Library RSELAB01 already exists in library list.

Library RSELAB01 (20 Objects)

Name	Type	Attribute	Text	Status	Last modified	Created	Size
CLC1	*PGM	CLLE	debuggable, calls Pay…	OK	July 17, 2003 …	July 17, 2003 4:13:24 PM EDT	81920
CLR1	*PGM	CLLE	debuggable, calls Pay…	OK	July 17, 2003 …	July 17, 2003 4:13:24 PM EDT	81920
MYCOMPILE	*PGM	CLLE		OK	July 17, 2003 …	July 17, 2003 4:13:24 PM EDT	73728
PAYROLLD	*PGM	CBLLE	no errors	OK	July 17, 2003 …	July 17, 2003 4:13:24 PM EDT	360448
PAYROLLG	*PGM	RPGLE		OK	July 17, 2003	July 17, 2003 4:13:24 PM EDT	360448

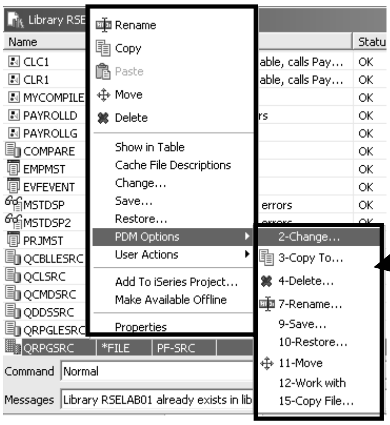
Command: Normal

Messages: Library RSELAB01 already exists in library list.

When listing objects in a library, in a table view, you can turn on “Additional information” to see more attributes: date-created, date-changed and size. Combined with the sorting capability, this can be very powerful.

The same little pulldown menu has other actions that PDM users will be familiar with.

iSeries Table View



Name			Statu
CLC1		able, calls Pay...	OK
CLR1		able, calls Pay...	OK
MYCOMPILE			OK
PAYROLLD		rs	OK
PAYROLLG			OK
COMPARE			OK
EMPMST			OK
EVFEVENT			OK
MSTDSP		errors	OK
MSTDSP2			
PRJMST			
QCBLLESRC			
QCLSRC			
QCMDSRC			
QDDSSRC			
QRPGLESRC			
QRPGSRC	*FILE	PF-SRC	

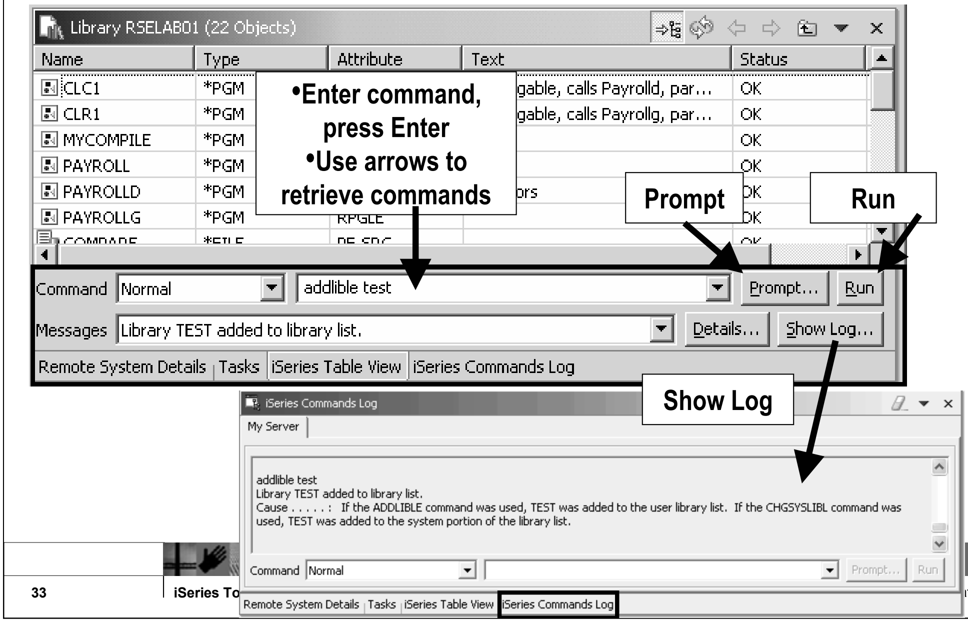
Command Normal

Messages Library RSELAB01 already exists in lib

✓Special PDM Options menu for PDM users

While there is nothing new in this menu, there is a PDM Options menu in the right click menu from the table view, which shows all the actions by the numbers their corresponding option was in PDM, to help with the learning curve of PDM users.

RSE Command Shell



Library RSELAB01 (22 Objects)

Name	Type	Attribute	Text	Status
CLC1	*PGM		gable, calls Payrolld, par…	OK
CLR1	*PGM		gable, calls Payrollg, par…	OK
MYCOMPILE	*PGM			OK
PAYROLL	*PGM			OK
PAYROLLD	*PGM		ors	OK
PAYROLLG	*PGM	RPGLE		OK
COMPARE	*FILE	PF-SRC		OK

Command: Normal — addlible test

Messages: Library TEST added to library list.

iSeries Commands Log — My Server

```
addlible test
Library TEST added to library list.
Cause . . . . . :   If the ADDLIBLE command was used, TEST was added to the user library list.  If the CHGSYSLIBL command was
used, TEST was added to the system portion of the library list.
```

Command: Normal

•Enter command, press Enter
•Use arrows to retrieve commands

Prompt

Run

Show Log

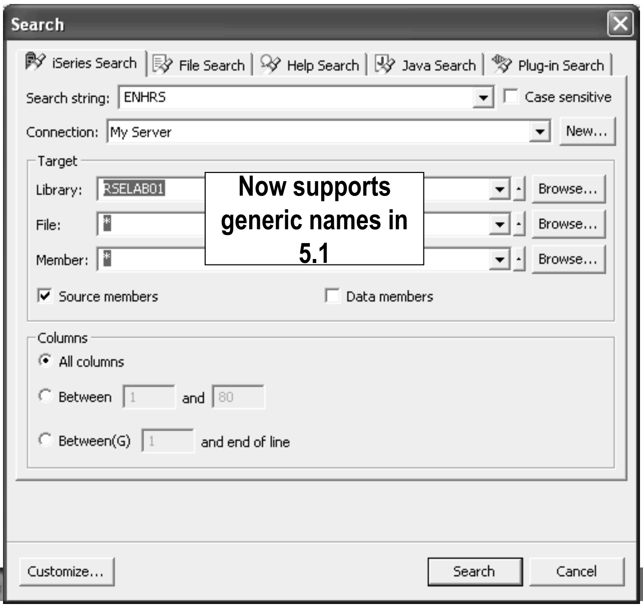
Like PDM, there is command line at the bottom of the table, and it can be used to enter command to be prompted and run. When run the results are shown in the messages combo box, and the command log can be seen via the Show Log button.

Note that in 5.1, you can use F4 and F9 in this command shell.

Multi-file Search

Select Search->iSeries from pulldown menu

GUI interface to FNDSTRPDM



Search string: ENHRS

□ Case sensitive

Connection: My Server

Target

Library: RSELAB01

File: *

Member: *

☑ Source members

□ Data members

Columns

● All columns

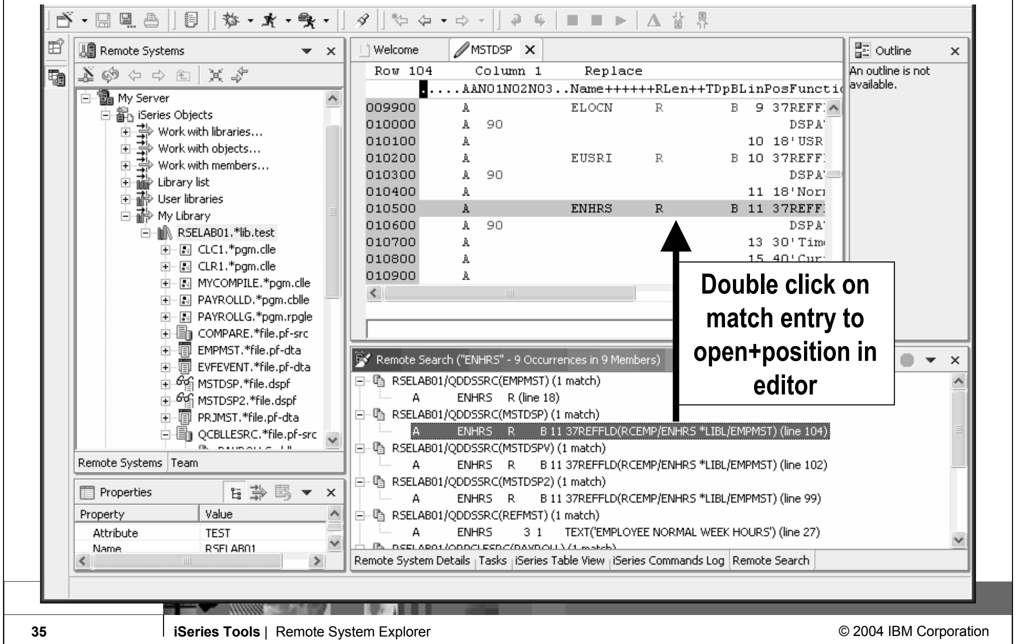
○ Between 1 and 80

○ Between(G) 1 and end of line

Now supports generic names in 5.1

Often we need to search through members looking for strings. To this from the RSE, there is a dialog to help with it. It supports the same options as FNDSTRPDM … actually more as it allows generic library and file names (as of 5.1). Indeed, this actually ends up calling FNDSTRPDM to do the search.

Search Result



Property	Value
Attribute	TEST
Name	RSELAB01

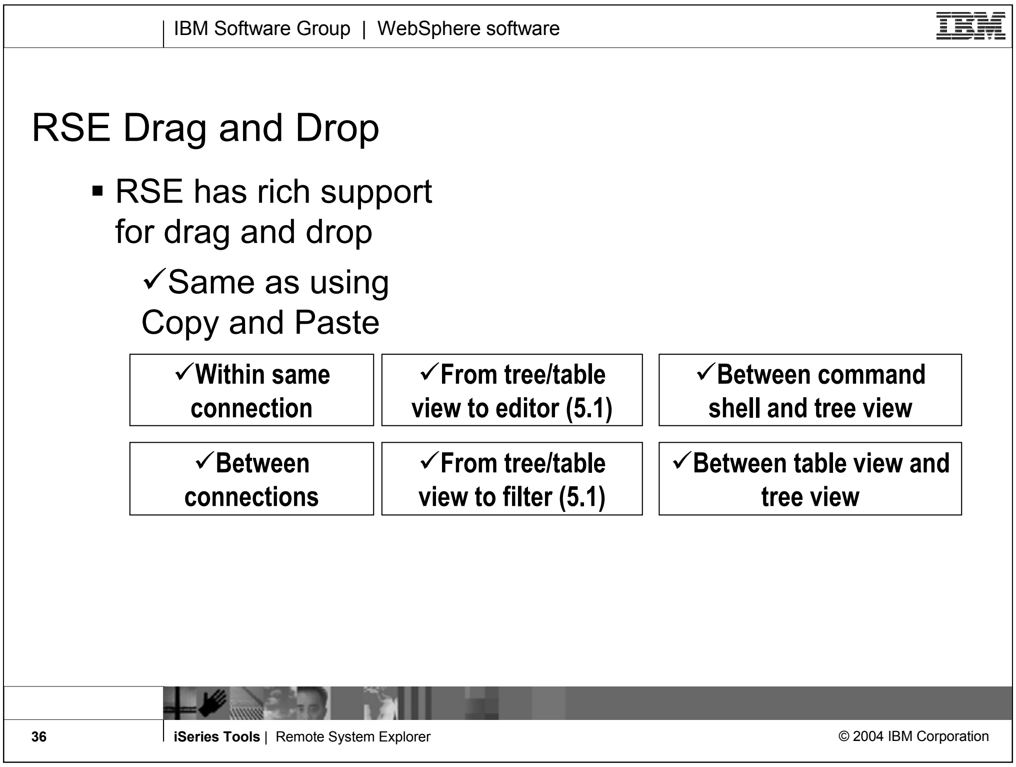
An outline is not available.

```
Row 104      Column 1      Replace
         .....AAN01N02N03..Name++++++RLen++TDpBLinPosFunctio
009900      A               ELOCN      R         B  9 37REFFI
010000      A  90                                     DSPA'
010100      A                                     10 18'USR
010200      A               EUSRI      R         B 10 37REFFI
010300      A  90                                     DSPA'
010400      A                                     11 18'Norı
010500      A               ENHRS      R         B 11 37REFFI
010600      A  90                                     DSPA'
010700      A                                     13 30'Tim
010800      A                                     15 40'Cur
010900      A
```

```
Remote Search ("ENHRS" - 9 Occurrences in 9 Members)
RSELAB01/QDDSSRC(EMPMST) (1 match)
    A       ENHRS    R (line 18)
RSELAB01/QDDSSRC(MSTDSP) (1 match)
    A       ENHRS    R     B 11 37REFFLD(RCEMP/ENHRS *LIBL/EMPMST) (line 104)
RSELAB01/QDDSSRC(MSTDSPV) (1 match)
    A       ENHRS    R     B 11 37REFFLD(RCEMP/ENHRS *LIBL/EMPMST) (line 102)
RSELAB01/QDDSSRC(MSTDSP2) (1 match)
    A       ENHRS    R     B 11 37REFFLD(RCEMP/ENHRS *LIBL/EMPMST) (line 99)
RSELAB01/QDDSSRC(REFMST) (1 match)
    A       ENHRS       3  1     TEXT('EMPLOYEE NORMAL WEEK HOURS') (line 27)
```

Double click on match entry to open+position in editor

The result of searching is a hit-list view where the resulting matches are shown. They can be double-clicked on to open the editor to the line with the match.



RSE Drag and Drop

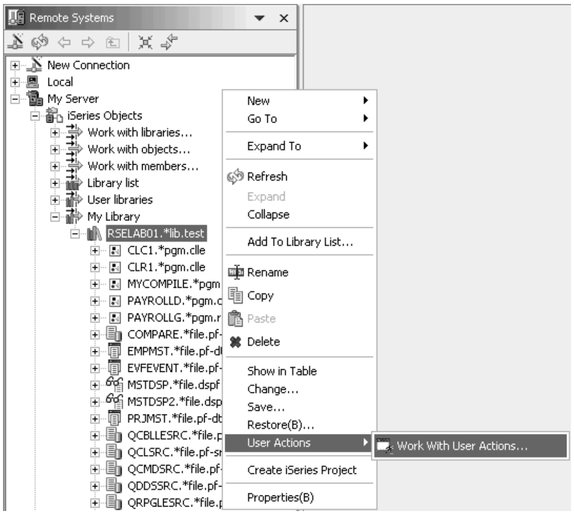
- RSE has rich support for drag and drop
  - ✓Same as using Copy and Paste

✓Within same connection	✓From tree/table view to editor (5.1)	✓Between command shell and tree view
✓Between connections	✓From tree/table view to filter (5.1)	✓Between table view and tree view

Here you can see that you can drag and drop files or copy and paste files across multiple file systems, within the same connection and using the Remote Systems view, iSeries Table view or the Command Shell.

RSE: User Actions

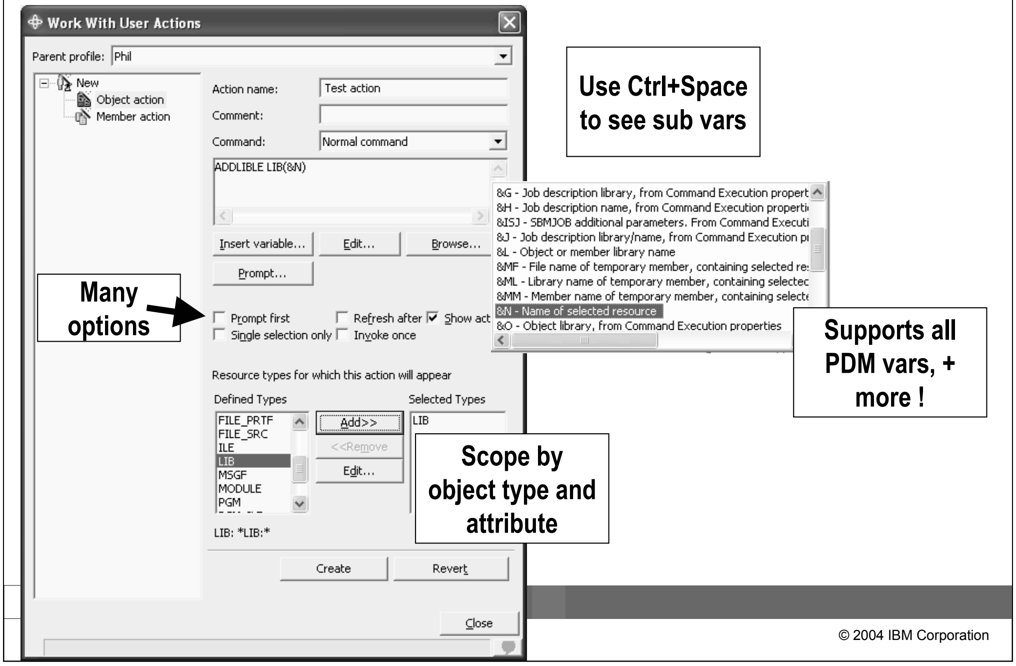
- **User-Defined Actions (like PDM!)**
  - – Right-click on iSeries Objects or any iSeries object member
  - – **Work With User Actions**
    - – Create, delete or change user-defined actions
    - – Scope them by type and attribute



While IBM supplies a number of useful actions for remote iSeries objects, it is not possible to supply them all. Like PDM, you can easily define your own actions. To create your own actions, use the Work With actions in the popup menu for iSeries Objects. These user-defined actions will appear in the popup menus for remote resources. To avoid seeing all actions in all popup menus, you scope each action to a one or more object or member types. You first define named collections of object or member types, then you create your actions and scope them to one of these named collections of types. You actions will then only appear for object or members that match one of the types in the collection. If you are a CODE user, you can use File->Import to import existing actions from CODE Project Organizer.

You can also create user actions for Jobs and for IFS (or local/windows/unix/linux) folders and files.

RSE: User Actions



Parent profile: Phil

Action name: Test action

Comment:

Command: Normal command

```
ADDLIBLE LIB(&N)
```

☐ Prompt first ☐ Refresh after ☑ Show act
☐ Single selection only ☐ Invoke once

Resource types for which this action will appear

Defined Types: FILE_PRTF, FILE_SRC, ILE, LIB, MSGF, MODULE, PGM

Selected Types: LIB

LIB: *LIB:*

```
&G - Job description library, from Command Execution propert
&H - Job description name, from Command Execution properti
&ISJ - SBMJOB additional parameters. From Command Executi
&J - Job description library/name, from Command Execution pı
&L - Object or member library name
&MF - File name of temporary member, containing selected re:
&ML - Library name of temporary member, containing selectec
&MM - Member name of temporary member, containing selecte
&N - Name of selected resource
&O - Object library, from Command Execution properties
```

Use Ctrl+Space to see sub vars

Many options

Supports all PDM vars, + more !

Scope by object type and attribute

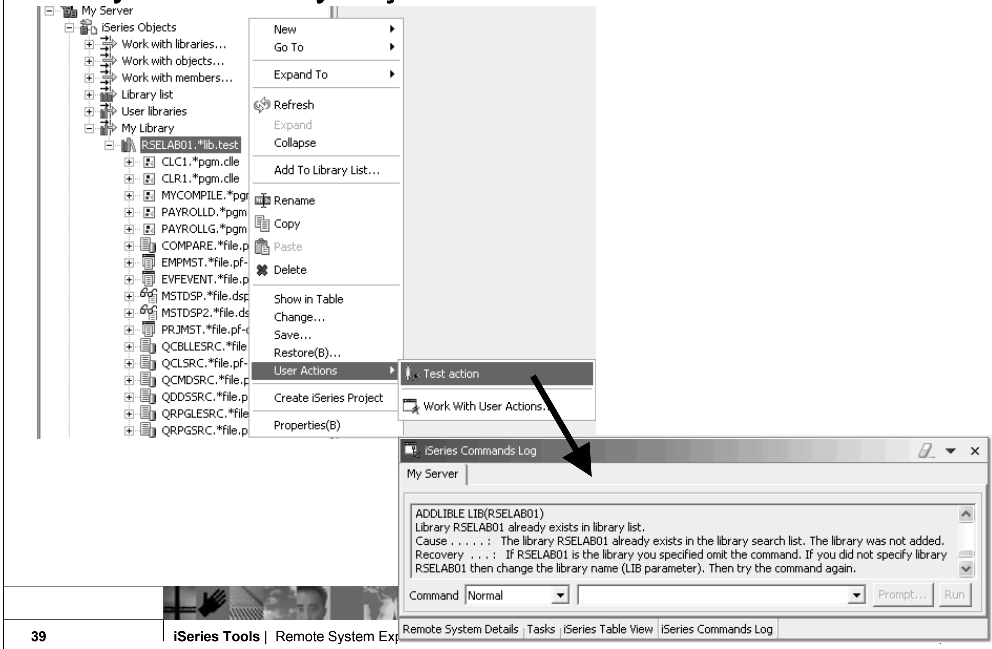
Here is what the dialog that is used to define new user actions looks like.

An action is a name (shown in popup menu), comment, command and a number of options.

All PDM’s substitution vairables are supported plus additional ones. Use Ctrl+Space, or press Insert variable, to see all the available variables.

Actions are scoped such that they only appear in the menus for the objects and members they apply to. This is better than PDM allows. Also, you can specify if the command should be prompted before running, whether to refresh the list after running the command, and whether the action should only appear if one item is selected, or what to do if multiple items are selected.

Use your action you just created!



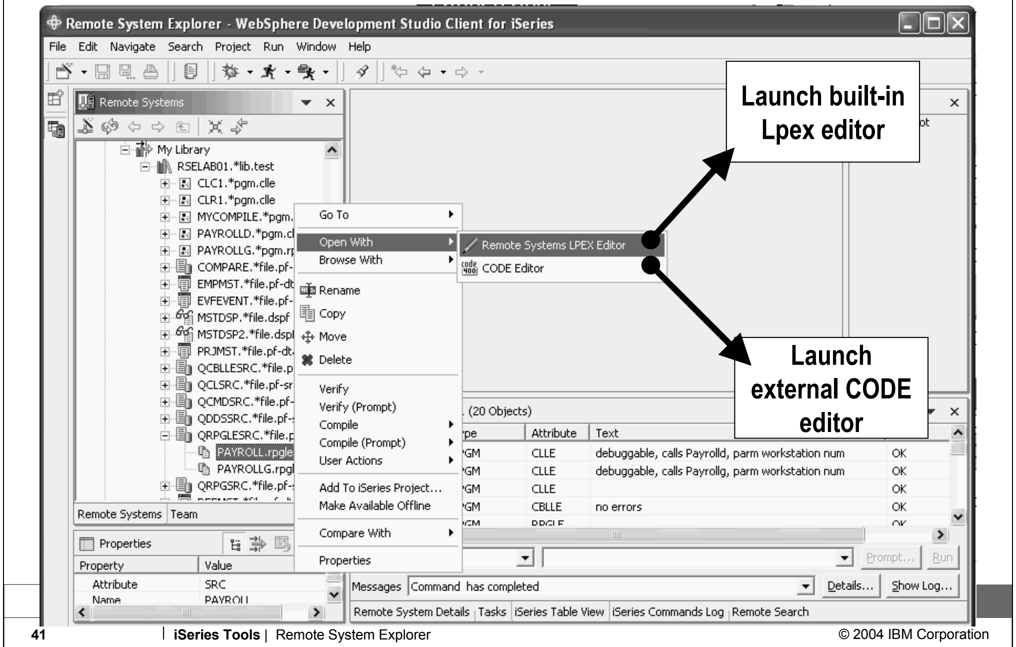
```
ADDLIBLE LIB(RSELAB01)
Library RSELAB01 already exists in library list.
Cause . . . . . :   The library RSELAB01 already exists in the library search list. The library was not added.
Recovery  . . . :   If RSELAB01 is the library you specified omit the command. If you did not specify library
RSELAB01 then change the library name (LIB parameter). Then try the command again.
```

Once your action is defined, you can use it. Right click on an object matching one of the types you specified, and expand the User Actions menu in the pop-up. Your action appears in the menu. Select it. If you chose to prompt the command, you will see the GUI prompt for the command. When the command has finished running, it results are logged in the Commands view.

Remote System Explorer

Editors

Editors



...pe	Attribute	Text	
GM	CLLE	debuggable, calls Payrolld, parm workstation num	OK
GM	CLLE	debuggable, calls Payrollg, parm workstation num	OK
GM	CLLE		OK
GM	CBLLE	no errors	OK

Property	Value
Attribute	SRC
Name	PAYROLL

Messages: Command has completed

Launch built-in Lpex editor

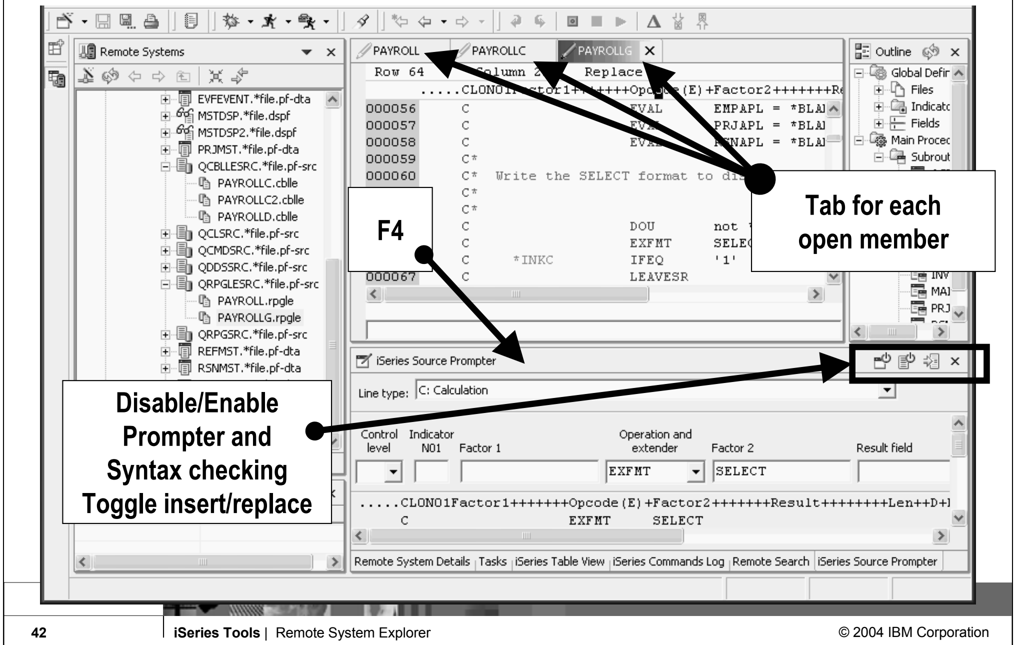
Launch external CODE editor

For a source member, there are two options for editing:

1. Remote Systems LPEX Editor. This is the new editor, written all in Java, that is built-in to the IDE. It is a re-write of the original CODE Editor, but as you will see has a subset of the functionality in CODE at this point.
2. CODE Editor. This is the classic full-functioned CODE editor, which is offered as an alternative until the Lpex editor catches up to the functionality of the CODE editor. This launches the CODE Editor in a separate window.

We will cover the Remote Systems LPEX editor next in more detail...

LPEX ("JLPEX") built-in IDE editor



```
Row 64      Column 2      Replace
      .....CLON01Factor1+++++++Opcode(E)+Factor2+++++++Re
000056      C                   EVAL      EMPAPL = *BLA
000057      C                   EVAL      PRJAPL = *BLA
000058      C                   EVAL      RSNAPL = *BLA
000059      C*
000060      C*  Write the SELECT format to di
            C*
            C*
            C                   DOU       not
            C                   EXFMT     SELEC
            C     *INKC         IFEQ      '1'
000067      C                   LEAVESR
```

Line type: C: Calculation

Control level	Indicator N01	Factor 1	Operation and extender	Factor 2	Result field
			EXFMT	SELECT	

```
.....CLON01Factor1+++++++Opcode(E)+Factor2+++++++Result++++++++Len++D+I
     C                   EXFMT     SELECT
```

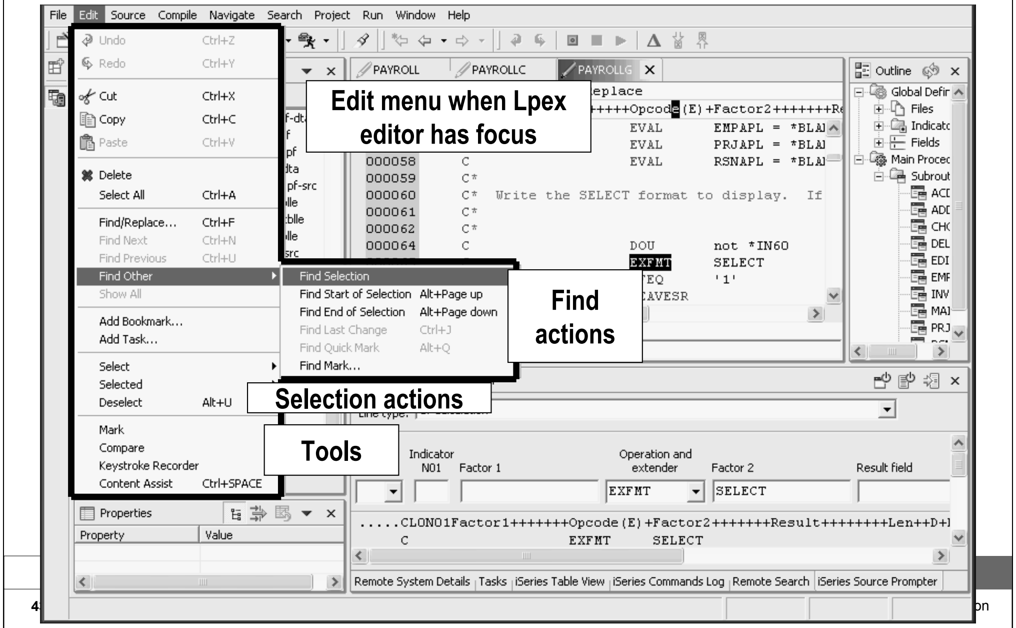
Tab for each open member

F4

Disable/Enable Prompter and Syntax checking Toggle insert/replace

The Remote Systems LPEX editor is built-in, so it shows up in a pane within the IDE. You can open multiple members for editing, and each will be shown in the editor area with a tab that when selected brings that member to the foreground. You can double click on a tab to expand that member's edit window to full size. When a tab shows an asterisk in it, that indicates there are pending changes that should be saved. For RPG (both III and IV) you will notice there is color highlighting and familiar F4 support to prompt for the current line. The prompter sits is a view that doesn't overlap the editor. When done filling in the prompt, you can press one of two buttons to replace the current line or insert a new line.

LPEX Editor Functions: Edit pulldown



Edit menu when Lpex editor has focus

Find actions

Selection actions

Tools

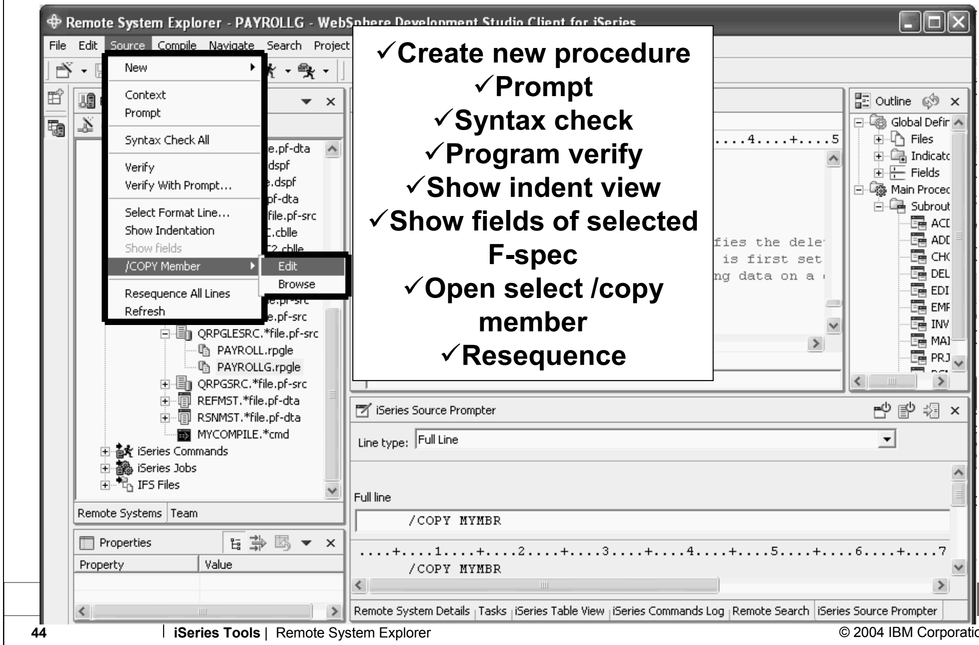
```
                       eplace
                 +++++Opcode(E)+Factor2+++++++R
                       EVAL      EMPAPL = *BLA
                       EVAL      PRJAPL = *BLA
000058     C           EVAL      RSNAPL = *BLA
000059     C*
000060     C*  Write the SELECT format to display.  If
000061     C*
000062     C*
000064     C           DOU       not *IN60
                       EXFMT     SELECT
                        EQ       '1'
                       AVESR
```

Operation and extender: EXFMT
Factor 2: SELECT

```
.....CLON01Factor1+++++++Opcode(E)+Factor2+++++++Result++++++++Len++D+H
     C                   EXFMT     SELECT
```

This shows the Edit menu, when the editor is open and in focus. This menus offers actions for clipboard, searching, selecting and a number of cool tools.

LPEX Editor Functions: Source pulldown



Line type: Full Line

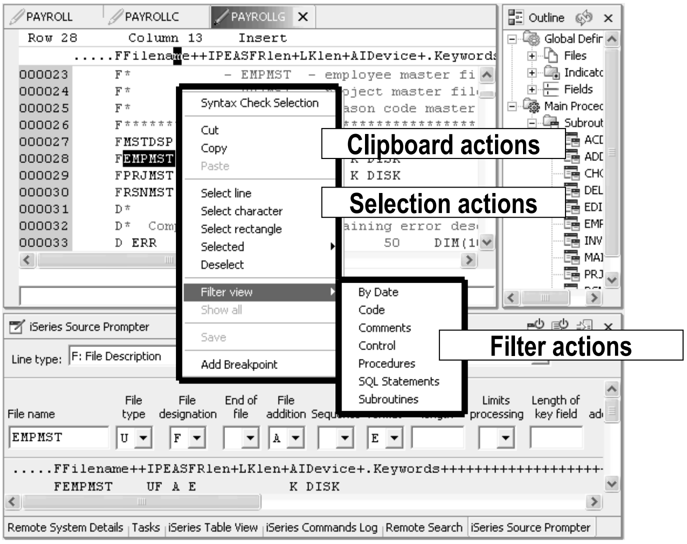
Full line

```
      /COPY MYMBR
....+....1....+....2....+....3....+....4....+....5....+....6....+....7
      /COPY MYMBR
```

✓Create new procedure
✓Prompt
✓Syntax check
✓Program verify
✓Show indent view
✓Show fields of selected F-spec
✓Open select /copy member
✓Resequence

This is the Source menu when the editor is open and in focus. It has a number of actions that apply to the entire source member, as opposed to what is selected.

LPEX Editor Functions: Context menu



```
 Row 28      Column 13     Insert
     .....FFilename++IPEASFRlen+LKlen+AIDevice+.Keywords
000023     F*            - EMPMST  - employee master fi
000024     F*                          oject master fil
000025     F*                          ason code master
000026     F******                     ****************
000027     FMSTDSP
000028     FEMPMST                     K DISK
000029     FPRJMST                     K DISK
000030     FRSNMST
000031     D*
000032     D*   Com                    aining error des
000033     D ERR                             50      DIM(1
```

Line type: F: File Description

File name	File type	File designation	End of file	File addition	Sequence	Format	Length	Limits processing	Length of key field
EMPMST	U	F		A		E			

```
.....FFilename++IPEASFRlen+LKlen+AIDevice+.Keywords++++++++++++++++++++
     FEMPMST    UF A E             K DISK
```

Clipboard actions

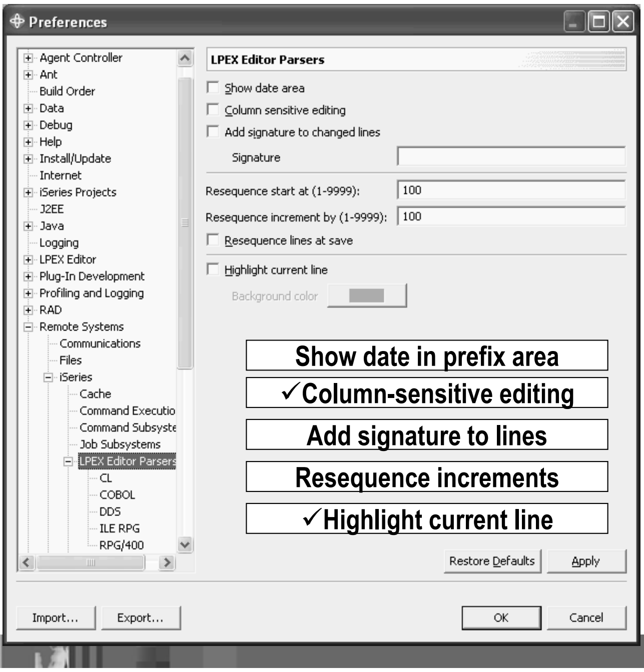
Selection actions

Filter actions

Here we see the pop-up menu within the LPEX editor. This contains clipboard and selection actions, as well as filtering actions which we will discuss.

LPEX Editor Functions: Preferences

- There are also a number of cool functions you can enable via the editor preferences
  - Window->Preferences



Preferences

LPEX Editor Parsers

□ Show date area

□ Column sensitive editing

□ Add signature to changed lines

Signature

Resequence start at (1-9999): 100

Resequence increment by (1-9999): 100

□ Resequence lines at save

□ Highlight current line

Background color

Show date in prefix area

✓Column-sensitive editing

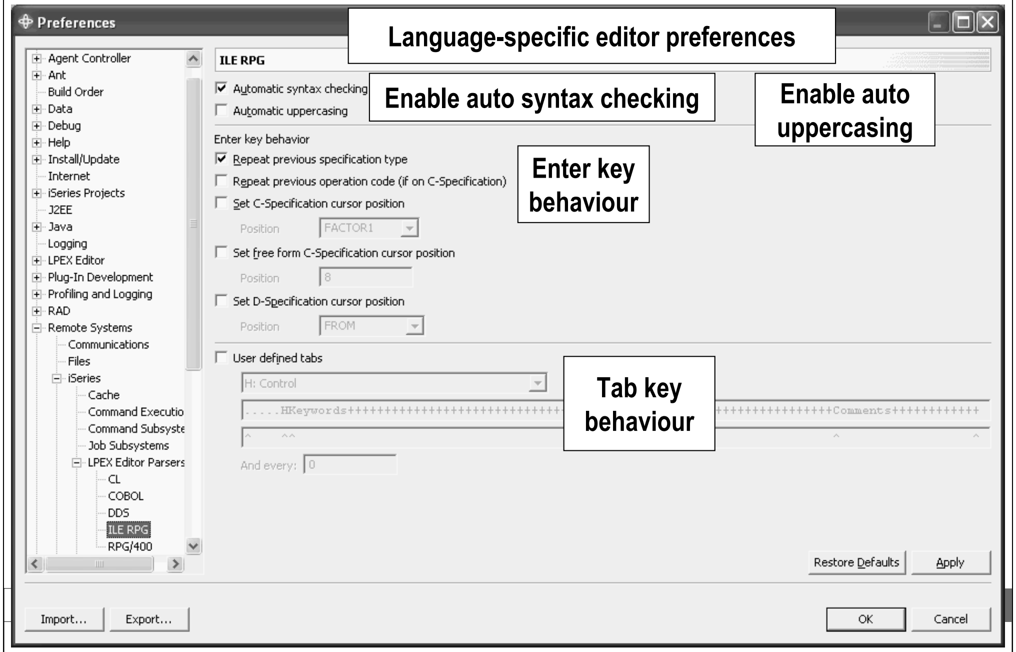
Add signature to lines

Resequence increments

✓Highlight current line

There are a number of other interesting Editor capabilities available for enabling in the editor’s preference page. The most exciting of these are the column-sensitive editing and the highlight current line option. The former allows editing within a range of the RPG/DDS spec such that other areas of the same line are not affected by insert or delete, while the latter highlights the line containing the cursor.

LPEX Editor Functions: Preferences



Preferences

ILE RPG

☑ Automatic syntax checking

□ Automatic uppercasing

Enter key behavior

☑ Repeat previous specification type

□ Repeat previous operation code (if on C-Specification)

□ Set C-Specification cursor position

Position: FACTOR1

□ Set free form C-Specification cursor position

Position: 8

□ Set D-Specification cursor position

Position: FROM

□ User defined tabs

H: Control

```
.....HKeywords+++++++++++++++++++++++++++++   ++++++++++++++++Comments++++++++++++
^    ^^                                                          ^                  ^
```

And every: 0

Language-specific editor preferences

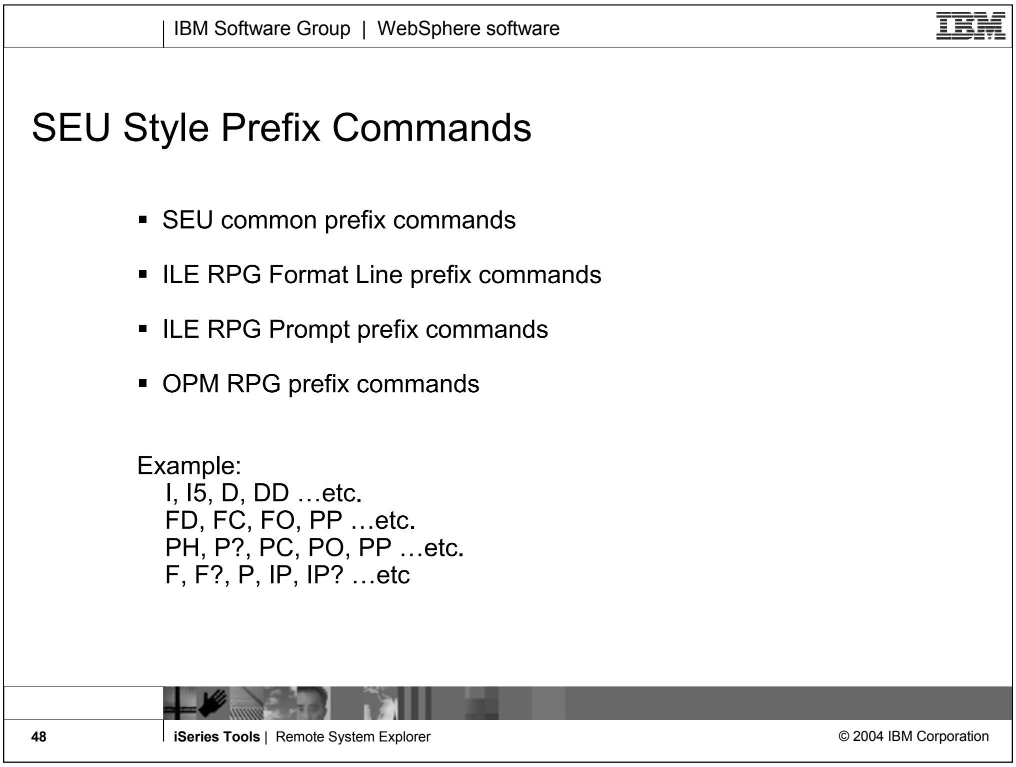
Enable auto syntax checking

Enable auto uppercasing

Enter key behaviour

Tab key behaviour

In addition to preferences that apply to all languages, there are preferences that apply specifically to individual languages.



SEU Style Prefix Commands

- SEU common prefix commands
- ILE RPG Format Line prefix commands
- ILE RPG Prompt prefix commands
- OPM RPG prefix commands

Example:
I, I5, D, DD …etc.
FD, FC, FO, PP …etc.
PH, P?, PC, PO, PP …etc.
F, F?, P, IP, IP? …etc

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 a prefix information and command area at the start of each line:

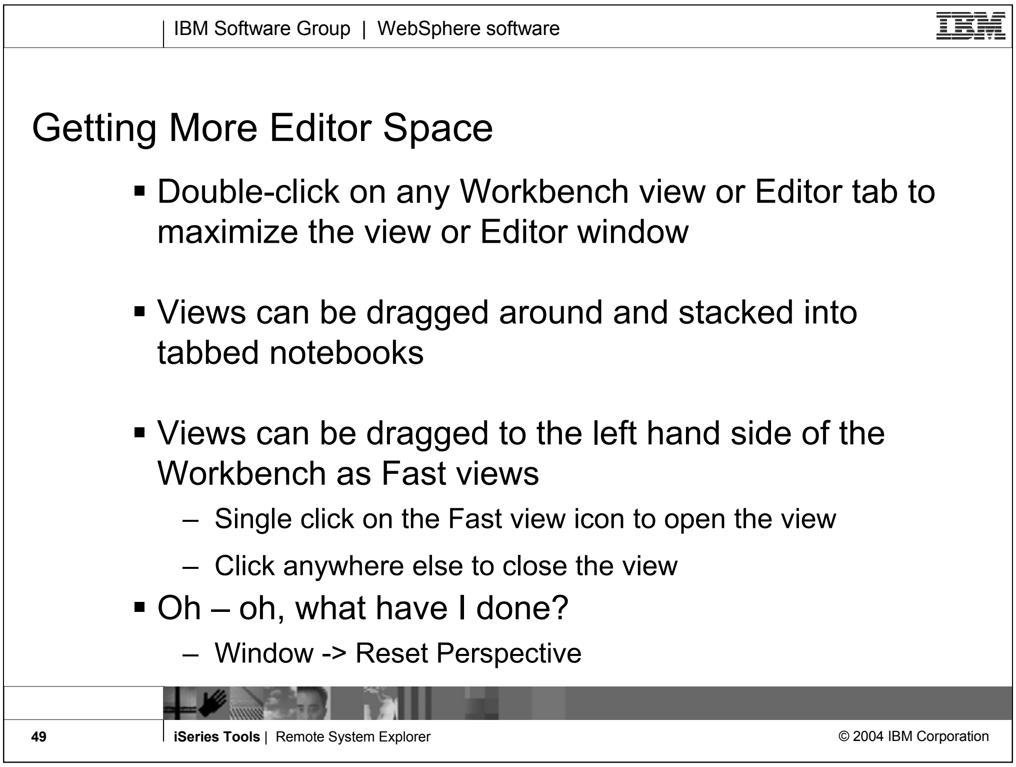
ispf

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.

By default, the SEU profile is the active profile.

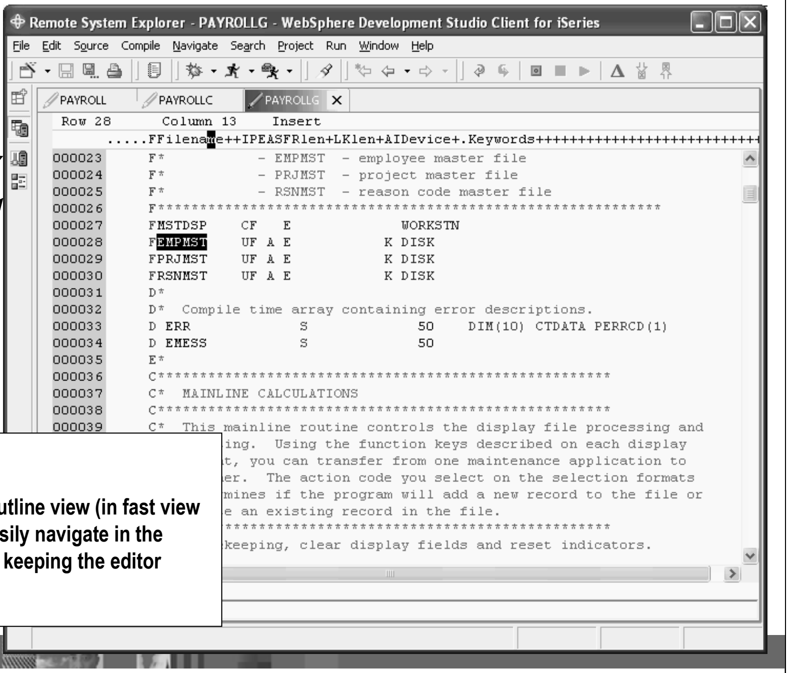


Getting More Editor Space

- Double-click on any Workbench view or Editor tab to maximize the view or Editor window
- Views can be dragged around and stacked into tabbed notebooks
- Views can be dragged to the left hand side of the Workbench as Fast views
  - Single click on the Fast view icon to open the view
  - Click anywhere else to close the view
- Oh – oh, what have I done?
  - Window -> Reset Perspective

You can easily double click on a view or editor tab to maximize the view or Editor window. If you double-click again you will return the view or Editor window to its original size. You can easily rearrange views by selecting hem and dragging them to another location in the workbench. If you are going to use a view frequently but don’t ant to see it all the time in the workbench you can make it a Fast view. You select the view, right click and select ast view. The view will then appear in the left hand frame of the Workbench as a Fast view icon.
To reset your workbench window to its original layout, you can select Window -> Reset perspective.

Fast View


Remote System Explorer - PAYROLLG - WebSphere Development Studio Client for iSeries
File Edit Source Compile Navigate Search Project Run Window Help
PAYROLL
PAYROLLC
PAYROLLG

```
Row 28      Column 13     Insert
     .....FFilename++IPEASFRlen+LKlen+AIDevice+.Keywords+++++++++++++++++++++++++++
          F*            - EMPMST  - employee master file
          F*            - PRJMST  - project master file
          F*            - RSNMST  - reason code master file
          F*************************************************************
          FMSTDSP    CF   E              WORKSTN
          FEMPMST    UF A E            K DISK
          FPRJMST    UF A E            K DISK
          FRSNMST    UF A E            K DISK
          D*
          D*  Compile time array containing error descriptions.
          D ERR             S              50    DIM(10) CTDATA PERRCD(1)
          D EMESS           S              50
          E*
          C*******************************************************
          C*  MAINLINE CALCULATIONS
          C*******************************************************
          C*  This mainline routine controls the display file processing and
                  ing.  Using the function keys described on each display
                  t, you can transfer from one maintenance application to
                  er.  The action code you select on the selection formats
                  mines if the program will add a new record to the file or
                  e an existing record in the file.
                  *********************************************
                  keeping, clear display fields and reset indicators.
```

Remote Systems view

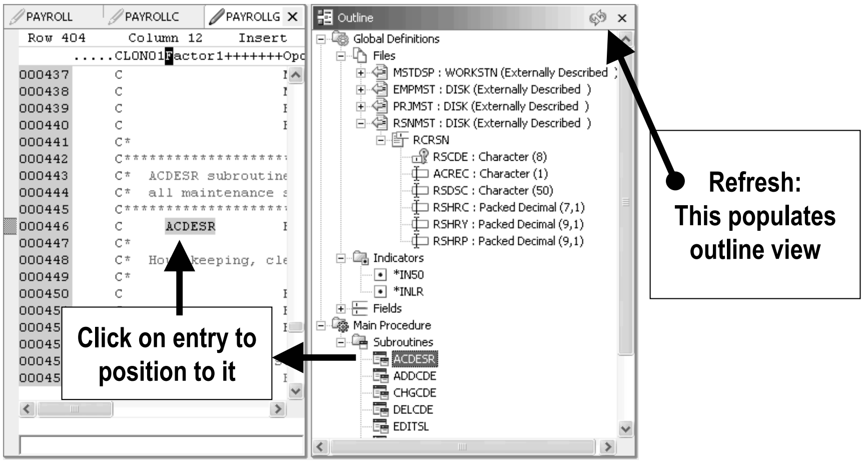
Outline View

Tip:

- ✓Use the outline view (in fast view mode) to easily navigate in the editor while keeping the editor maximized!

Here you see an example of the Remote Systems view and the Outline view as Fast views in the workbench left hand frame.

LPEX Editor Views – Outline view



```
Row 404      Column 12     Insert
     .....CLON01Factor1+++++++Opc
000437       C                    I
000438       C                    I
000439       C                    I
000440       C                    I
000441       C*
000442       C********************
000443       C*   ACDESR subroutine
000444       C*   all maintenance s
000445       C********************
000446       C       ACDESR       I
000447       C*
000448       C*   Ho  keeping, cle
000449       C*
000450       C                    I
00045                             I
00045                             I
00045
00045
00045                             I
```

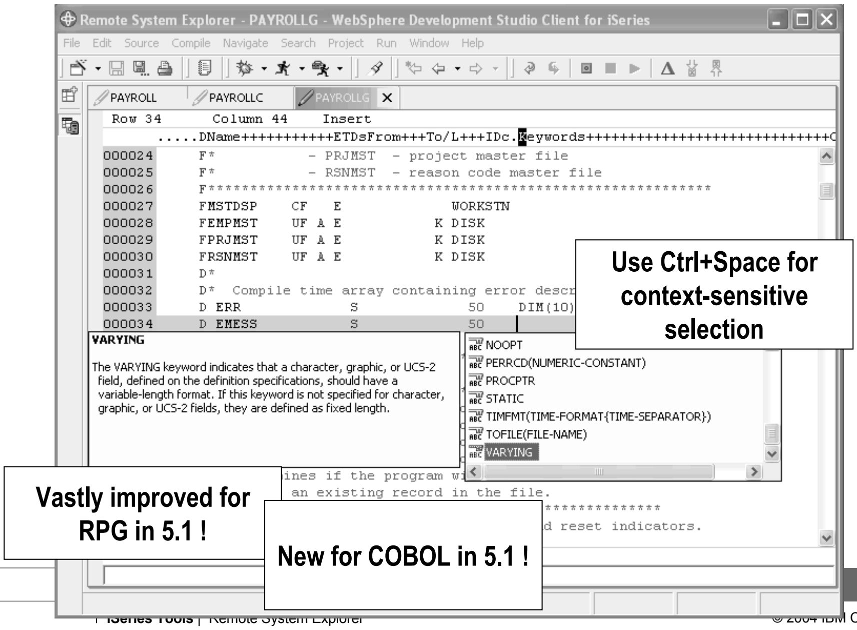
```
Global Definitions
  Files
    MSTDSP : WORKSTN (Externally Described )
    EMPMST : DISK (Externally Described )
    PRJMST : DISK (Externally Described )
    RSNMST : DISK (Externally Described )
      RCRSN
        RSCDE : Character (8)
        ACREC : Character (1)
        RSDSC : Character (50)
        RSHRC : Packed Decimal (7,1)
        RSHRY : Packed Decimal (9,1)
        RSHRP : Packed Decimal (9,1)
  Indicators
    *IN50
    *INLR
  Fields
Main Procedure
  Subroutines
    ACDESR
    ADDCDE
    CHGCDE
    DELCDE
    EDITSL
```

Click on entry to position to it

Refresh: This populates outline view

The Outline view helps you visualize the member you are editing by displaying all the program structures and functions in a clear-cut view.

Code Assist


Remote System Explorer - PAYROLLG - WebSphere Development Studio Client for iSeries
File Edit Source Compile Navigate Search Project Run Window Help
PAYROLL
PAYROLLC
PAYROLLG

```
Row 34      Column 44     Insert
     .....DName+++++++++++ETDsFrom+++To/L+++IDc.Keywords+++++++++++++++++++++++++++++C
000024     F*              - PRJMST  - project master file
000025     F*              - RSNMST  - reason code master file
000026     F************************************************************
000027     FMSTDSP    CF   E                WORKSTN
000028     FEMPMST    UF A E            K DISK
000029     FPRJMST    UF A E            K DISK
000030     FRSNMST    UF A E            K DISK
000031     D*
000032     D*  Compile time array containing error descr
000033     D ERR              S              50    DIM(10)
000034     D EMESS            S              50
```

VARYING

The VARYING keyword indicates that a character, graphic, or UCS-2 field, defined on the definition specifications, should have a variable-length format. If this keyword is not specified for character, graphic, or UCS-2 fields, they are defined as fixed length.

- NOOPT
- PERRCD(NUMERIC-CONSTANT)
- PROCPTR
- STATIC
- TIMFMT(TIME-FORMAT{TIME-SEPARATOR})
- TOFILE(FILE-NAME)
- VARYING

```
ines if the program wi
 an existing record in the file.
**************
d reset indicators.
```

Use Ctrl+Space for context-sensitive selection

Vastly improved for RPG in 5.1 !

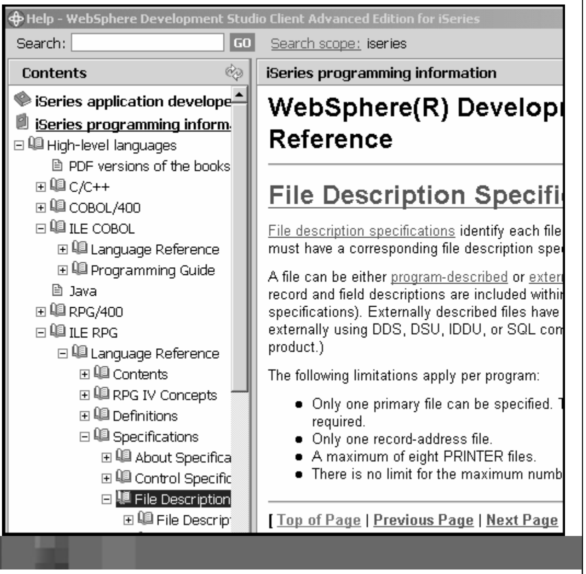
New for COBOL in 5.1 !

The Content Assist tool offers not only auto-complete functionality, by giving you a list of possible functions, objects or keywords to use, but also offers documentation on each of these to help you decide.

Help – at your Fingertips

- RPG, Cobol, DDS online references
- Programming Guides including CL
- F1 Help

  Sensitive to where cursor is in the editor
- Message Help
- and much more



Help - WebSphere Development Studio Client Advanced Edition for iSeries
Search:
GO
Search scope: iseries
Contents

- iSeries application develope
- iSeries programming inform
  - ⊟ High-level languages
    - PDF versions of the books
    - ⊞ C/C++
    - ⊞ COBOL/400
    - ⊟ ILE COBOL
      - ⊞ Language Reference
      - ⊞ Programming Guide
    - Java
    - ⊞ RPG/400
    - ⊟ ILE RPG
      - ⊟ Language Reference
        - ⊞ Contents
        - ⊞ RPG IV Concepts
        - ⊞ Definitions
        - ⊟ Specifications
          - ⊞ About Specifica
          - ⊞ Control Specific
          - ⊟ File Description
            - ⊞ File Descrip

iSeries programming information

WebSphere(R) Developi Reference

File Description Specifi

File description specifications identify each file must have a corresponding file description spe

A file can be either program-described or exter record and field descriptions are included withi specifications). Externally described files have externally using DDS, DSU, IDDU, or SQL com product.)

The following limitations apply per program:

- Only one primary file can be specified. T required.
- Only one record-address file.
- A maximum of eight PRINTER files.
- There is no limit for the maximum numb

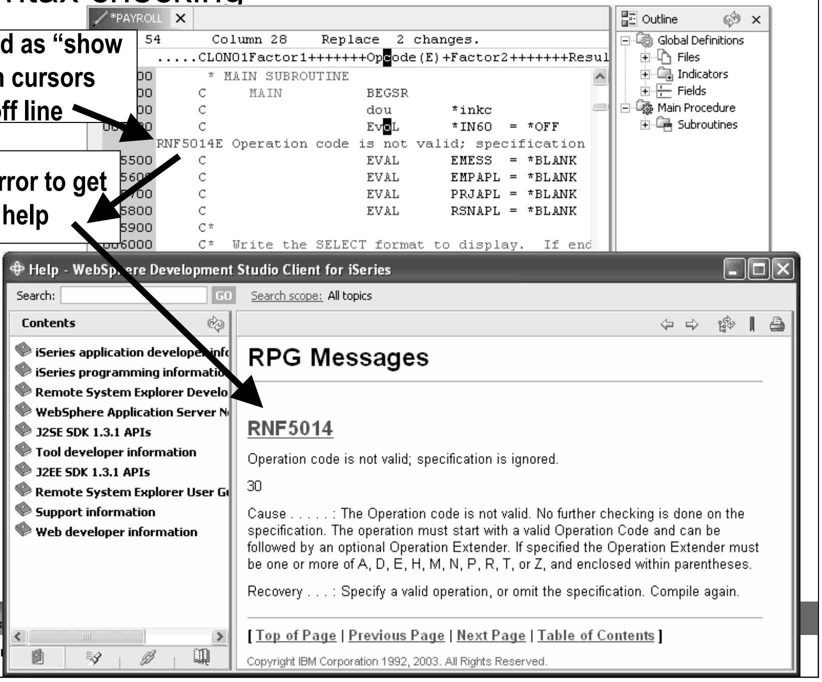
[Top of Page | Previous Page | Next Page

Now you can have a ILE RPG reference at your finger tips. Simply press F1

Instant syntax checking

Errors inserted as "show lines" when cursors moves off line

Press F1 on error to get 2nd-level help



*PAYROLL
Outline
Global Definitions
Files
Indicators
Fields
Main Procedure
Subroutines
Help - WebSphere Development Studio Client for iSeries
Search:
GO
Search scope: All topics
Contents
iSeries application developer infc
iSeries programming informatio
Remote System Explorer Develo
WebSphere Application Server N
J2SE SDK 1.3.1 APIs
Tool developer information
J2EE SDK 1.3.1 APIs
Remote System Explorer User Gu
Support information
Web developer information

```
54      Column 28    Replace  2 changes.
.....CL0N01Factor1+++++++Opcode(E)+Factor2+++++++Resul
   00      * MAIN SUBROUTINE
   00     C     MAIN          BEGSR
   00     C                   dou       *inkc
   00     C                   EvoL      *IN60   = *OFF
RNF5014E Operation code is not valid; specification
 5500     C                   EVAL      EMESS  = *BLANK
 5600     C                   EVAL      EMPAPL = *BLANK
 5700     C                   EVAL      PRJAPL = *BLANK
 5800     C                   EVAL      RSNAPL = *BLANK
 5900     C*
006000    C*  Write the SELECT format to display.  If end
```

RPG Messages

RNF5014

Operation code is not valid; specification is ignored.

30

Cause . . . . . : The Operation code is not valid. No further checking is done on the specification. The operation must start with a valid Operation Code and can be followed by an optional Operation Extender. If specified the Operation Extender must be one or more of A, D, E, H, M, N, P, R, T, or Z, and enclosed within parentheses.

Recovery . . . : Specify a valid operation, or omit the specification. Compile again.

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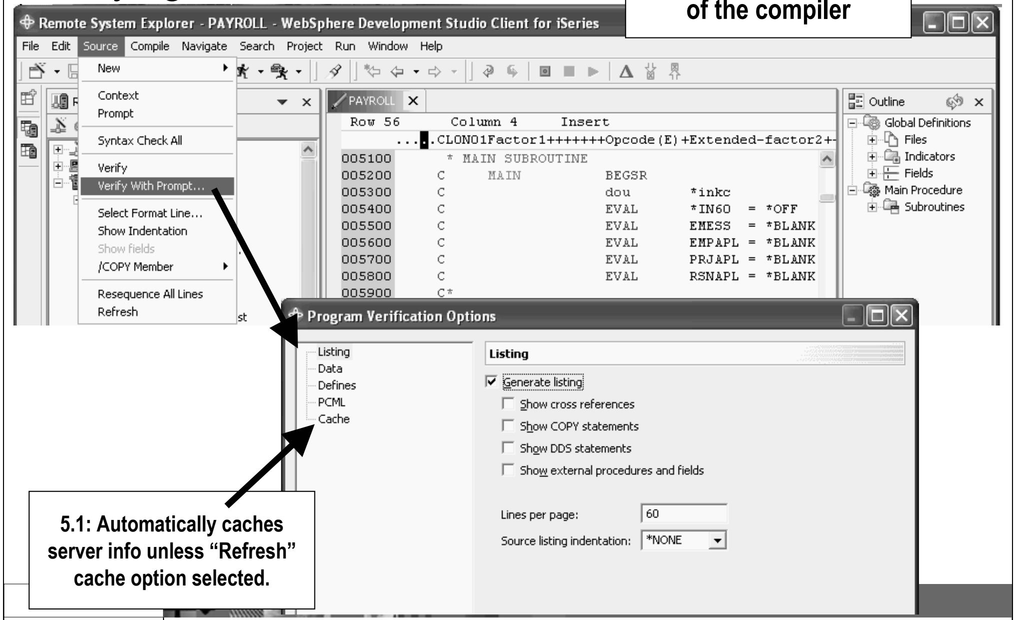
The Remote Systems LPEX Editor gives you instant feedback for your code, at the location where a syntax error occurs. This happens as you cursor off a changed line.

Verifying

Verify runs built-in copy of the compiler



```
 Row 56       Column 4      Insert
      ....CLON01Factor1+++++++Opcode(E)+Extended-factor2+-
005100          * MAIN SUBROUTINE
005200     C      MAIN           BEGSR
005300     C                     dou       *inkc
005400     C                     EVAL      *IN60   = *OFF
005500     C                     EVAL      EMESS   = *BLANK
005600     C                     EVAL      EMPAPL  = *BLANK
005700     C                     EVAL      PRJAPL  = *BLANK
005800     C                     EVAL      RSNAPL  = *BLANK
005900     C*
```

Listing

☑ Generate listing

☐ Show cross references

☐ Show COPY statements

☐ Show DDS statements

☐ Show external procedures and fields

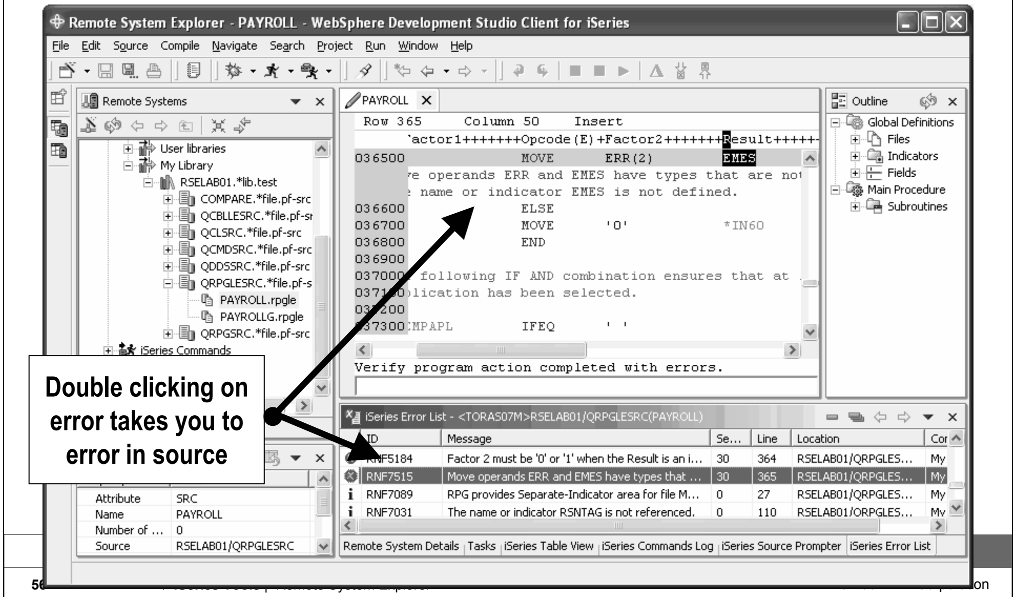
Lines per page: 60

Source listing indentation: *NONE

5.1: Automatically caches server info unless "Refresh" cache option selected.

Use the Source pulldown to verify your work. The verifier is a built-in copy of the compiler, for the purpose of catching all errors, not just syntax. The verify has options, which effectively are the subset of the compiler options that affect error checking.

Verify – Error List



Double clicking on error takes you to error in source

```
 Row 365      Column 50     Insert
      'actor1+++++++Opcode(E)+Factor2+++++++Result+++++-
036500             MOVE      ERR(2)        EMES
      ve operands ERR and EMES have types that are not
      e name or indicator EMES is not defined.
036600             ELSE
036700             MOVE      '0'           *IN60
036800             END
036900
037000  following IF AND combination ensures that at
037100 plication has been selected.
037200
037300CMPAPL       IFEQ      ' '
Verify program action completed with errors.
```

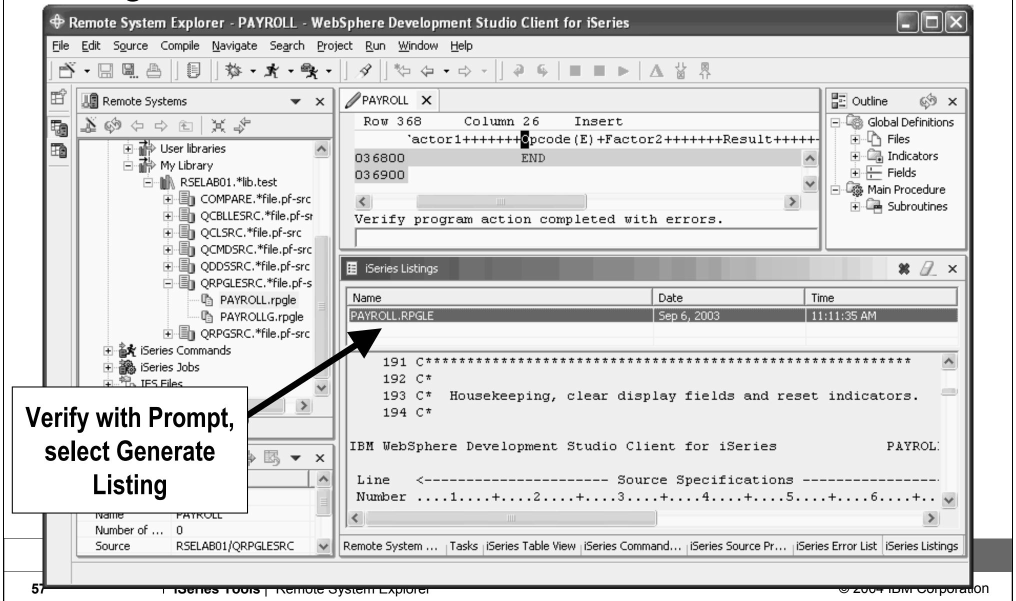
Attribute	SRC
Name	PAYROLL
Number of ...	0
Source	RSELAB01/QRPGLESRC

iSeries Error List - <TORAS07M>RSELAB01/QRPGLESRC(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/ORPGLES...	My

After performing a verify, the Error List window lists the errors that are found and their severity, inserts the error messages directly into the source and helps you to navigate between the errors.

Listing View



```
 Row 368      Column 26     Insert
       'actor1+++++++Opcode(E)+Factor2+++++++Result+++++-
036800                     END
036900
Verify program action completed with errors.
```

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              PAYROL

 Line   <---------------------- Source Specifications ----------------
 Number ....1....+....2....+....3....+....4....+....5....+....6....+..
```

Verify with Prompt, select Generate Listing

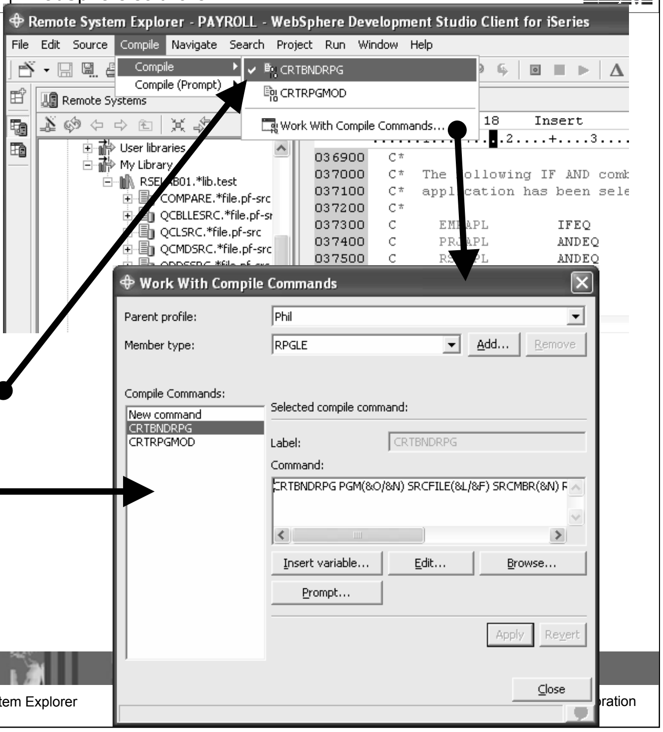
Here is the Listing view from the Program Verifier, if that option was chosen.

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



```
036900   C*
037000   C*  The  ollowing IF AND comb
037100   C*  appl cation has been sele
037200   C*
037300   C     EM  APL        IFEQ
037400   C     PR  APL        ANDEQ
037500   C     R   L          ANDEQ
```

Parent profile: Phil

Member type: RPGLE

Compile Commands: New command, CRTBNDRPG, CRTRPGMOD

Selected compile command:

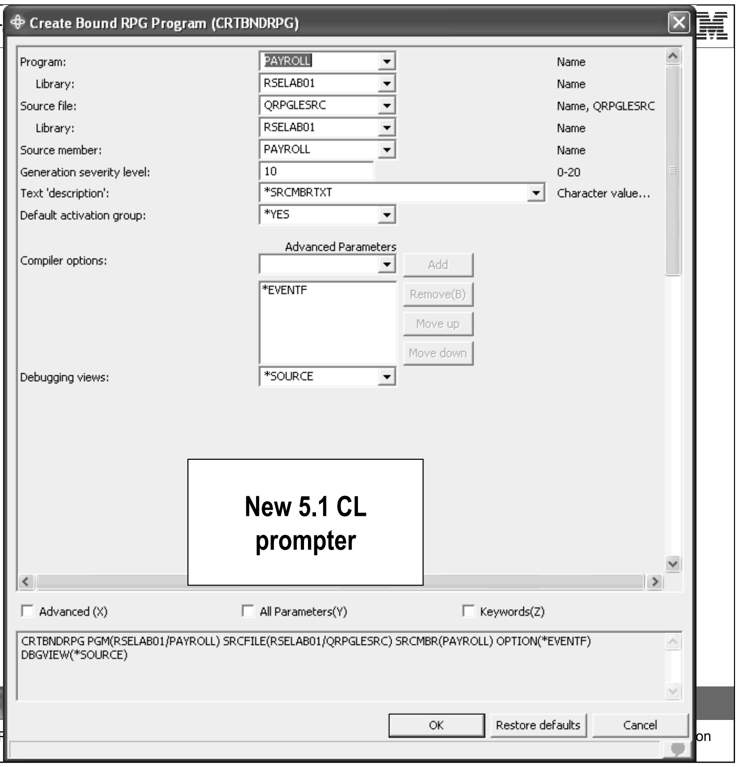
Label: CRTBNDRPG

Command: CRTBNDRPG PGM(&O/&N) SRCFILE(&L/&F) SRCMBR(&N) F

After you have verified and fixed all your errors, it is time to launch the compile. This is done via the Compile pulldown (only if editor is active) or the member's popup menu. There are a number of compile commands pre-supplied for you, for each member type, or you can create your own compile command. Like user actions, these support substitution variables. Once you create a compile command, it appears in the cascading Compile menu.

The last-used command, for this member's type, is checked in the Compile menu.

Compile with prompt …



Create Bound RPG Program (CRTBNDRPG)

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

Advanced Parameters

Compiler options:	*EVENTF	
Debugging views:	*SOURCE	

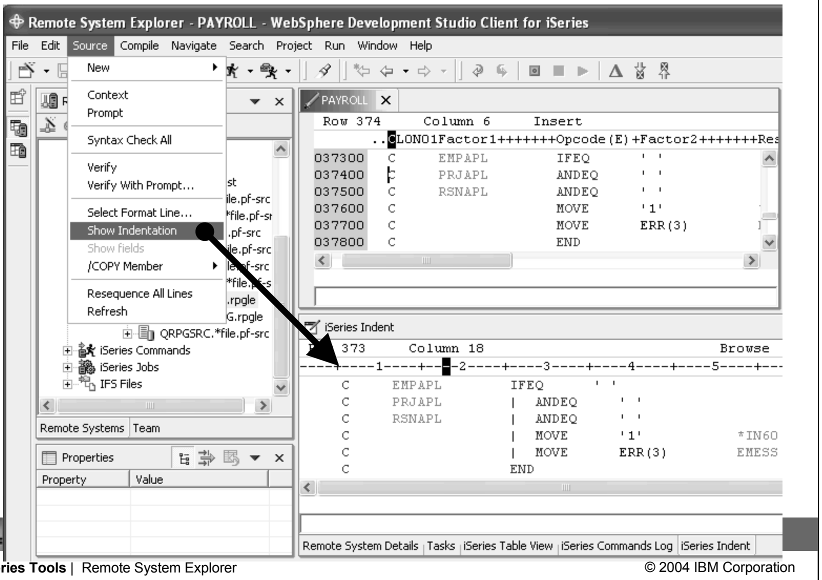
New 5.1 CL prompter

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

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

When you select to prompt the compile command, the command prompt is converted to a GUI and displayed. For the 5.1 release, this GUI was re-written from Java’s Swing to Eclipse’s SWT so it more consistent with the rest of the dialogs in the IDE.

Indent View

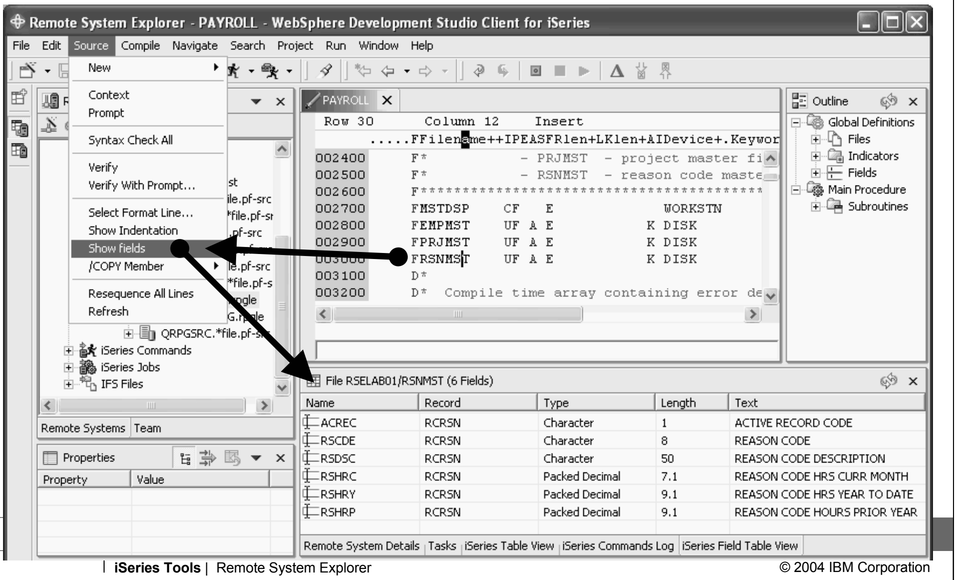


```
 Row 374      Column 6      Insert
        ..CLON01Factor1+++++++Opcode(E)+Factor2+++++++Res
037300    C        EMPAPL          IFEQ      ' '
037400    C        PRJAPL          ANDEQ     ' '
037500    C        RSNAPL          ANDEQ     ' '
037600    C                        MOVE      '1'
037700    C                        MOVE      ERR(3)
037800    C                        END
```

```
 R  373      Column 18                              Browse
----+----1----+----2----+----3----+----4----+----5----+---
    C        EMPAPL          IFEQ      ' '
    C        PRJAPL          |  ANDEQ     ' '
    C        RSNAPL          |  ANDEQ     ' '
    C                        |  MOVE      '1'           *IN60
    C                        |  MOVE      ERR(3)        EMESS
    C                        END
```

Here you see the results of the indent option: a readonly view showing the code indented, much as it is in a compiler listing, but with color.

Show Fields



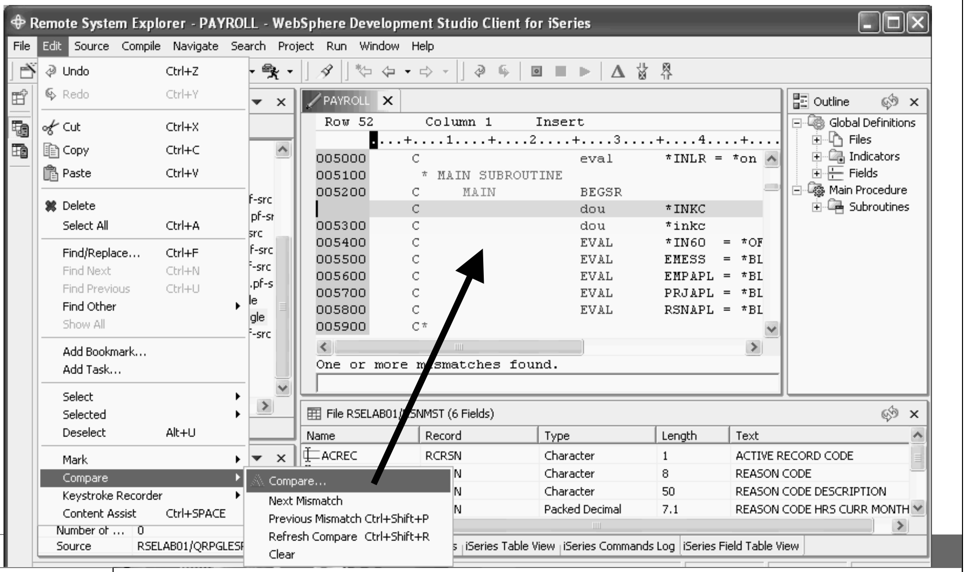
```
 Row 30      Column 12     Insert
       .....FFilename++IPEASFRlen+LKlen+AIDevice+.Keywor
002400     F*            - PRJMST  - project master fi
002500     F*            - RSNMST  - reason code maste
002600     F******************************************
002700     FMSTDSP    CF   E               WORKSTN
002800     FEMPMST    UF A E             K DISK
002900     FPRJMST    UF A E             K DISK
003000     FRSNMST    UF A E             K DISK
003100     D*
003200     D*  Compile time array containing error de
```

File RSELAB01/RSNMST (6 Fields)

Name	Record	Type	Length	Text
ACREC	RCRSN	Character	1	ACTIVE RECORD CODE
RSCDE	RCRSN	Character	8	REASON CODE
RSDSC	RCRSN	Character	50	REASON CODE DESCRIPTION
RSHRC	RCRSN	Packed Decimal	7.1	REASON CODE HRS CURR MONTH
RSHRY	RCRSN	Packed Decimal	9.1	REASON CODE HRS YEAR TO DATE
RSHRP	RCRSN	Packed Decimal	9.1	REASON CODE HOURS PRIOR YEAR

Here you see the results of the Show Fields tool. It retrieves the fields for the file under the cursor, and shows the fields in a table view.

Integrated Compare



```
Row 52       Column 1      Insert
         ....+....1....+....2....+....3....+....4....+....
005000       C                      eval      *INLR = *on
005100        * MAIN SUBROUTINE
005200       C     MAIN             BEGSR
             C                      dou       *INKC
005300       C                      dou       *inkc
005400       C                      EVAL      *IN60   = *OF
005500       C                      EVAL      EMESS   = *BL
005600       C                      EVAL      EMPAPL = *BL
005700       C                      EVAL      PRJAPL = *BL
005800       C                      EVAL      RSNAPL = *BL
005900       C*
One or more mismatches found.
```

File RSELAB01/RSNMST (6 Fields)

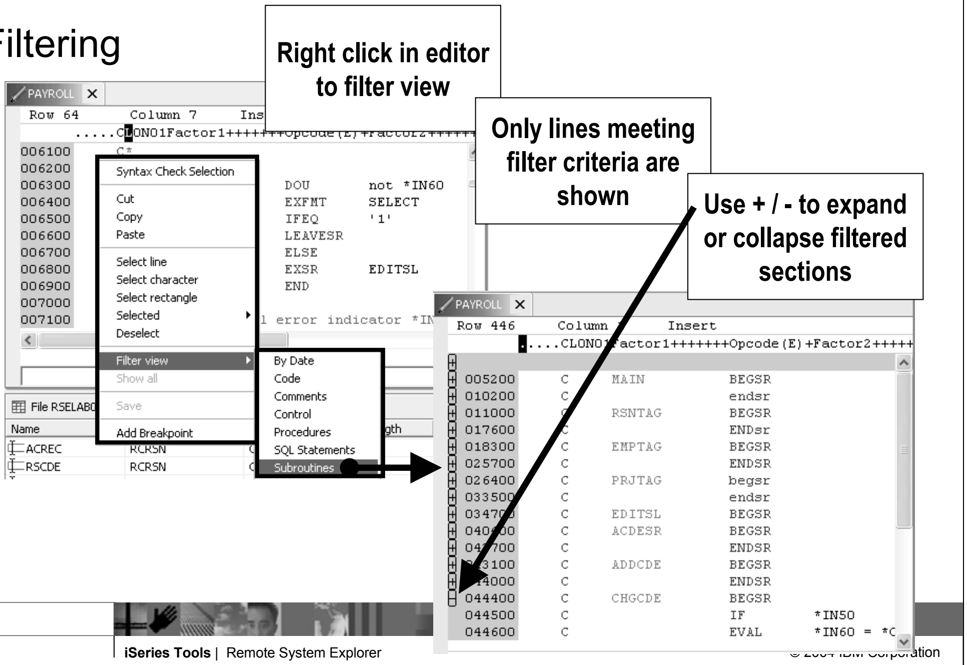
Name	Record	Type	Length	Text
ACREC	RCRSN	Character	1	ACTIVE RECORD CODE
	N	Character	8	REASON CODE
	N	Character	50	REASON CODE DESCRIPTION
	N	Packed Decimal	7.1	REASON CODE HRS CURR MONTH

Number of ...	0
Source	RSELAB01/QRPGLESR

The compare tool under the Edit menu is used to compare the currently active member in the editor with another member you select, and the differences are shown within the edit window, as we see here.

Alternatively, there is another compare utility not editor based, in the popup menu for members.

Filtering



Right click in editor to filter view

Only lines meeting filter criteria are shown

Use + / - to expand or collapse filtered sections

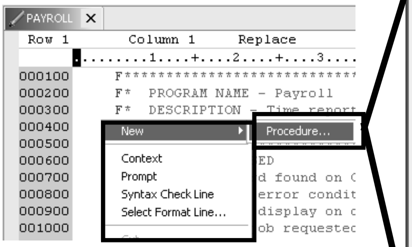
```
Row 64      Column 7     Ins
     .....CLON01Factor1+++++++Opcode(E)+Factor2+++++++
006100     C*
006200
006300                           DOU       not *IN60
006400                           EXFMT     SELECT
006500                           IFEQ      '1'
006600                           LEAVESR
006700                           ELSE
006800                           EXSR      EDITSL
006900                           END
007000
007100                     l error indicator *IN
```

```
Row 446      Column 7      Insert
      .....CLON01Factor1+++++++Opcode(E)+Factor2+++++
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
040400     C          ACDESR        BEGSR
041700     C                        ENDSR
043100     C          ADDCDE        BEGSR
044000     C                        ENDSR
044400     C          CHGCDE        BEGSR
044500     C                        IF          *IN50
044600     C                        EVAL        *IN60 = *C
```

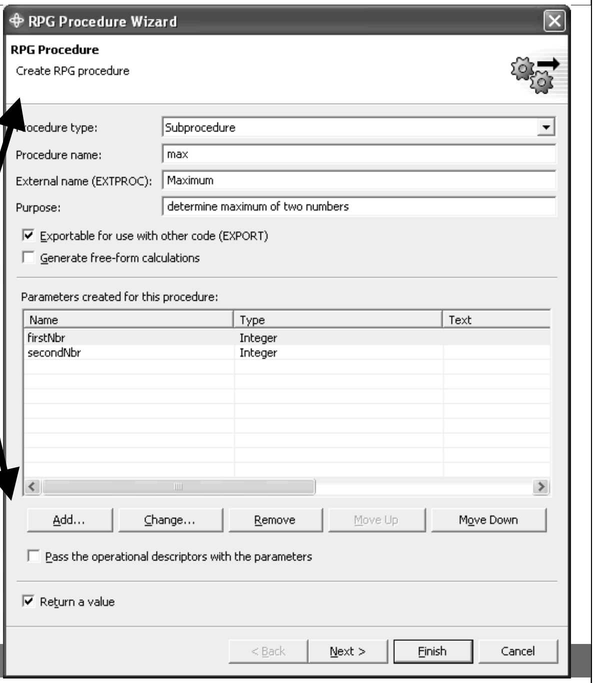
A very popular feature of LPEX is its support for subsetting the source to show only lines meeting a criteria, such as containing a given string or representing the begin or end of a subroutine / procedure. This capability is accessed from the right click menu of the editor. In subset mode, you will notice plus signs, that if expanded will un-hide the lines up to the next visible line.

NEW FOR 5.1 !

New Procedure wizard



```
PAYROLL
 Row 1        Column 1     Replace
 .........1....+....2....+....3....
000100      F****************************
000200      F*  PROGRAM NAME - Payroll
000300      F*  DESCRIPTION - Time report
000400
000500
000600                          ED
000700                          d found on C
000800                          error condit
000900                          display on c
001000                          ob requestec
```



RPG Procedure Wizard

RPG Procedure

Create RPG procedure

Procedure type: Subprocedure

Procedure name: max

External name (EXTPROC): Maximum

Purpose: determine maximum of two numbers

☑ Exportable for use with other code (EXPORT)

☐ Generate free-form calculations

Parameters created for this procedure:

Name	Type	Text
firstNbr	Integer	
secondNbr	Integer	

☐ Pass the operational descriptors with the parameters

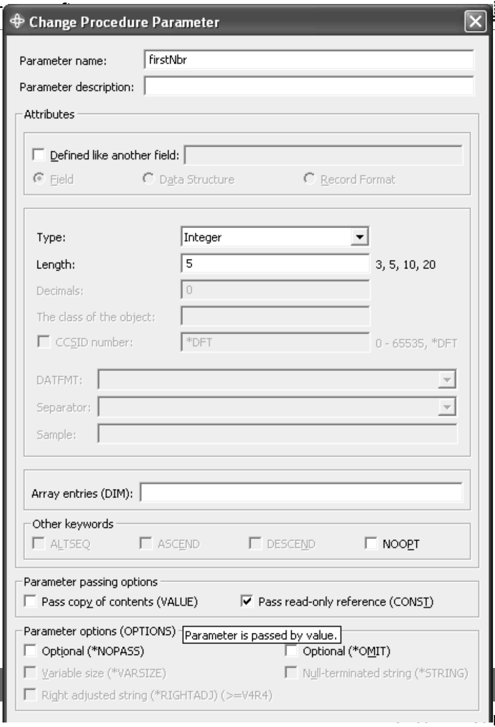
☑ Return a value

Procedure wizard generates prototype and body stub

In 5.1, the Procedure SmartGuide from CODE/400 was ported to the new editor. This will prompt for a procedures signature information (name, parameters and return type) and generate the procedure prototype and the body. It is up to you to subsequently add logic to that body.

The prototype is generated at the top, after the last D-spec, while the body is placed at the bottom of the current member.

New Procedure wizard



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

DATFMT:

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)

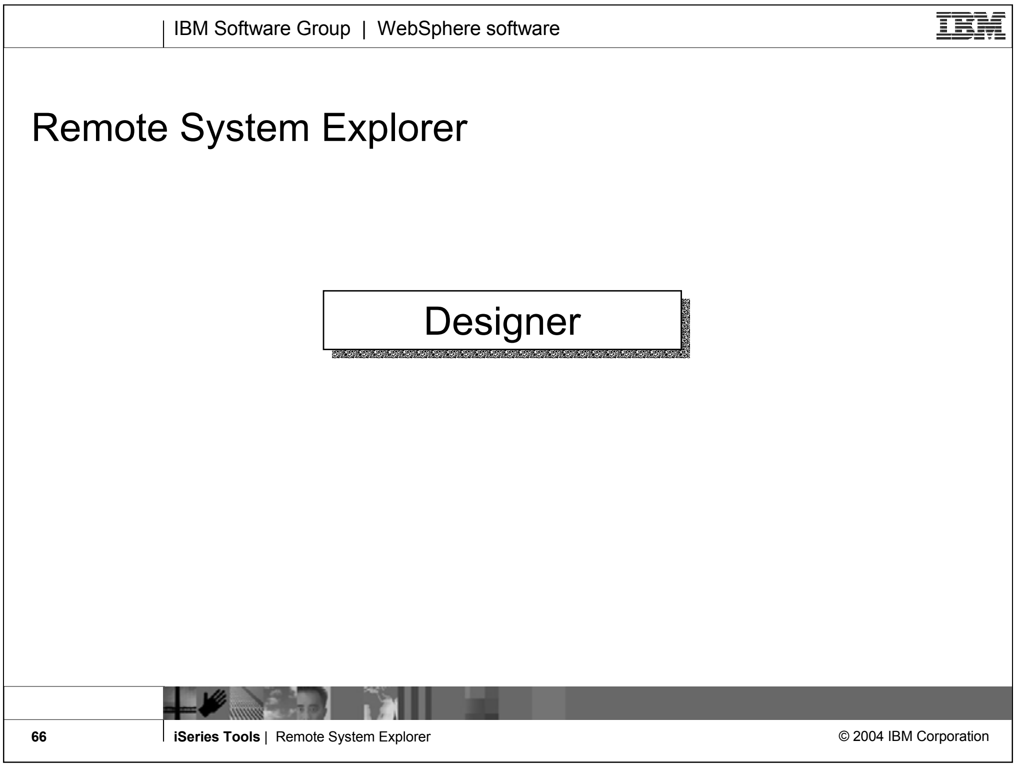
☐ Variable size (*VARSIZE) ☐ Null-terminated string (*STRING)

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

Procedure wizard helps with complexity of RPG language

Flyover help describes each option

The procedure wizard can help with users not fully familiar with RPG IV, especially for the parameters and return type information.



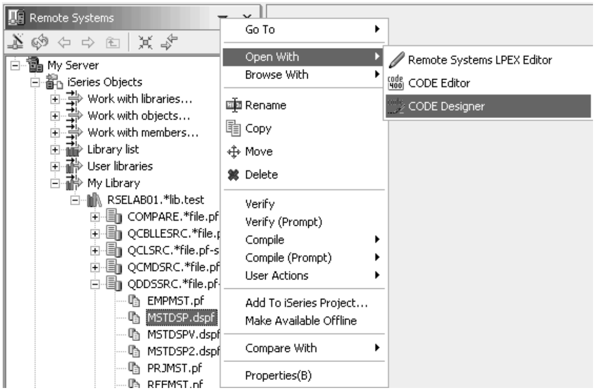
Remote System Explorer

Designer

Now we’ll describe the CODE Designer tool, launchable from the IDE.

CODE Designer

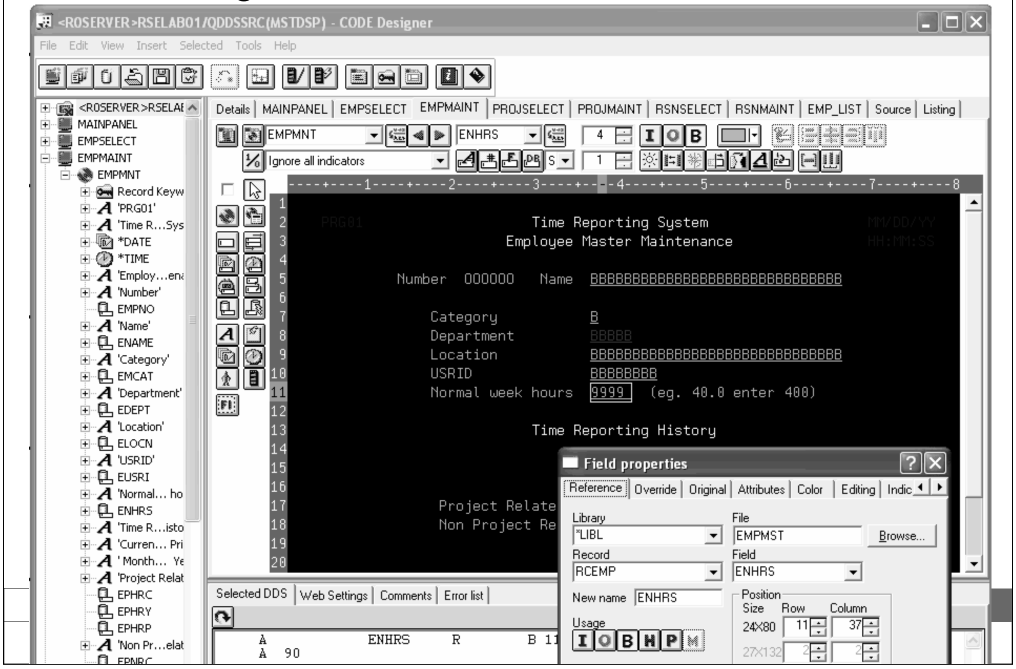
- Use **Open With -> CODE Designer** to open designer
  - For DSPF, PRTF, PF
  - Launches in separate window
  - Currently no built-in DDS designer, but built-in source editor does support DDS



CODE Designer is an editor like SDA and RLU, for WYSIWYG development of display files and printer files. It also supports physical files.

Unlike the source editor, this editor has not been ported into the IDE yet, so those wanting a great WYSIWYG tool have to use it still. To make that easy, there is a right click action to launch it from a selected member.

CODE Designer



```
 1
 2   PRG01                 Time Reporting System                MM/DD/YY
 3                      Employee Master Maintenance             HH:MM:SS
 4
 5         Number  000000   Name  BBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
 6
 7            Category            B
 8            Department          BBBBB
 9            Location            BBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
10            USRID               BBBBBBBB
11            Normal week hours   9999   (eg. 40.0 enter 400)
12
13                         Time Reporting History
14
15
16
17             Project Relate
18             Non Project Re
19
20
```

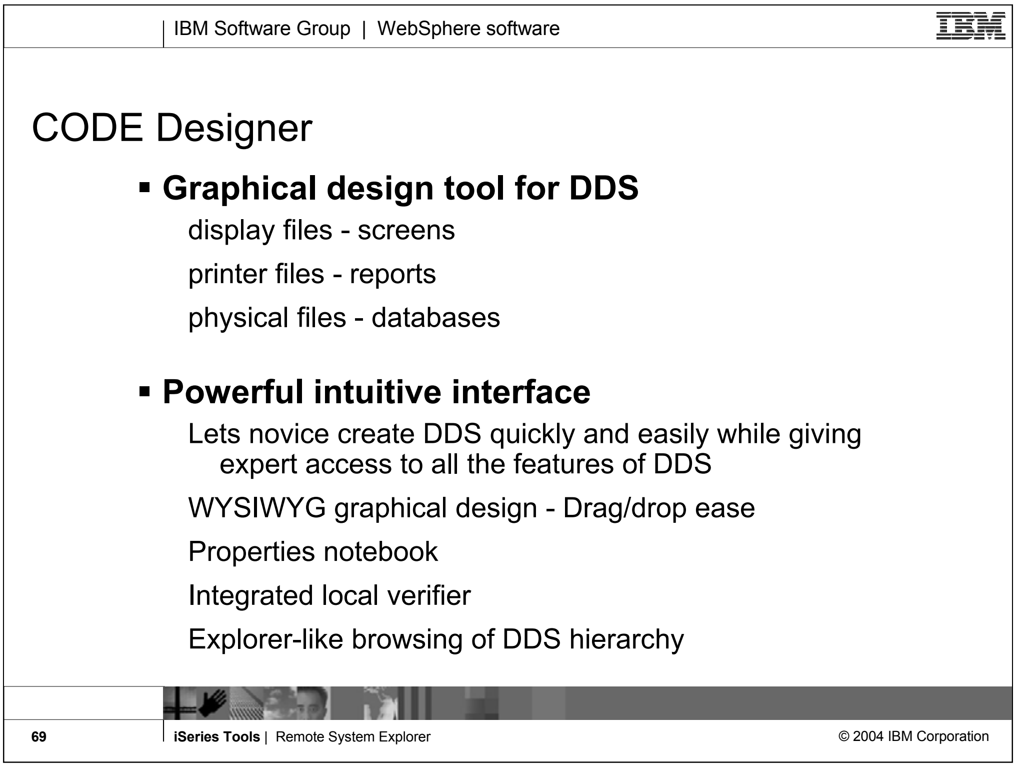
```
     A              ENHRS      R         B 11
     A  90
```

Field properties

Reference | Override | Original | Attributes | Color | Editing | Indic

Library: *LIBL
File: EMPMST
Record: RCEMP
Field: ENHRS
New name: ENHRS
Usage: I O B H P M
Position — Size 24X80, Row 11, Column 37; 27X132

This is the CODE Designer. As you can see, because its not in the IDE, it launches in its own main window.



CODE Designer

- **Graphical design tool for DDS**

  display files - screens

  printer files - reports

  physical files - databases

- **Powerful intuitive interface**

  Lets novice create DDS quickly and easily while giving expert access to all the features of DDS

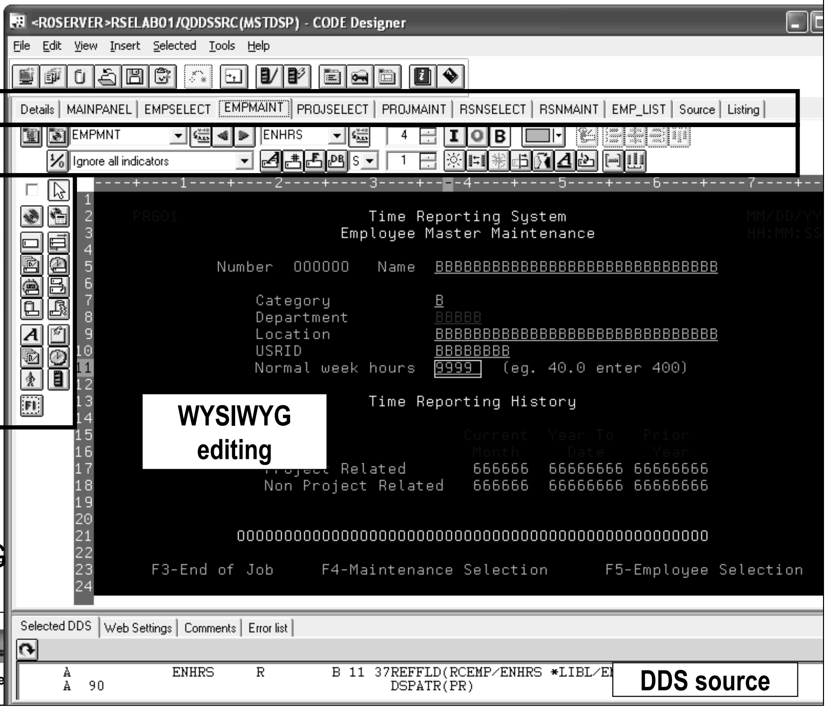
  WYSIWYG graphical design - Drag/drop ease

  Properties notebook

  Integrated local verifier

  Explorer-like browsing of DDS hierarchy

CODE Designer is a very popular and powerful tool.


<ROSERVER>RSELAB01/QDDSSRC(MSTDSP) - CODE Designer
File Edit View Insert Selected Tools Help
Details | MAINPANEL | EMPSELECT | EMPMAINT | PROJSELECT | PROJMAINT | RSNSELECT | RSNMAINT | EMP_LIST | Source | Listing
EMPMNT
ENHRS
Ignore all indicators
Selected DDS | Web Settings | Comments | Error list
Screens
Toolbar
Palette
WYSIWYG editing
DDS source

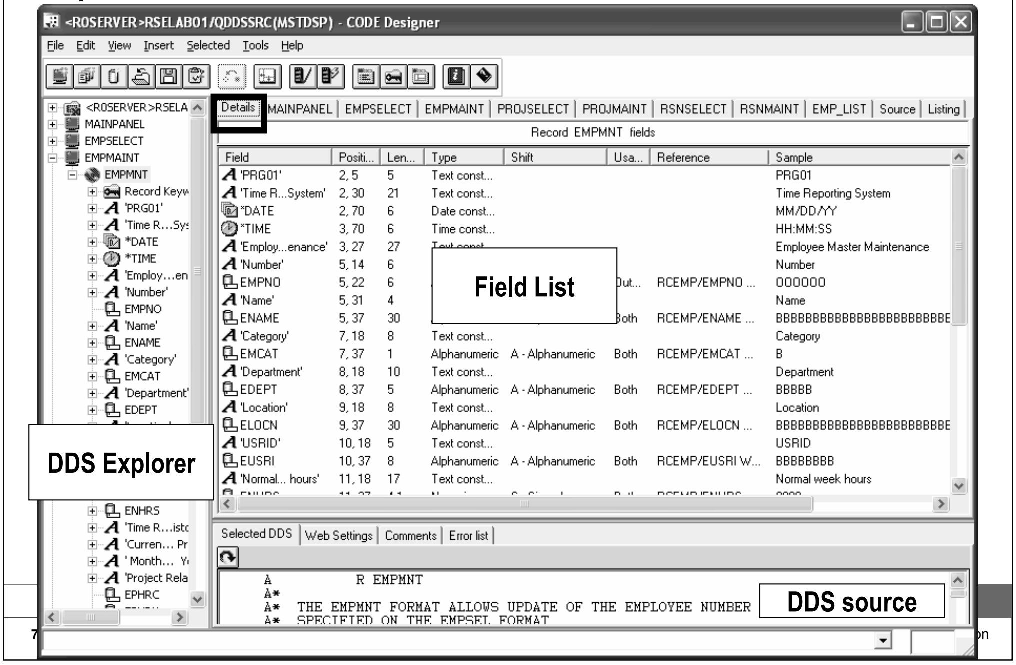
```
     PRG01                 Time Reporting System                           MM/DD/YY
                        Employee Master Maintenance                        HH:MM:SS

               Number   000000   Name  BBBBBBBBBBBBBBBBBBBBBBBBBBBBBB

                  Category           B
                  Department         BBBBB
                  Location           BBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
                  USRID              BBBBBBBB
                  Normal week hours  9999  (eg. 40.0 enter 400)

                           Time Reporting History

                                         Current   Year To    Prior
                                          Month     Date      Year
                   Project Related       666666  66666666  66666666
                   Non Project Related   666666  66666666  66666666


                0000000000000000000000000000000000000000000000000000

      F3-End of Job     F4-Maintenance Selection      F5-Employee Selection
```

```
     A            ENHRS     R        B 11 37REFFLD(RCEMP/ENHRS *LIBL/E
     A  90                                   DSPATR(PR)
```

Design Page – WYSIWYG Layout

This is the equivalent of SDA’s option 12 design screen. It is rich in toolbar and palette items, and supports drag and drop, and direct editing.

Explorer for DDS

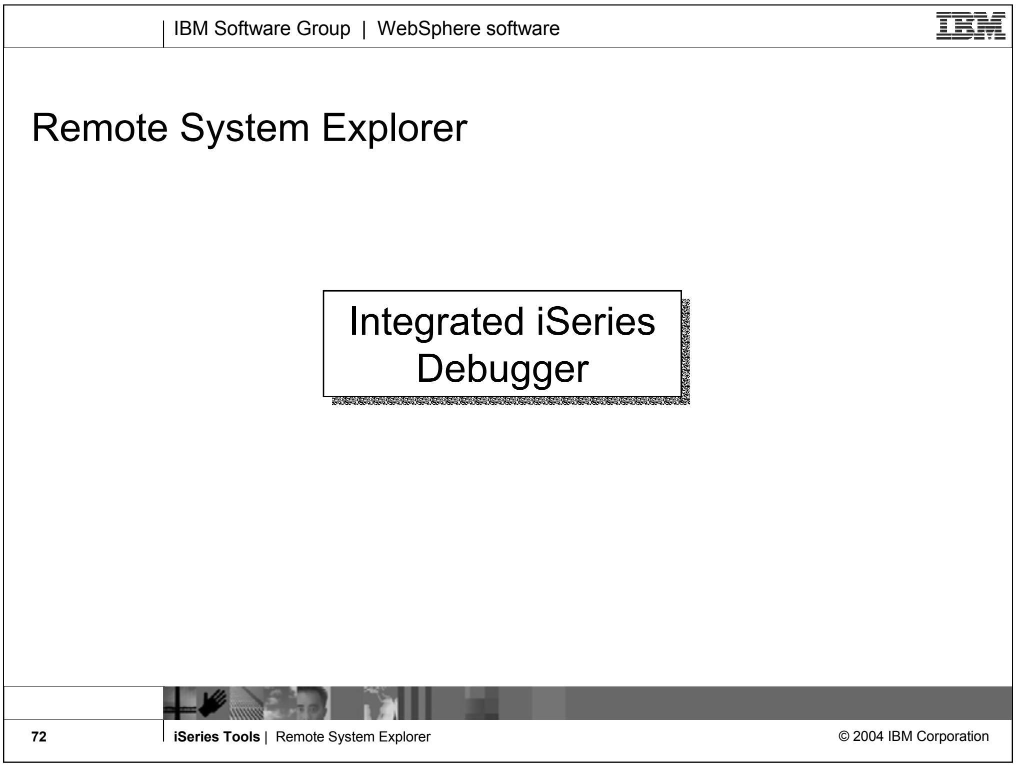


Record EMPMNT fields

Field	Positi...	Len...	Type	Shift	Usa...	Reference	Sample
'PRG01'	2, 5	5	Text const...				PRG01
'Time R...System'	2, 30	21	Text const...				Time Reporting System
*DATE	2, 70	6	Date const...				MM/DD/YY
*TIME	3, 70	6	Time const...				HH:MM:SS
'Employ...enance'	3, 27	27	Text const...				Employee Master Maintenance
'Number'	5, 14	6					Number
EMPNO	5, 22	6			Out...	RCEMP/EMPNO ...	000000
'Name'	5, 31	4					Name
ENAME	5, 37	30			Both	RCEMP/ENAME ...	BBBBBBBBBBBBBBBBBBBBBBBBE
'Category'	7, 18	8	Text const...				Category
EMCAT	7, 37	1	Alphanumeric	A - Alphanumeric	Both	RCEMP/EMCAT ...	B
'Department'	8, 18	10	Text const...				Department
EDEPT	8, 37	5	Alphanumeric	A - Alphanumeric	Both	RCEMP/EDEPT ...	BBBBB
'Location'	9, 18	8	Text const...				Location
ELOCN	9, 37	30	Alphanumeric	A - Alphanumeric	Both	RCEMP/ELOCN ...	BBBBBBBBBBBBBBBBBBBBBBBBE
'USRID'	10, 18	5	Text const...				USRID
EUSRI	10, 37	8	Alphanumeric	A - Alphanumeric	Both	RCEMP/EUSRI W...	BBBBBBBB
'Normal... hours'	11, 18	17	Text const...				Normal week hours

```
     A          R EMPMNT
     A*
     A*   THE EMPMNT FORMAT ALLOWS UPDATE OF THE EMPLOYEE NUMBER
     A*   SPECIFIED ON THE EMPSEL FORMAT
```

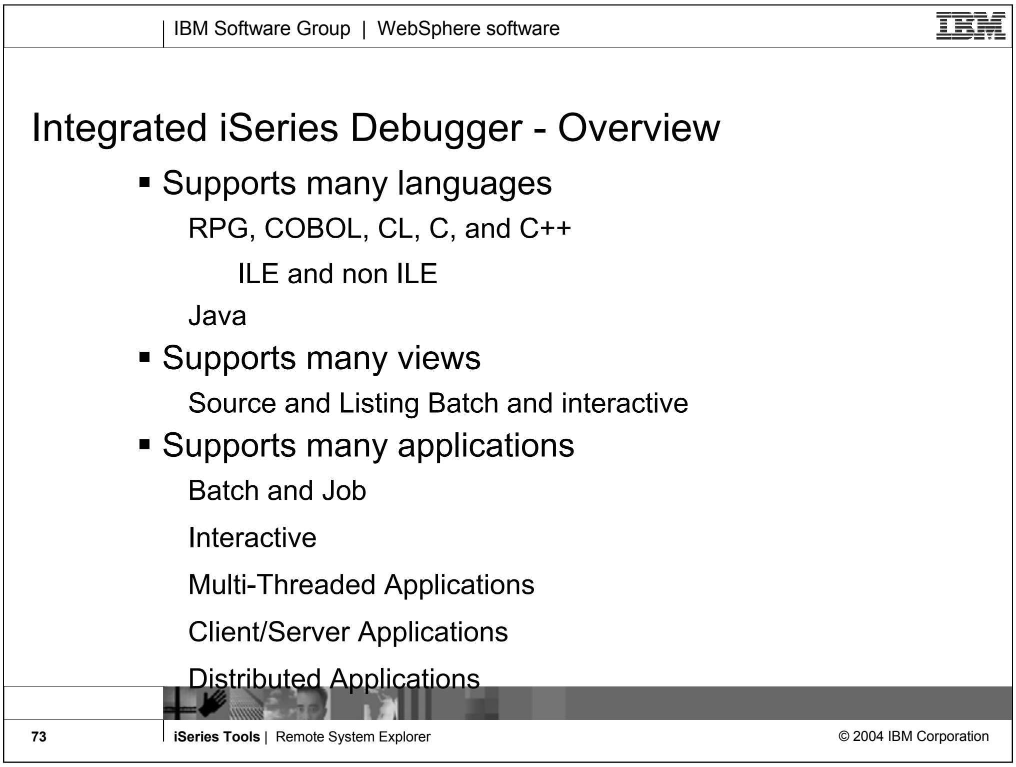
For those who prefer non-WYSIWYG, there is also a field list where you can create, change and re-order fields. It contents changes as records are selected in the DDS Explorer primary view on the left. The field list is the only option for PF editing.



Remote System Explorer

Integrated iSeries Debugger

With the Integrated iSeries Debugger you can debug your program running on the iSeries host from a graphical user interface on your workstation. 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 debugger window. Each session you debug is listed separately in the Debug view.



Integrated iSeries Debugger - Overview

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

The Integrated iSeries Debugger is powerful and complete.

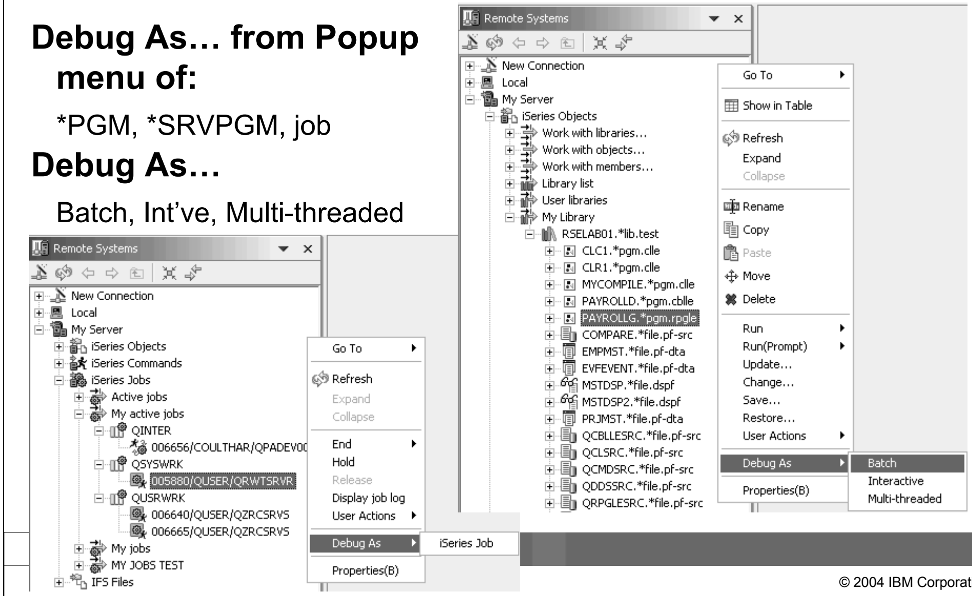
Debugger Invocation: from popup menus

Debug As… from Popup menu of:

*PGM, *SRVPGM, job

Debug As…

Batch, Int've, Multi-threaded



You can run and debug programs from the Remote Systems view or the iSeries Table view in three ways:

•In a batch job

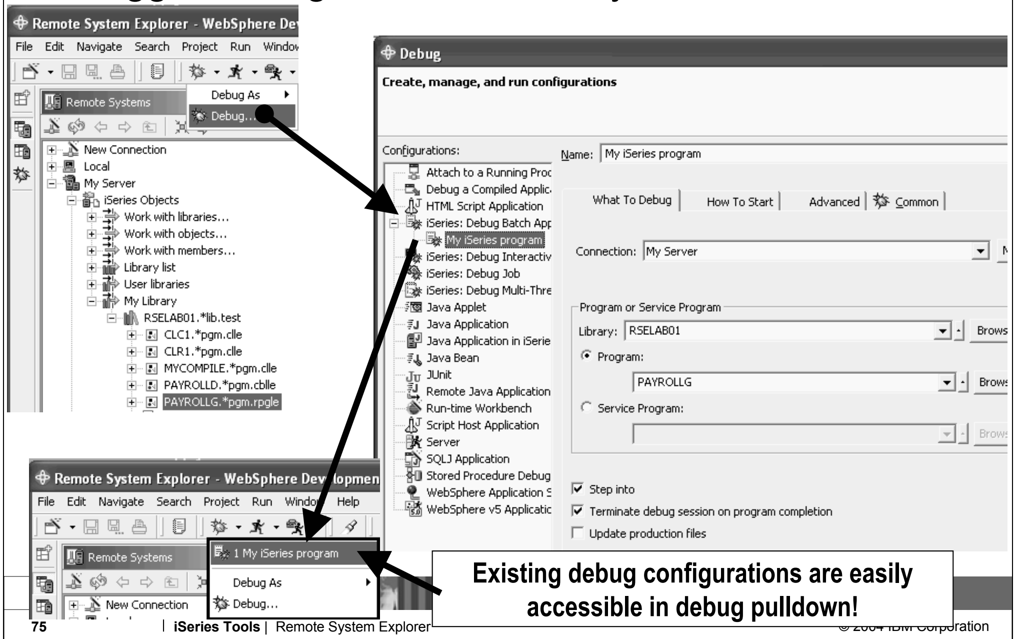
•In an interactive job

•In a server job

In the third case, running the program will use the same job as the Remote System Explorer communications server job. 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.

Note: A multi-threaded debug session creates a new server job and this way keeps the RSE communications server job free for other tasks.

Debugger Configurations: for easy re-use!



Create, manage, and run configurations

Name: My iSeries program

Connection: My Server

Library: RSELAB01

● Program: PAYROLLG

○ Service Program:

☑ Step into

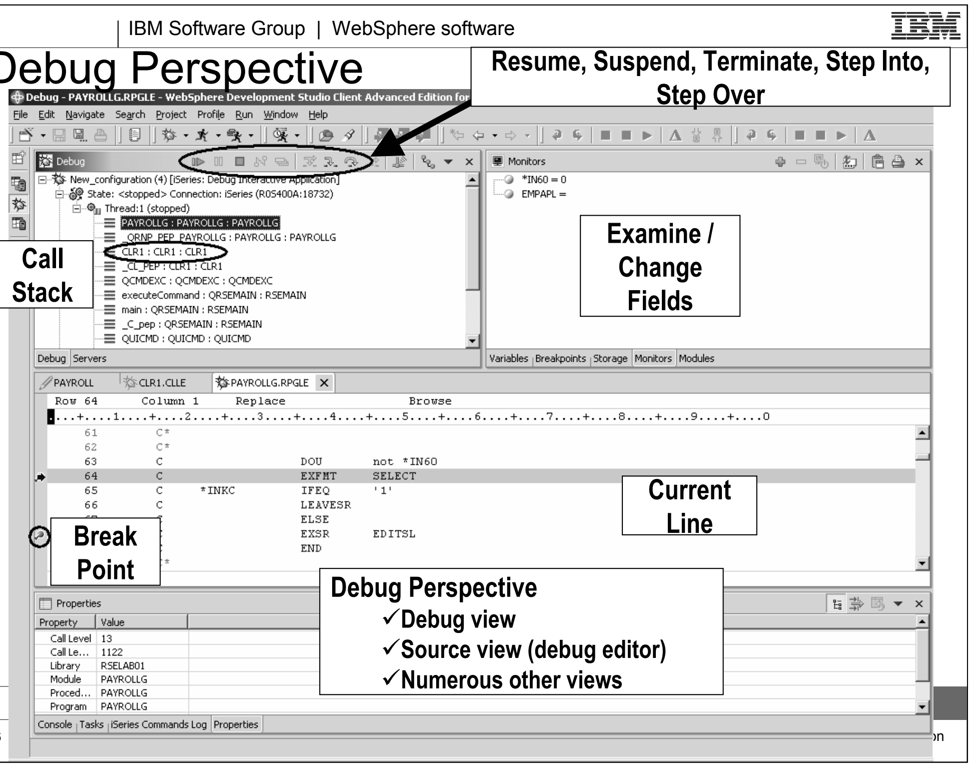
☑ Terminate debug session on program completion

☐ Update production files

Existing debug configurations are easily accessible in debug pulldown!

Debug configurations are for powerful re-use. If what you want to debug 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 dropdown for the debug icon, and can be selected easily.

Debug Perspective



Debug - PAYROLLG.RPGLE - WebSphere Development Studio Client Advanced Edition for
File Edit Navigate Search Project Profile Run Window Help
Debug
Monitors
Debug Servers
Variables Breakpoints Storage Monitors Modules
PAYROLL
CLR1.CLLE
PAYROLLG.RPGLE
Properties
Console Tasks iSeries Commands Log Properties

Resume, Suspend, Terminate, Step Into, Step Over

```
New_configuration (4) [iSeries: Debug Interactive Application]
  State: <stopped> Connection: iSeries (R05400A:18732)
    Thread:1 (stopped)
      PAYROLLG : PAYROLLG : PAYROLLG
      _QRNP_PEP_PAYROLLG : 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
```

Call Stack

```
*IN60 = 0
EMPAPL =
```

Examine / Change Fields

```
 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
                 *
```

Current Line

Break Point

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

Debug Perspective

✓Debug view

✓Source view (debug editor)

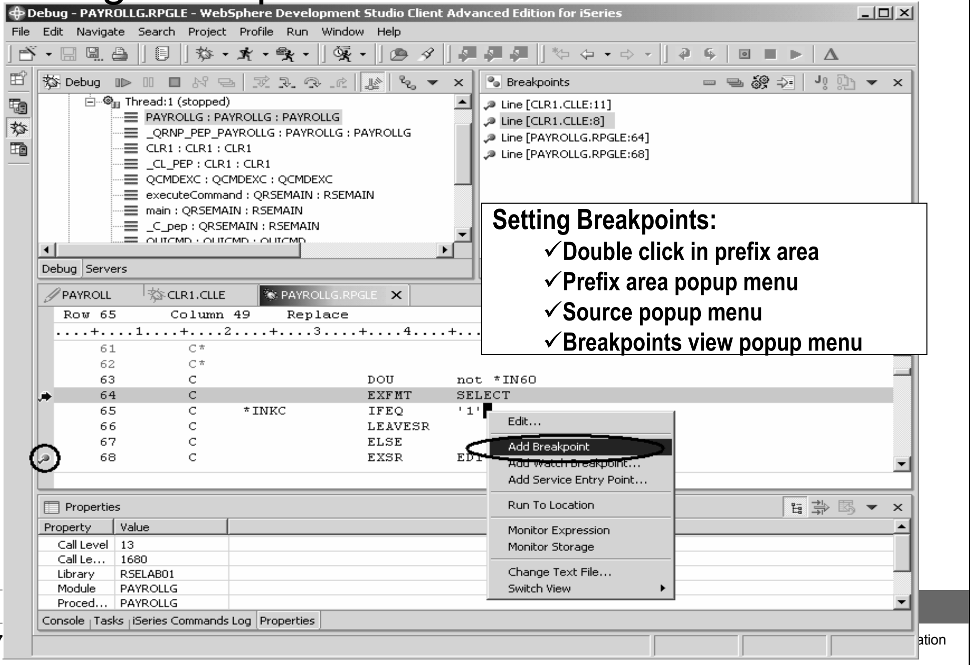
✓Numerous other views

Here we see the common Eclipse Debug perspective, which is being used to debug an RPG program. The common debug user interface has been connected to the iSeries debug engine in Version 5.0, to offer a common and compelling debug story for OPM/ILE RPG and COBOL and CL, and ILE C and C++.

In the upper left pane is the call stack, much like option 11 in the OS/400's WRKACTJOB. It shows the calls that reflect your current program execution. When you double click an item in the stack, its source (if available) is shown in the source pane in the middle. The upper right is where all the various views are for working with data contents, breakpoints etc.. The middle is the debugger source view, with source executable (debug) lines in blue, others in green. The current line of execution is highlighted, and breakpoints appear as a dot with a check mark in the left margin.

Although not part of the common Debug Perspective, the Properties view contains valuable information about the selected object, which could be a breakpoint selected in the Breakpoints view, an entry selected in the call stack, etc. To add the Properties view, click on the menu item **Window** and **Show View** on the pull down menu, select **Other** from the submenu , expand **Basic**, select **Properties** and click OK.

Setting Breakpoints


Debug - PAYROLLG.RPGLE - WebSphere Development Studio Client Advanced Edition for iSeries
File Edit Navigate Search Project Profile Run Window Help
Debug
Breakpoints
Debug Servers
PAYROLL
CLR1.CLLE
PAYROLLG.RPGLE
Properties
Console Tasks iSeries Commands Log Properties
Edit...
Add Breakpoint
Add Watch Breakpoint...
Add Service Entry Point...
Run To Location
Monitor Expression
Monitor Storage
Change Text File...
Switch View

```
Thread:1 (stopped)
    PAYROLLG : PAYROLLG : PAYROLLG
    _QRNP_PEP_PAYROLLG : 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
```

```
Line [CLR1.CLLE:11]
Line [CLR1.CLLE:8]
Line [PAYROLLG.RPGLE:64]
Line [PAYROLLG.RPGLE:68]
```

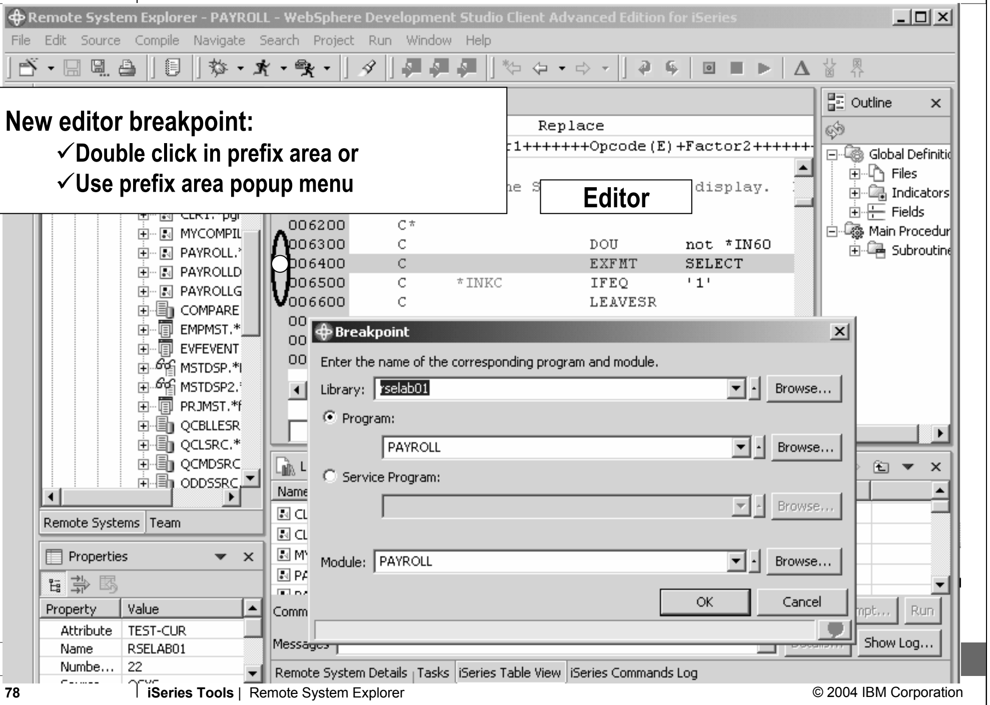
```
 Row 65      Column 49     Replace
....+....1....+....2....+....3....+....4....+...
      61         C*
      62         C*
      63         C                        DOU       not *IN60
      64         C                        EXFMT     SELECT
      65         C      *INKC             IFEQ      '1'
      66         C                        LEAVESR
      67         C                        ELSE
      68         C                        EXSR      EDI
```

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

Setting Breakpoints:

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

You can only set breakpoints at executable lines. All executables lines are displayed in blue.



New editor breakpoint:

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

Editor

```
006200     C*
006300     C                   DOU       not *IN60
006400     C                   EXFMT     SELECT
006500     C      *INKC        IFEQ      '1'
006600     C                   LEAVESR
```

Breakpoint

Enter the name of the corresponding program and module.

Library: rselab01

● Program: PAYROLL

○ Service Program:

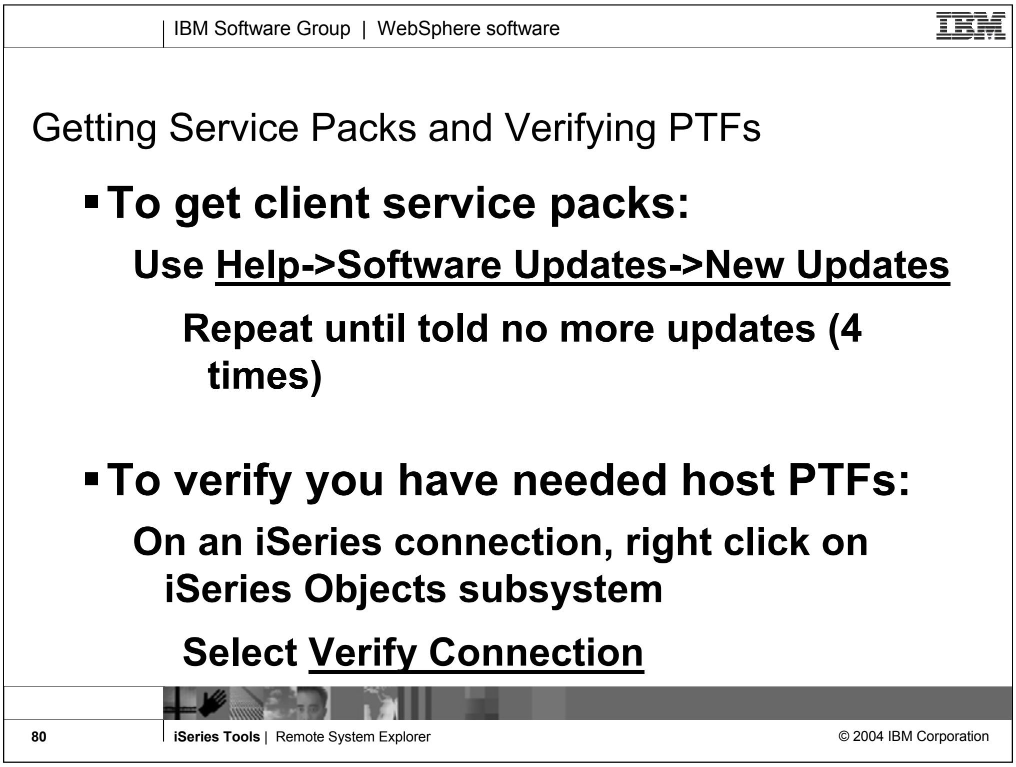
Module: PAYROLL

OK Cancel

This is the dialog for edit breakpoints. Enter the library name and select Program or Service Program. The breakpoint is shown as a dot in the prefix area. If there is an active debug session, the breakpoint will be set in that session and there will be no marker in the editor. The breakpoint is then listed in the Breakpoints view in the Debug perspective.

Remote System Explorer

Reference: Getting Fixes



Getting Service Packs and Verifying PTFs

- **To get client service packs:**

  Use Help->Software Updates->New Updates

  Repeat until told no more updates (4 times)

- **To verify you have needed host PTFs:**

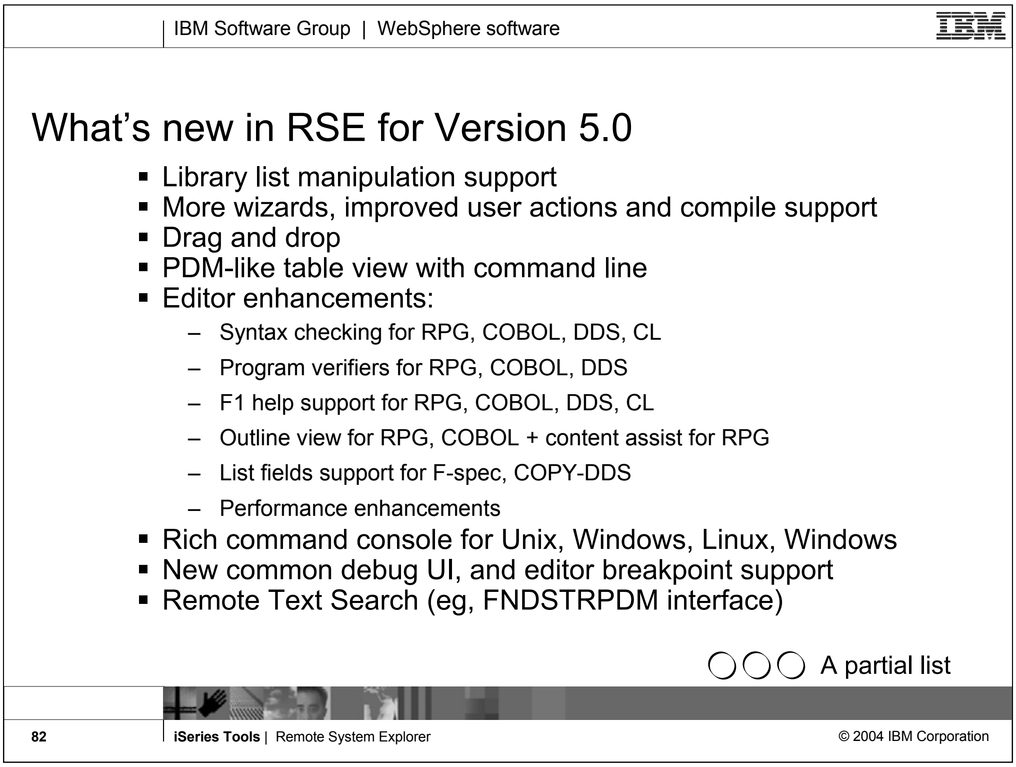
  On an iSeries connection, right click on iSeries Objects subsystem

  Select Verify Connection

Please try the RSE! And to ensure success, we want to ensure you have the latest client and server fixes.

Remote System Explorer

Reference:
What's New



What's new in RSE for Version 5.0

- Library list manipulation support
- More wizards, improved user actions and compile support
- Drag and drop
- PDM-like table view with command line
- Editor enhancements:
  - Syntax checking for RPG, COBOL, DDS, CL
  - Program verifiers for RPG, COBOL, DDS
  - F1 help support for RPG, COBOL, DDS, CL
  - Outline view for RPG, COBOL + content assist for RPG
  - List fields support for F-spec, COPY-DDS
  - Performance enhancements
- Rich command console for Unix, Windows, Linux, Windows
- New common debug UI, and editor breakpoint support
- Remote Text Search (eg, FNDSTRPDM interface)

○○○ A partial list

Some of the primary enhancements in 5.0 are:

•Support for a new library list filter, and actions for manipulating the library list. This is much like *LIBL support in WRKLIBPDM.

•New easy-to-use wizards to create libraries, files, members, data areas, data queues and message files.

•Ability to drag source members to another file, or another iSeries, or to any other system such as local, UNIX, Windows and Linux source files.

•The primary view in Remote Systems Explorer is the Remote Systems tree view, but PDM users are used to a table view, so there is now an iSeries Table view that shows what the Remote Systems tree view shows, but in table format. You can sort the columns when you click on the column heading. The contents of the table are easily replaced for example when you double click on a file. There are right-click actions that are the same as PDM's, and a command line at the bottom just like in PDM.

•The Remote Systems LPEX Editor is now well beyond SEU's function, and getting close to all of CODE's. The syntax checker is ported down from SEU, the compilers are imbedded for verifying all errors, and the reference manuals are built-in and F1 cursor sensitive. There is a new outline view showing the program hierarchy at a glance, and something really cool called Content assist which offers lists of options for code-completion based on the location of the cursor in the source. You invoke Content assist easily in the editor through the Ctrl+spacebar keys.

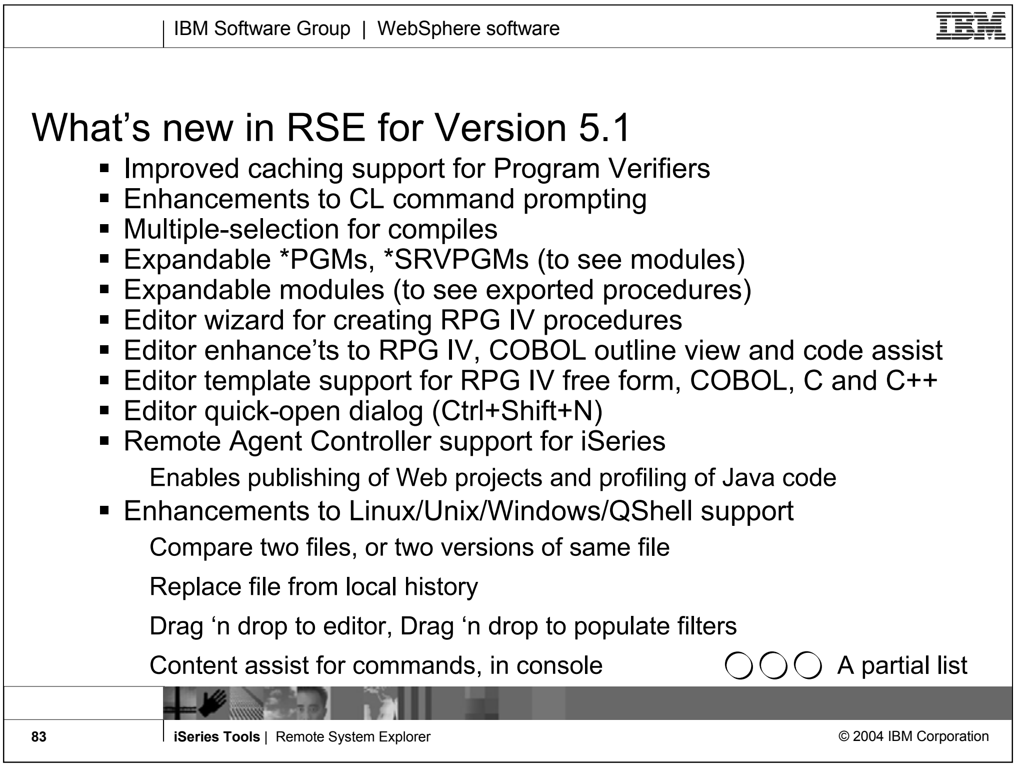
•The List fields option is available when the cursor is on an F-spec or COBOL Copy-DDS statement. This option opens a Window that shows all the fields in the referenced file.

•There are also significant enhancements to the editor's open, save and runtime performance.

•A new command console is available for QShell, UNIX, Windows, Linux and local which are very rich in capability. You can run any command remotely, and see the feedback. The feedback is parsed, so when listing files, for example, you can double click to open the file. Or double click on a folder name to open a table view on the folder's contents.

•The common Eclipse-supplied Debug perspective to iSeries programs is integrated into the workbench, offering skills transfer. You can set breakpoints in the built-in Remote Systems LPEX editor, and then run to the breakpoint. This opens the Debug perspective. There is also new support for the common Eclipse run-configurations and debug-configurations.

•The Remote Text Search is a local GUI interface to FNDSTRPDM (find string PDM) that searches remote members for a given string. The results are shown in a local window, and you can double click to open the editor and position the cursor.



What’s new in RSE for Version 5.1

- Improved caching support for Program Verifiers
- Enhancements to CL command prompting
- Multiple-selection for compiles
- Expandable *PGMs, *SRVPGMs (to see modules)
- Expandable modules (to see exported procedures)
- Editor wizard for creating RPG IV procedures
- Editor enhance’ts to RPG IV, COBOL outline view and code assist
- Editor template support for RPG IV free form, COBOL, C and C++
- Editor quick-open dialog (Ctrl+Shift+N)
- Remote Agent Controller support for iSeries
  - Enables publishing of Web projects and profiling of Java code
- Enhancements to Linux/Unix/Windows/QShell support
  - Compare two files, or two versions of same file
  - Replace file from local history
  - Drag ‘n drop to editor, Drag ‘n drop to populate filters
  - Content assist for commands, in console

○○○ A partial list

Some of the primary enhancements in the 5.1 release are listed here.

•Improved caching for the verifiers. This now behaves as it did in CODE – the cache information is used if available, unless the refresh-cache option is chosen. This can significantly improve verifier performance.

•CL command prompting is now SWT-based versus Swing-based, so it looks like the rest of the IDE.

•It is now possible to select multiple members to submit to compile. The order they are compiled is configurable by member type.

•Program objects are expandable to show modules.

•Modules objects are expandable to show exported procedures within the module.

•The CODE/400 SmartGuide for creating new procedures has been ported to the new editor, and enhanced

•The outline view for RPG IV shows more information now, and positions properly when items selected. There is totally new support for code assist for COBOL, and the RPG IV code assist is way better with support for parameters to keywords, functions, etc and case sensitivity.

•There is a new action from the local toolbar of the Remote Systems view to quickly open a member for edit or browse. It is also easily invoked via Ctrl+Shift+N. This can be faster than drilling down if you know what you want to edit.

•The Remote Agent Controller has been ported to iSeries, as well as the agents that come with it for Web publishing and Java profiling. See the documentation for more details. There are also actions in the RSE now for starting and stopping the RAC server on the iSeries.

•The non-iSeries support is also much enhanced this release:

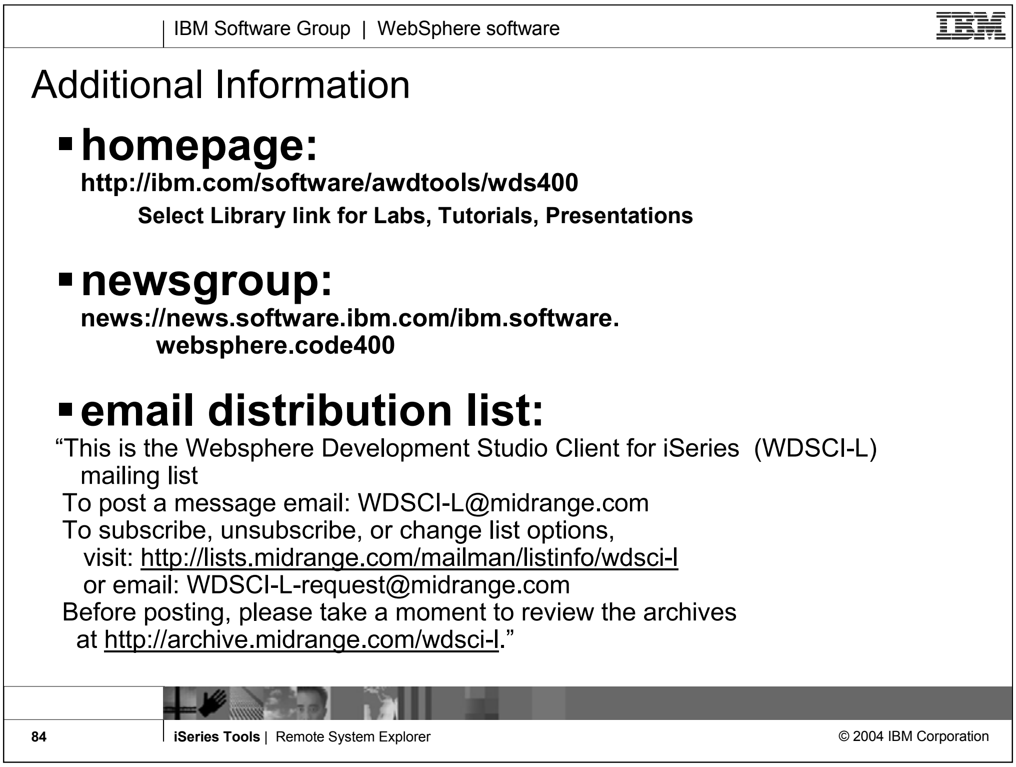
•New actions to compare a file with another, or another version of itself.

•New action to replace a file with a previous version from the local history. Each edit of the file creates a new local history.

•Open files by dragging them to the editor.

•Add folders/files to filters by dragging them to a filter.

•Use Ctrl+Space in the command console to see a list of commands available (built-in plus on path).



Additional Information

- **homepage:**
  http://ibm.com/software/awdtools/wds400
  Select Library link for Labs, Tutorials, Presentations

- **newsgroup:**
  news://news.software.ibm.com/ibm.software.websphere.code400

- **email distribution list:**

"This is the Websphere Development Studio Client for iSeries (WDSCI-L) mailing list
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We hope this presentation helped you understand more about Development Studio Client iSeries application development tools. We started with an overview of our strategy for iSeries application development tools, went onto review the Remote System Explorer, the perspective for iSeries programmers to maintain and develop iSeries applications and explained how to extend RSE to include your own iSeries application development tools.

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Acknowledgement:

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Remote System Explorer in IBM WebSphere Development Studio Client for iSeries

WebSphere. software

iSeries AD Team. Toronto

e business software