



Learn to Fly with RDi

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Business Architect Application Development



Agenda

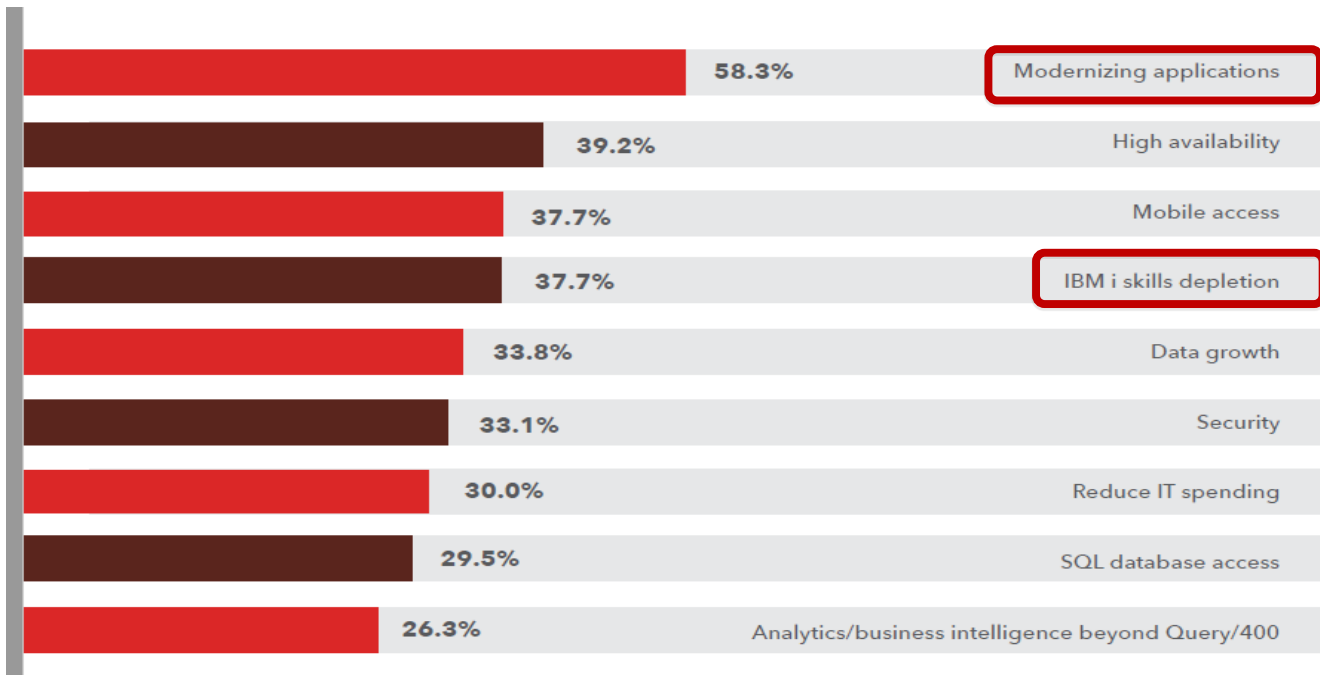
- RDi Quick Introduction
- What's New
 - 9.5.1.1 – December 2016
 - 9.5.1.2 – April 2017

RDi Currency

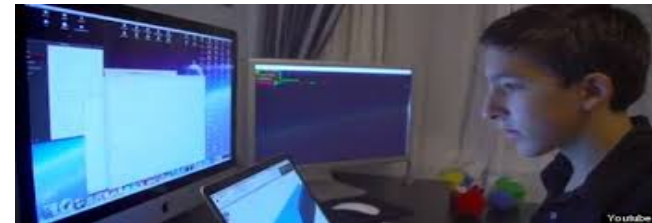
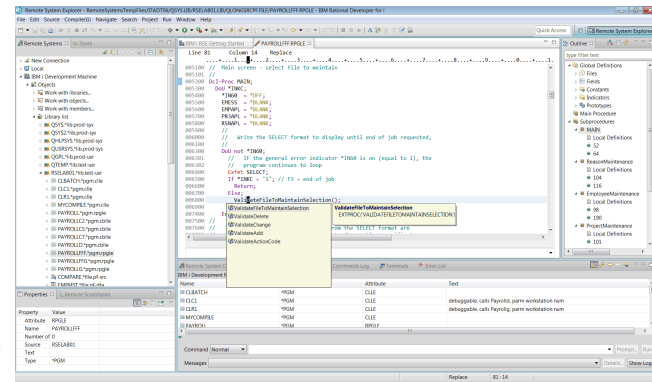
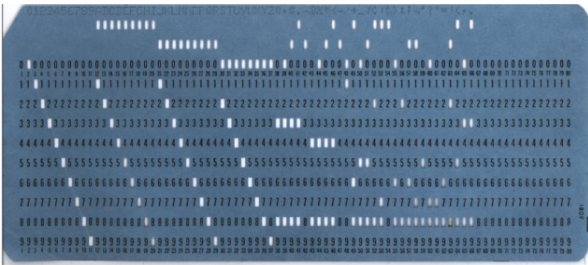
Which version is the most current version used in your shop

- Green screen tools like SEU/SDA (1970s)
- CODE/400 (1990s) or WDSc (2000s)
- RDi 7.x or RD Power 8.x (2010 - 2012)
- RDi 9.0.x (2013) or RDi 9.1.x (2014)
- RDi 9.5.0.x (2015-2016)
- RDi 9.5.1 (2016 September)
- RDi 9.5.1.1 (2017 December)
- RDi 9.5.1.2 (2017 Spring)
- Some other tool

Top Concerns for IBM i IT – Help Systems Survey 2016



Modern RPG – Constant Transformation



RPG IV - A Modern Business Language

```
ctl-opt bnmdir('ACCRCV');

dcl-f custfile usage(*update);
dcl-ds custDs;
dcl-f report printer;

read custfile custDs;
dow not %eof;
  if dueDate > %date(); // overdue?
    sendOverdueNotice ();
    write reportFmt;
    exec sql insert :name, :duedate into
      mylib/myfile;
  endif;
  read custfile custDs;
enddo;
inlr = '1';

dcl-proc sendOverdueNotice;
  /copy invoices
  sendInvoice (custDs : IS_OVERDUE);
end-proc;
```

Remove 8-80 Column Restriction

Today column 1-8 are reserved (goes back to the punch card days)
Max Column for content is 80 (again....punch card)

```
Line 4      Column 1      Insert  5 changes
█...+....1....+....2....+....3....+....4....+....5....+....6....+....7....+....8....+....9..
// Compiler options
// Code and comments can now extend well beyond the 80-column limit, allowing much greater f
ctl-opt ALLOC(*TERASPACE) NOMAIN TEXT('long and meaningful description text for this');

//Files and definitions
dcl-ds progStatus PSDS;
    procedure *proc;
end-ds;
```

- If column 1 of a source line contains '**FREE', the following lines contain free-form RPG code beginning in column 1 and continuing to the end of the line
- If **FREE has not appeared in the source file, the following lines have RPG code in columns 6 – 80.

7

How is this changing the game?



Hear how Modern RPG and Tools allows a 23 <http://bit.ly/1WhM7uT>
year old developer to be success today!

Roadmap to Modern RPG

- Modern coding style
 - Easier to code and maintain
 - Easier for new programmers
- But older code still works
- Easily express business logic

Value Proposition

Continual Investment and Innovation

7.3

- New and enhanced built-in functions to improve string processing
- Use ALIAS names for all externally-described files
- Relaxed rules for data structures for I/O operations
- Enhancements related to null-capable fields
- Usability enhancements for generated PCML
- Maximum number of parameters for a bound call increased to 16,382

- [Nested data structures without LIKEDS](#)
- [New %MAX/%MIN BIFs](#)
- [ALIGN\(*FULL\) extends DS length to match alignment](#)

NONE of these are supported by SEU!

7.1

- Free-form H, F, D and C statements
- Removal of 8-80 column limit
- Sort and search data structure arrays
- Sort ascending or descending
- %SCANRPL built-in function
- Support for ALIAS names in files and data structures
- Relaxed rules for data structure I/O
- Faster return values with RTNPARM
- %PARMNUM built-in function
- Optional prototypes
- Implicit CCSID conversion for parameters
- Teraspace storage model
- CCSIDCVT keyword to notify about conversion errors
- Encrypted listing debug view

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7.2

- CCSID support for alphanumeric data
- Alphanumeric subfields in external data structures can have the same CCSID as the field in the file
- Implicit CCSID conversion for concatenation
- Option to open database files without CCSID conversion
- /SET and /RESTORE directives to temporarily change the default CCSID or date/time format
- More control for %SUBDT
- 0 and 12 fractional seconds for timestamps

7.2 & 7.3 PTF: Nested data structures

7.2 and 7.3
PTFs - 2017

You can now code data structure subfields directly when using free-form declarations

Before

```
dcl-ds orders_t qualified template;  
  id char(10);  
  price packed(7 : 2);  
  quantity int(10);  
end-ds;  
  
dcl-ds order_info qualified;  
  num_orders int(10);  
  orders likes(orders_t) dim(100);  
  discount packed(7 : 2);  
end-ds;
```

Now

```
dcl-ds order_info qualified;  
  num_orders int(10);  
  dcl-ds orders dim(100);  
    id char(10);  
    price packed(7 : 2);  
    quantity int(10);  
  end-ds;  
  discount packed(7 : 2);  
end-ds;
```

7.2 & 7.3 PTF: %MAX and %MIN

7.2 and 7.3
PTFs - 2017

New built-in functions %MAX and %MIN

```
max_dim = %MAX(length : height : width);
```

```
earliest_move_in_date = %MIN(electrical_ready  
: appliances_ready  
: painting_done  
: furniture_delivered);
```

7.2 & 7.3 PTF: ALIGN(*FULL)

7.2 and 7.3
PTFs - 2017

Use ALIGN(*FULL) to define a data structure the way a C API defines it

The ALIGN keyword changes the positioning of the subfields and thereby the size of data structures.

See Barbara's presentation and the RPG Reference for details

RDİ needs to reflect these changes in its outline and hover information.

Modern RPG

New in Dec 2016

Updated from the original book
from 2000

Many of the same expert
Authors, plus a few New ones!

<https://www.redbooks.ibm.com/redbooks/pdfs/sg245402.pdf>



Who Knew You Could Do That with RPG IV? Modern RPG for the Modern Programmer

Rich Diedrich
Jim Diephuis
Susan Gartner
Jeff Minette
Jon Paris
Kody Robinson
Tim Rowe
Paul Tuohy



Power Systems



Redbooks

Development tools....



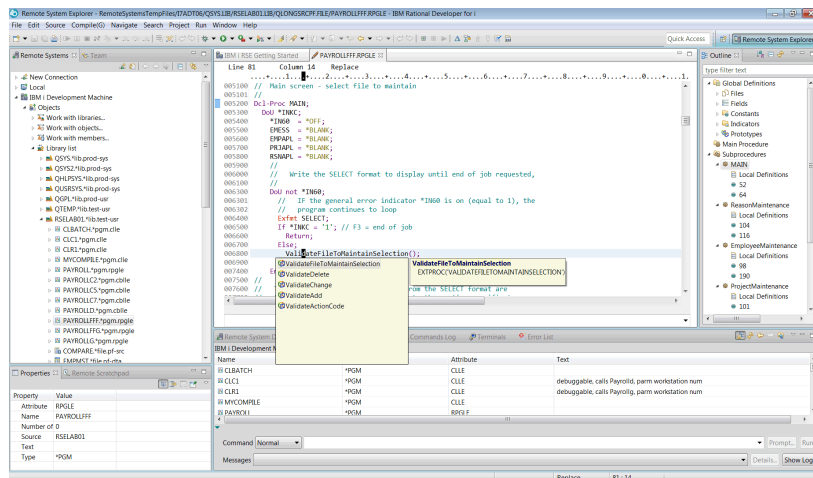
```
Session A - [24 x 80]
Columns . . . : 6 76          Edit          YANTZ1/QRPLESRC
SEU=>
FMT *  * 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+...
***** Beginning of data *****
0001.00
0002.00
0003.00
0004.00 * Program: ORDENTR
0005.00 *
0006.00 * This program allows a user to enter and confirm an order. It sends
0007.00 * a print request to a batch job via a data queue. The program only
0008.00 * handles District 1 and Warehouse '0001'.
0009.00 *
0010.00 * Don was here
0011.00 *
0012.00 * INDICATOR USAGE:
0013.00 * 03 - F3=Exit
0014.00 * 04 - F4=Prompt
0015.00 * 06 - F6=Accept order
0016.00 * 12 - F12=Cancel

F3=Exit   F4=Prompt   F5=Refresh   F9=Retrieve   F10=Cursor   F11=Toggle
F16=Repeat find   F17=Repeat change   F24=More keys
(C) COPYRIGHT IBM CORP. 1981, 2005.
MB a MW 02/009
```

Tried and True, Yes but also SLOW, OLD, No new features

Rational Developer for i

- **Modern**, Eclipse-based, development tools for IBM i
- Visual editors, outline views, content assist, integrated language help
- **Integrated** file management, search, edit, compile/build, debug capabilities
- Analysis tools (application diagram, call hierarchies, code coverage)
- Easily debug batch, interactive, and Web applications with a common visual debugger – analyze code coverage of tests
- Visual DDS design tools: Screen and Report Designer
- Supports RPG, COBOL, C, C++, SQL, DDS



Use the Right Tool for the Job!



Developer Productivity

- Return on Investment
- Better able to respond to the needs of the business
- Higher quality
- Positioned to adopt new talent

20% → 50% Productivity
improvement



Why ??

Content Assist

Undo / Redo

More Visible Code

SEU & PDM Function combined

Outline View

Integrated Compile Listings

Program Verifier

Syntax Checker

Color Coded Styles

Built in Debugger

Rational Developer for i RoadMap

- Tightly integrated
- Edit/Compile/Debug
- Program Understanding
- Code Coverage Analysis
- Extensible by IBM
- Extensible by ISVs
- Extensible by open source

Value Proposition



- 8.5.1
- **Live ILE RPG outline** view
 - **IBM Data Studio** included
 - 64-bit operation system support
 - 8 RFEs
 - 36 fixes

- 9.0.0
- Hover/Hyperlink to RPG definitions
 - Improved Content Assist
 - Improved CL support
 - 9 RFEs
 - 39 fixes

- 9.0.0.1
- 11 fixes

- 9.0.1
- **Free-form ILE RPG declarations**
 - Improved syntax highlighting
 - Improved visualization of block nesting
 - 4 RFEs
 - 49 fixes

- 9.1.0
- **Code Coverage**
 - Search/Filter within ILE RPG outline view
 - Quick open for browse
 - F1 help on RPG opcode/ keyword/ BIF
 - 7 RFEs
 - 46 fixes

- 9.1.1
- Configuration backup and distribution
 - Code Coverage for interactive jobs
 - Mark occurrences of all RPG declarations in editor
 - 8 RFEs
 - 57 fixes

- 9.1.1.1
- 14 fixes

- 9.5
- **Fully Free RPG** – no column restrictions
 - **Integrated 5250** emulator
 - ILE RPG indentation action
 - Update Notifier
 - Eclipse 4.4.2
 - 10 RFEs
 - 52 fixes

- 9.5.0.2
- Better context-sensitive help and content assist
 - Improved indentation support
 - 21 fixes

- 9.5.0.3
- Language support for IBM i 7.3
 - Windows 10 support
 - [Launch Run SQL Scripts from SQLRPGLE](#)
 - [Launch Printer Output from RSE](#)
 - [Show block nesting, also shows which procedure/subroutine](#)
 - Push to Client saves custom perspectives
 - Enhance language sensitive help for embedded SQL in RPG
 - 31 fixes

- 9.5.1
- **Mac Support**
 - **Kerberos Support**
 - Synchronize Eclipse projects with **IFS**
 - RPGLE outline
 - Full O-Spec support
 - Full I-Spec support
 - Filter out unreferenced
 - Comment shortcuts for CLLE and DDS
 - Syntax error annotations
 - More parameter info in content assist
 - Integrated ACS supports **Visual Explain**
 - 18 RFEs
 - 4 features
 - 19 fixes

- 9.5.1.1
- **RPG Refactoring – Rename Variables**
 - Default to Browse preference
 - Kerberos fixes
 - 7 RFEs
 - 19 fixes

- 9.5.1.2
- Nested Data Structures in RPGLE
 - %MAX/%MIN BIFs
 - ALIGN(*FULL)
 - Support for *LIKE DEFINE
 - Trim leading spaces on line join Alt-J
 - 4 RFEs
 - 28 fixes

What's new in 9.5.1.2

- [Official list of enhancements and fixes](#)
- Fixpack – no need for reinstall or getting licenses
- Support for new ILE RPG nested data structures, built-in functions %MAX and %MIN, and ALIGN(*FULL). [Announcement](#) has details
 - Support in token highlighting, verifier, outline view, content assist, hyperlink, etc.
- ILE RPG: Definitions via *LIKE DEFINE are now fully supported
- [RFE77545](#) Trim Leading Spaces when joining lines (alt-J)
 - Note: This is only supported for RPG and the RFE will remain open until implemented for CL.
- [RFE83464](#) Content Assist correctly describes RPG data structure arrays
- Update integrated Access Client Solutions to version 1.1.7
- 4 RFEs
- 32 fixes

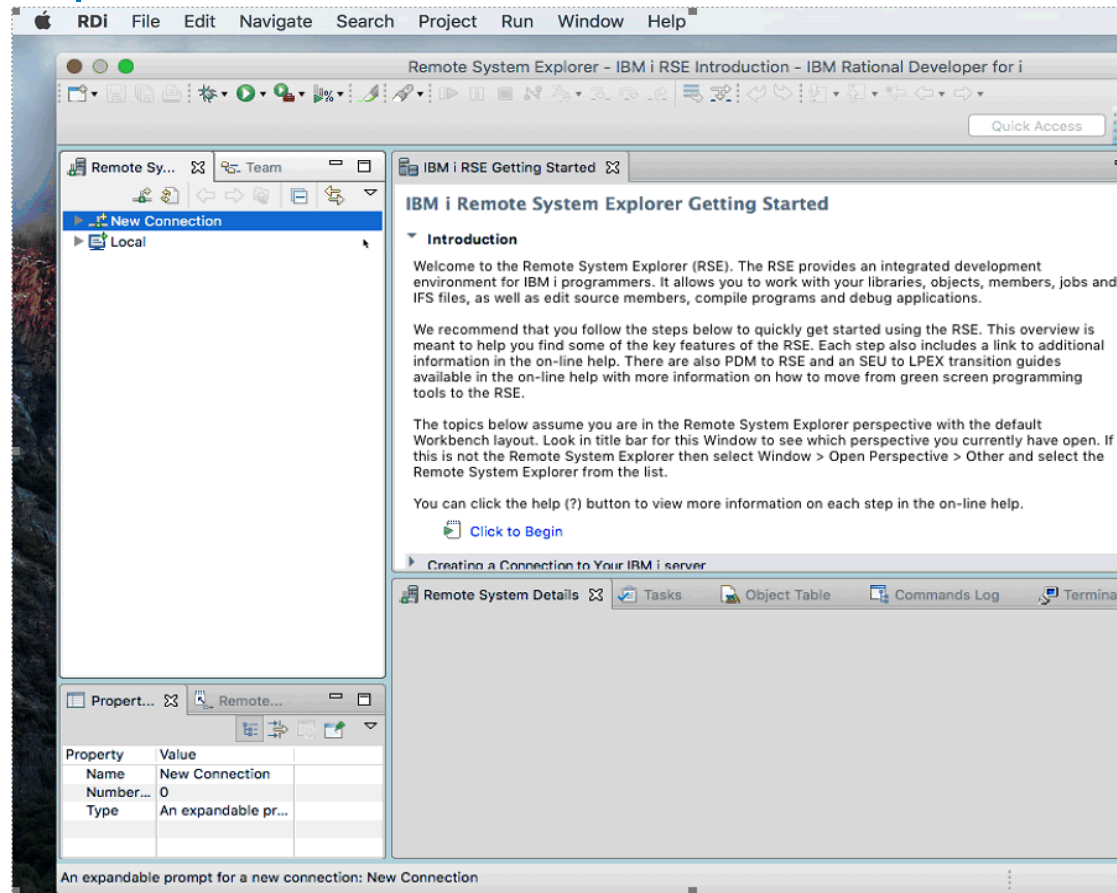
What's new in 9.5.1.1.

- Refactoring capability – Rename ILE RPG declarations
- Preference for default open member action to be browse versus edit
- 2 Kerberos APAR fixes
 - Debug fixes require host PTFs
V7R1M0 PTF SI53473
V7R2M0 PTF SI63271
V7R3M0 PTF SI55962
- 17 other APAR fixes

What's new in 9.5.1

- Mac Support
- Kerberos Support
- Synchronize Eclipse projects with IFS
- RPGLE outline
 - Full O-Spec support
 - Improved I-Spec support
 - Improved indicator support
 - Filter out unreferenced
- Integrated ACS supports Visual Explain
- Comment shortcuts for CLLE and DDS
- Syntax error annotations
- More parameter info in content assist
- Improved language sensitive help in embedded SQL

Starting up on Mac



Editing on Mac

The screenshot displays the IBM RDI (Remote Development Interface) software running on a Mac. The main window is titled 'Remote System Explorer - RemoteSystemsTempFiles/17ADT06/QSYS.LIB/RSELABXX.LIB/QLONGSRCPF.FILE/PAYROLLFF.RPGLE'. The code editor shows the following COBOL code:

```

Line 449 Column 11 Replace Browse
.....1.....2.....3.....4.....5.....6.
045600      /**
045700      /** The following code verifies the delete request. The
045800      /** protect indicator *IN90 is first set on (equal to 1)
045900      /** allow changes to existing data on a delete request.
046000      /**
046100      Dcl-Proc ValidateDelete;
046200      *IN90 = *0N;
046300      IF *IN50;
046400      DisplayError(9);
046600      ELSE;
046700      IF NOT *IN50 AND ACREC = 'D';
046800      DisplayError(10);
047000      ENDIF; DisplayError( errCode Unsigned Integer (3,0) )
047100      ENDIF;
047200      End-Proc;
047901      //
047902      // Display error at the bottom of the screen with the giv
047903      Dcl-Proc DisplayError;
    
```

The interface includes a file explorer on the left showing a tree structure of files like PAYROLLG.pgm.rpgle, PAYROLLN.pgm.rpgle, etc. At the bottom, there is a 'Property' window and an 'Object Table' with the following data:

Name	Type	Attribute	Text
QSYS	*LIB	PROD-SYS	SYSTEM LIBRARY
QSYS2	*LIB	PROD-SYS	SYSTEM LIBRARY FOR CP/S
QHLPYSYS	*LIB	PROD-SYS	
QIJSRSYS	*LIB	PROD-SYS	System Library for Users

Application Diagram on Mac

Remote System Explorer - The application diagram for PAYROLLFFF. - IBM Rational Developer for i

my IBM i: Filter "Library list" (7 Objects)

Name	Type	Attribute	Text
QSYS	*LIB	PROD-SYS	SYSTEM LIBRARY
QSYS2	*LIB	PROD-SYS	SYSTEM LIBRARY FOR CPI'S
QHLPSYS	*LIB	PROD-SYS	

Differences on Mac

- Keyboard shortcuts detailed:

http://www.ibm.com/support/knowledgecenter/SSAE4W_9.5.1/com.ibm.etools.iseries.rse.doc/topics/keyboard_shortcuts_platforms.html

- Detailed blog post on
 - How to install on Mac
 - What function is supported
 - Workarounds for limitations

https://www.ibm.com/developerworks/community/blogs/49773f8f-a20d-4816-86f2-44a2d862dbc1/entry/RFE13454_Mac_OS_X_v10_11_support_in_RDi_9_5_1

Shortcuts for Windows and Apple computers available in Rational® Developer for i.

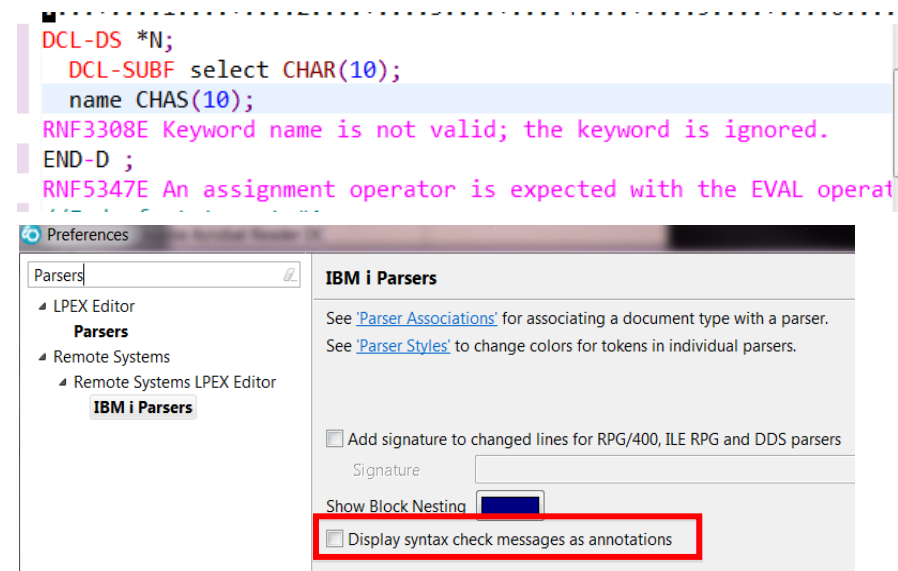
- [General](#)
- [Editing](#)
- [Editor navigation](#)
- [Code block highlighting](#)
- [Debugging](#)

Note: On Apple systems, the shortcuts below that specify using the F_n key may be different depending on the preferences that you have set for your keyboard. For example, in OS X, if you have selected the keyboard preference *Use all F1, F2, etc. keys as standard function keys*, then you may be able to omit using the F_n key as part of the shortcut. For example, the default shortcut for F1 Help is F_n+F1 . But if you have selected the preference to use the keys as standard function keys, then you can simply press $F1$ instead.

Action	Windows	Apple
General		
Copy	Ctrl+C	Command+C
Cut	Ctrl+X	Command+X
Paste	Ctrl+V	Command+V
Undo	Ctrl+Z	Command+Z

9.5.1 Syntax Errors as Annotations

- Syntax checker errors used to be shown as pink lines inserted into the source
- Now you can choose to show them as annotations instead
- The annotations are specific to the column range and move with the tokens in error



The top part of the screenshot shows a code editor with the following code and error messages:

```
DCL-DS *N;  
DCL-SUBF select CHAR(10);  
name CHAS(10);  
RNF3308E Keyword name is not valid; the keyword is ignored.  
END-D ;  
RNF5347E An assignment operator is expected with the EVAL operat
```

The bottom part of the screenshot shows the 'Preferences' dialog box, specifically the 'IBM i Parsers' section. The 'Display syntax check messages as annotations' checkbox is highlighted with a red box.



The diagram shows a code editor on the left with a syntax error. A blue arrow labeled 'Hover' points to the right, where the same code editor shows the error message as an annotation box over the error.

```
DCL-DS *N;  
DCL-SUBF select CHAR(10);  
name CHAS(10);  
DCL-SUBF address CHAR(25);
```

Annotation: RNF3308E Keyword name is not valid; the keyword is ignored.

Comments now shown in hover

```
// The following statements perform
// two functions. First they determine the type of maintenance
// requested and branche to the appropriate subroutine and secondly
// they determine if the maintenance code entered is invalid.
//
Select;
  When ACODE = 'A';
    ValidateAdd();
  When ACO
  Valida
  When ACO
  Valida
  Other;
  Displa
EndSl;
End-Proc;
//
// The fol
// Input:
```

ValidateAdd

The following code verifies the add request.

Input:

- ACREC is the recorded state of the employee
- 'A' means added
- 'D' means deleted
- *IN50 indicates the record is not found

Output:

- If an error occurs, the EMESS field contains the appropriate message

Press 'F2' for focus

Tasks Object T Comma Terminals Error List Progress

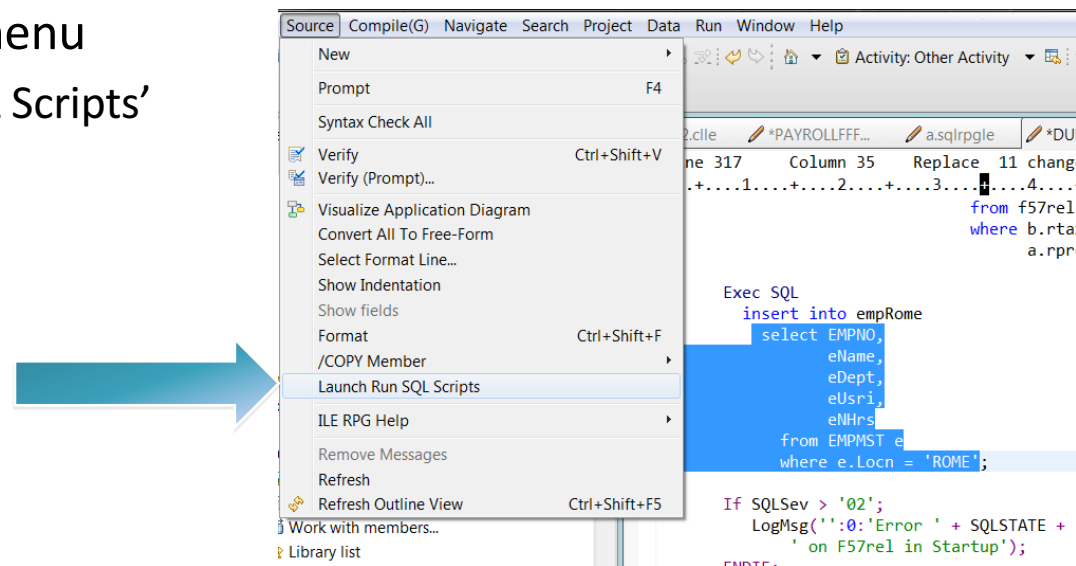
Why ACS ?

- Access Client Solutions
 - Best of Breed Emulator
 - Lots of SQL tooling, from building/executing queries to detailed performance analysis
 - It installs and runs anywhere
- RDi will launch the version of ACS you already have installed if it is recent enough
 - and you have access to all its other functions

(<http://www-03.ibm.com/systems/power/software/i/access/solutions.html>)
- If ACS is not installed, RDi will launch a copy shipped with RDi

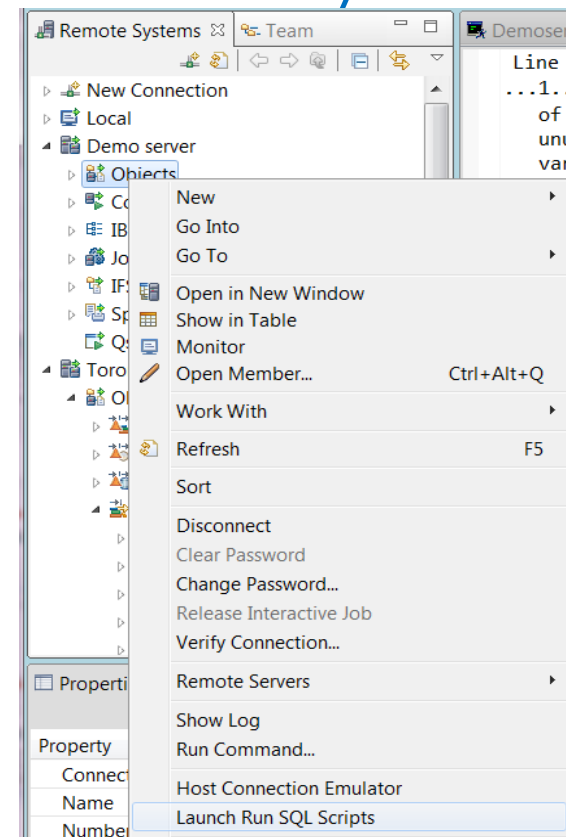
9.5.0.3 Run SQL queries from your editor

- Access Client Solutions ([ACS](#)) now has Run SQL Support. RDi provides tight integration with it.
- Select the SQLRPGLE source in the editor
- From the Source menu
 - ‘Launch Run SQL Scripts’



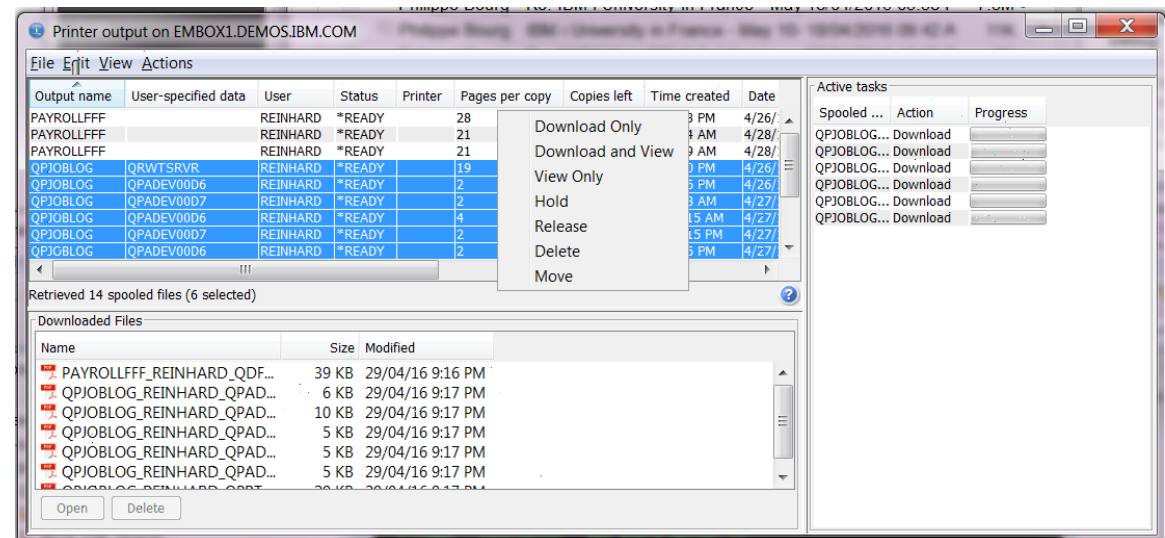
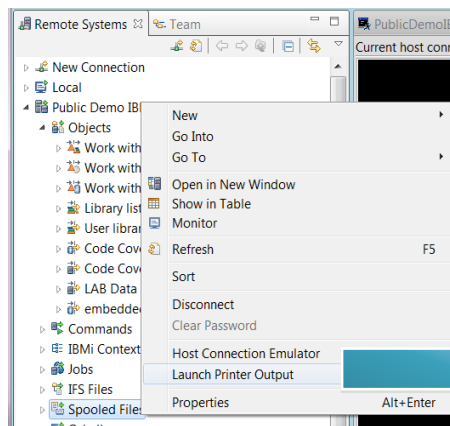
9.5.1 Run SQL Scripts - launched at any time

As of 9.5.1 the RSS can be launched from the Objects Subsystem and is not restricted to SQLRPGLE members



Launch Printer Output from 'Spooled Files' subsystem

- Sortable columns
- Download, View as PDF
- Hold/Release/Delete/Move actions
- Filtering options



More ACS in RDi – the Total package



The screenshot illustrates the integration of various ACS components within the RDi environment. A context menu is open over a tree view, with arrows pointing to specific options: 'Host Connection Emulator', 'Launch Run SQL Scripts', 'Launch Schemas', 'Launch 5250 Emulator', and 'Launch Access Client Solutions'. The 'Launch Access Client Solutions' option is highlighted with a blue box. In the background, a 'Schemas - P8ADT07.CANLAB.IBM.COM' window shows a tree view of database objects, with a table list window displaying the following data:

Name	System Name	Owner	Definer	La
CUSTSUMS	CUSTSUMS	REINHARD	REINHARD	09/
DESLIMER	DESLIMER	REINHARD	REINHARD	09/
ORDERS	ORDERS	REINHARD	REINHARD	09/
QSRC	QSRC	REINHARD	REINHARD	09/
RUTUTORIAL	RUTUTORIAL	REINHARD	REINHARD	09/

Below the schema browser, a terminal window displays system information for 'IBMi Canada Lab' (System: I7ADT06, Subsystem: QDNLV00L). A red box highlights an 'Important Note' regarding internal system usage. The 'IBM i Access Client Solutions' application window is shown on the right, listing various components under categories like General, Database, Console, and Management.

Rename ILE RPG Declaration Refactoring

- RPG refactoring was the highest voted RFE
- Refactoring is the process of changing code without changing the function of the code. The purpose of refactoring is to make the code more readable and maintainable.
- Rename refactoring allows the user to rename all and only the symbols in an ILE RPG file that are related to the user-defined name containing the cursor or selection.

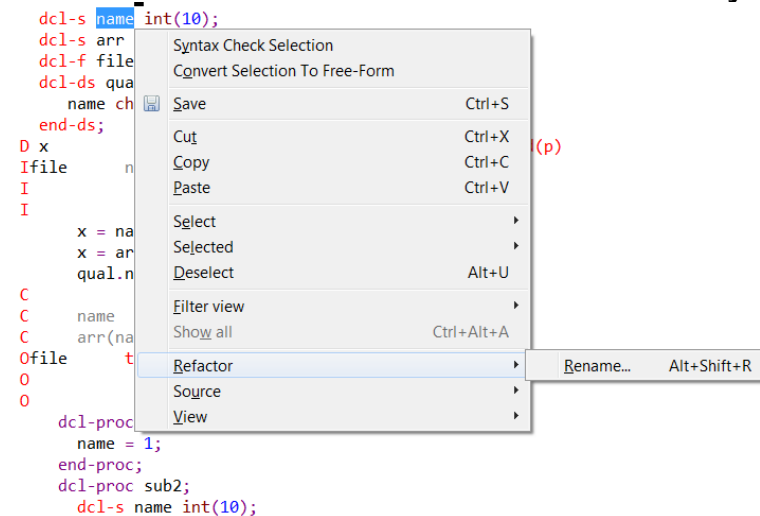
Renaming

Any fool can write code a computer can understand.... Good programmers write code that a human can understand.

Martin Fowler

Rename Refactoring – Invocation

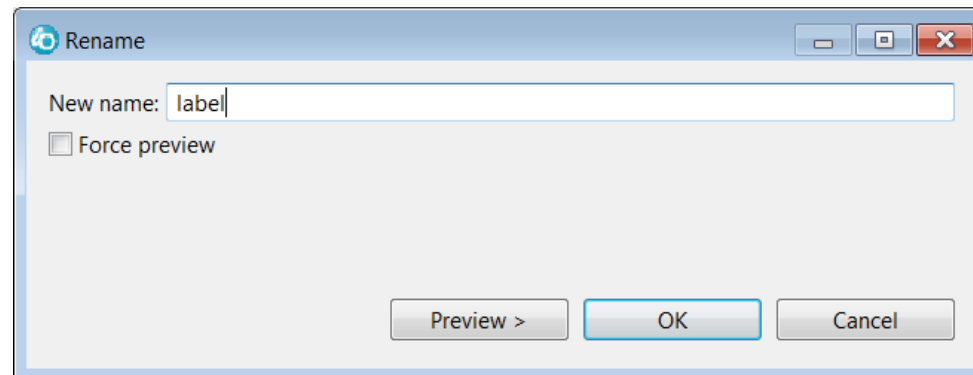
- Place the cursor or select the name to rename in the Remote Systems LPEX editor



- Either right click or pull down the *Source* menu and select *Refactor->Rename*, or press *Alt+Shift+R*
- If the name is not a valid user-defined name, the *Source->Refactor->Rename* will be disabled

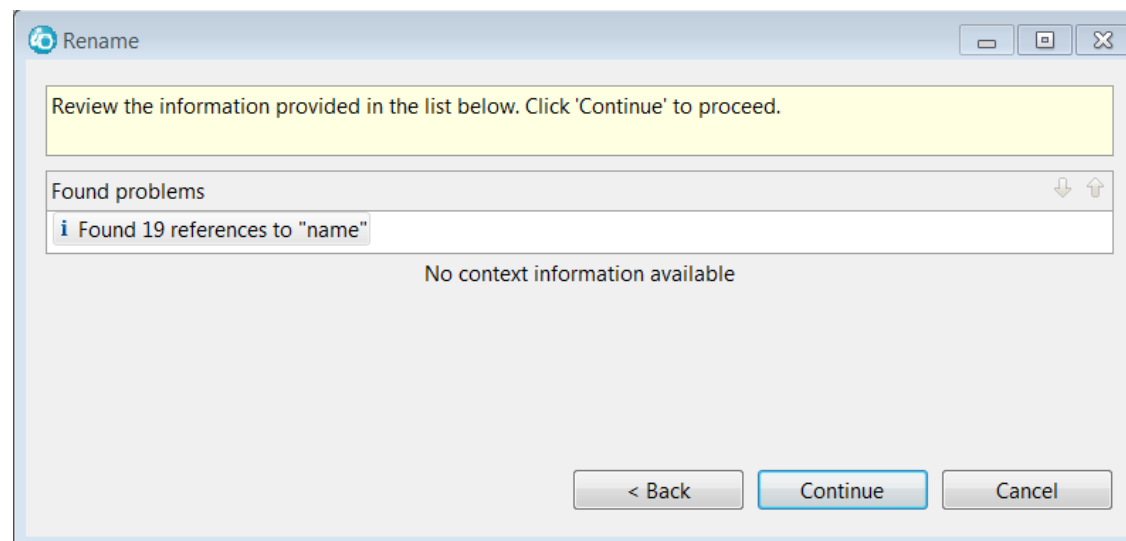
Rename Refactoring – Specify new name

- After selecting the menu item, a dialog will appear prompting for the new name.
- The OK and Preview buttons will only enable once the new name is different than the old one.
- Click OK to complete the process, click Preview to preview the changes that will occur, or select Force preview and then OK to ensure that the changes are previewed.
 - If you select Force preview, this option will become the default for the next time that you use the wizard.



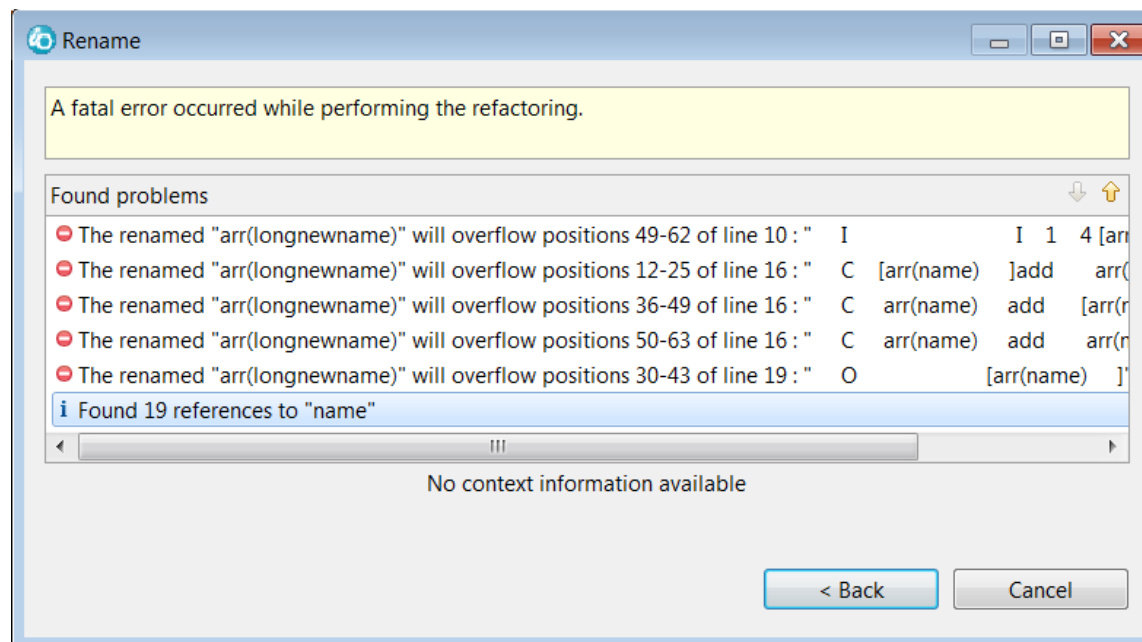
Rename Refactoring – Preview - Success

- The initial **preview** panel shows how many references there are to the declaration that you want to rename in an informational message.



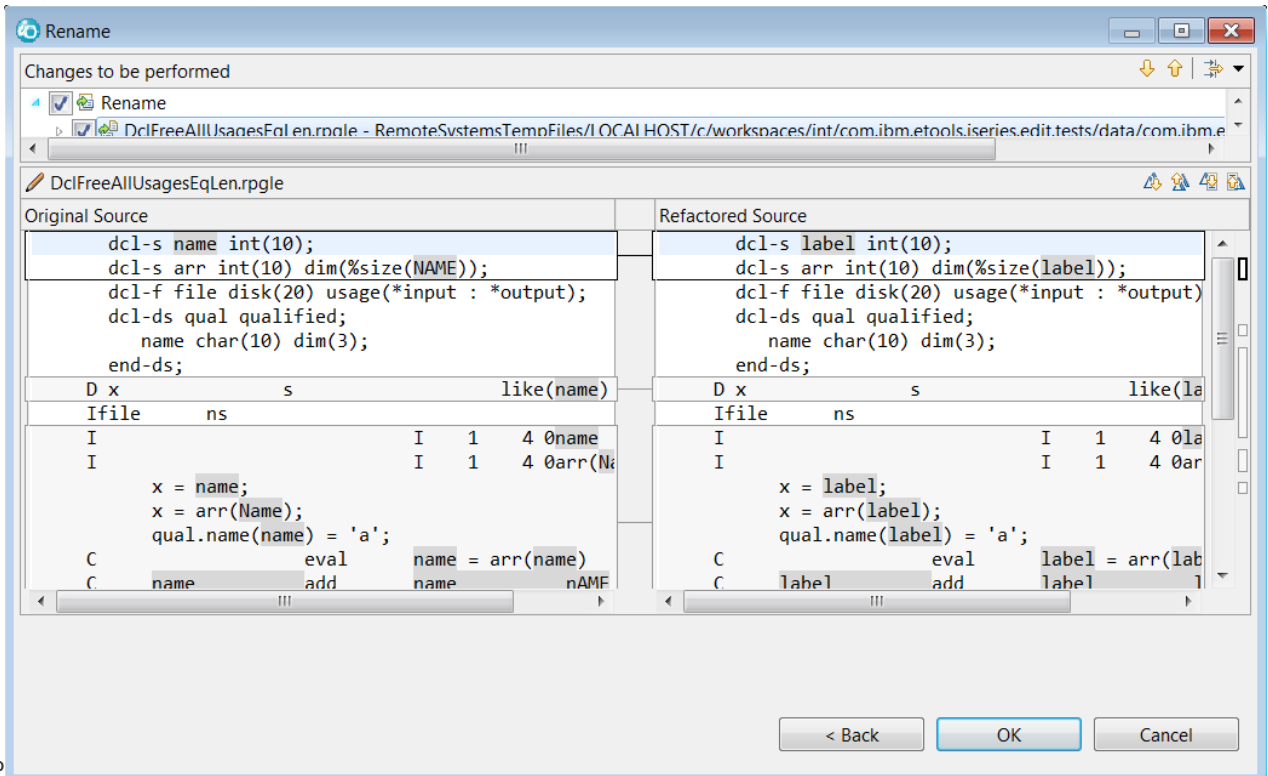
Rename Refactoring – Preview - Errors

- If there are issues with the rename, warning or fatal messages will be shown. If fatal messages, only Back and Cancel buttons are available.



Rename Refactoring – Preview

- See Changes ‘Pre-update’



Original Source

```
dcl-s name int(10);
dcl-s arr int(10) dim(%size(NAME));
dcl-f file disk(20) usage(*input : *output);
dcl-ds qual qualified;
      name char(10) dim(3);
end-ds;
```

D	x	s	like(name)
I	file	ns	
I			I 1 4 0name
I			I 1 4 0arr(Ni

Refactored Source

```
dcl-s label int(10);
dcl-s arr int(10) dim(%size(label));
dcl-f file disk(20) usage(*input : *output);
dcl-ds qual qualified;
      name char(10) dim(3);
end-ds;
```

D	x	s	like(label)
I	file	ns	
I			I 1 4 0la
I			I 1 4 0ar

Original Source

```
x = name;
x = arr(NAME);
qual.name(name) = 'a';
```

C	eval	name = arr(name)
C	name	add name nAMF

Refactored Source

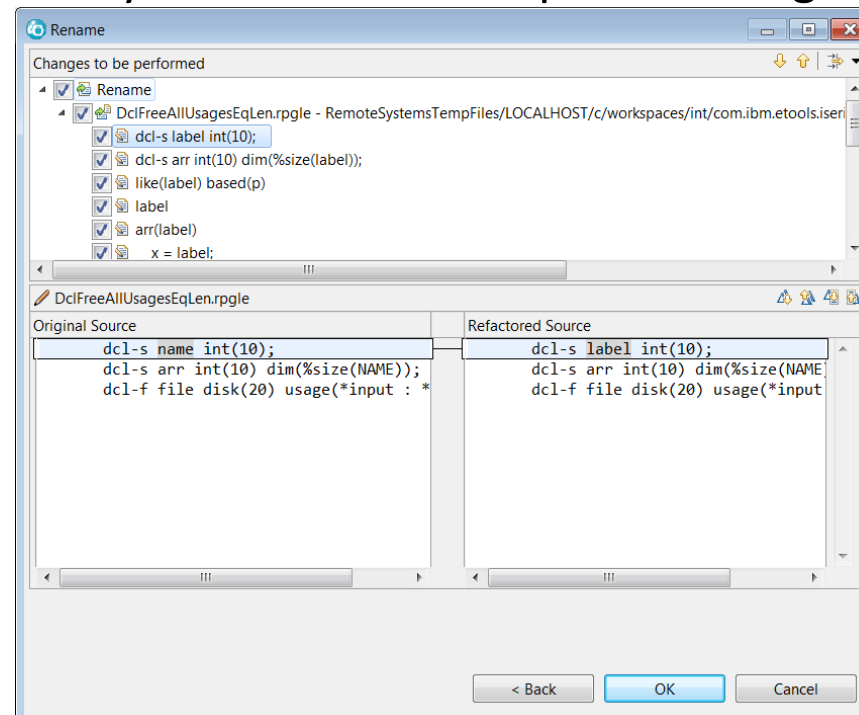
```
x = label;
x = arr(label);
qual.name(label) = 'a';
```

C	eval	label = arr(label)
C	label	add label l

< Back OK Cancel

Rename Refactoring – Preview

- Expand the list of previewed changes to work with changes individually. Clear the checkbox if you do not want a specific change to be performed.



Rename Refactoring

- Click OK to update the editor.
- Use Undo if you want to revert the changes.

- Limitations

- /COPY members are not updated.
- Code that is excluded by /IF /ELSE statements will not be renamed.
- Only renames within a line are supported

- Documentation available at:

https://www.ibm.com/support/knowledgecenter/SSAE4W_9.5.1/com.ibm.etools.iseries.rse.doc/topics/refactor.html

```
dcl-s label int(10);
dcl-s arr int(10) dim(%size(label));
dcl-f file disk(20) usage(*input : *output);
dcl-ds qual qualified;
      name char(10) dim(3);
end-ds;
D x          s          like(label) based(p)
Ifile      ns
I          I  1  4 0label
I          I  1  4 0arr(label)

      x = label;
      x = arr(label);
      qual.name(label) = 'a';
C          eval      label = arr(label)
C  label      add      label      label
C  arr(label) add      arr(label)  arr(label)
Ofile      t
O          label
O          arr(label)

dcl-proc sub;
  label = 1;
end-proc;
```


Qualified Subfields

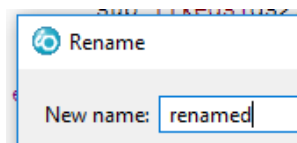
```
dcl-ds ds1;  
  sub char(10);  
end-ds;
```

```
dcl-ds ds2 likeds(ds1);
```

```
sub = 'x';  
ds2.sub = 'y';
```

```
dcl-proc proc;  
  dcl-ds ds3 qualified;  
    sub likeds(ds2);  
  end-ds;  
  ds3.sub.sub = 'a';  
end-proc;
```

```
dcl-proc proc2;  
  dcl-ds ds1 qualified;  
    sub char(10);  
  end-ds;  
  ds1.sub = 'x';  
  sub = 'y';  
end-proc;
```



```
dcl-ds ds1;  
  renamed char(10);  
end-ds;
```

```
dcl-ds ds2 likeds(ds1);
```

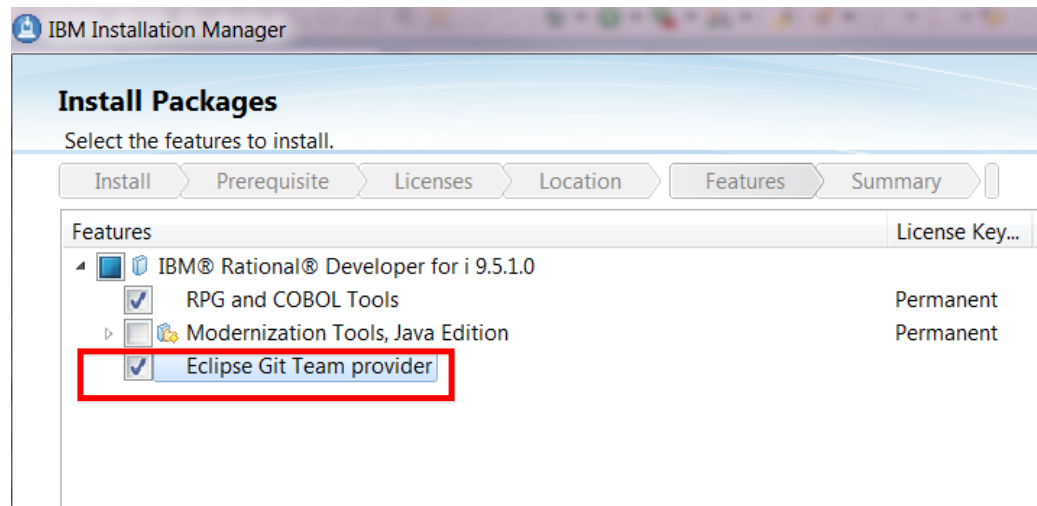
```
renamed = 'x';  
ds2.renamed = 'y';
```

```
dcl-proc proc;  
  dcl-ds ds3 qualified;  
    sub likeds(ds2);  
  end-ds;  
  ds3.sub.renamed = 'a';  
end-proc;
```

```
dcl-proc proc2;  
  dcl-ds ds1 qualified;  
    sub char(10);  
  end-ds;  
  ds1.sub = 'x';  
  renamed = 'y';  
end-proc;
```

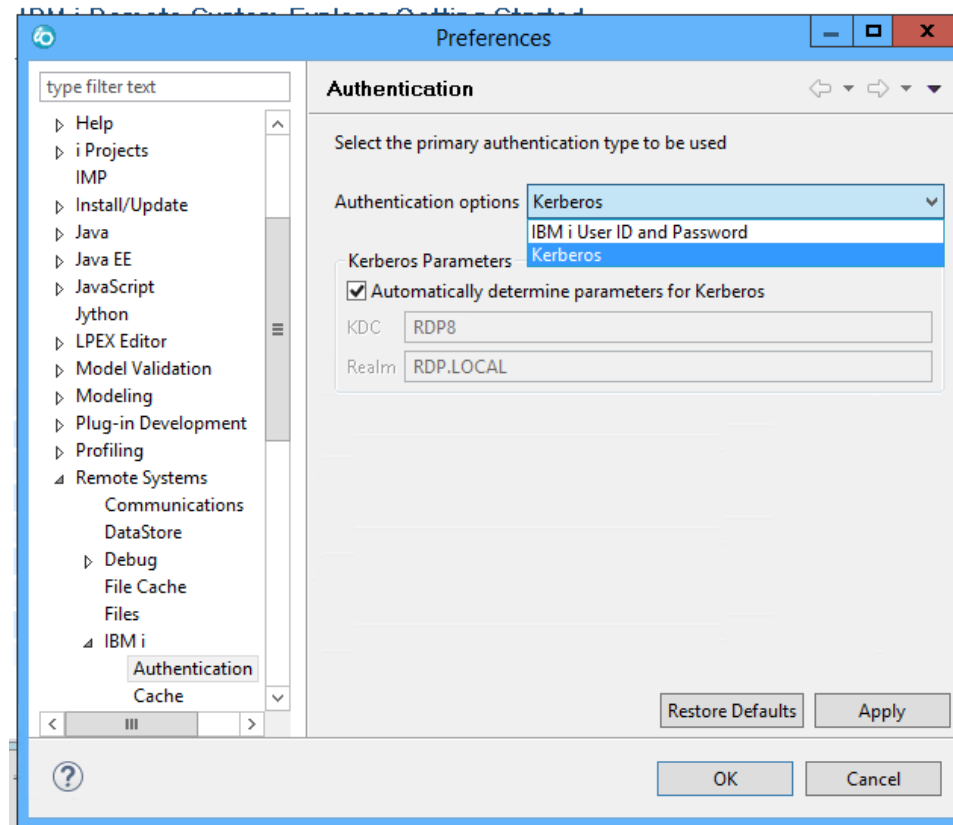
EGit is now available on the base RPG/COBOL package

- Git is a very powerful and free source control system that is now available on IBM i
- EGit is a free user interface for Git that is integrated with Eclipse.
- RDi ships this for free with the base package but it is also available to install from Eclipse Marketplace (via Help menu)



Kerberos support

- Single Signon: No longer need to provide logon credentials when connecting to IBM i through RDi





Kerberos documentation

- http://www.ibm.com/support/knowledgecenter/SSAE4W_9.5.1/com.ibm.ertools.iseries.rse.doc/topics/kerberos_setup_ovr.html

Kerberos authentication requires configuring several resources. Server configurations are usually handled by a system administrator. This topic provides an overview of the setup requirements.

Note: If Kerberos authentication is already a standard practice in your business, server and your personal computer configurations may already be in place. If this is the case, you may only need to [Configure Kerberos authentication in the IDE](#) to work with Kerberos authentication. Consult your system administrator for guidance.

1. **Setup a Kerberos Key Distribution Center (KDC) server.** For more information see: <https://social.technet.microsoft.com/wiki/contents/articles/12370.windows-server-2012-set-up-your-first-domain-controller-step-by-step.aspx>.
2. **Configure the IBM i server for Kerberos authentication.** More specifically, EIM (Enterprise Identify Mapping) needs to be configured to work with Kerberos authentication:
 - a. **Configure LDAP on IBM i.** For more information see: [IBM Tivoli Directory Server for IBM i \(LDAP\)](#).
 - b. **Configure the network authentication service.** For more information, see the section *Configuring network authentication service on the IBM i platform (steps 1-4)* at [Configuring network authentication service](#).
 - c. **Configure single sign-on on IBM i.** For more information see: [Single sign-on](#).
3. **Configure the workstation that the IDE is installed on.** For more information see: [Configure your operating system security policy](#).
4. **Join your workstation to a Kerberos domain** if domain authentication is used in your environment. Consult your system administrator for details about joining a Kerberos domain on your network. For general information about how to join your computer to a domain, see: [How to Join Your Computer to a Domain](#).
5. **Configure the IDE to work with Kerberos authentication.** For more information see: [Configure Kerberos authentication in the IDE](#).

ILE RPG live model improvements

- Outline view, references, hover, hyperlink
1. Control Statements section
 2. Output Statements section
 3. Exception Output section
 4. O-Specs: qualified indexed arrays
 5. O-Specs: named constants
 6. I-Specs: qualified indexed arrays
 7. Indexed indicator array references

The screenshot shows the IBM ILE RPG IDE with the following code in the editor:

```

Line 17      Column 39      Insert  62 changes
.....0.....N01N02N03Field+++++YB.End++PConstant/Editword/DTformat++Comments++++
    ctl-opt OPTION(*XREF);
    dcl-ds qu qualified;
        named int(10);
    end-ds;
    dcl-s arr int(10) dim(%size(qu.named));
    dcl-f file disk(20) usage(*input : *output);
    dcl-c output_constant 'Hello world!';

Ifile      ns
I          I  2  4 0arr(qu.named) 6

C          write  exp1
C          SETON                               LR

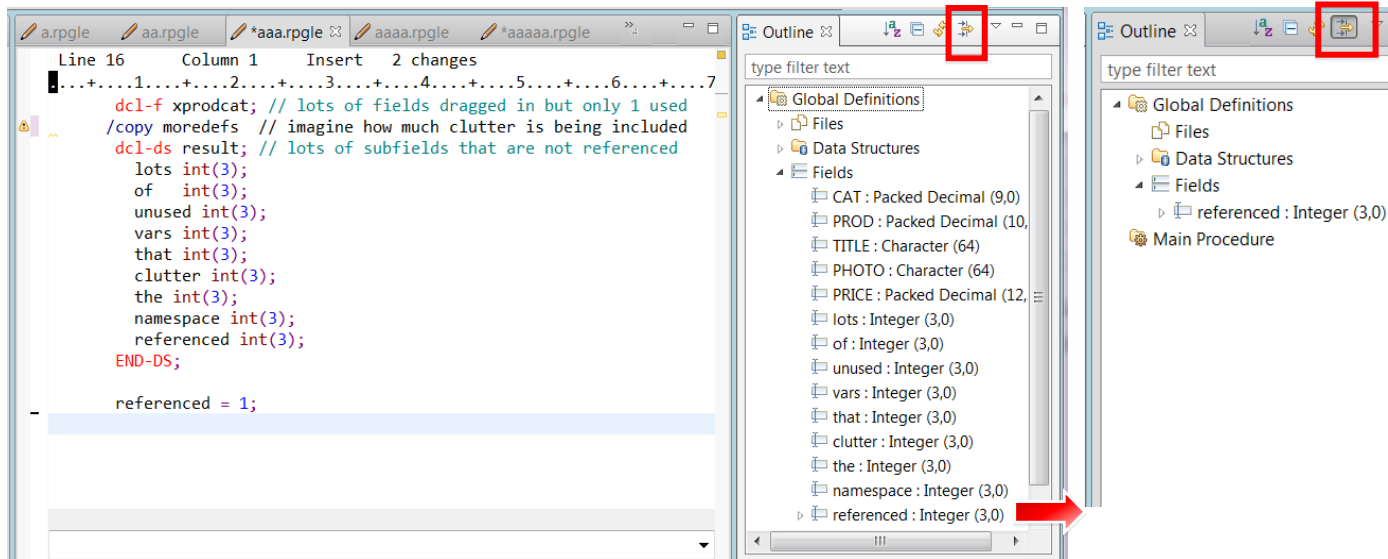
Ofile      e          exp1
O          4          output_constant 5
O          7          arr(qu.named)
O          *IN(03) 7          named : Integer (10,0)

```

The Outline view on the right shows the following structure:

- Control Statements (1)
- Global Definitions
- Files
- Data Structures
- Fields
- Constants
- Indicators
- *INLR (7)
- *IN03 (7)
- 18
- Prototypes
- Exception Output (3)
 - exp1 (3)
 - 12
- Input Statements
- Main Procedure
- Output Statements (2)

ILE RPG Outline subset to referenced variables



- 11th highest voted RFE 12353 – only show those definitions in outline view that are actually referenced in the source



ILE RPG Language Sensitive Help for embedded SQL

Hit F1 to get reference information on the SQL command under the cursor

The screenshot shows the IBM Rational Developer for i interface. In the background, an SQL editor displays the following code:

```
Exec SQL  
DECLARE CS_Account CURSOR FOR  
SELECT *  
FROM ACCOUNT  
WHERE BUILDDATEID = :Txyr;
```

A red arrow points from the `DECLARE CURSOR` line in the code to the help window. The help window, titled "Help - IBM Rational Developer for i", shows the following content:

Search: Go Scope: All topics

Contents

- CREATE TRIGGER
- CREATE TYPE
- CREATE TYPE (array)
- CREATE TYPE (distinct)
- CREATE VARIABLE
- CREATE VIEW
- DEALLOCATE DESCRIPTOR
- DECLARE CURSOR**
- DECLARE GLOBAL TEMPORARY TABLE
- DECLARE PROCEDURE
- DECLARE STATEMENT
- DECLARE VARIABLE
- DELETE
- DESCRIBE
- DESCRIBE CURSOR

[IBM i 7.3 > Database > Reference > SQL reference > Statements](#)

DECLARE CURSOR

The DECLARE CURSOR statement defines a cursor.

Invocation

This statement can only be embedded in an application program. It is not an executable statement. It must not be specified in Java™.

Authorization

No authorization is required to use this statement. However to use OPEN or FETCH for the cursor, the privileges held by the authorization ID of the statement must include at least one of the following:

- For each table or view identified in the SELECT statement of the cursor:

ILE RPG Automatic Content Assist

The screenshot displays the IBM i development environment. At the top, the 'Preferences' dialog is open to the 'Content Assist' section. The 'Content Assist' panel shows the following settings:

- Auto Activation: Automatically make suggestions
- Auto Activation delay (ms): 500
- Prompt when these characters are inserted: %

Below the preferences, the main editor window shows the following code:

```
Line 7      Column 18  Insert  2 changes
..... Free-Form+
000110      dcl-ds color qualified;
000111      red   int(10);
000112      green int(5);
000113      dcl-subf blue   int(5);
000114      END-DS;
000117
000118      x = color.
000143      RNF0632E T red
000143      RNF5507E A green
000143      blue
```

The 'Outline' pane on the right shows the project structure:

- Global Definitions
 - Data Structures
 - color : QUALIFIED
 - red : Integer (10,0)
 - green : Integer (5,0)
 - blue : Integer (5,0)
 - 7
 - Main Procedure

Code completion suggestions are visible for the variable 'color' on line 000118, showing 'red', 'green', and 'blue' with their respective data types.

ILE RPG Additional Parameter Info on Content Assist

```
dcl-pr calcTax;  
  name char(10);  
  salary zoned(8:2);  
end-pr;  
referenced = calcTax('Tim Rowe' : );
```

calcTax
EXTPROC('CALCTAX')
(
 name char(10)
 salary zoned(8,2)
)

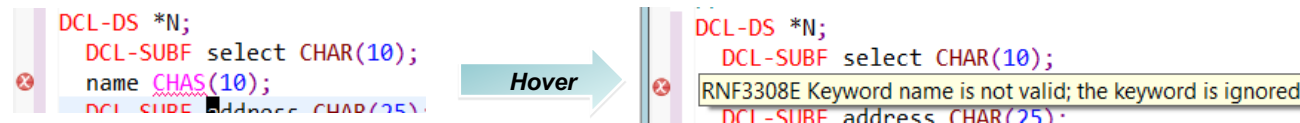
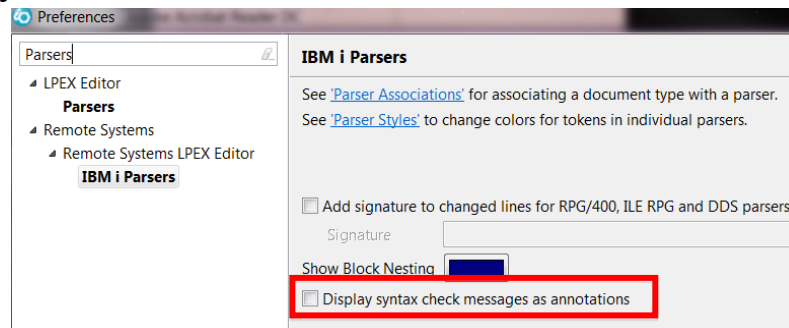
Syntax Errors as Annotations

- Syntax checker errors used to be shown a pink lines inserted into the source

```

DCL-DS *N;
  DCL-SUBF select CHAR(10);
  name CHAS(10);
RNF3308E Keyword name is not valid; the keyword is ignored.
END-D ;
RNF5347E An assignment operator is expected with the EVAL operat
  
```

- Now you can choose to show them as annotations instead



Comment / Uncomment actions in CL and DDS

- Ctrl-/ will comment each individual line selected

```
DCL VAR(&CLIENT) TYPE(*CHAR) LEN(3)
DCL VAR(&CARRY) TYPE(*CHAR) LEN(3)
```

- Becomes

```
/* DCL VAR(&CLIENT) TYPE(*CHAR) LEN(3) */
/* DCL VAR(&CARRY) TYPE(*CHAR) LEN(3) */
```

- Ctrl-\ will uncomment



```
DCL VAR(&CLIENT) TYPE(*CHAR) /* LEN(3) */
```

- Ctrl+Shift+/ will block comment only the selection

Servers and Systems Software RFE Community



- Overview
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Welcome users! Here you have an opportunity to collaborate directly with the product development teams and other product users.

Filter the page content by brand and product

Servers and Systems Software ▾ Developer for Power Systems ▾ >

Hot Top New Search ⓘ

122 votes **RPG refactoring ability**
 Would like to be able to perform refactoring on RPG code similar to the refactoring Eclipse can do with C++.

✓ Vote
 Refactor > Rename
 Refactor > Extract Local Variable
 Refactor > Extract Constant
 Refactor > ...

Uncommitted Candidate

http://ibm.biz/rdi_rfe



Delivered in 9.5.1.1

Delivered in 9.5

Delivered in 9.5.1

Delivered in 9.5.1

118 votes **Function to indent/format existing code similar to how "Source/Convert All ...**
 Would like to see a function to indent/format existing code. Could work similarly to how "Source/Convert All to Free-Form" works now, as well as "Convert Selection to Free-Form. on the context menu.

...
 Delivered

89 votes **support for mac in rdp**
 i want to be able to run the RDP on my mac native.

→ Voted Delivered

75 votes **Identify where in the code you are at.**
 When editing or browsing through a source member in the LPEX editor, it would be helpful to know in what subroutine or procedure you are at. This would eliminate the need to find BEGSR Previous. Sim...

Delivered

Your ideas matter!
 As of today:
 5 new
 2 planned
108 delivered

195 users
 3913 votes
 1988 comments

- Spotlight**
- RFE Community is updated (Release 18)
 - IBM Commerce adds Payments (FTM) products to the RFE Community
 - IBM Security adds MaaS360 products to the RFE Community
- See all announcements

Give us feedback

Participate in the [RFE Community survey](#) to help us improve your experience.



Delivered in 9.0.1

65
votes

Live Update of Content Assist

In RDP 8.5, we received live outline refresh, which is great. However for me, I always associated the outline with content assist. Except the content assist does not have visibility of the live outl...

Delivered

Delivered in 9.5.0.3

55
votes

Integration of iIBM i Access database functions into RD Power

While bringing back the Database perspective was a step in the right direction, the IBM i Access database functions are much more complete, especially Visual Explain. I'd like to see the IBM i Acces...

Delivered

Delivered in 9.5.1.1

54
votes

Add preference to default all opens to be browse only.

I want all my opens from features that allow a choice to default to browse unless I choose other wise on that open selection.



Uncommitted Candidate

Delivered in 8.5.1

51
votes

Update outline view constantly

The outline view should be constantly updated with the new information from the editor when the user changed the source code in the LPEX editor. At the moment the user has to click the refresh button...

Delivered

Delivered in 9.5.1.2

46
votes

Trim Leading Spaces when joining lines (alt-J)

Being able to join lines with alt-J is very nice. It would be preferable if the join would trim off leading spaces of what is being joined and possibly add a single space so the join doesn't but up d...



Uncommitted Candidate

46
votes

From a SQLxxxLE source, a "SQL prompter" on SQL lines

From a SQLxxxLE source, a "SQL prompter" on SQL lines as we can have in SEU with the F4 function key



Uncommitted Candidate

Delivered in 9.5.1

44
votes

Filter Outline by Referenced/Unref

Provide a means to filter fields/procedures/prototypes/etc by whether or not the module uses them.

Delivered

Delivered in 9.5.1

42
votes

Automatic Content assist should be available as a preference

In the early days of WDSC content assist was automatic as it is with most other tools based on Eclipse. That capability was removed and we now have to use Ctrl/Space to activate. This makes sense for ...

Delivered

RD*i* Fix List – RFEs delivered

http://ibm.biz/rdi_fix_list shows RFEs and APARs delivered by release/fixpack

- 18 RFEs in RD*i* 9.5.1
- 7 RFEs in RD*i* 9.5.1.1
- 4 RFEs in RD*i* 9.5.1.2
- 7+ RFEs in RD*i* 9.6

RFE12100	Kerberos authentication for Rdi. User can now use single-sign-on and enterprise identity mapping based on Kerberos to eliminate the need to provide logon credentials when connecting to the IBM Business Rational Developer for I.										
RFE12100	Add support for Dimension with ILE RPG Outline View. Enable nesting for referenced fields/prototypes/data structures/procedures/files in the outline view										
RFE13454	Mac OS X v10.11 support										
RFE11119	Identify where in the code you are at - enhanced Show Block Nesting for SQL ILE RPG and ILE RPG										
RFE64933	ILE RPG Live outline now supports *IN(nn) indicators										
RFE58254	From ILE RPG Outline View position to O-Specs and track references to EXCEPT names										
RFE29561	RDP 8.5 live outline view does not show field if used in internally described printer output										
RFE23954	ILE RPG Outline view not showing indicator usage in program defined output specs										
RFE74859	Context-sensitive help for embedded SQL in ILE RPG - F1 on SQL statement will go to the particular statements help in the reference manual										
RFE45970	Consolidated Project View - remote reconciler with remote contexts on IFS All projects in RD <i>i</i> except for i Projects can now be associated with an IFS location. From the project, right click Remote Reconciler -> Enable Remote Support... to select the IFS location with the same name as the project. Use the Remote Reconciler view and disable the icon "Hide files and folders that do not have pending changes" to view existing remote IFS files that can be imported into your General Project. From the Remote Reconciler view, files can be pushed to and pulled from the IFS location. See RFE45970 - IFS project support using RD<i>i</i> 9.5.1 blog post for additional information.										
RFE87369	Always make Run SQL Scripts available, not just when in SQLRPGLE source - Objects subsystem popup menu has Run SQL Scripts action										
RFE38930	Display additional parameter information in RPGLE content assist										
RFE77454 & RFE77455	RFE77454: Change ctrl-f to function like eclipse find RFE77455: Make ctrl-f function the same way in both block and stream modes NOTE: Restrict search to selection is now enabled for both Block and Stream selection modes.										
RFE23938	Automatic Content assist should be available as a preference										
RFE60989 CAAC AD0424	add commenting key shortcuts/actions for CL and DDS (like RPG)										
	<table border="1"> <thead> <tr> <th>Name</th> <th>Function</th> <th>Keyboard Shortcut</th> </tr> </thead> <tbody> <tr> <td>Comment</td> <td>Comment all lines containing the current selection.</td> <td>Ctrl + /</td> </tr> <tr> <td>Uncomment</td> <td>Uncomment all lines containing the current selection.</td> <td>Ctrl + \</td> </tr> </tbody> </table>	Name	Function	Keyboard Shortcut	Comment	Comment all lines containing the current selection.	Ctrl + /	Uncomment	Uncomment all lines containing the current selection.	Ctrl + \	
Name	Function	Keyboard Shortcut									
Comment	Comment all lines containing the current selection.	Ctrl + /									
Uncomment	Uncomment all lines containing the current selection.	Ctrl + \									
	NOTE: The solution includes CL, CLLE and DDS source, but does not include OPM RPG or COBOL source.										
RFE86909	Regular expression scan and replace										

Future Product Investments

Choose 2 of your highest priorities

- SQL support
- Software Engineering – Refactoring/Automated Test/Code Coverage
- Git integration
- Dependency Build
- Developing with source on IFS


Conclusion

- RPG is evolving rapidly and RDi is keeping pace (SEU is not)
- Free-form RPG and RDi solves skill-depletion
- Lot's of goodies in RDi 9.5.1.2 – worth upgrading
- RDi 9.6 is coming soon – be the first to get the productivity boost
- We are prioritizing investment according to your feedback via RFE



With RDi, IBM i programming is cool and productive!

Resources

- Rational Developer for i 9.5.1.2
 - http://ibm.biz/rdi_product – purchase, what's new
 - http://ibm.biz/rdi_product_evolution – is this an update, technical details
 - http://ibm.biz/rdi_web_install – simplest install for individuals
 - http://ibm.biz/rdi_install – options for enterprise installation
 - http://ibm.biz/rdi_roi – personalized business case generator
 - http://ibm.biz/rdi_wiki_self_learning - lots of online learning resources
 - http://ibm.biz/rdi_documents - documentation and notices
- How to stay in touch
 - https://ibm.biz/rdi_hub – community, blog, announcements, wiki, links, resources
 - <https://ibm.biz/wdsci-l> - very active discussion group
 - http://ibm.biz/rdi_rfe - request for enhancements
 - [COMMON](#) 

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Revised September 26, 2006

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