



# What's New with RDi V9.6

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Rational Developer for i - Developer, Release and Install lead

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# Agenda

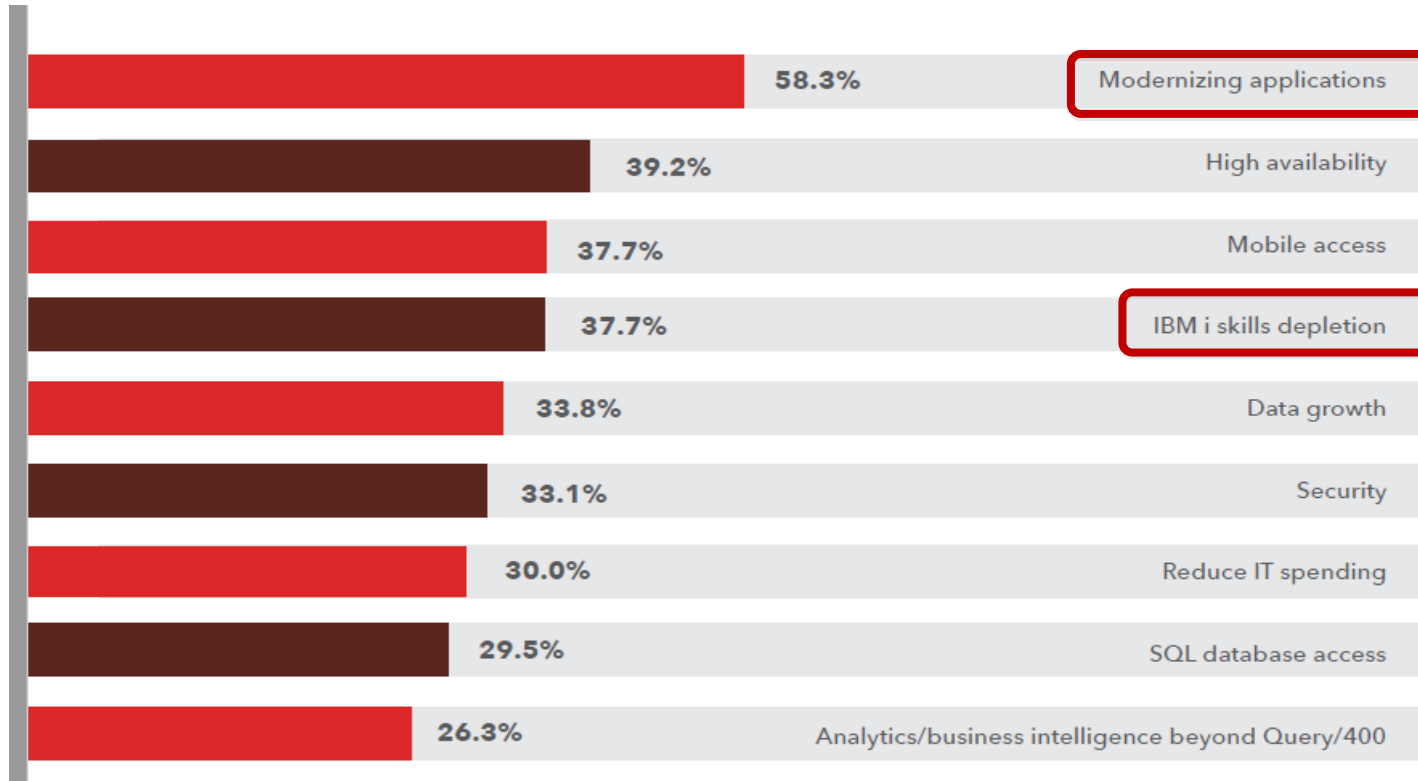
- Why RDi
- What's New in 9.6 – November 2017
  - Eclipse
  - IBM i tooling
  - Code Coverage
  - ACS Integration
  - Modernization Tools, Java Edition
- Feedback and direction setting

# RDi currency

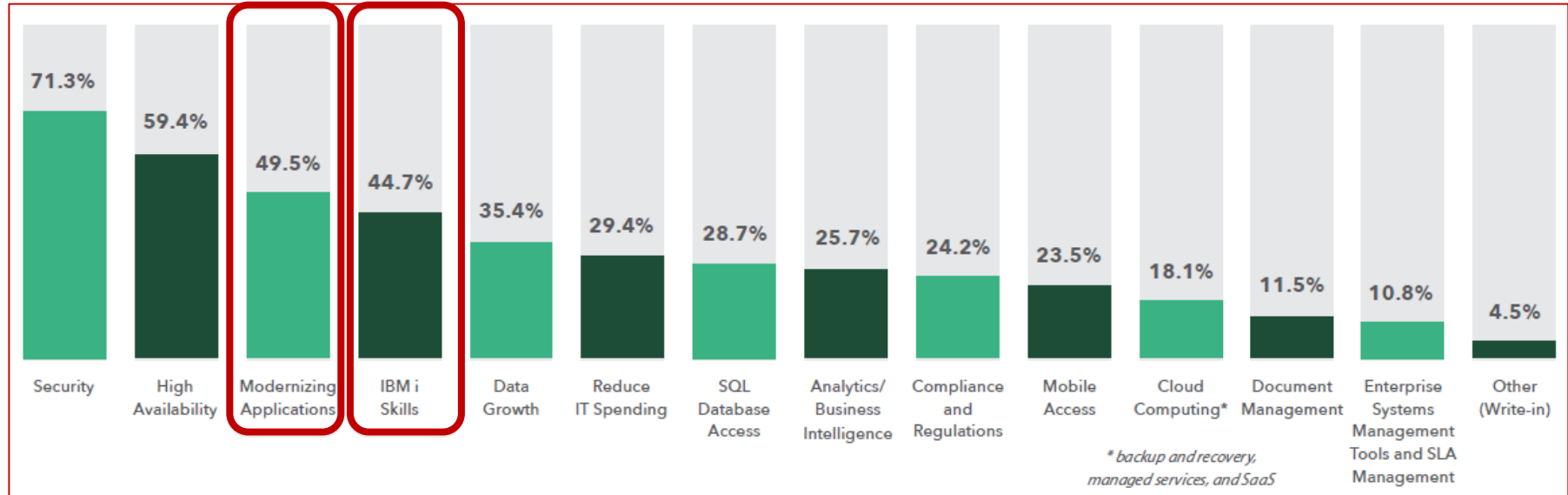
Which is most recent version actively used in your shop?

1. Green screen only (1970-1990)
2. CODE/400 (1990-2000)
3. WDSc (2000- 2009)
4. RD Power 7.x or 8x (2010-2012)
5. RDi 9.0.x (2013)
6. RDi 9.1.x (2014)
7. RDi 9.5-9.5.0.3 (2015 Sep)
8. RDi 9.5.1-9.5.1.2 (2016 Sep)
9. RDi 9.6 (2017 Nov)

# Top Concerns for IBM i IT – Help Systems Survey 2016

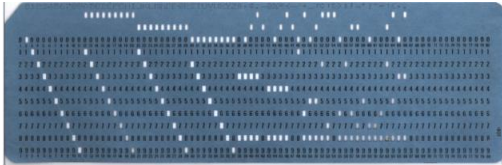


# Top Concerns for IBM i IT – Help Systems Survey 2017





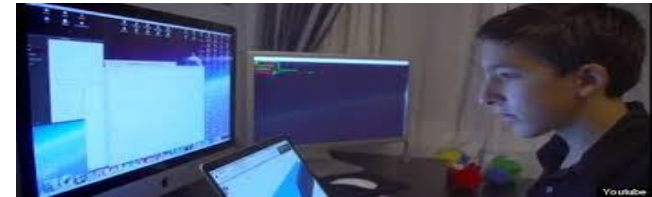
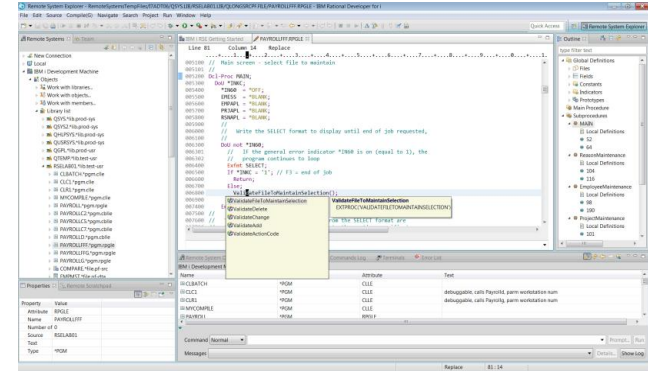
# Modern RPG – Constant Transformation



```

Session A. [24 x 80]
Columns: 6 76 Edit YANTZI@RPGLESC
FCU=>
***** Beginning of data *****
-----
0001.00
0002.00
0003.00
0004.00 * Program ORDENTR
0005.00 * This program allows a user to enter and confirm an order. It sends
0006.00 * a print request to a batch job via a data queue. The program only
0007.00 * handles District 1 and Warehouse 0001.
0008.00
0009.00 * Don was here
0010.00
0011.00
0012.00 * INDICATOR USAGE:
0013.00 * 03 - F3=Exit
0014.00 * 04 - F4=Prompt
0015.00 * 05 - F5=Accept order
0016.00 * 12 - F12=Cancel

F9=Exit F4=Prompt F5=Refresh F9=Retrieve F10=Cursor F11=Toggle
F16=Repeat Find F17=Repeat change (C) COPYRIGHT IBM CORP. 1981, 2005.
MI a MIU 02/009
    
```



# 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

### 7.1

- 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

### 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

### 7.3

- 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

**All of these features are NOT supported by SEU!**

- [Nested data structures without LIKEDS](#)
- [New %MAX/%MIN BIFs](#)
- [ALIGN\(\\*FULL\) extends DS length to match alignment](#)
- [%PROC return external proc name](#)
- [Complex names for %ELEM/@SIZE/DEALLOC/RESET](#)
- [PCML 7.0 support](#)

*Supported in RDi 9.5.1.2*

*Supported in RDi 9.6*

```
ctl-opt bnddir('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;
```

Compiler Options

File Definitions

Data Definitions

Procedure Definitions

Calc Specs





# Development tools....



```
Session A - [24 x 80]
Columns . . . : 6 76      Edit      YANTZI/QRPGLESRC
SEU==>          ORDENTR
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

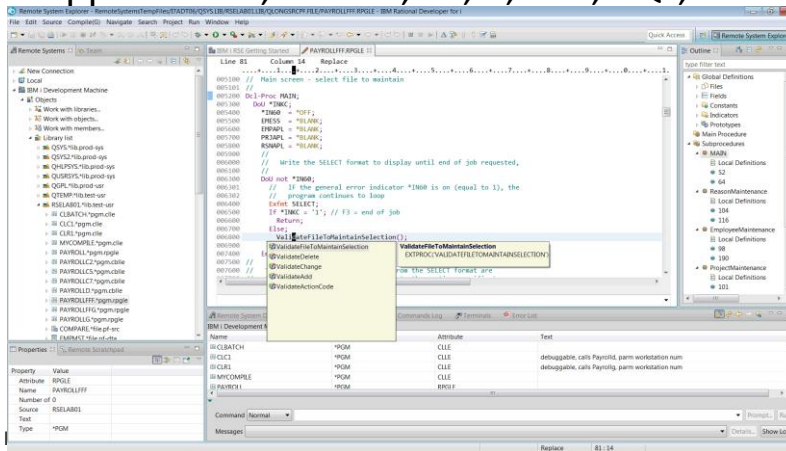
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve  F10=Cursor  F11=Toggle
F16=Repeat find  F17=Repeat change  F24=More keys
(C) COPYRIGHT IBM CORP. 1981, 2005.
M a MW 02/009
```

Tried and True, Yes but also SLOW, OLD, No new features  
Don't let SEU hold you back!

<http://ibmsystemsmag.com/blogs/idevelop/april-2017/seu-was-holding-me-back/>

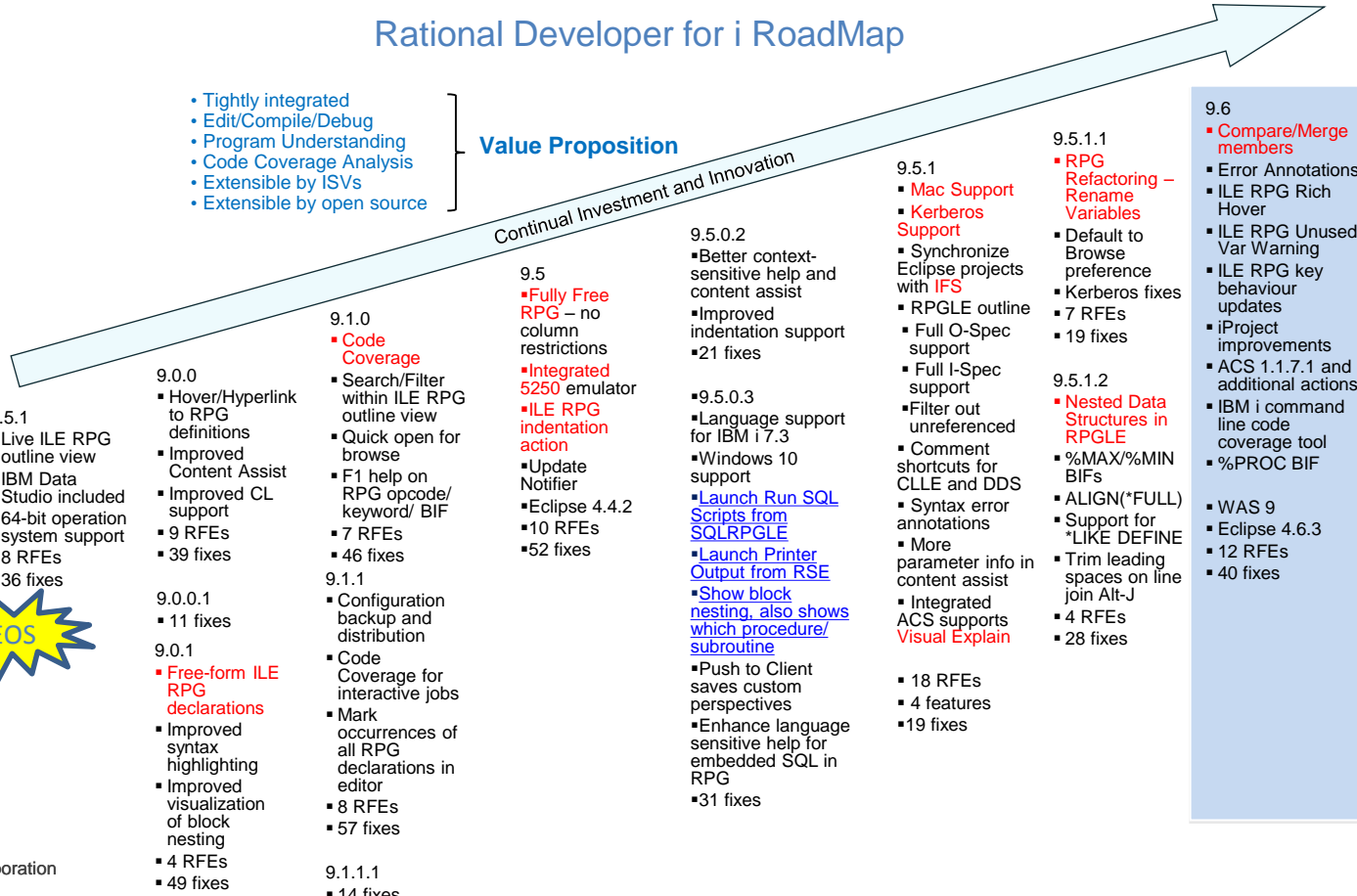
# Rational Developer for i

- Modern, Eclipse-based, development tools for IBM i
- Visual editors, outline views, content assist, hover/hyperlink, integrated language help
- Integrated file management, search, edit, compile/build, debug capabilities
- Analysis tools (application diagram, call hierarchies, type hierarchies)
- 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, CL, C, C++, SQL, DDS



**Use the Right Tool for the Job!**

## Rational Developer for i RoadMap



# Where to get RDi

- Trial – Nov 16 <https://www.ibm.com/developerworks/downloads/r/rdi/>
  - Web Install (for manual web install you need Installation Manager 1.8.7 minimum)
  - Product zips download
- Passport Advantage – Nov 16
  - Product zips and activation kits
- Entitled Software Site (ESS) – Nov 21
  - Product zips and activation kits
- To install Rational Developer for i at the latest level on multiple developer machines, see <http://www-01.ibm.com/support/docview.wss?uid=swg21668005>

# Editions

- Based on Eclipse 4.6.3
- For 9.6, the editions available are:
  - RPG and COBOL Tools
  - Modernization Tools, Java Edition
- No Modernization Tools, EGL Edition for 9.6
- All editions currently bundle in IBM Data Studio 4.1.2
  - Not updated for Eclipse 4.6 so do not shell share **\*\*high priority issue\*\***

# RDi 9.6 Platform support

- Added Mac OS 10.12
  - Dropped Mac OS 10.11.



- Linux
  - Dropped several versions.

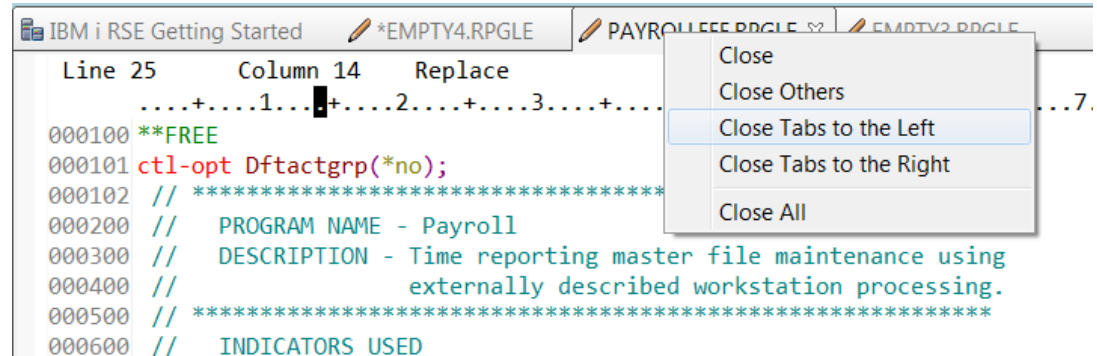
– Supported:	Red Hat (RHEL)	7	64-bit
	Ubuntu	16.04 LTS	64-bit

- Windows
  - Dropped 32-bit Win 7. Dropped Win 8. Likely to drop 32-bit JDK.

– Supported:	Windows	OS	JDK
	7	64-bit	32,64
	8.1	64-bit	32,64
	10	64-bit	32,64
	Server 2016	64-bit	32,64

## 9.6 Eclipse 4.6.3

- Editor Close Tabs to the left/right
- Print toolbar button now hidden by default
  - Customize Perspective to add it back to the toolbar

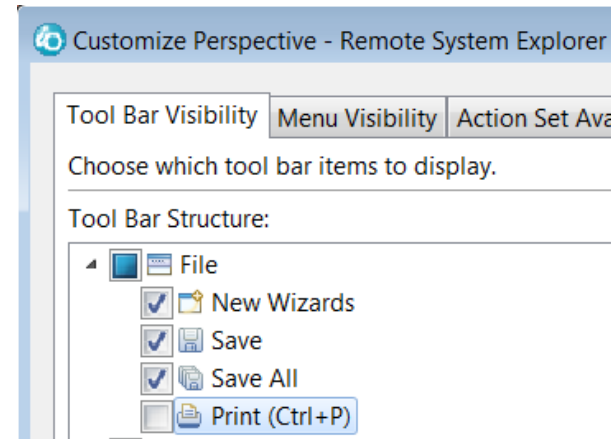


The screenshot shows the Eclipse IDE interface with a code editor open. The editor displays the following code:

```
Line 25      Column 14      Replace
...+...1...+...2...+...3...+...
000100 **FREE
000101 ctl-opt Dftactgrp(*no);
000102 // *****
000200 // PROGRAM NAME - Payroll
000300 // DESCRIPTION - Time reporting master file maintenance using
000400 // externally described workstation processing.
000500 // *****
000600 // INDICATORS USED
```

A context menu is open over the editor, showing the following options:

- Close
- Close Others
- Close Tabs to the Left
- Close Tabs to the Right
- Close All





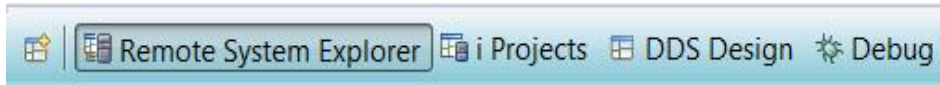
## 9.6 Eclipse 4.6.3

To save space in the toolbar, the perspective switcher has been changed to show only the icons of perspectives by default. You can show the text again via the context menu.

New default:



Old default:

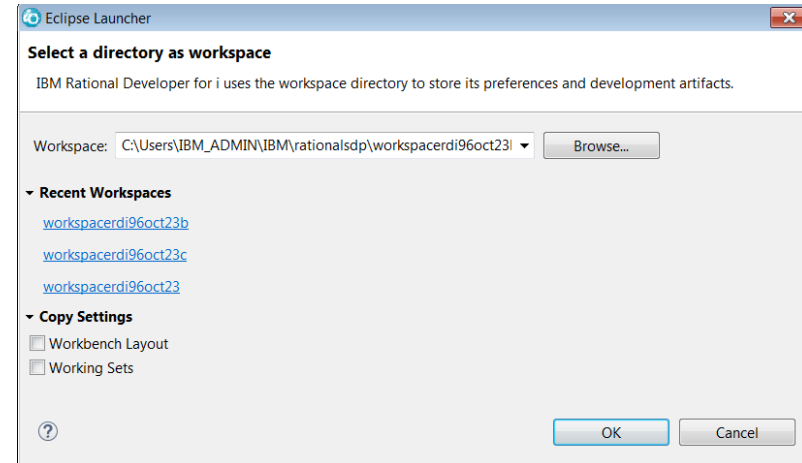


### Settings Transfers

When you switch your workspace you can select settings that will be transferred to the new workspace. These settings are supplied by the `org.eclipse.ui.preferenceTransfer` extension.

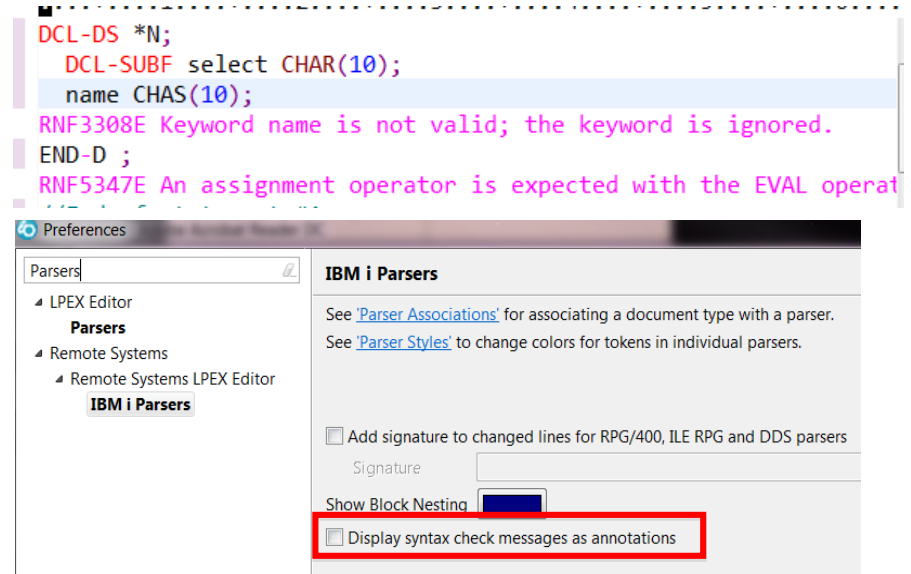
The SDK supplies transfers for:

- **Workspace Layout:** Opened views, their size, and selected perspectives.
- **Working Sets:** The user defined working sets.



## 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



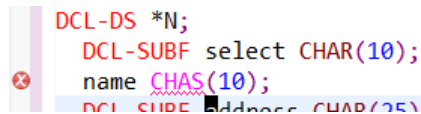
The top part of the screenshot shows a code editor with the following code:

```
DCL-DS *N;  
DCL-SUBF select CHAR(10);  
name CHAS(10);  
END-D ;
```

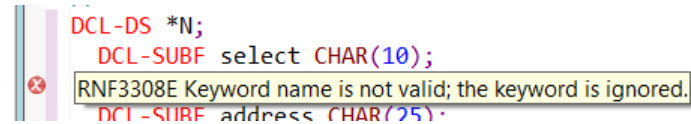
Two error messages are displayed in pink text:

- RNF3308E Keyword name is not valid; the keyword is ignored.
- 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 checkbox 'Display syntax check messages as annotations' is highlighted with a red box.



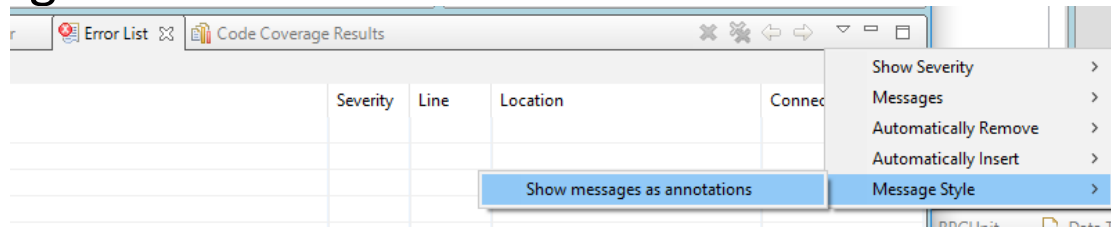
The code editor shows the same code as above. The error messages are shown as pink lines inserted into the source code.



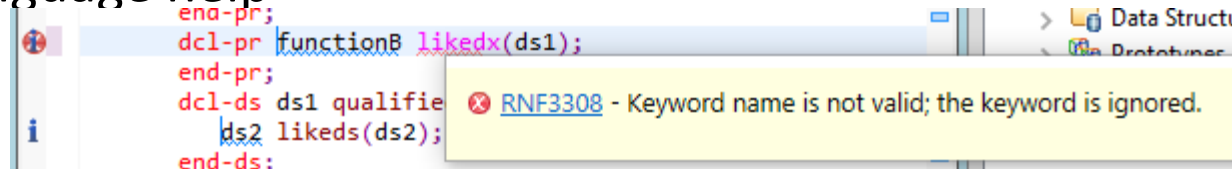
The code editor shows the same code as above. The error messages are now shown as annotations (yellow boxes) that move with the tokens in error.

## 9.6 Compiler/Verifier Errors as Annotations

- This was requested as RFE82757 because the error location is out of date after line addition/deletions
- To configure use the Error List view menu



- The hover will show you the all the errors and give you a link to get the language help



## 9.6 Unused ILE RPG variables are annotated

- If a declaration is never used, an informational annotation is given
- This behaviour can be configured on or off

The top screenshot shows a code editor with the following ILE RPG code:

```
dcl-ds dsQual qualified;  
  qual1 char(3);  
  sub1  
End-Ds
```

An informational annotation is displayed over the code: "i The subfield qual1 in the data structure dsQual is not used".

The bottom screenshot shows the "Preferences" dialog box, specifically the "ILE RPG" section. The "Annotate unreferenced definitions" checkbox is checked and highlighted with a red box. Other options include:

- Automatic syntax checking
  - Automatic syntax checking of SQL statements (performed on the server)
- Automatic uppercasing
- Show lowercase values in dropdown menus in Source Prompter
- Block comment behavior
  - Fixed format
    - Insert \* into column 7 and shift line by one column
    - Overwrite blanks in column 7 with \*
  - Free format
    - Insert // at beginning of line and shift line by two columns
    - Overwrite blanks at beginning of line with //
- Update the Outline view when text is changed in the editor
- Categorize named indicator as Fields in the outline view.
- Annotate unreferenced definitions

Buttons at the bottom include "Restore Defaults", "Apply", "OK", and "Cancel".

## 9.6 Rich ILE RPG hover showing all contributing definitions

- Variables may have non-obvious relationships with external definitions
- The hover will show all contributing definitions with resolved externals

```
dcl-f cust1 disk rename(custom01 : custrec);  
  
ICUSTREC  
I          custna          cust_name  
  
cust_name = 'Maha';
```

[cust\\_name](#) : Character (40)  
Defined by:  
 cust1/custrec - External: ECLIPSTEST/CUST1/CUSTOM01/CUSTNA  
Renamed by:  
 [cust\\_name](#) - on Input specification custrec

Press 'F2' for focus

## 9.6 Rich ILE RPG hover – parent data structures

- Show relationship with parent data structures

```
dcl-ds ds1 qualified;  
  nested likeds(ds2);  
End-Ds;  
dcl-ds ds2;  
  subfield int(5);  
End-Ds;
```

```
ds1.nested.subfield = 'abc';
```

```
subfield : Integer (5,0)  
Contained by:  
dcl-ds ds1 QUALIFIED;  
dcl-ds nested LIKEDS(ds2);
```

Press 'F2' for focus

## 9.6 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:

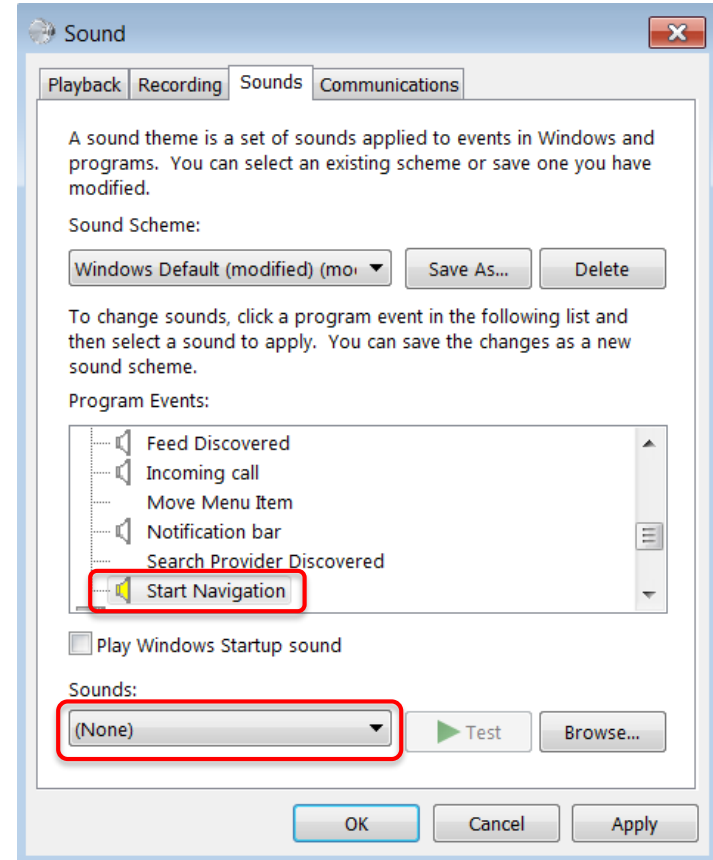
If an error occurs, the EMESS field contains the appropriate message

Press 'F2' for focus

Tasks Object T Comma Terminals Error List Progress

## 9.6 Sound effect with hover

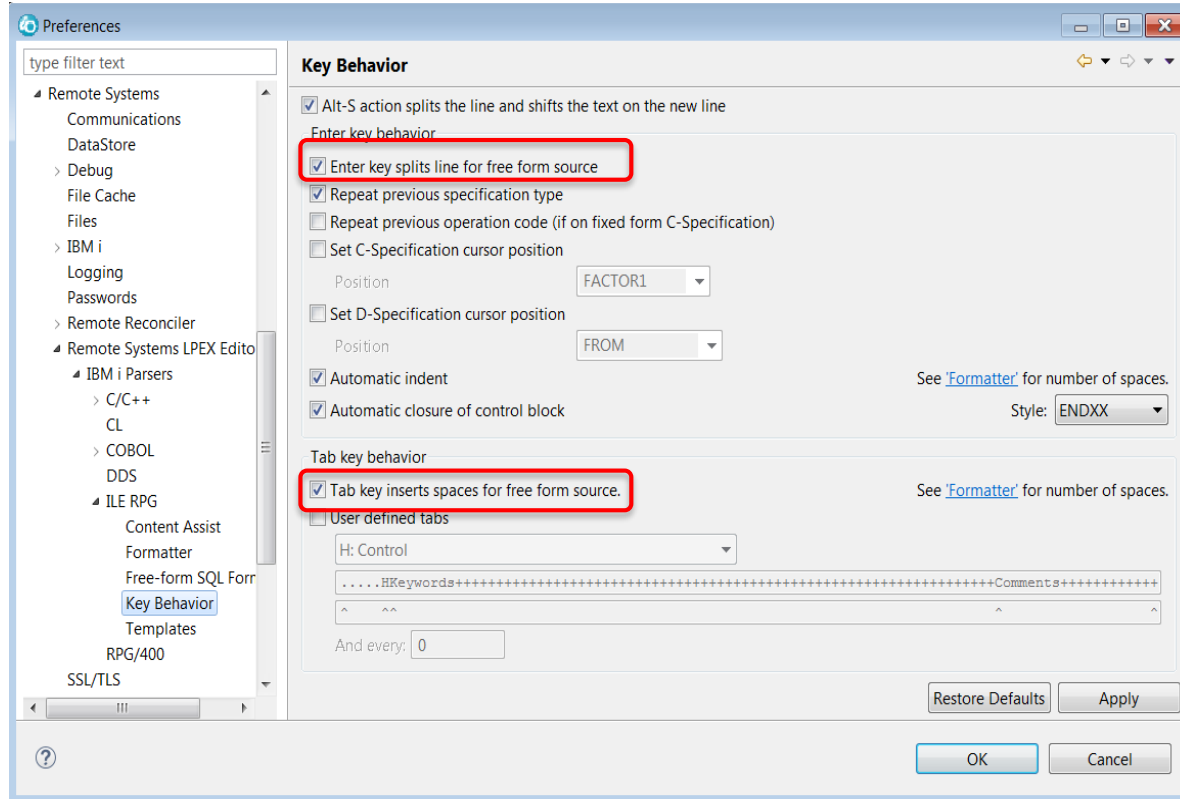
- On Windows, sound effect might occur with displaying the hover information
- To turn off the 'click', go to Control Panel > Sound > Sounds (tab) > Windows Explorer > Start Navigation, and set to None





# ILE RPG Key behaviour preference page

- Consolidate key behavior preferences
- Add Enter key splits line for free form source
- Add Tab key inserts spaces for free form source



The screenshot shows the 'Preferences' dialog box with the 'Key Behavior' section selected. The 'Enter key splits line for free form source' and 'Tab key inserts spaces for free form source' options are highlighted with red boxes. The 'Key Behavior' section includes the following options:

- Alt-S action splits the line and shifts the text on the new line
- Enter key splits line for free form source
- Repeat previous specification type
- Repeat previous operation code (if on fixed form C-Specification)
- Set C-Specification cursor position
- Position: FACTOR1
- Set D-Specification cursor position
- Position: FROM
- Automatic indent (See [Formatter](#) for number of spaces.)
- Automatic closure of control block (Style: ENDXX)

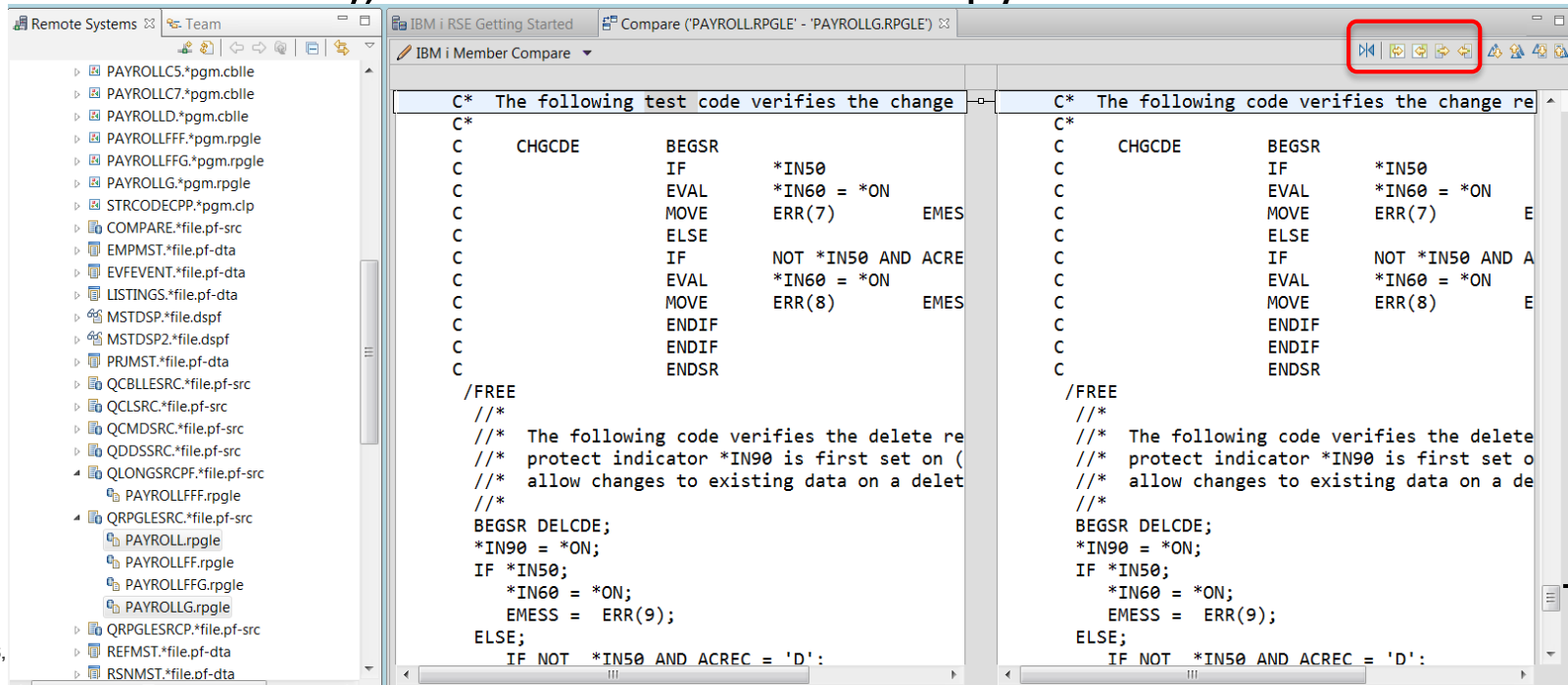
The 'Tab key behavior' section includes the following options:

- Tab key inserts spaces for free form source. (See [Formatter](#) for number of spaces.)
- User defined tabs
- H: Control
- .....#Keywords+++++++Comments+++++++
- ^ ^^
- And every: 0

Buttons at the bottom: Restore Defaults, Apply, OK, Cancel.

# Compare/Merge of members with sequence numbers

- When comparing two members from Remote Systems view (Compare With > Each Other), it is now editable and Copy actions in toolbar



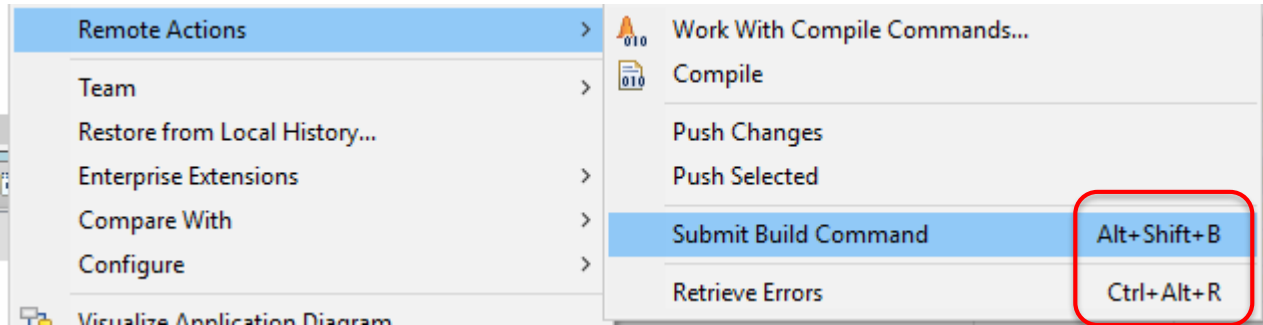
The screenshot displays the IBM i Remote Systems interface. On the left, a tree view shows a list of members under the 'Team' folder, including various payroll-related files. The main window is titled 'Compare (PAYROLLRPGLE - PAYROLLG.RPGLE)' and shows a side-by-side comparison of two code members. The left member is 'C\* The following test code verifies the change' and the right member is 'C\* The following code verifies the change re'. Both members contain COBOL code for a payroll program, including sections for CHGCODE, BEGSR, and a FREE section with comments. A red box highlights the toolbar at the top right of the main window, which contains icons for navigation and editing, indicating that the comparison view is now interactive.

```
C* The following test code verifies the change
C
C   CHGCODE       BEGSR
C                   IF          *IN50
C                   EVAL        *IN60 = *ON
C                   MOVE        ERR(7)  EMES
C                   ELSE
C                   IF          NOT *IN50 AND ACRE
C                   EVAL        *IN60 = *ON
C                   MOVE        ERR(8)  EMES
C                   ENDIF
C                   ENDIF
C                   ENDSR
C
C /FREE
C /**
C /** The following code verifies the delete re
C /** protect indicator *IN90 is first set on (
C /** allow changes to existing data on a delet
C /**
C BEGSR DELCDE;
C *IN90 = *ON;
C IF *IN50;
C     *IN60 = *ON;
C     EMESS = ERR(9);
C ELSE;
C     IF NOT *IN50 AND ACREC = 'D':
```



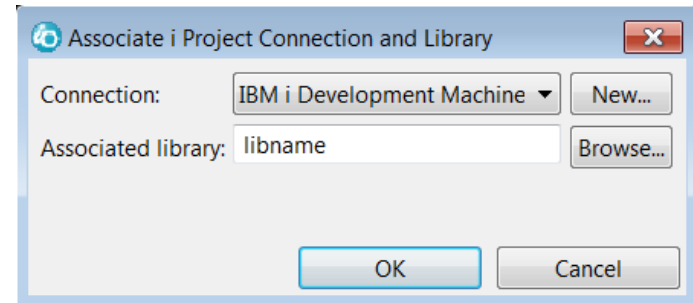
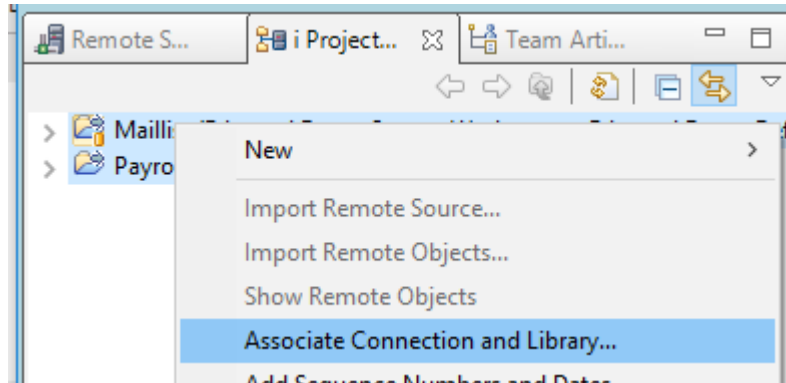
# i Project Build and Retrieve Errors shortcuts

- Can now build and get error feedback without leaving the editor or keyboard
- Alt-Shift-B – builds the project
- Ctrl-Alt-R – retrieves the errors into the editor



# Set associated connection and library on multiple i Projects at once

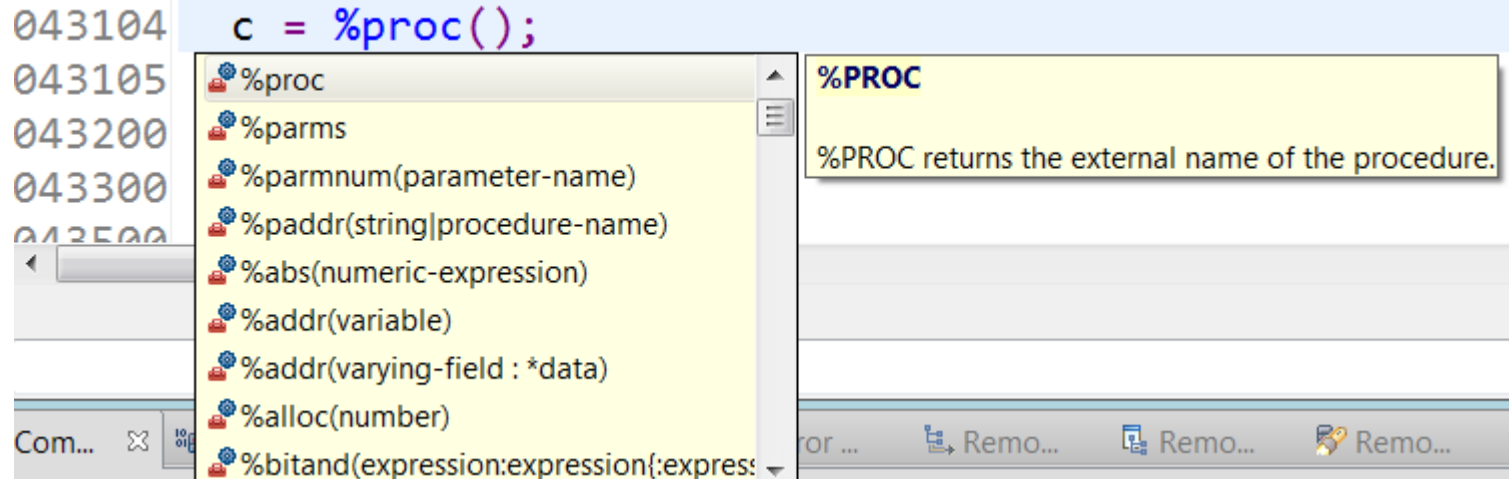
- If you are extracting many projects from source control, you can now set the associated library/connection in one shot as the action supports multiple selection



# %PROC Built-in function

- %PROC Built-in function supported in editor

```
043104 c = %proc();
043105
043200
043300
043500
```



The screenshot shows an IDE interface. The code editor contains the line `c = %proc();`. A dropdown menu is open, listing built-in functions: `%proc`, `%parms`, `%parmnum(parameter-name)`, `%paddr(string|procedure-name)`, `%abs(numeric-expression)`, `%addr(variable)`, `%addr(varying-field : *data)`, `%alloc(number)`, and `%bitand(expression:expression{:expression`. A tooltip for the selected `%PROC` function is displayed, stating: `%PROC` returns the external name of the procedure. The bottom of the IDE shows a toolbar with several 'Remo...' buttons.

# Command Line Code Coverage

- Code coverage added to RDi in 9.1 and updated in 9.5 with significant performance boost. Covers batch, interactive, SEP.
- PTFs are now available for RDS with command-line Code Coverage tool
- Use RDi to view the results
- Enables you to include code coverage runs in your builds
- Freely available with RDS option 60 on the IBM I

IBM i	MRM	MRI
V7R3	PTF 5770WDS SI65229	2924 PTF 5770WDS SI64655
V7R2	PTF 5770WDS SI65228	2924 PTF 5770WDS SI64544

- Full details: <https://www.ibm.com/developerworks/community/files/app#/file/d54ac305-6ca0-4ba8-9552-e61f6c88331b>

# Requirements on job environment

- Programs and service programs for instrumentation must be compiled with one of the following debug options:
  - `DBGVIEW(*SOURCE)`
  - `DBGVIEW(*LIST)`
  - `DBGVIEW(*ALL)`
- Headless code coverage tools are located under the QDEVTOOLS library
  - Add it to the library list: `ADDLIB QDEVTOOLS`
- Main command: **`QDEVTOOLS/CODECOV`**



# Code Coverage Mandatory Parameters

- Two parameters are mandatory:
  - **Command to run:** The full command line that will run in code coverage instrumentation mode
    - Use CALL command for running a program, specify program parameters using the PARM parameter:
      - `CALL LIBNAME/PGMNAME PARM(...)`
    - Also support customized user command:
      - `MYCOMMAND MYPARM(...)`
    - Command length restriction: 6000
  - **At least one entry in the MODULES list**
    - Include at least one program or service program for code coverage instrumentation
    - Does not have to be the main program

# Code Coverage Output options

- Two parameters to control output options:
  - **Output directory** and **Output stream file**
  - They cannot be specified at the same time
  - Error message is issued if they are specified at the same time:
    - **Parameters OUTDIR and OUTSTMF cannot be used at the same time**
- **Output directory:**
  - Code coverage result file is saved to this directory.
  - Use generated name for code coverage result file
    - Generated result name format:
      - *ProgramName\_TimeStamp.cczip*
  - The default output directory is \*CURRENT.
- **Output stream file:**
  - Fully qualified IFS file name for code coverage result file
  - If the base name does not have extension
    - Extension .cczip is appended to the base name
  - If the base name has an extension, it must be .cczip, otherwise an error is issued:
    - **The extension for the result name ... is not .cczip.**

# Viewing code coverage results on RDi

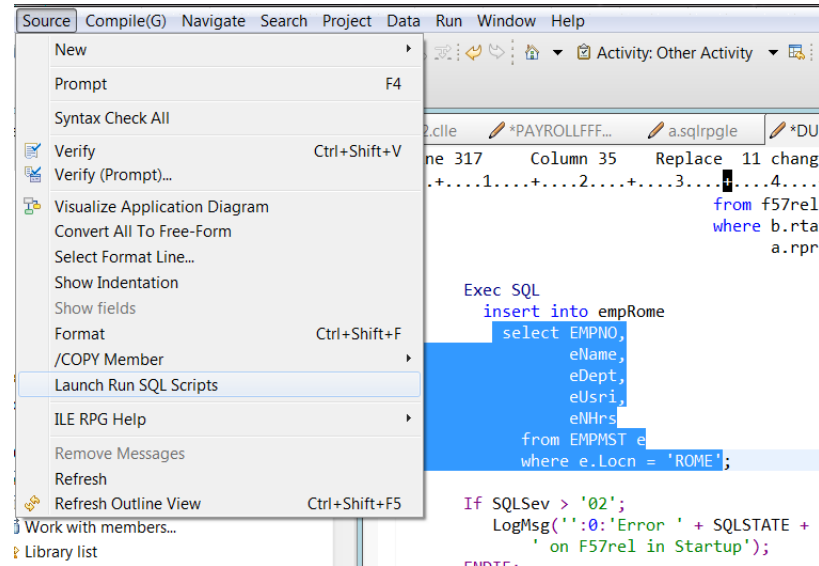
- Steps to view code coverage results in RDi:
  - Create a local or IFS directory and store all the \*.cczip files there
  - Open the Code Coverage Results view using the following steps, if this view is not opened yet:
    - From the main menu, select Windows > Show View > Other...
    - Select Code Coverage > Code Coverage Results, and click OK
  - Right click inside Code Coverage Results view and select "Add Result Location..."
  - Click the "Local File System..." or "Remote Systems" button, browse to select the directory you created at step #1 that contains all the \*.cczip files, click OK
  - You should see a new result location in the Code Coverage Results view
  - Expand this result location, and you will see all the results
  - Double click on a result
  - A "File Level Code Coverage Results" report is opened in the editor area
  - Expand each of the source files in the File Report to reveal the procedures under it
  - Double click on a procedure in the File Report
  - An editor session is opened for the source file and the pointer is positioned to the selected procedure
  - Now you can look at the code coverage annotation to see which lines are hit or not hit

# Why ACS and which ACS

- ACS is being invested in heavily by IBM and will continue to see enhancements.
  - The emulator is best of breed
  - Lots of SQL tooling, from building/executing queries to detailed performance analysis
  - It installs and runs anywhere (using Java)
- 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  
(it is free from <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. As of RDi 9.6, the bundled version of ACS is 1.1.7.1

## 9.5.0.3 Run SQL queries from the selection in 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’



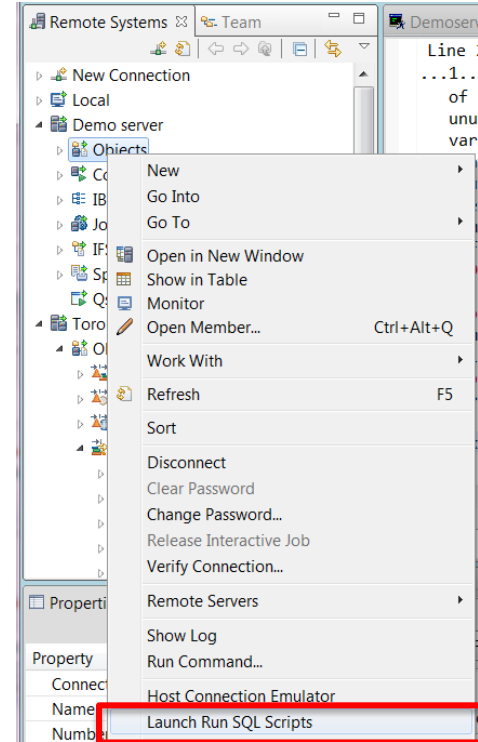
```
Source | Compile(G) | Navigate | Search | Project | Data | Run | Window | Help
├── New
├── Prompt F4
├── Syntax Check All
├── Verify Ctrl+Shift+V
├── Verify (Prompt)...
├── Visualize Application Diagram
├── Convert All To Free-Form
├── Select Format Line...
├── Show Indentation
├── Show fields
├── Format Ctrl+Shift+F
├── /COPY Member
├── Launch Run SQL Scripts
├── ILE RPG Help
├── Remove Messages
├── Refresh
├── Refresh Outline View Ctrl+Shift+F5
├── Work with members...
└── Library list
```

```
Exec SQL
insert into empRome
select EMPNO,
       eName,
       eDept,
       eUsri,
       eNHrs
from EMPMST e
where e.Locn = 'ROME';

If SQLSev > '02';
  LogMsg('':0:'Error ' + SQLSTATE + '
        ' on F57rel in Startup');
ENPTC.
```

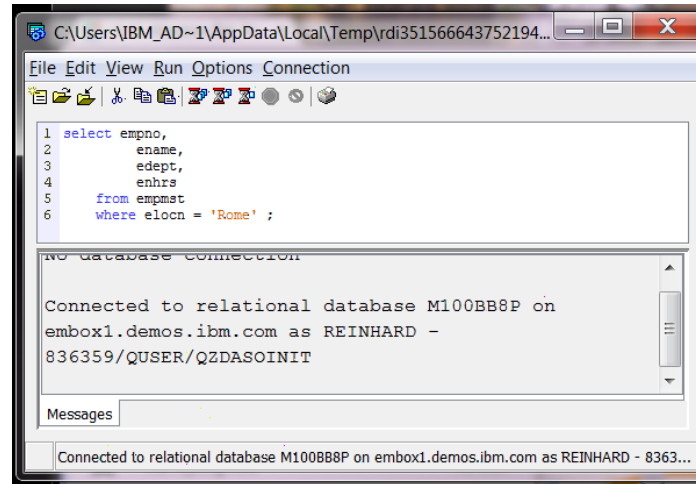
## 9.5.1 Run SQL Scripts can be launched at any time

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



## 9.5.0.3 Run SQL queries from the selection in your editor

- Launches the ACS Run SQL Statements
- Connects to the database on the system that the member was on
- Some editing may be required to replace RPG variables with literals, etc.



The screenshot shows a window titled "C:\Users\IBM\_AD~1\AppData\Local\Temp\rdi351566643752194..." with a menu bar (File, Edit, View, Run, Options, Connection) and a toolbar. The main text area contains the following SQL query:

```
1 select empno,  
2     ename,  
3     edept,  
4     enhrs  
5 from empms  
6 where elocn = 'Rome' ;
```

Below the query, a message pane displays the following text:

```
No database connection  
  
Connected to relational database M100BB8P on  
embox1.demos.ibm.com as REINHARD -  
836359/QUSER/QZDASOINIT
```

A "Messages" tab is visible at the bottom of the window, showing a summary of the connection:

```
Connected to relational database M100BB8P on embox1.demos.ibm.com as REINHARD - 8363...
```

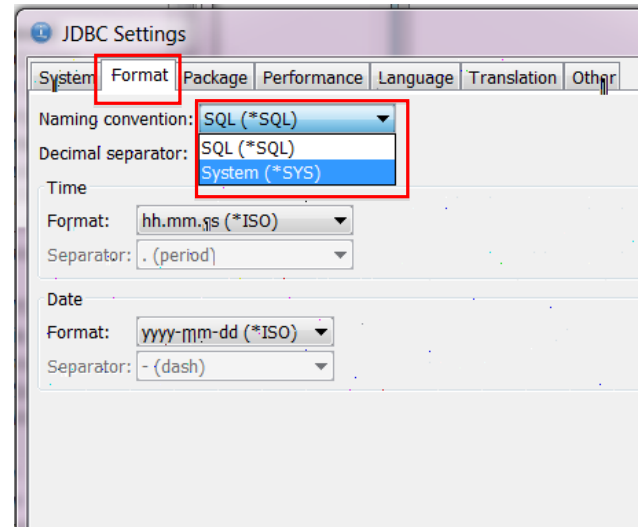
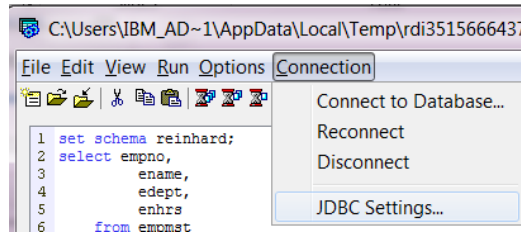
## 9.5.0.3 Run SQL queries from the selection in your editor

- However RSS does not set up the same LIBL as in RSE
- You can do this using one of the following commands:

```
cl:chglbl lib1 lib2 lib3;  
cl:call setmylibl;  
set schema prodlib;
```

```
1 set schema reinhard;  
2 select empno,
```

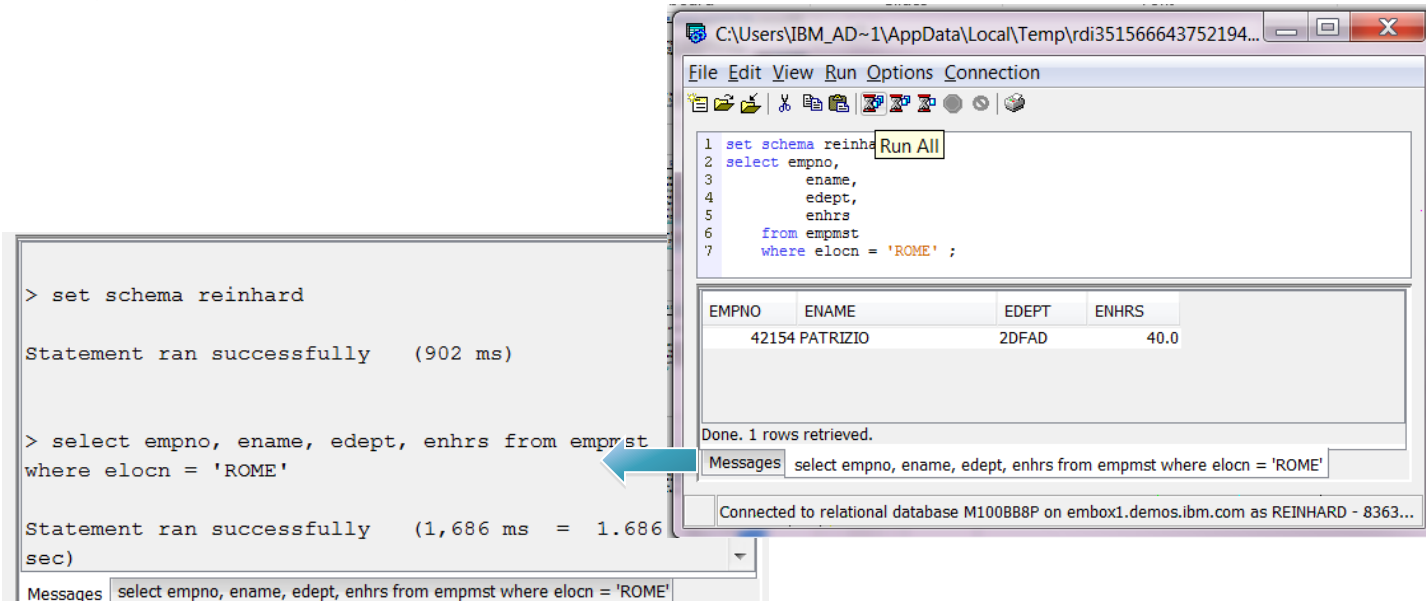
- You also should then set the naming to \*SYS





## 9.5.0.3 Select Run All and see the results

- Select Run All either from the toolbar or menu
- The results are shown in a tab on the bottom
- The Messages tab shows the log of commands and results



The screenshot shows a database client window with a menu bar (File, Edit, View, Run, Options, Connection) and a toolbar. The main area contains SQL code:

```
1 set schema reinhard
2 select empno,
3     ename,
4     edept,
5     enhrs
6 from empmst
7 where elocn = 'ROME' ;
```

A yellow box highlights the "Run All" button in the toolbar. Below the code is a table with the following data:

EMPNO	ENAME	EDEPT	ENHRS
42154	PATRIZIO	2DFAD	40.0

Below the table, it says "Done. 1 rows retrieved." and "Messages select empno, ename, edept, enhrs from empmst where elocn = 'ROME'". A blue arrow points from the "Messages" tab in the bottom left to the "Messages" tab in the bottom right. The status bar at the bottom right says "Connected to relational database M100BB8P on embox1.demos.ibm.com as REINHARD - 8363...".

On the left, a separate window shows the command prompt output:

```
> set schema reinhard

Statement ran successfully (902 ms)

> select empno, ename, edept, enhrs from empmst
where elocn = 'ROME'

Statement ran successfully (1,686 ms = 1.686
sec)

Messages | select empno, ename, edept, enhrs from empmst where elocn = 'ROME'
```

# 9.5.1 Visual Explain through ACS

The screenshot shows the Visual Explain interface. On the left, a SQL editor window displays a query: `SELECT * FROM MyTable WHERE Salary > 100000`. The 'Visual Explain' menu is open, with 'Run and Explain' (Ctrl+U) highlighted. A red arrow points from this menu item to the main Visual Explain window. The main window shows a query plan diagram with the following steps: User-Defined Table Function, Temporary Sorted List, Sorted List Scan, Rank, and Final Select. On the right, a table displays execution statistics:

Attribute	Value
Query Engin...	SQE
<b>Time Infor...</b>	
Timestamp...	2016-09-...
Statement S...	2016-09-...
Statement E...	2016-09-...
Total Estim...	1.956
<b>Actual Run...</b>	
Optimizatio...	2
Run Time (...)	Not Available
Statement O...	Not Available
Statement F...	Not Available
Statement C...	Not Available

At the bottom, the 'Statement text' tab is active, showing the following SQL code:

```
With TOP_CONSUMERS(JOB_NAME, MEMORY_POOL, AUTHORIZATION_NAME, FUNCTION_TYPE, Function,
TEMPORARY_STORAGE, RANK)
As (Select JOB_NAME, MEMORY_POOL, AUTHORIZATION_NAME, FUNCTION_TYPE, Function,
TEMPORARY_STORAGE, RANK()
OVER(Partition By MEMORY_POOL Order By TEMPORARY_STORAGE Desc)
From Table(QSYS2.ACTIVE_JOB_INFO()) X
Where JOB_TYPE <> 'SYS')
Select JOB_NAME, MEMORY_POOL, AUTHORIZATION_NAME, FUNCTION_TYPE CONCAT '-' CONCAT Function
As Function, TEMPORARY_STORAGE From TOP_CONSUMERS Where RANK In (1,2,3,4) Order By
MEMORY_POOL Desc
```

IBM i specific SQL query optimization

# 9.6 More ACS launch menus

v7r4 Toronto

Results

- New
- Go Into
- Go To
- Open in New Window
- Show in Table
- Monitor
- Open Member... Ctrl+Alt+Q
- Work With
- Refresh F5
- Sort
- Disconnect
- Clear Password
- Change Password...
- Release Interactive Job
- Verify Connection...
- Remote Servers
- Show Log
- Run Command...
- Host Connection Emulator
- Launch Run SQL Scripts
- Launch Schemas
- Launch 5250 Emulator
- Launch Access Client Solutions
- Properties Alt+Enter

Schemas - P8ADT07.CANLAB.IBM.COM

File View Actions

Databases

- P8adt07
  - Schemas
    - REINHARD
      - All Objects
      - Aliases
      - Column Masks
      - Constraints
      - Functions
      - Global Variables
      - Indexes
      - Journals
      - Journal Receivers
      - Procedures
      - Row Permissions
      - Sequences
      - SQL Packages
      - Tables
      - Triggers
      - Types
      - Views
      - XML Schema Repository (XSR)

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/

```
IBM Canada Lab
System : : : : : I7ADT06
Subsystem : : : : : DITTR
Display : : : : : UPGRD V001


Password : : : : :
Menu : : : : :
Current library : : : : :

Important Note
This internal system must only be
used for conducting IBM's business
for purposes authorized by IBM
management.
This system is subject to audit at any time
by IBM management.
You must ensure you have proper
permissions on your files!
For help submit your requests to
p://w0.canlab.ibm.com/help

Ver/Rel/Mod : : : : : 710
Driver : : : : : GA XPF/GA SLIC
System : : : : : I7ADT06
Owner : : : : : Phil Masby
Phone ext : : : : : 2314129
Install date: : : : : 012811
System Usage: : : : : 001 710 DBCS Test
Sec Level : : : : : 48

(C) COPYRIGHT IBM CORP. 1988, 2009.
06/022
```

IBM i Access Client Solutions

IBM i Access Client Solutions 

File Edit Actions Tools Help

System: p8adt05.canlab.ibm.com

- General
  - Data Transfer
  - 5250 Emulator
  - Integrated File System
  - Navigator for i
  - Printer Output
- Database
  - Schemas
  - Run SQL Scripts
  - SQL Performance Center
- Console
  - 5250 Console
  - Virtual Control Panel
  - Hardware Management Interface 1
- Management
  - System Configurations
  - 5250 Session Manager
  - HMC Probe Utility

## 9.6 Improvements to new ACS shipped with RDi 9.6

- **July 2017 – Version 1.1.7.1**
  - General enhancements:
    - Option to disable end users from accepting "trusted" signers (RFE 99153)
    - Option to enable SSL by default (RFE 100725)
    - Enable "Check for updates" from command line (RFE 96516)
    - Provide better error details (RFE 99599, RFE 105977)
  - Enhancements to 5250 Emulation:
    - Screen History Archiving
    - Toolbar buttons for launching Navigator for i, Schemas, and SQL Performance Center
  - Enhancements to Printer Output:
    - Combine date/time into single column with most current entry displayed first (RFE 93655)
    - Date/Time filter (RFE 99212)
    - Filter Reset button (RFE 104310)
  - Enhancements to Data Transfer:
    - Automatically truncate extra columns during upload (RFE 106407)

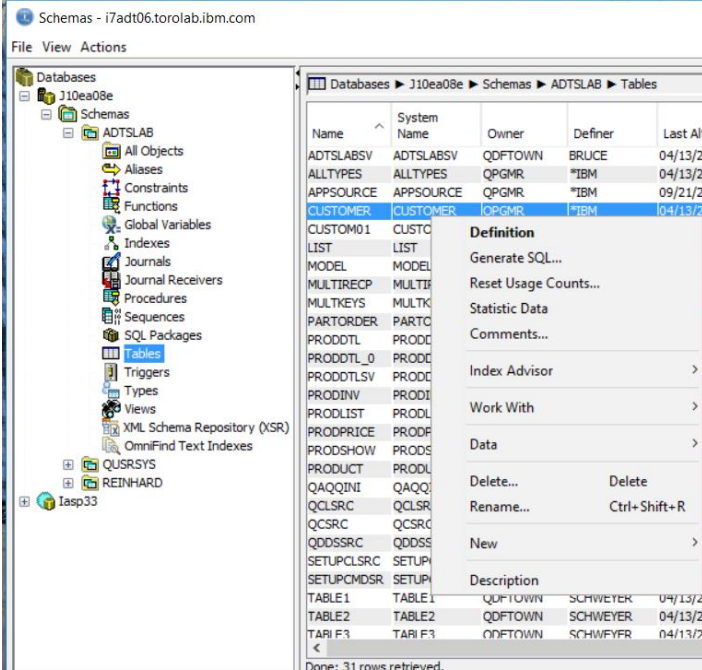
## 9.6 ACS 1.1.7.1 enhancement contd

- Enhancements to Schemas:
  - Added Health Center
  - Additional filters for object folders
  - Action for checking permissions
  - Added View Entries to Journals
- Enhancements to Run SQL Scripts:
  - Added SQL Performance Monitor
  - Added headings to text type output (RFE 91120)
- Enhancements to SQL Performance Center:
  - Added Import SQL performance data
  - Support for adding SQL Performance Monitors, Plan Cache Snapshots, SQL Plan Cache Event Monitors
  - Properties for SQL Performance Monitors, Plan Cache Snapshots, and SQL Plan Cache Event Monitors
- Enhancements to Visual Explain:
  - Added icon Help text
- Several fixes

## 9.5.1.2 Improvements to new ACS shipped with RDi 9.5.1.2

### List of ACS enhancements

- **March 2017 – Version 1.1.7.0**
- Many actions on database objects
- Such as:
  - Manage definitions
  - Generate SQL
  - Work with properties
  - Object rename
  - Create new database object
  - Show object references
  - Index advisor (raw and condensed)
  - Explain SQL
  - Table data actions
    - (view, clear, copy, initialize)



Schemas - i7adt06.torolab.ibm.com

File View Actions

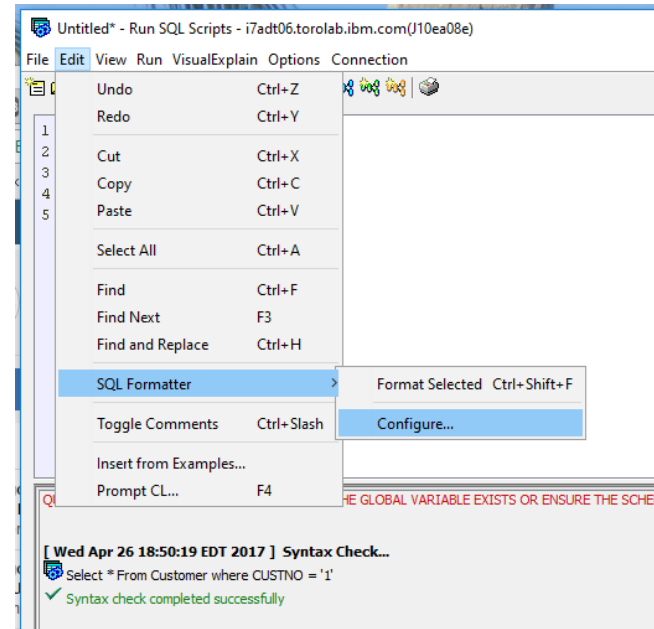
Databases ▶ J10ea08e ▶ Schemas ▶ ADTSLAB ▶ Tables

Name	System Name	Owner	Definer	Last Al
ADTSLABSV	ADTSLABSV	QDFTOWN	BRUCE	04/13/20
ALLTYPES	ALLTYPES	QPGMR	*IBM	04/13/20
APPSOURCE	APPSOURCE	QPGMR	*IBM	09/21/20
CUSTOMER	CUSTOMER	QPGMR	*IBM	04/13/20
CUSTOM01	CUSTO			
LIST	LIST			
MODEL	MODEL			
MULTIRECP	MULTI			
MULTKEYS	MULTK			
PARTORDER	PARTO			
PRODDTL	PRODC			
PRODDTL_0	PRODC			
PRODDTLV	PRODC			
PRODINV	PRODI			
PRODLIST	PRODL			
PRODPRICE	PRODF			
PRODSHOW	PRODS			
PRODUCT	PRODL			
QAQQINI	QAQQI			
QCLSRC	QCLSR			
QCSRC	QCSRC			
QDSSSRC	QDSS			
SETUPCLSRC	SETUP			
SETUPCMDSR	SETUP			
TABLE1	TABLE1	QDFTOWN	SCHWEYER	04/13/20
TABLE2	TABLE2	QDFTOWN	SCHWEYER	04/13/20
TARI F3	TARI F3	QDFTOWN	SCHWEYER	04/13/20

Done: 31 rows retrieved.







## 9.5.1.2 Improvements to new ACS shipped with RDi 9.5.1.2

- Enhancements to Run SQL Scripts
  - Added CL Prompter
  - Added upload results
  - Improved formatting
  - Enhanced SQL highlighting
  - Many new 'Insert from Examples' (built using SQL Services)
- **January 2017 – Version 1.1.6.2**
- Enhancements to Printer Output filter:
  - multiple output queues
  - User-Specified Data



# Modernization Tools, Java Edition

- Added WAS 9 tools, dropped WAS 7/8 tools
- Using Rational Application Developer 9.6.1 components

-  IBM® Rational® Developer for i 9.6.0.0
  -  RPG and COBOL Tools
  -  Modernization Tools, Java Edition
    -  Web and mobile developer tools
    - Bluemix tools
    - Cordova tools
    -  IBM i and enterprise web developer tools
  -  WebSphere® Application Server tools
    - WebSphere Application Server Liberty tools
    - WebSphere Application Server classic 9.0 tools
    - WebSphere Application Server classic 8.5 tools
    - WebSphere Application Server Liberty Portal tools
    - WebSphere Portal Server 9.0 tools
    - WebSphere Portal Server 9.0 on WebSphere Application Server 8.5
    - WebSphere Portal Server 8.5 tools
    - WebSphere Portal Server 8.0 on WebSphere Application Server 8.5
    - WebSphere Application Server test and performance tools
- Eclipse Git Team provider



# Servers and Systems Software RFE Community



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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

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Developer for Power Systems

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Top

New

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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](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:

1 new

0 planned

120 delivered

215 users

5013 votes

2166 comments

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.

✓ Vote

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...

✓ Vote

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

✓ Vote

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](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
- 5 RFEs in RD i 9.5.1.2
- 12 RFEs in RD i 9.6

	Support for ILE RPG %PROC built-in function. For more information, see the documentation in: <a href="https://www.ibm.com/support/knowledgecenter/SSAE4W_9.6.0/com.ibm.stools.iseries.ile.rpg.ref.doc/topics/bproc.htm">https://www.ibm.com/support/knowledgecenter/SSAE4W_9.6.0/com.ibm.stools.iseries.ile.rpg.ref.doc/topics/bproc.htm</a>
RFE70905	Compare Doesn't Merge from RSE. The Compare tool in RSE now enables the merge features when comparing remote IBM i members. Previously, this was only available when comparing local members in i Projects or when comparing local i Project members with their corresponding remote members in Remote Reconciler. In addition, differences like sequence numbers can now be properly displayed using the Text Compare option in the Compare tool and will allow you to better synchronize and merge conflicts, for example, when using eGit tools. NOTE: If multiple compare editors are open for the same source members edit mode will be disabled.
RFE82757	Error list does not position to correct source line if any source lines have been added or deleted. Error List messages are now displayed as annotations in the editor instead of inserted as pink inline message text. Double clicking on verify or compile errors in the Error List view, will open the source member, insert the messages as annotations, highlight the code in error and allow you to hover over the code and click on a link to get the second level message help. If you prefer to go back to the style where messages are inserted as text in the source, select the View Menu -> Message Style -> Show messages as annotations (drop down arrow icon on the right hand side of the Error List view). Note: Syntax check errors are also set to display messages as annotations by default. To turn this off, go to Window -> Preferences, then select Remote Systems > Remote Systems LPEX Editor > IBM i Parsers. Uncheck 'Display syntax check messages as annotations'. Issue: Annotations cannot be properly displayed for some DDS compile messages and should be turned off for this case. This is a known issue and will be corrected. For more information, see the documentation in: <a href="https://www.ibm.com/support/knowledgecenter/SSAE4W_9.6.0/com.ibm.stools.iseries.rse.doc/topics/t_error_message_style.html">https://www.ibm.com/support/knowledgecenter/SSAE4W_9.6.0/com.ibm.stools.iseries.rse.doc/topics/t_error_message_style.html</a>
RFE36974	Change behaviour of TAB-key for /free lines. The Tab key will now insert spaces into free form ILE RPG source lines when pressed. Shift+Tab will indent the free form line. If you select one or more free form lines and press Tab or Shift+Tab it will increase or decrease the indent respectively. To change the number of spaces used, go to Window -> Preferences, then select Remote Systems > Remote Systems LPEX Editor > IBM i Parsers -> ILE RPG -> Formatter. Set the value in 'Number of spaces to indent by'. If you prefer to go back to the behavior where Tab and Shift+Tab behave the same way on free form lines as fixed form lines, go to Window -> Preferences, then select Remote Systems > Remote Systems LPEX Editor > IBM i Parsers -> ILE RPG -> Key Behavior. Uncheck 'Tab key inserts spaces for free form source'. Note: The 'Key Behavior' preference now includes all Key behavior settings previously found in the parent ILE RPG preference. Two new settings were added: 'Tab key inserts spaces for free form source' for RFE36974 and 'Enter key splits line for free form source' for RFE25265.
RFE25265	LPEX Editor behavior when enter pressed/delete pressed. The Enter key will now split the line when Enter is pressed on free form ILE RPG source lines. The delete key has not been enabled to join lines, so Alt+J should still be used to join lines. RFE25265 has been partially implemented and will remain open. If you prefer to go back to the original behavior for the Enter key, go to Window -> Preferences, then select Remote Systems > Remote Systems LPEX Editor > IBM i Parsers -> ILE RPG -> Key Behavior. Uncheck 'Enter key splits line for free form source'. Note: The 'Key Behavior' preference now includes all Key behavior settings previously found in the parent ILE RPG preference. Two new settings were added: 'Tab key inserts spaces for free form source' for RFE36974 and 'Enter key splits line for free form source' for RFE25265.
RFE74270	Show contextual warning about unused local variables. Warning annotations are now displayed in the editor for any unreferenced definitions. To turn this off, go to Window -> Preferences, then select Remote System LPEX Editor > IBM i Parsers -> ILE RPG. Uncheck "Annotate unreferenced definitions". For more information, see the documentation in: <a href="https://www.ibm.com/support/knowledgecenter/SSAE4W_9.6.0/com.ibm.stools.iseries.rse.doc/topics/tannot_unref.html">https://www.ibm.com/support/knowledgecenter/SSAE4W_9.6.0/com.ibm.stools.iseries.rse.doc/topics/tannot_unref.html</a>
RFE103832	Recognize fields renamed in RPG I-specs in RD i live outline. ILE RPG Fields that are renamed by externally-described I-Specs are now fully supported.
RFE104305	RD i search should include PF38-SRC as well as PF-SRC
RFE89682	ILE RPG Display Parameters When Hovering Over External Procedure Calls
RFE77545	Trim Leading Spaces when joining lines (alt-J). Note: This now supports CL in addition to RPG.
RFE40701	Shortcut in i Projects for Remote Actions - Push Selected, Compile Commands. i Project short cut key Alt+Shift+B can now be used to launch a project build and Ctrl+Alt+R can be used from within the editor to retrieve errors from the last project build
RFE26939	ILE RPG Named Indicator should appear in the Fields section of the Outline view
RFE85666	IBM i command line tools for code coverage. PTfs are now available for IBM i 7.2 and 7.3 for RDS option 60 that provide command line tools to invoke code coverage. The output is imported into RD i to view the results.

# Future Product Goals

- Make RDi the most compelling development tool for the IBM i
- Make it seamless for SEU/PDM users to upgrade
- Attract young development talent to platform
- Improve the effectiveness of IBM i developers
  - Software Engineering – Refactoring/Automated Test/Code Coverage


# Conclusion

- RPG is evolving rapidly and RDi is keeping pace (SEU is not)
- Free-form RPG and RDi solves skill-depletion
- Goal to make green screen developers more comfortable and productive
- Lot's of goodies in RDi 9.6 – worth upgrading
- Organization effectiveness enhanced through software best practices
- We are prioritizing investment according to your feedback via RFE



**With RDi, IBM i programming is cool and productive!**

## Resources

- Rational Developer for i 9.6
  - [http://ibm.biz/rdi\\_product](http://ibm.biz/rdi_product) – purchase, what's new
  - [http://ibm.biz/rdi\\_product\\_evolution](http://ibm.biz/rdi_product_evolution) – is this an update, technical details
  - [http://ibm.biz/rdi\\_fix\\_list](http://ibm.biz/rdi_fix_list) – list of all enhancements and fixes by release
  - [http://ibm.biz/rdi\\_install](http://ibm.biz/rdi_install) – options for enterprise installation
  - [http://ibm.biz/rdi\\_roi](http://ibm.biz/rdi_roi) – personalized business case generator
  - [http://ibm.biz/rdi\\_wiki\\_self\\_learning](http://ibm.biz/rdi_wiki_self_learning) - lots of online learning resources
  - [http://ibm.biz/rdi\\_documents](http://ibm.biz/rdi_documents) - documentation and notices
- How to stay in touch
  - [https://ibm.biz/rdi\\_hub](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](http://ibm.biz/rdi_rfe) - request for enhancements
  - [LUG requirements](#) 
  - [COMMON](#) 