

Rational Developer for i Sandbox for IBM i Lab Exercise Workbook

Rational Developer for i

Lab 02f - Maintain a Free-Form ILE RPG application using Remote System Explorer

This exercise guides you through editing a free-form RPG source member and working with the LPEX editor

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The most up to date version of this document can be found on Rational Developer for i - Hands-On Labs at http://ibm.biz/rdi_labs.

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Lab 02f - Maintain an IBM i application using Remote System Explorer (RSE) to Edit Free-Form RPG source

Overview

This tutorial teaches you how to maintain an IBM i application written in ILE RPG using the Remote System Explorer.

Learning objectives

Use tools and views in the Remote System Explorer (RSE) perspective to edit, a source member.

Skill level and prerequisites

Introductory.

Important!



You should complete **RD i Lab01** 'Getting started' before you work on this lab. Lab01 contains the following information and instructions:

- Which IBM i server to connect to
- Which User ID to use
- How to start RDi, create a connection and connect
- How to setup the correct library list for this lab

Knowledge of basic Microsoft Windows operations such as working with the desktop, mouse operations such as opening folders and drag-and-drop is assumed. It will also be helpful if you understand DDS and ILE RPG.

Conventions used in this workbook

Bold font	is used to highlight user interface controls
Mono-spaced font	is used for user input text and code blocks
<i>Italic font</i>	is used for variable names and glossary terms

The following icons are also used to identify categories of information:

Icon	Purpose	Explanation
	Important!	This symbol calls attention to a particular step or command. For example, it might alert you to type a command carefully because it is case sensitive.
	Information	This symbol indicates information that might not be necessary to complete a step but is helpful or good to know.
	Trouble-shooting	This symbol indicates that you can fix a specific problem by completing the associated troubleshooting information.

Client System requirements

The labs require IBM Rational Developer for IBM i (RDi) to be installed on your workstation. If you do not yet have this, you can download it for free from http://ibm.biz/rdi_trial.

Host System requirements

The easiest way to ensure you have everything you need, is to use the demonstration IBM i server that is set up and ready to use with these lab exercises. These labs use the RSELABxx library on that system. For those who want to run these labs on to their own system, you can load a SAVF with the RSELABxx library from [rselabxx.savf](#).

1. Opening source members in the Remote System Explorer

This module teaches you about the Live Parsing eXtensible (LPEX) editor. How to edit source members and how to navigate through source member.

Learning objectives:

- Open a member for edit from the Table view or the Remote Systems view
- Maximize the editor space
- Open another member for edit
- Switch from one edit session to another edit session
- Open multiple views of the same source member
- Display a structural outline of items defined in a source member

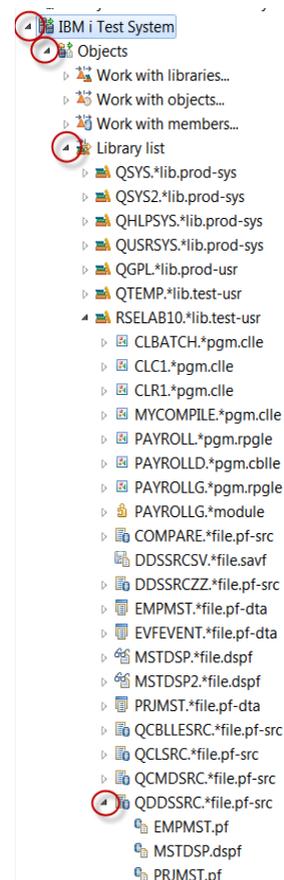
1.1 Getting started with RDi

The information about starting Rational Developer for i (RDi) is described in Lab01 the first of this series of labs. Please start with the first lab to learn how create a connection to an IBM i system. How to use the Remote System Explorer View to access IBM i objects. After you went through the exercises in the first Lab, you are ready to start with this Lab and use the connection to your IBM i system that is available in the RDi workspace.

Make sure the library list is setup so library RSELABxx, xx being your assigned team number, is part of the library list.

__1. Expand library **RSELABxx** if it is not already expanded

__2. Expand file **QDDSSRC** in library **RSELABxx**



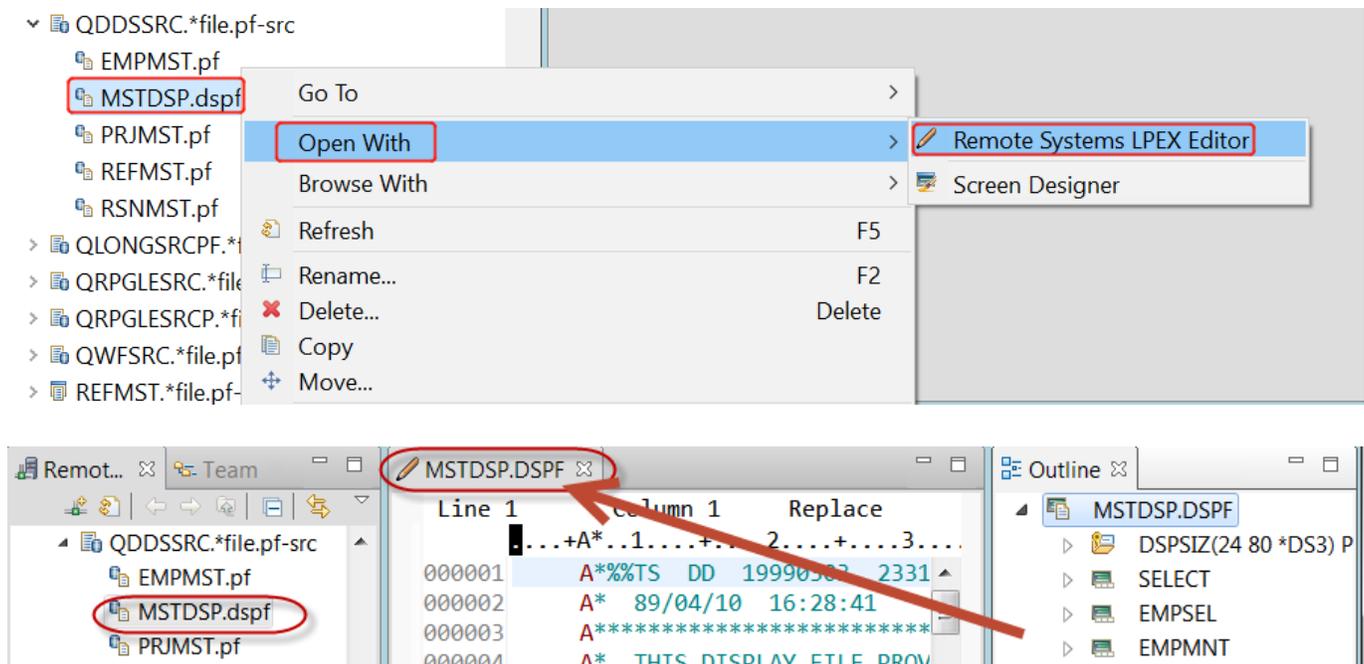
1.2 Opening a source member

You are going to use the Remote Systems LPEX Editor to edit the member **MSTDSP** found in **QDDSSRC**.

1. From the Remote Systems view **right-click** member **MSTDSP** in the **QDDSSRC** source file. Select to **Open With**, then **Remote Systems LPEX Editor**.

The Remote Systems LPEX Editor opens. It is built right into the workbench, with rich editing functions and is IBM i aware! It is a superset of SEU! The syntax checker is ported from SEU, and the reference manuals are built-in and F1 cursor sensitive.

2. Double-click the **MSTDSP** tab to maximize the Editor window.
3. Double-click the **MSTDSP** tab again to return the view to its original size.



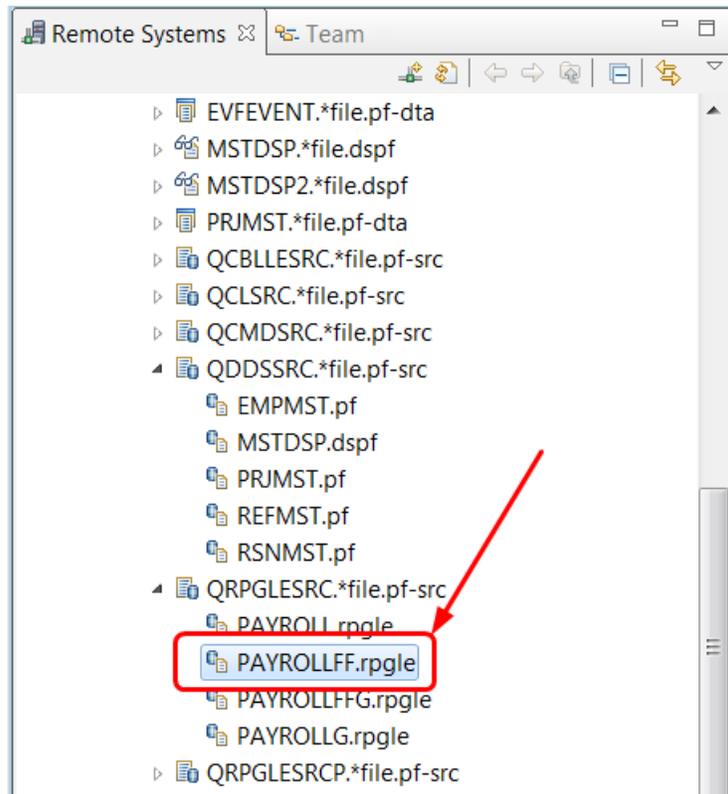
Tip: To open IBM i™ members quickly, you can use the keyboard shortcut **Ctrl+Alt+Q**.

1.3 Opening a second source member and multiple views

Next let's open a second member in the editor.

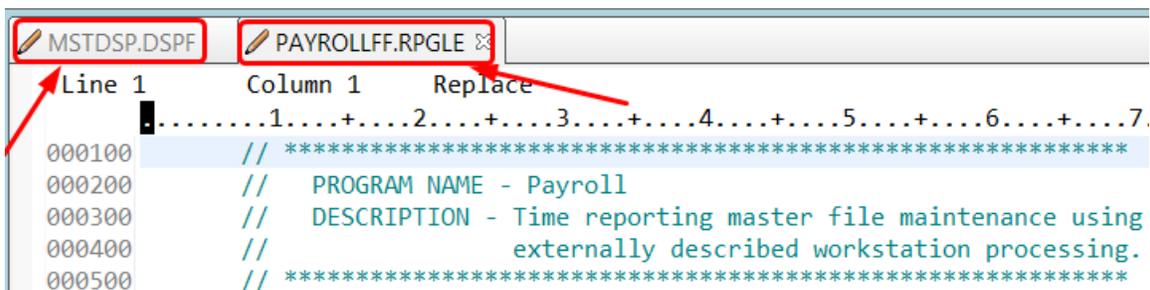
To open a second source member:

1. In the Remote Systems view, double-click member **PAYROLLFF** in the **QRPGLESRC** source file.



You can easily switch between the two edit sessions

- __2. Click on each tab to switch from one edit session to another edit session.



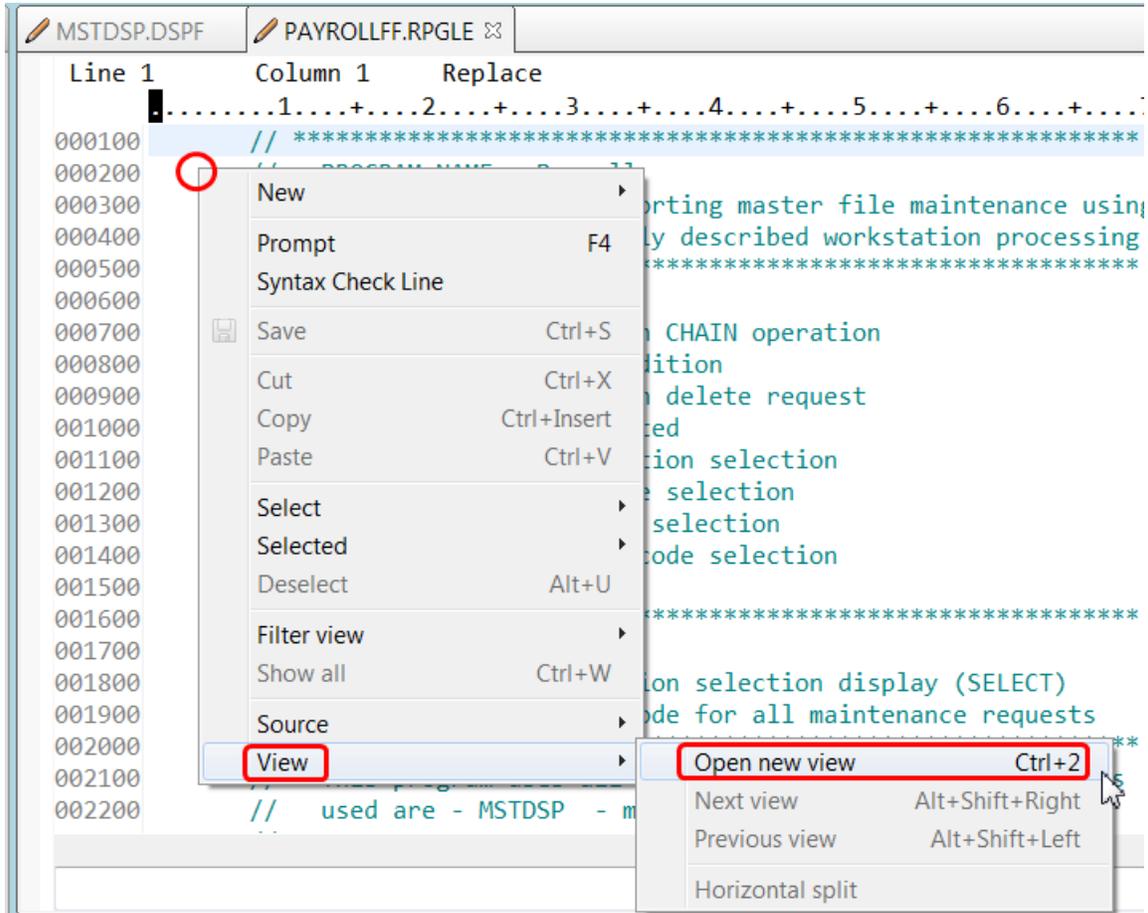
Tip: You can also switch between files that are open in the editor view by pressing **CTRL+F6**.

You can open multiple views of the **same** source member while editing in the Remote Systems LPEX editor. To open multiple views of your RPG source:

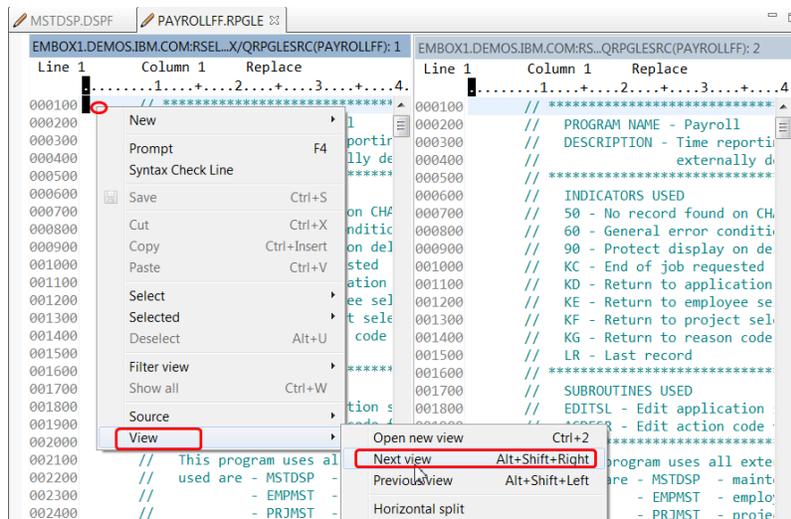
- __3. Double-click the **PAYROLLFF** tab in the editor to maximize the Editor window.
- __4. Right-click this source in the Editor view and click **View > Open new view**.



Tip: You can open a maximum of five views of the same source.



- 5. Right-click in one of the source views and select **View > Next view** or **View > Previous view** to navigate among the views.





Note:

Any changes made in one of the views will automatically update all other views of the same source.

- 6. Scroll down and place the cursor at line 33 in the left view of the Payroll source.
- 7. Press End key, then Press Enter.

Line	Column	Replace	1 change
003200	1	//	Compile time array containing error
003300	1	Dcl-S	ERR Char(50) DIM
003400	1	Dcl-S	EMESS Char(50);
003500	1	//	
003600	1	//	*****

A new line is inserted in both views.

Define a new integer variable, **i** with length 10:

- 8. First type in **Dc** and press Ctrl-Space to see what op-codes are available.

```

300      Dcl-S ERR          Char(50)      DIM(10) CTDA*
301      Dc
400
500      Dcl-c
600      Dcl-ds
700      Dcl-f
800      Dcl-parm
900      Dcl-pi
000      Dcl-pr
100      Dcl-s
200      Dcl-subf
300      Dcl-proc
    
```

- 9. Select Dcl-S, press Space key and then press Ctrl-Space to find out what comes next

```

RNF3308
RNF3308
RNF3308
    
```

Dcl-s

Name:

Name:
Enter a valid name. The normal rules for RPG IV symbolic names apply; reserved words cannot be used (see Symbolic Names). The name can begin in any position in the space provided. Thus, indenting can be used to indicate the shape of data in data structures.

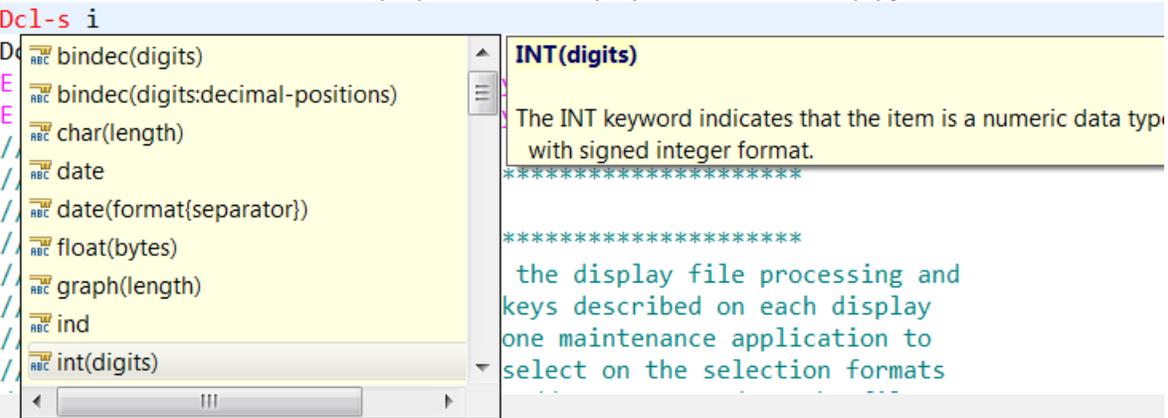
Is the display file processing and
n keys described on each display
m one maintenance application to

- __10. Enter the name **i** and a space then press Ctrl-Space to get content assistance on what comes next.

```

Dcl-S ERR          Char(50)          DIM(10) CTDATA PERRCD(1);
Dcl-s i

```



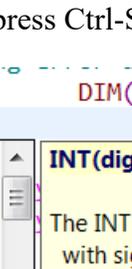
The screenshot shows a code completion popup for the variable `i`. The popup lists several data types: `bindec(digits)`, `bindec(digits:decimal-positions)`, `char(length)`, `date`, `date(format{separator})`, `float(bytes)`, `graph(length)`, `ind`, and `int(digits)`. The `int(digits)` option is highlighted. A tooltip for `INT(digits)` is also visible, explaining that the `INT` keyword indicates that the item is a numeric data type with signed integer format.

- __11. Select **int(digits)** and you are prompted to type in the number of digits in between the parentheses.

```

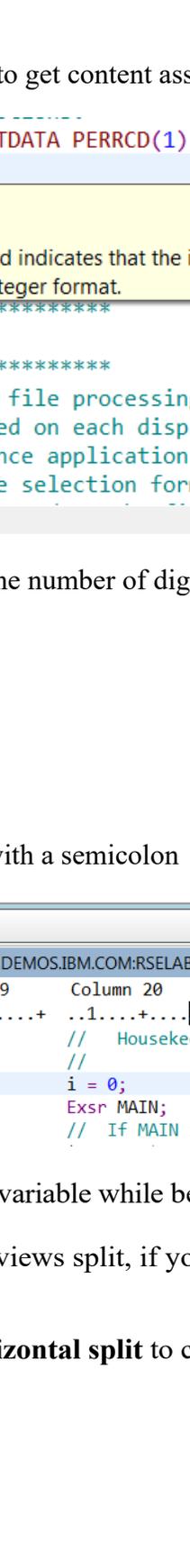
Dcl-F INT
// (
// ( digits t
Dcl-S )
Dcl-s i int()

```



The screenshot shows the code completion popup for `int(digits)`. The user has entered `int(` and the popup shows `int(digits)`. The user is prompted to enter the number of digits in between the parentheses.

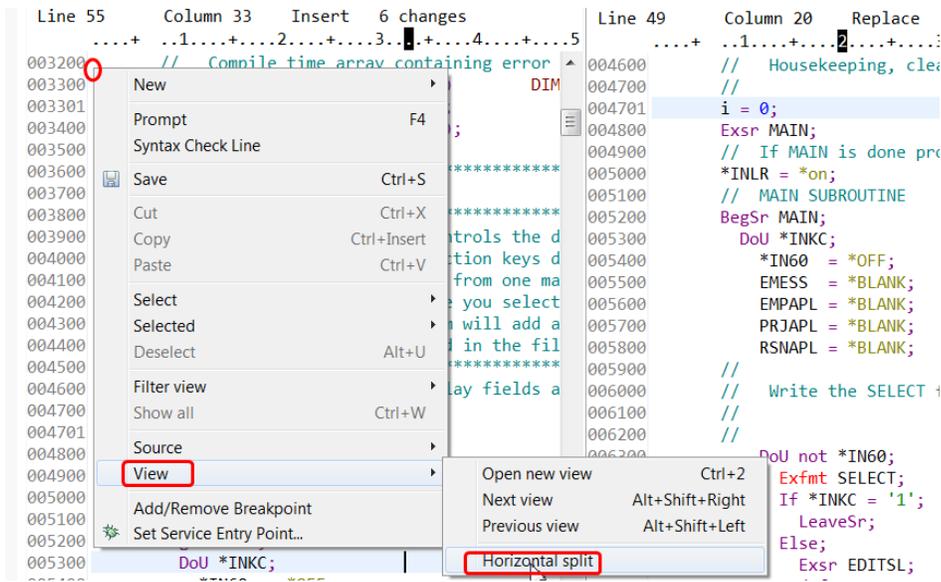
- __12. Specify 10 digits and end the free-form statement with a semicolon



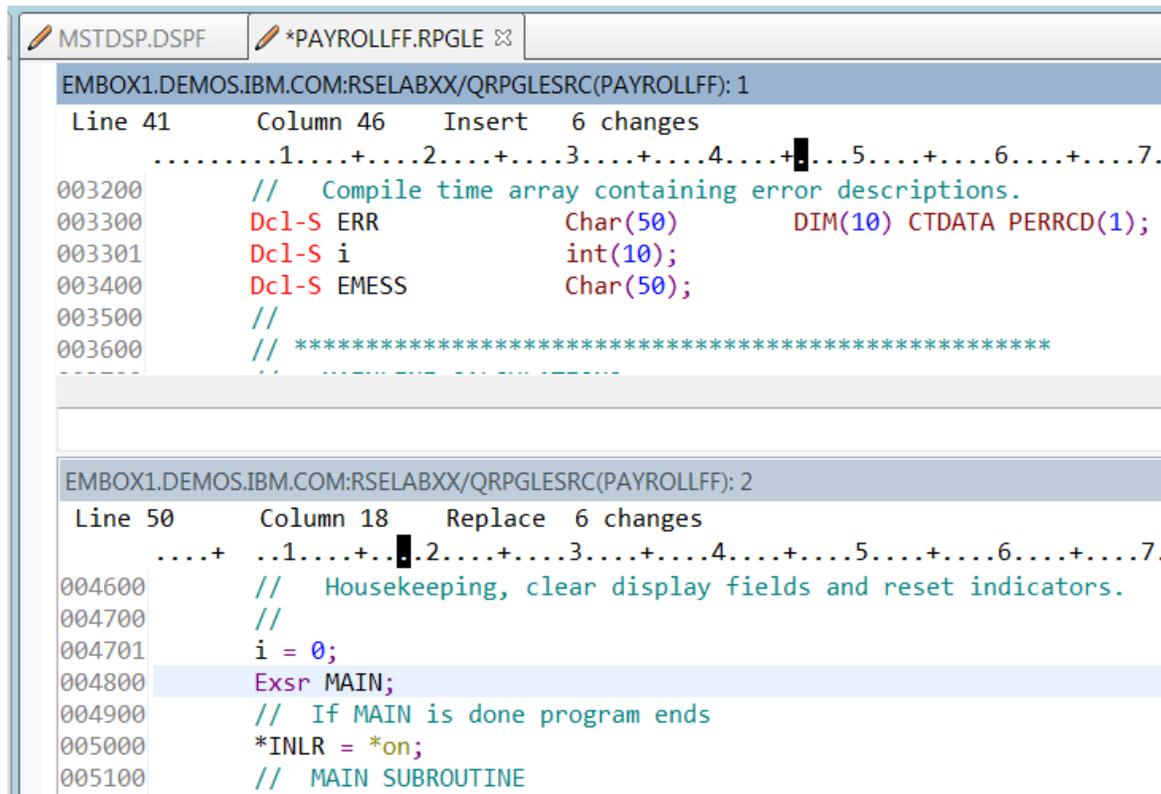
The screenshot shows two source views side-by-side. The left view shows the definition of the variable `i` as `int(10);`. The right view shows the use of the variable `i` in a program, including a comment "Housekeeping, clear display fields" and a line `i = 0;`.

Now, in the view on the right, you can start using the new variable while being able to maintain your view on the left on the definition of the variable. Another nice feature is the ability to change the way the views split, if you don't like the vertical split you can specify to split horizontal instead. Let's try that:

- __13. Right-click a source view and select **View > Horizontal split** to change from a vertical split of the views to a horizontal split of the views.



Here is how your edit view should look now:



If you want to close the extra views:

- __14. Right-click the source view that you want to close
(RSELABXX/QRPGLESRC(PAYROLL): 2)
- __15. Select **View > Close view**



Tip:

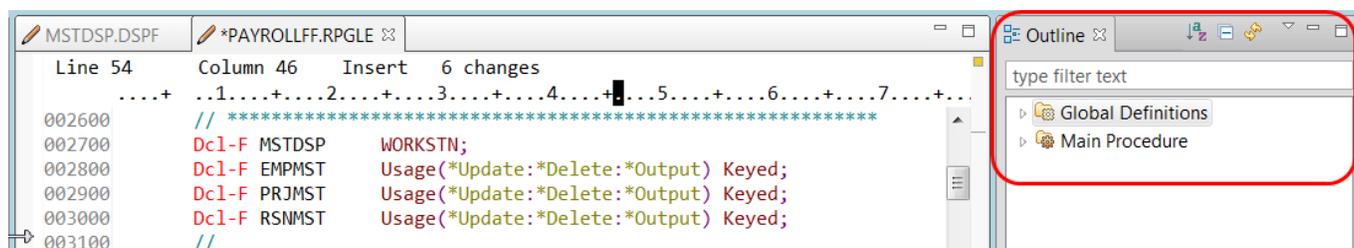
This option is not available on the first view

You have opened another member for edit and seen multiple views of a member.

1.4 Using the Outline view of a source member

The Outline view acts as an excellent resource when you want to navigate through RPG, COBOL and DDS source in the Remote Systems LPEX editor. The Outline view displays a structural outline of items defined in the file that you currently have open in the Remote Systems LPEX editor window. With the editor active, you can expand the file structure in the Outline view and click various elements in the view to jump to that location in the source itself. To see an Outline view of your RPG source:

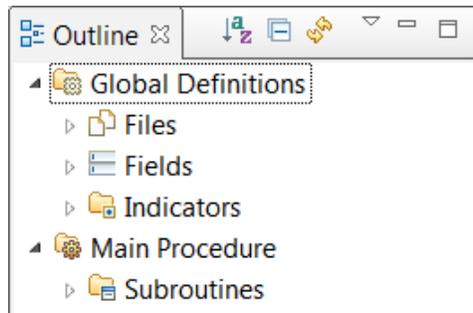
- __1. Click the **PAYROLLFF** tab in the editor and take a look at the outline view on its right.



Tip:

If you have closed the Outline view previously, you can reset the perspective by selecting **Window > Reset perspective** from the workbench menu or **Window > Show view > Other**, then expand **General** and click **Outline** in the Show view dialog.

The Outline view contains your source program in a tree view without the lines containing logic.



Now you want to see more details of your source member.

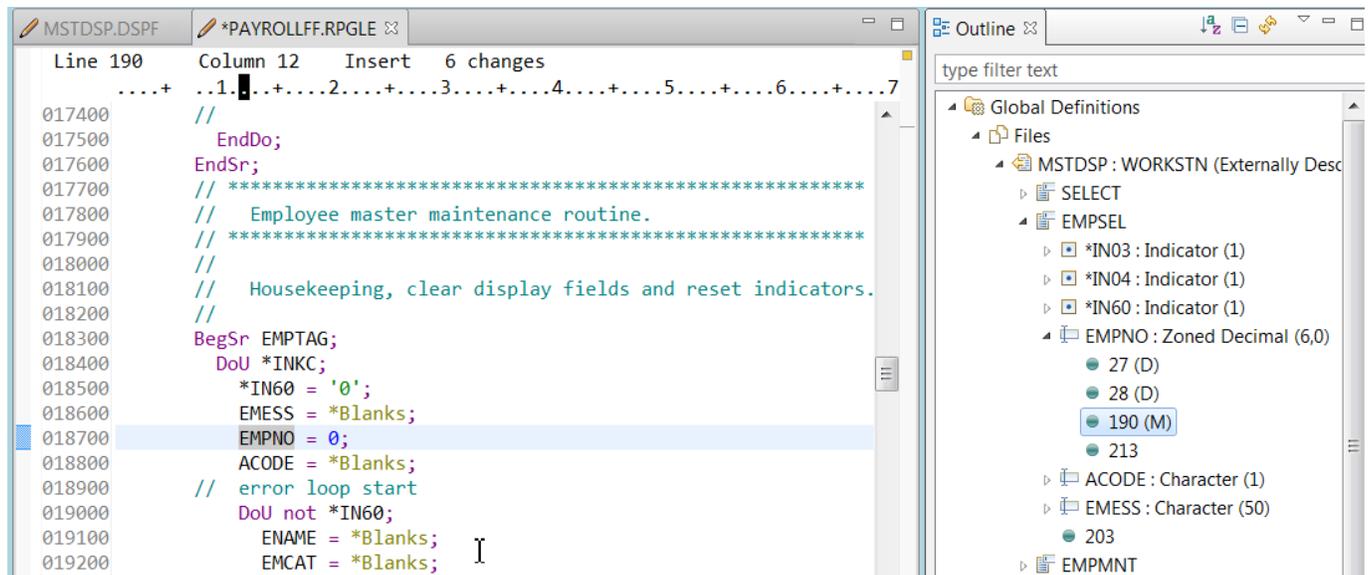
- __2. Expand Files.
- __3. Expand the MSTDSP workstation file.
- __4. Expand the EMPSEL record format.
- __5. Expand EMPNO.
- __6. Click on any line number in the Outline view.

This will position the source editor accordingly.



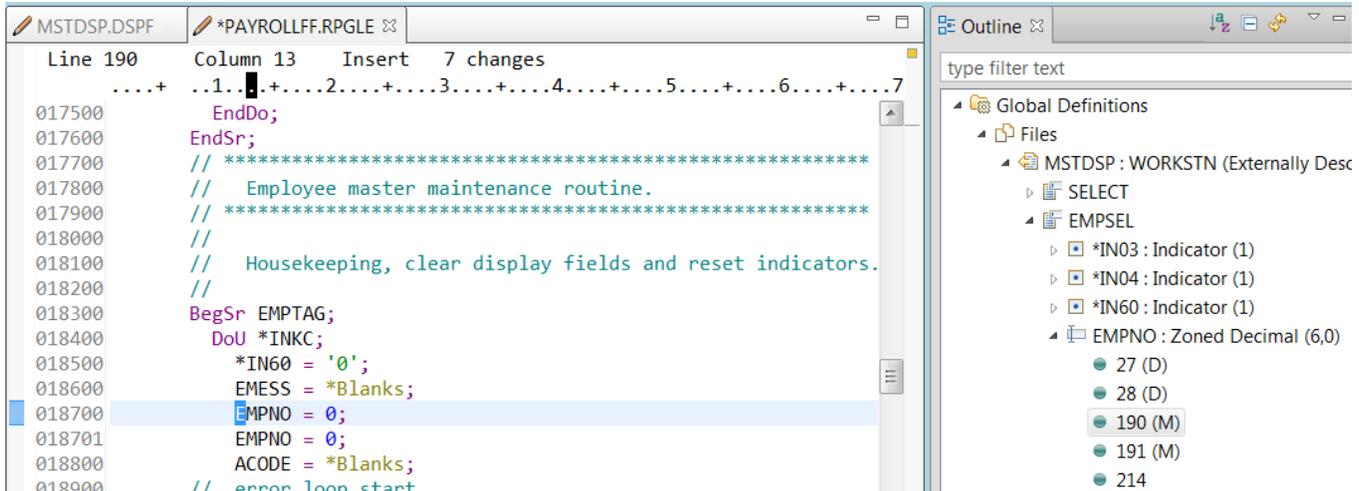
Tip:

Clicking a field or a variable in the Outline view will position the editor to its definition.

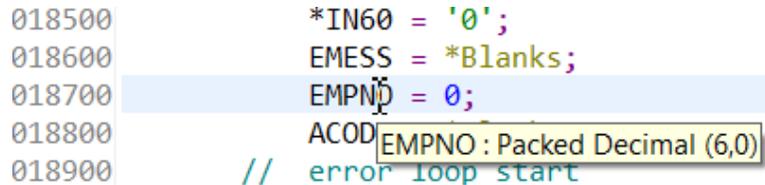


The lines followed by a (D) mean definitions. Those followed by an M mean a modification reference and if there is no suffix, then it is a read only reference.

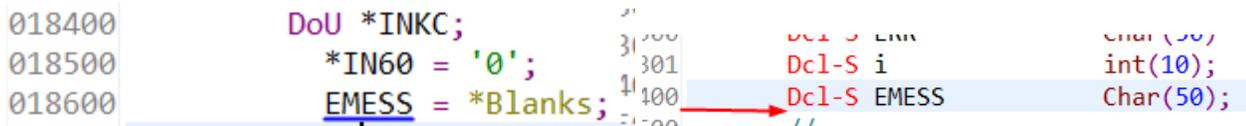
- __7. Press Ctrl-D to duplicate the line `EMPNO = 0;`. Notice how the outline view is immediately updated with the new reference. Press Ctrl-Z to remove the duplicated line. We will discuss **Undo** more in the next section.



8. Hover the mouse over the EMPNO variable for a little while and notice the hover that appears and shows the definition of the variable. This will work for all other references as well.



9. Hold down the Ctrl key and hover over any variable, for example the EMESS variable and it will appear underlined like a hyperlink. If you click on it at this point, it will take you to the definition of that variable. This will also work for calls to subroutines and procedures.



10. The other buttons on the outline view allow you to sort entries alphabetically, instead of in the order they appear in the source, as well as collapse all sections. The yellow arrows allow you to refresh the outline view in case external files have changed and you want to pick up the new set of records and fields. The final divot brings up a menu that will take you to preferences to customize your ILE RPG editor behavior.



11. Click the **PAYROLL** tab to get the PAYROLL editor window in focus for the next lesson.

You have displayed an outline of a source member while editing RPG or DDS sources.

2. Working with the Remote Systems LPEX editor

This module teaches you how to edit an RPG source member and learn about some of the Remote Systems LPEX Editor's language support features.

Learning Objectives

- Change the default settings of the LPEX Editor Parsers
- Change the color settings and font used by the Editor
- Change the default behavior of the Enter key
- Use SEU commands to edit source
- Undo and redo source changes
- View language sensitive help for the MOVE operation code
- View a list of all help contents
- Limit the search of help to specific documents
- Search the help
- Request a prompt for a specification line
- Display context sensitive help for any field in the IBM i Source Prompter
- View the beginning and ending of constructs in your source
- Use the Find and Replace window to search for an item in your source
- Filter or subset your source
- Filter lines based on line type
- Search through members in a source physical file
- Compare different versions of a program and identify the differences
- Syntax check source by line
- View help on syntax errors
- Introducing the LPEX editor

Your program editing tasks are simplified with the Remote Systems LPEX Editor. The editor can access source files on your workstation or your IBM i system directly. When a compilation results in errors, you can jump from the compiler messages to an editor containing the source. The editor opens with the cursor positioned at the offending source statements so that you can correct them.

Here is a list of some of the basic editor features that you would expect in a workstation editor:

- Cut, copy, and paste
- Block marking of lines, characters, or rectangles with copy, move, and delete operations
- Powerful find and replace function
- Unlimited undo and redo

In addition, there are a few more functions that you may not have seen in a workstation editor:

- Token highlighting where different language constructs are highlighted using different colors to help identify them in a program
- SEU-like format-line rulers to show the purpose of each column for column-sensitive languages like RPG and DDS. These rulers can automatically update themselves to reflect the current specification.
- SEU-like specification prompting for CL, RPG, and DDS
- Sequence numbers, which allow SEU-style commands in the prefix area
- Intelligent tabbing between columns for column-sensitive languages
- Automatic uppercasing for languages that expect uppercase
- Settings for column-sensitive languages that simplify text insertions and deletions
- On-line language reference

2.1 Changing default editor settings

The LPEX Editor has predefined settings, but also has an associated preferences page containing settings that you can modify. The name of the preference category is LPEX Editor and it appears in the left pane of the **Preferences** window.

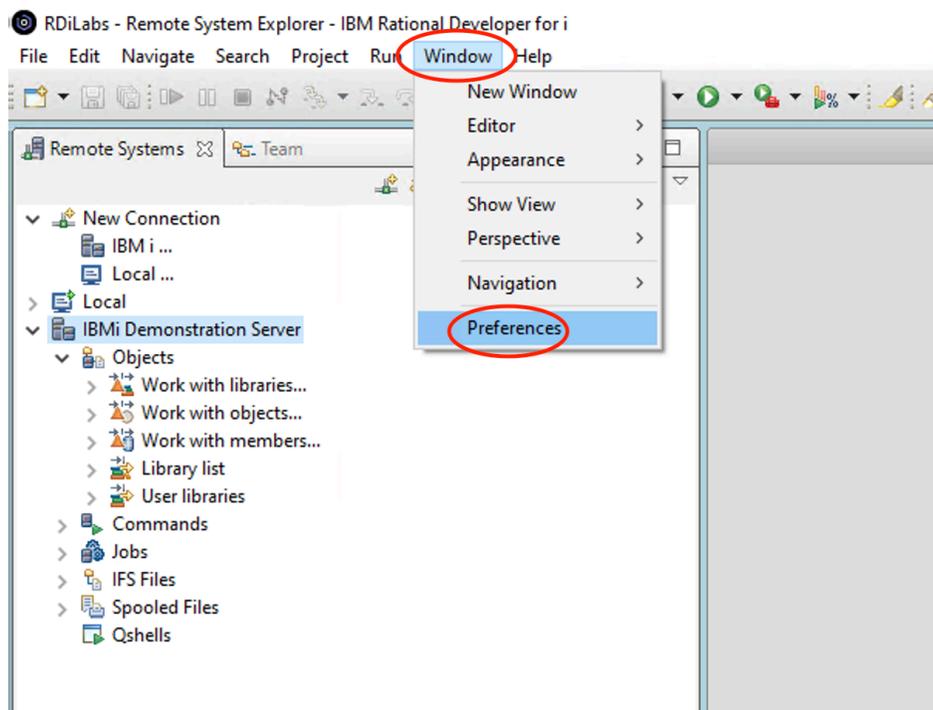
You will change the default settings of LPEX Editor Parsers, Appearance and User Key Actions.

LPEX provides special support for insertion and deletion in column-sensitive languages.

When column-sensitive editing is selected, each column is considered as a separate entry space. For example, in an RPG source member, if you are inserting into or deleting characters from a string that is in the Factor 2 entry, the Result field entry does not move. The default editor preference is that column-sensitive editing is off. You can switch this support on by going to the workbench preferences window.

2.2 Autosave while editing source

1. In the workbench menu, click **Window > Preferences** from the workbench menu.



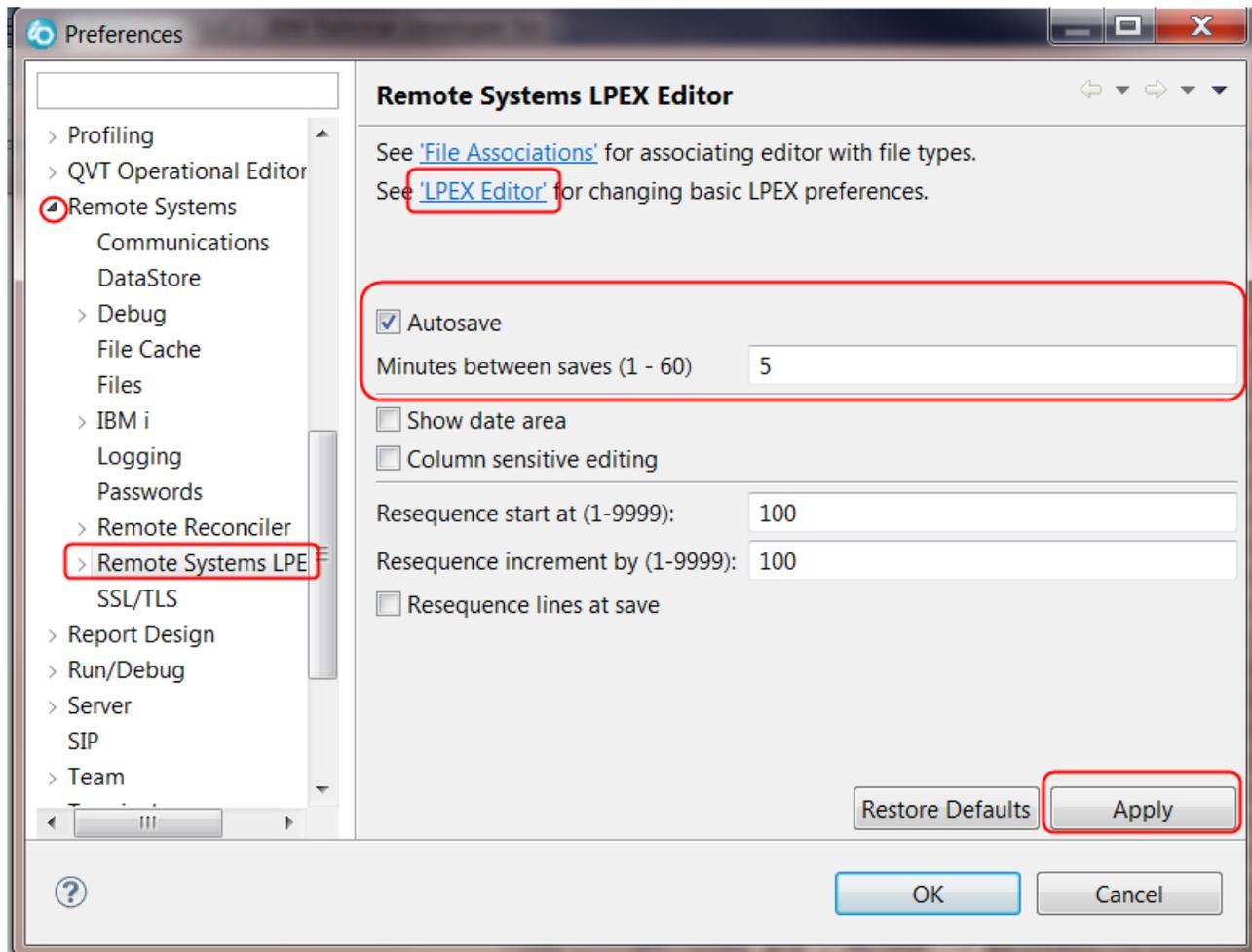
The Preferences window opens

In the left pane of the Preferences window, expand **Remote Systems**.

2. Select **Remote Systems LPEX Editor**.
3. The right pane allows you to set preferences for this feature.
4. When selected, each column is considered as a separate entry space. To enable or disable **autosave** while editing source in the Remote Systems LPEX Editor, select or de-select the **Autosave** check box in the preference dialog. By default, autosave is enabled and the value

for the minutes is set to 5. You can specify a value between 1 and 60 minutes

- __5. Click the **Apply** button.



Note: The **Autosave** action will perform a local backup onto the workstation disk. It will not remotely save the member onto the IBM i server. Use the **Save** or **Save as** actions to save the member back onto the IBM i server.

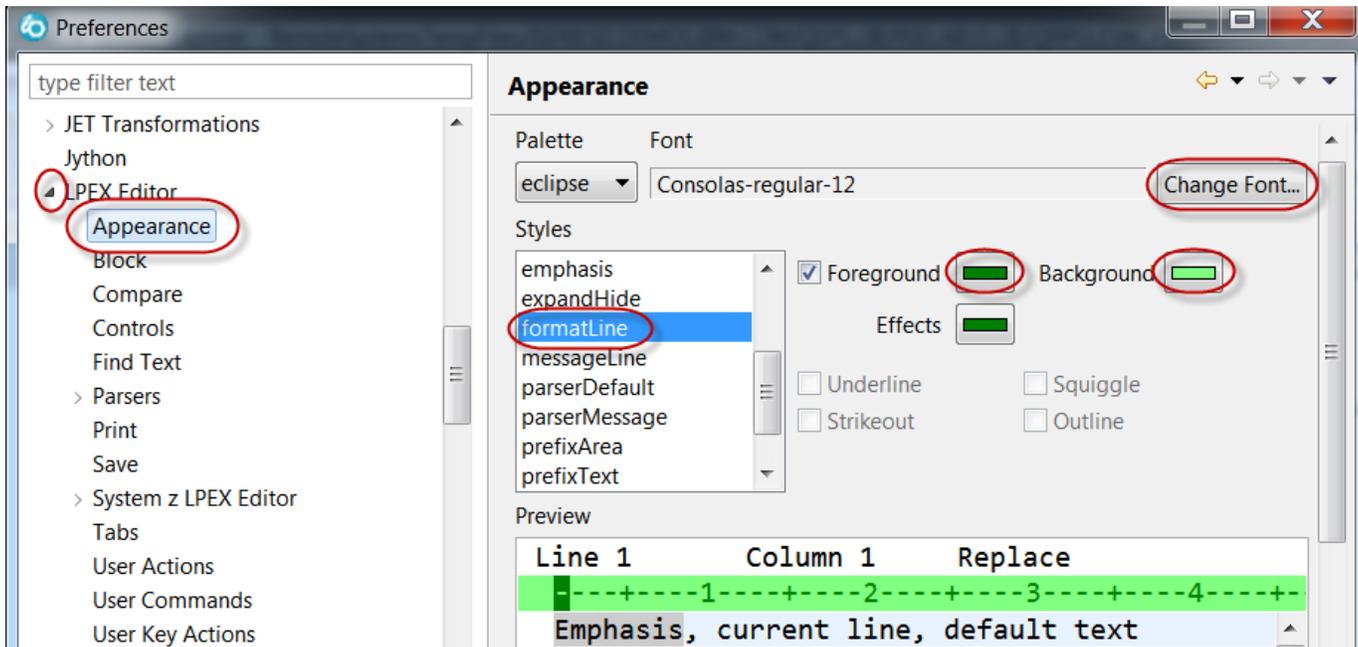
2.3 Changing the editor appearance

Other interesting preference settings are located under LPEX Editor. You can use the link at the top of the page to quickly jump to the LPEX Editor preferences. **Appearance** allows you to modify color settings and font used by the Editor.

To change the editor **appearance**:

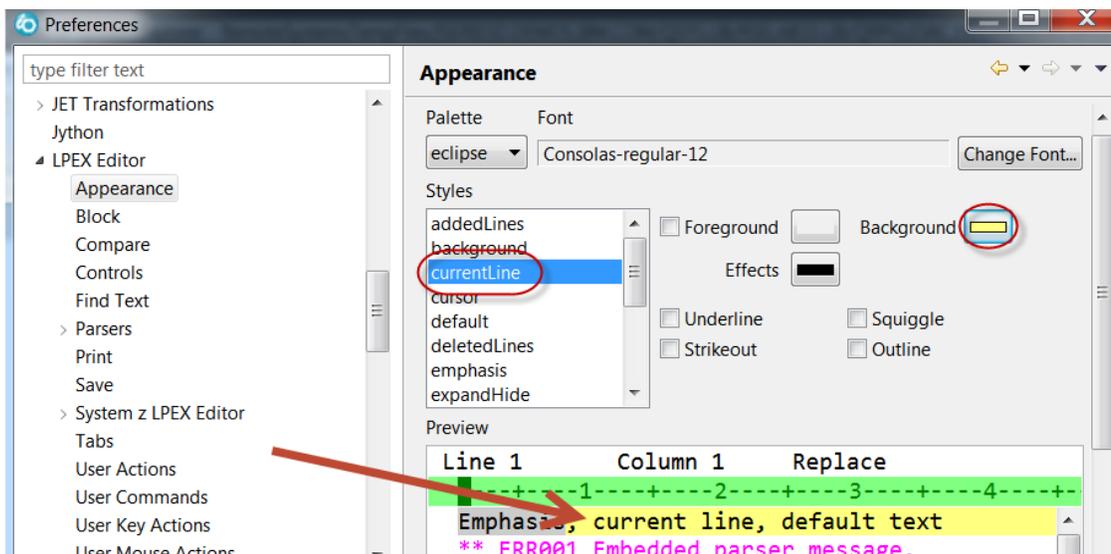
- __1. In the left pane of the **Preferences** window, expand **LPEX Editor**.
- __2. Select **Appearance** under LPEX Editor
- __3. In the right pane under the **Styles** list, select **formatLine**.
- __4. Change the **Foreground** color to dark green.

- __5. Change Font to 12.
 __6. Change **Background** color to light green.
 Notice, how your changes are reflected in the sample edit view.



To change the current line appearance to make it more visible when editing:

- __7. Select **currentLine** under the **Styles** list.
 This option highlights the line that the cursor is on. The option applies to all source files opened in the editor area.
 __8. Change the **Background** color to light yellow.
 __9. If you don't like the changes you made, you can click **Restore Defaults** to return to the original settings.



2.4 Changing key behavior in the editor

To modify the default behavior of the Enter key:

- __1. Expand **LPEX Editor** if not already expanded
- __2. Select **User Key Actions**.

The LPEX Editor has a predefined behavior for the **Enter** key to always add a new line and not split the line when the Enter key is pressed. To change the default behavior for the Enter key to split the line, use the following instructions.

- __3. Type **c-i** in the Key field, this means Ctrl-I as shown.



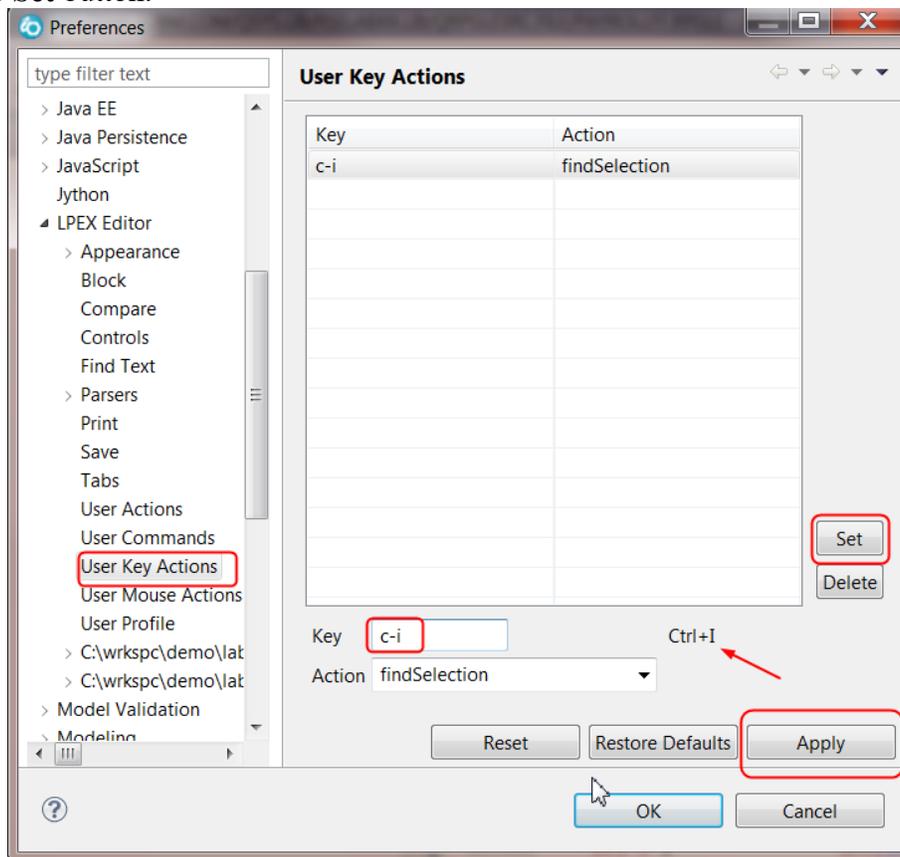
Tip: The Key and Action fields are case sensitive. Make sure that the values typed in the Key and Action fields are exactly as shown above.

- __4. Type **findSelection** in the **Action** field.



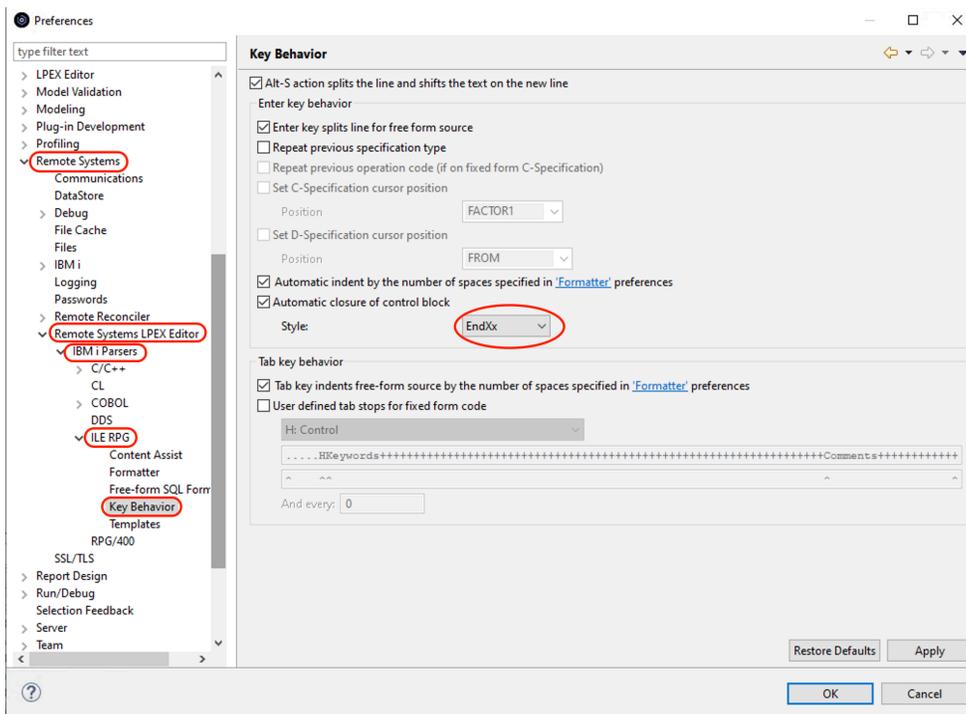
Tip: Use the drop-down list to select the value

- __5. Click the **Set** button.



We go through one other preferences entry that users like to change. When you enter a control opcode LPEX can automatically indent the subsequent lines a configurable number of blanks and insert the endxx statement with the capitalization that meets your conventions. In our case, we are using camel case for our opcodes. Here is how to configure this behavior:

- __6. Expand **Remote Systems**
- __7. Expand **Remote Systems LPEX Editor**, and then **IBM i Parsers**
- __8. Expand **ILE RPG**
- __9. Click **Key Behavior**
- __10. Change the **Automatic closure of control block style** combo box to the camel case option
- __11. Click **OK** on the Preferences window
- __12. Return to the Editor window.



Next let's see the results of the customization.

- __12. Position your cursor around line 53, and double click on the *INKC reference.

```

Exsr MAIN;
// If MAIN is done program ends
*INLR = *on;
// MAIN SUBROUTINE
BegSr MAIN;
DoU *INKC;
    *IN60 = *OFF;
    EMESS = *BLANK;
    FMPAPI = *RI ANK

```

- __13. Hold down the Ctrl key and press i.

```

DoU not *IN60;
Exfmt SELECT;
If *INKC = '1';
  LeaveSr;
Else;
  Exsr EDITSL;

```

This finds the next occurrence of the selected text.

- __14. Hit **Enter** to insert a line, notice that the cursor is indented properly.
- __15. Type **if *INLR=*off;** and press **enter**

```

DoU not *IN60;
Exfmt SELECT;
If *INKC = '1';
  If *INLR = *off;
  EndIf;
  LeaveSr;
Else;
  Exsr EDITSL;
EndIf;

```

Notice how the **EndIf** is inserted in camel case and the cursor is indented 2 spaces all as specified in the preferences.

You have changed some of the default editor settings and seen the results of the changes. Feel free to change the preferences to your preferred settings.

2.5 Using SEU commands in the LPEX editor

You can configure the LPEX Editor to adopt the keyboard and command personalities of many popular editors. Most editor profiles differ only in the keys and commands used to perform various editor tasks. Some base editor profiles, listed below, also add prefix information and a command area at the start of each line:

- ispf
- seu
- xedit

The editor recognizes prefix commands used by these editor profiles. Depending on which profile you are using, you can enter SEU, XEDIT, or ISPF commands when the prefix area is active.

If you are an SEU expert, you will appreciate the ability to use SEU commands.

To enter SEU commands:

- __1. Move the cursor into the gray sequence number area to the left of the edit area
- __2. On any sequence number type dd.
- __3. Go down a few lines and type dd again and press **Enter**.

```

MSTDSP.DSPF *PAYROLLFF.RPGLE
Line 31 Column 1 Replace 17 changes
.....1...+...2...+...3...+...4...+...5...+...6...+
002600 // *****
dd Dcl-F MSTDSP WORKSTN;
002800 Dcl-F EMPMST Usage(*Update:*Delete:*Output) Keyed;
002900 Dcl-F PRJMST Usage(*Update:*Delete:*Output) Keyed;
003000 Dcl-F RSNMST Usage(*Update:*Delete:*Output) Keyed;
dd //
003200 // Compile time array containing error descriptions.

```

Notice that the lines have been deleted.

- __4. Now type i5 in the sequence number area.
- __5. Make sure the cursor is within the sequence number area.
- __6. Press **Enter**.

```

MSTDSP.DSPF *PAYROLLFF.RPGLE
Line 27 Column 1 Replace 18 changes
.....1...+...2...+...3...+...4...+...5...+...6...
002200 // used are - MSTDSP - maintenance display file
002300 // - EMPMST - employee master file
002400 // - PRJMST - project master file
002500 // - RSNMST - reason code master file
i5 // *****
// Compile time array containing error descriptions.
003201

```

Five new lines are inserted.

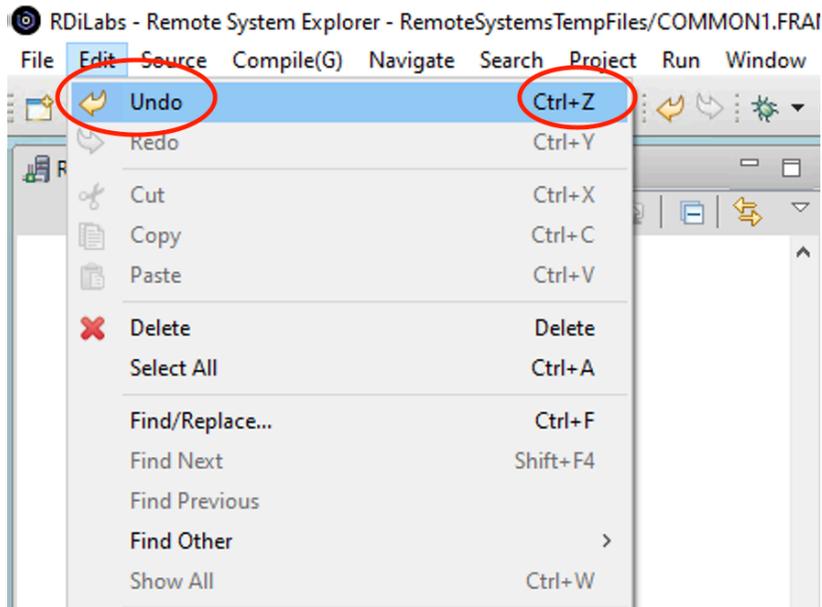
You have learned how to use SEU commands in the editor.

2.6 Requesting undo and redo operations

The editor records each set of changes you make to a file in the Editor window. The number of changes made since the last file save is displayed on the status line. If you want to undo a set of changes made to a file you use the Undo operation. You can also cancel the effects of an Undo operation by using the Redo operation.

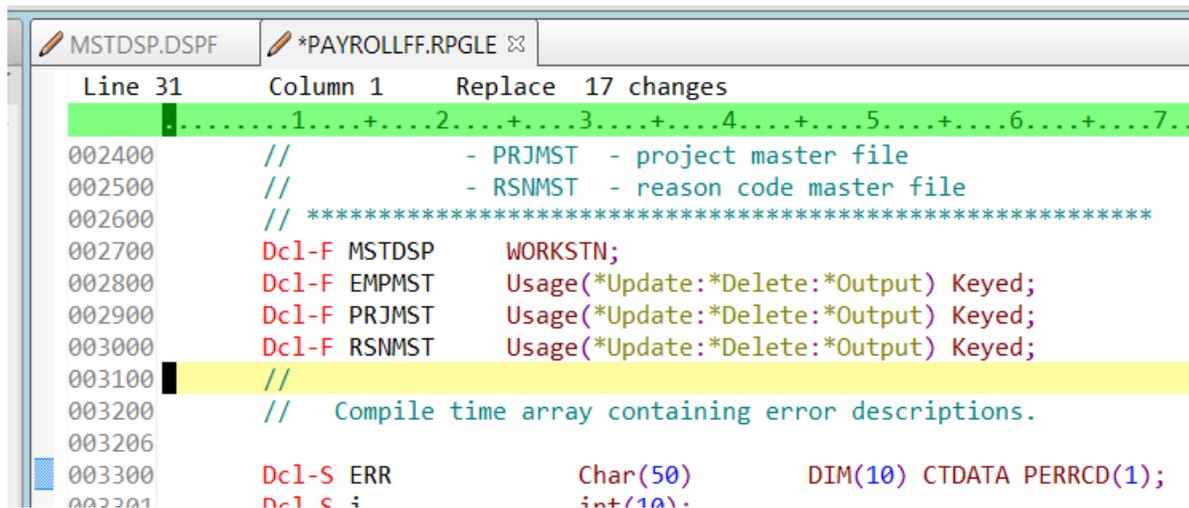
Now you are going to undo some of the changes you just made to the file. Then you will cancel the Undo operation by using the Redo operation. Finally, you will reload the source so that it is back to its original content.

- __1. Click **Edit > Undo** from the workbench menu. Notice that the 5 new lines disappear.



2. Press **Ctrl+Z** to undo the last change.

Notice that the deleted lines reappear.



3. Click **Edit > Redo** from the workbench menu.

Notice that the lines are deleted again.

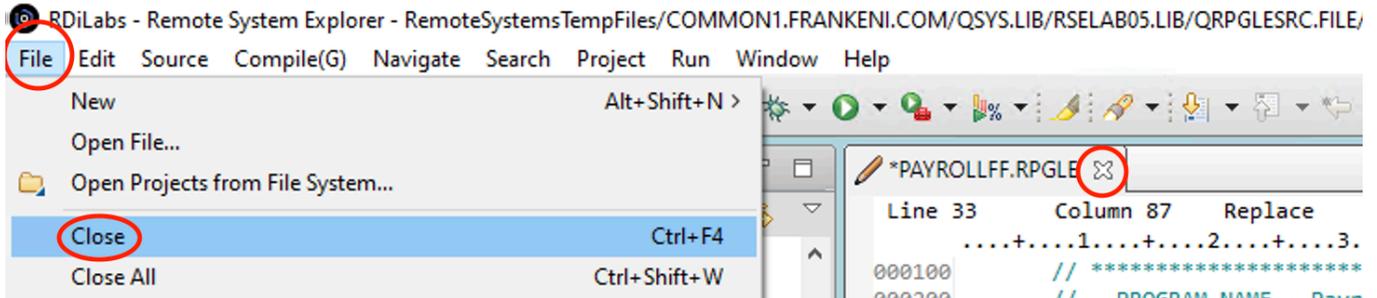
At this point you will reload the source from the IBM i server to make sure that it is back in its original form.

4. Click **File > Close** on the workbench menu.

**Tip:**

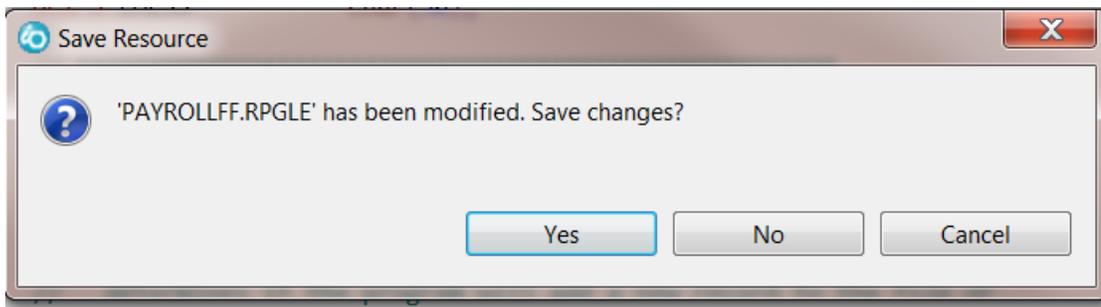
You can also click the **X** on the **PAYROLLFF** tab.

The asterisk before a file name in the tab, means there are unsaved changes.

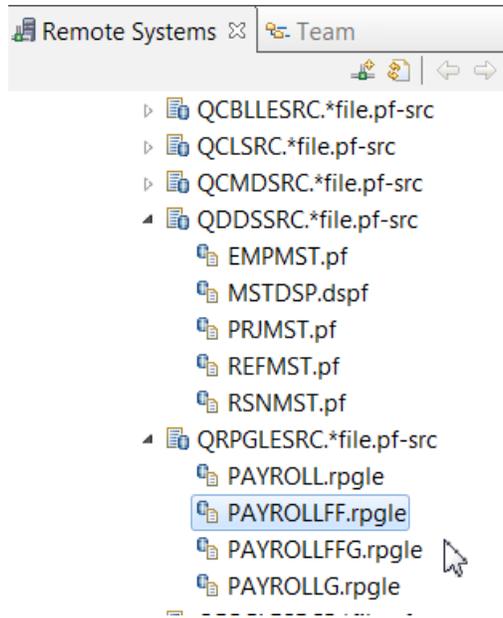


A Save Resource dialog opens asking if you want to save the latest changes.

5. Click No



6. In the workbench, in the Remote Systems view and open the PAYROLLFF member in the QRPGLSRC file by double clicking on it.



You have learned how to undo and redo changes that you made to a file.

2.7 Invoking language sensitive help

Inside the editor, there is cursor-sensitive language-reference help available.

This help is invaluable if you cannot remember the order of fields in an RPG specification or the allowed values for a variable field. This help is available from the LPEX Editor window.

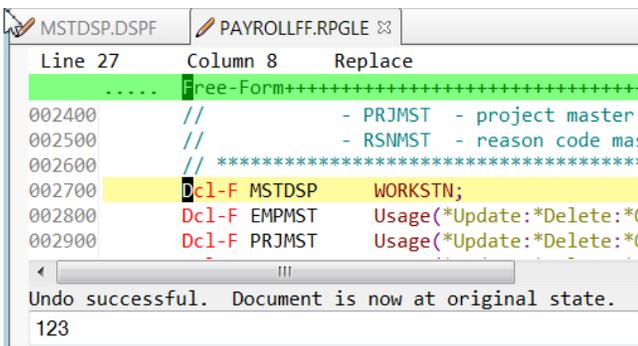
To receive language sensitive help, press F1 in an Editor window. If the cursor is on an operation code, you receive help for that operation code; otherwise, you receive help for the current specification. To access language sensitive help

1. Position the cursor over the **Dcl-F** operation code in line 27 of the ILE RPG source

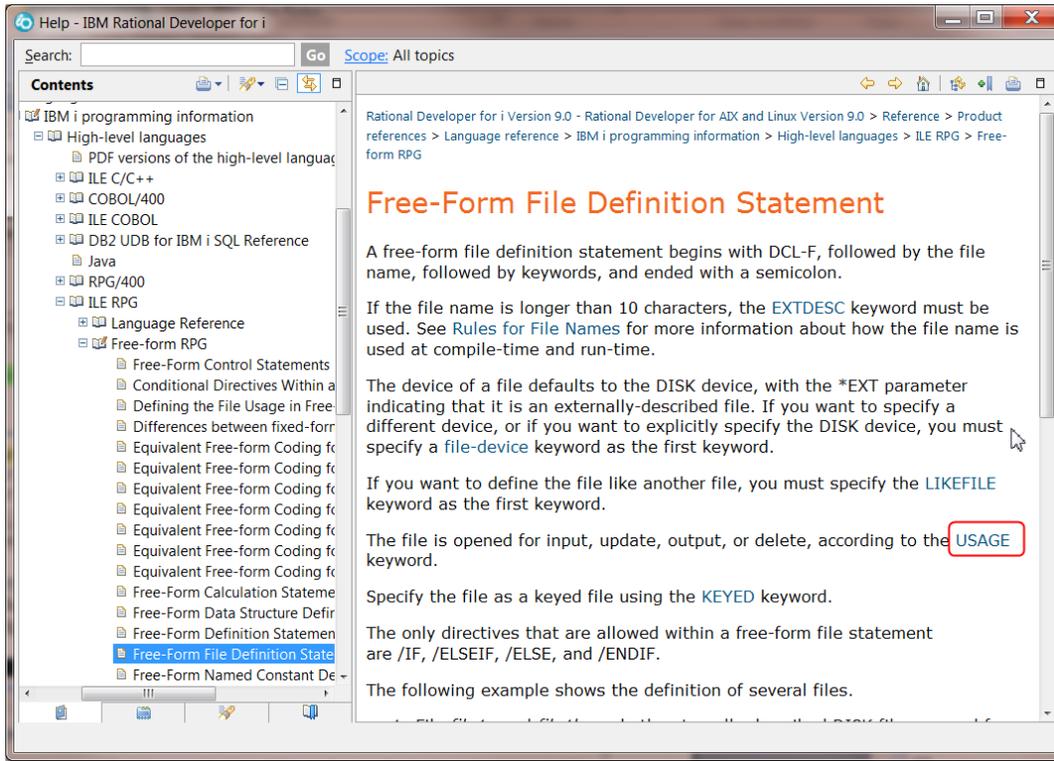
i

Tip:
To jump to a specific line, type the number into the editor's command entry line (the Esc key will take you there) and press Enter.

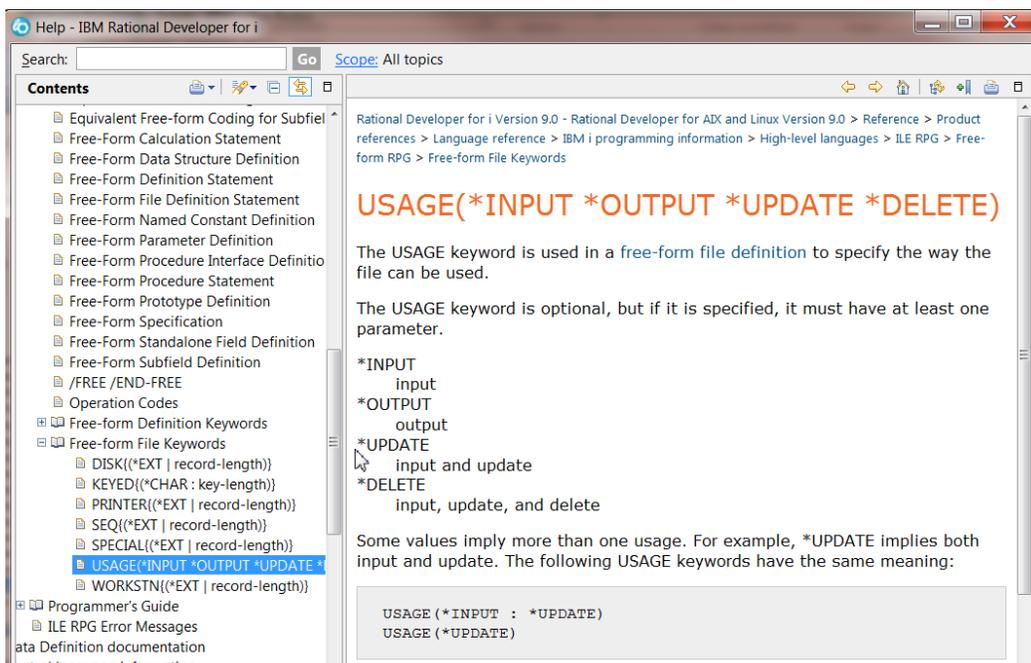
2. Press **F1**.



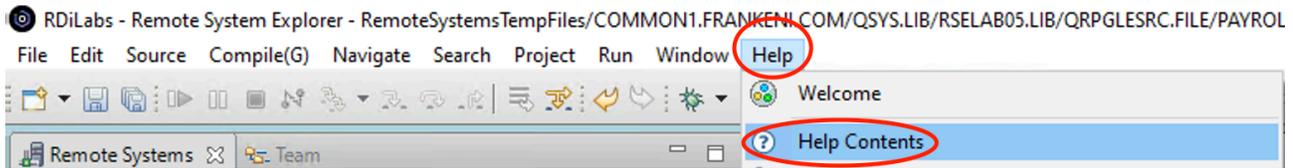
Language-sensitive help for the DCL-F operation code appears in a Help window. Text marked in blue in the Help window contains the link to detailed information about the topic in blue.



Click the link **USAGE**.
The Help page for **Date Data Type** is displayed



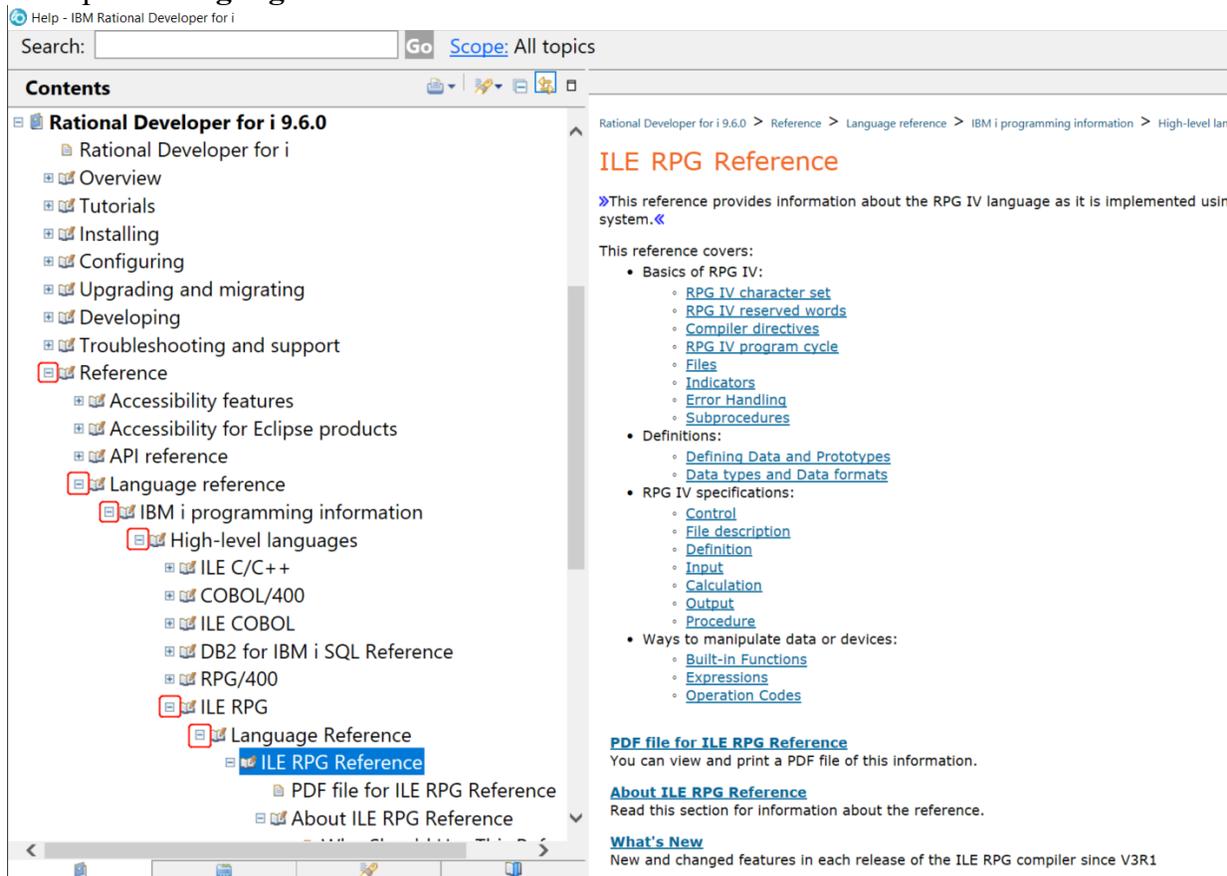
- __3. Explore the Help window to see what else is available.
- __4. Close the Help window.
- __5. Select **Help > Help Contents** on the workbench menu



You can see the help that is available in the product.
To locate the language reference information for ILE RPG:

In the left pane of the Help window:

- __6. Expand **Rational Developer for i**
- __7. Expand **Reference**.
- __8. Expand **Language reference**.
- __9. Expand **IBM i programming information**.
- __10. Expand **High-level languages**.
- __11. Expand **ILE RPG**.
- __12. Expand **Language Reference**.



Having the latest version of the manuals at your fingertips will make it easier to find programming information. There is also the option to search the help by specifying a search string.

You have accessed language sensitive help

2.8 Finding and replacing text

The LPEX Editor also has a powerful find and replace text feature. You use the Find and Replace window to search for an item. You can search for a word, a partial word, or a sequence of such. You can also enter a pattern you want to match, provided that the pattern follows the rules of regular expression. You can replace the found search item. If the entered text or pattern is found, the cursor moves to either the next or previous occurrence of the search item, according to your chosen search direction, and replaces the found text according to your selections.

To find and replace text:

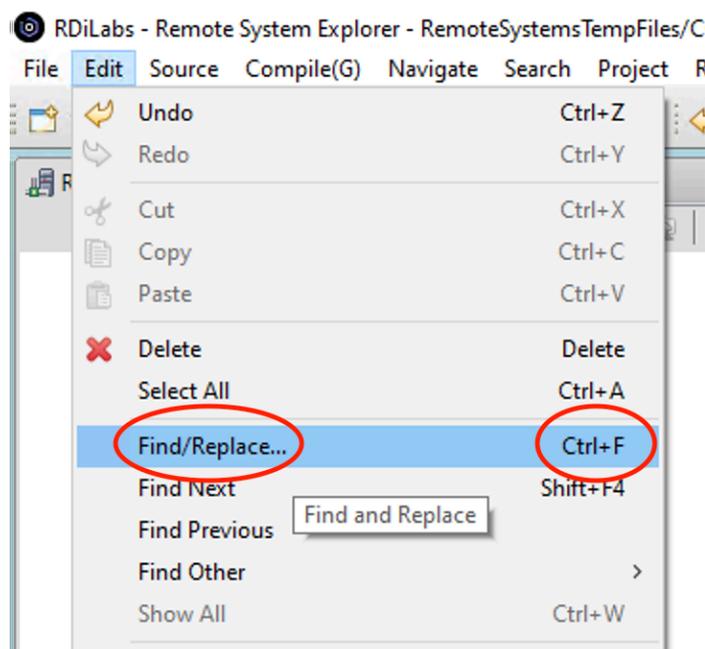
1. Click anywhere in the editor to give it focus then press **Ctrl+Home** to go to the top of the file.



Tip:

When you press **Ctrl+Home** to go to the top of a file or **Ctrl+End** to go to the bottom of a file, a quick mark is set at your cursor position. This allows you to return to that line by pressing **Alt+Q**. **Ctrl+Q** will set a quick mark.

2. Click **Edit > Find/Replace** from the workbench menu or press **Ctrl+F**.

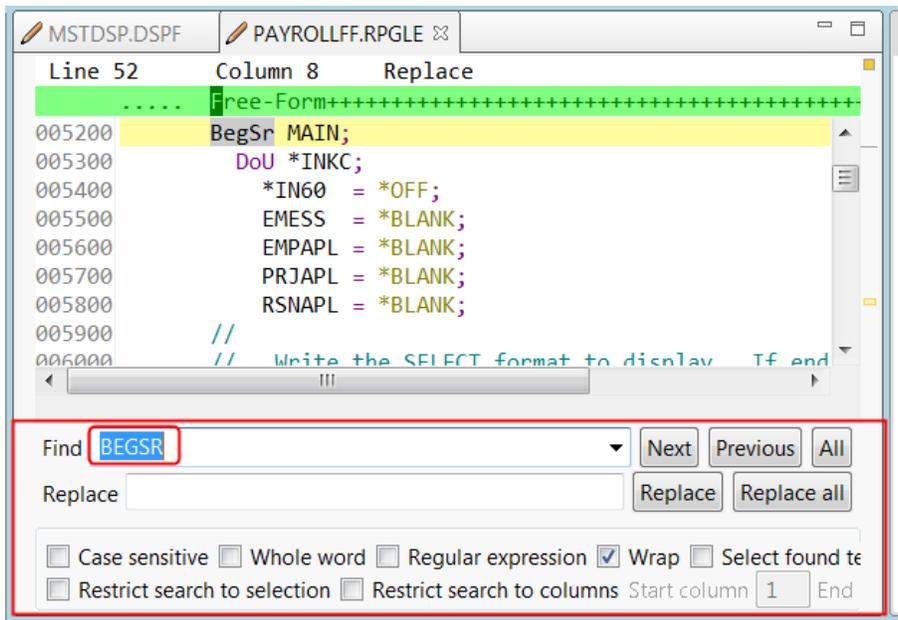


The Find/Replace window opens at the bottom of the Editor window

At the bottom of this window, you will notice that you have some options to select from, for example, search only in certain columns. You want to find the first occurrence of BEGSR.

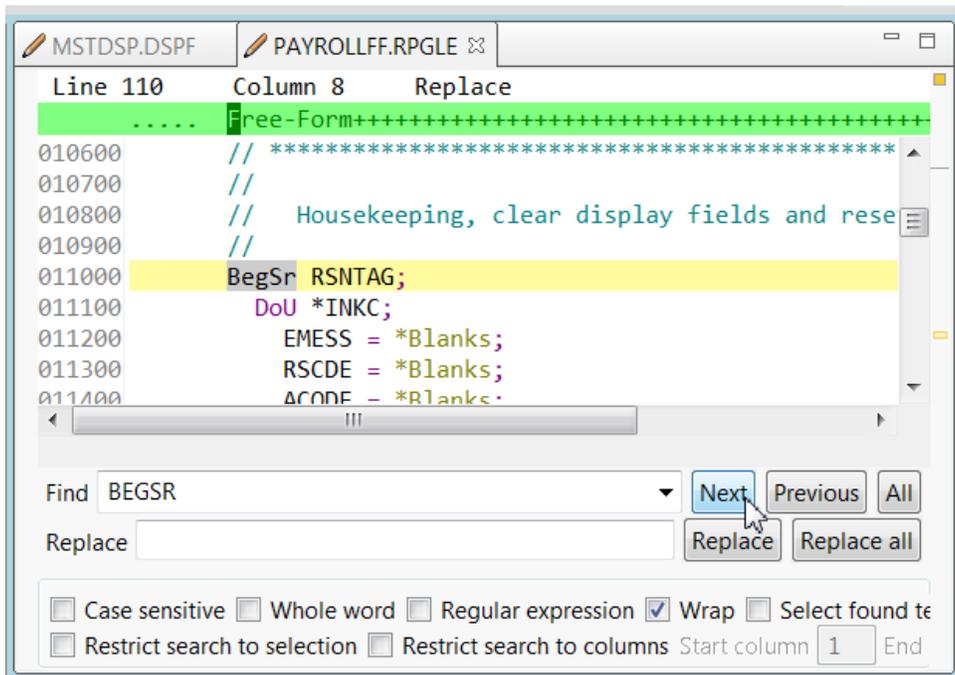
3. In the **Find** field, enter **BEGSR** to find the start of a subroutine.
4. Make sure the **Replace** field is blank.

You would use this field for text replacement.

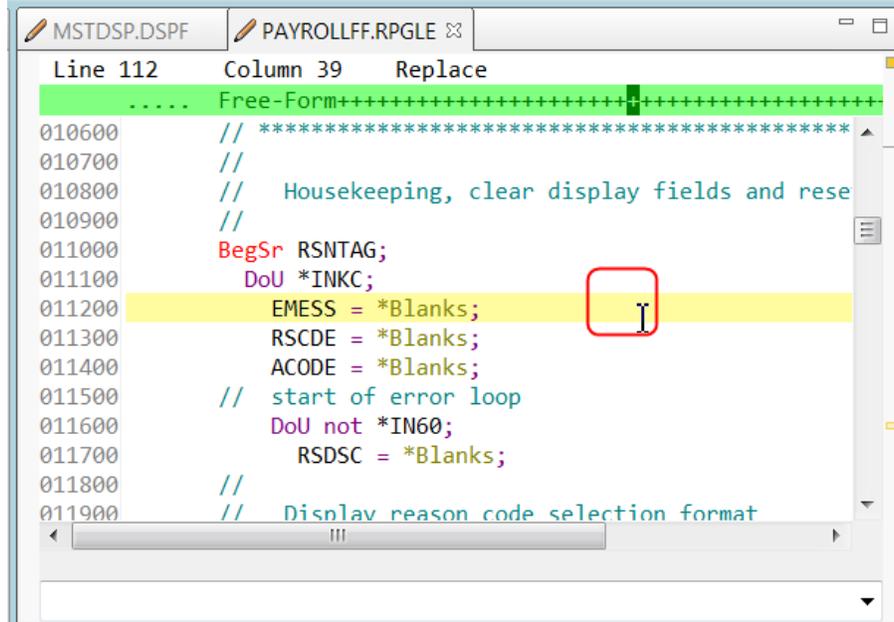


The Editor moves the active line to line 52, which contains the first **BEGSR** phrase in the file.

5. Click **Next** to go to the next location of **BEGSR** in the file



- __6. Click anywhere in the Editor window to close the Find/Replace window.



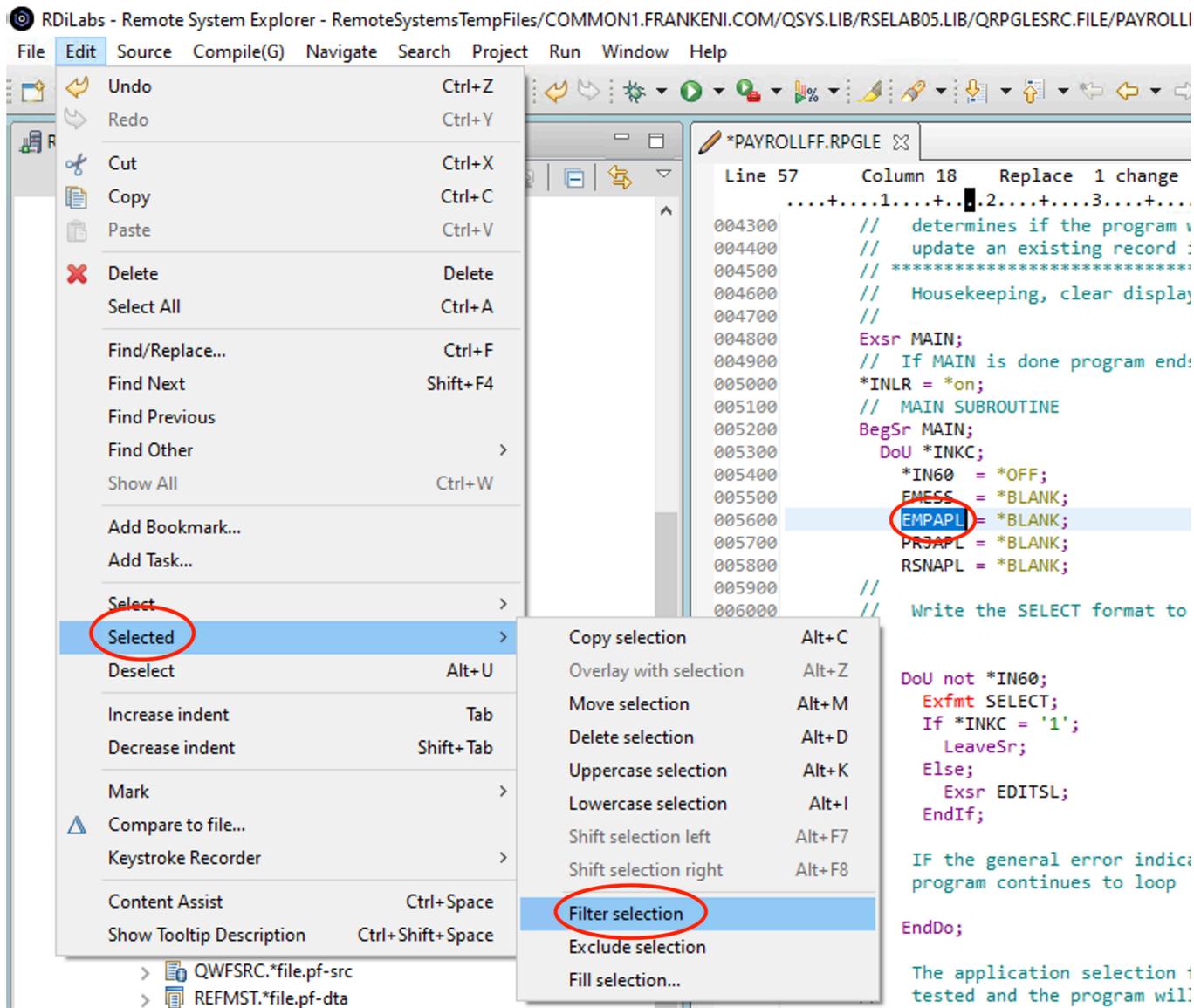
You have searched for a string in your source using the Find/Replace window. Next let's do some filtering

2.9 Filtering lines by string

The editor allows you to filter or subset your source so that you see only lines containing a given string. Filtering lines makes it quick and easy to find lines without having to scroll through your source.

To filter source by string:

- __1. Double-click the variable EMPAPL, on line 56 in the Editor window, to select it.
- __2. Select **Edit > Selected > Filter Selection** from the workbench menu.



A compressed source view is shown, it only displays the lines that contain the string EMPAPL. Plus signs in front of the line numbers allow to expand the source lines following the line containing the string

MSTDSP.DSPF PAYROLLFF.RPGLE

Line 56 Column 18 Replace

```

..... Free-Form+
+
+ 005600 EMPAPL = *BLANK;
+ 007900 // If EMPAPL (employee maintenance) equals X,
+ 008800 When EMPAPL = 'X';
+ 035800 If EMPAPL = 'X'
+ 036000 or EMPAPL = 'X'
+ 037300 If EMPAPL = ' '
+ 038300 If EMPAPL <> ' '
+ 038400 and EMPAPL <> 'X';

```

8 occurrences.

The number of occurrences is shown at the bottom of the editor view.
To expand the section of source after line 79 up to the next occurrence of the string:

__3. Expand line 79.

MSTDSP.DSPF PAYROLLFF.RPGLE

Line 81 Column 1 Replace

```

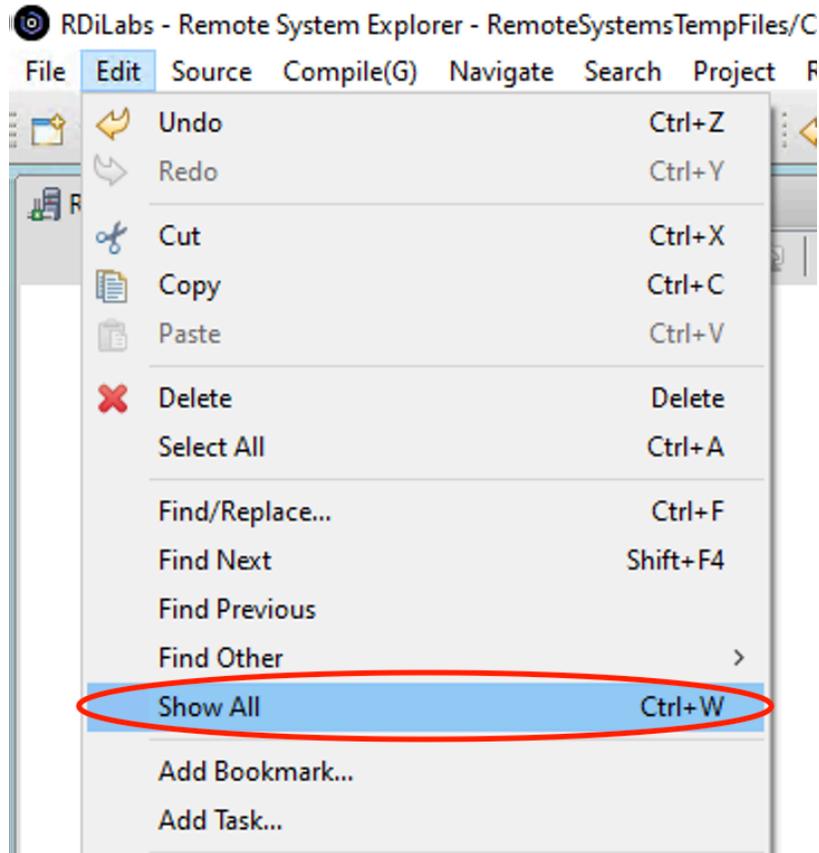
.....1.....+.....2.....+.....3.....+.....4.....+.....5.....+
+
+ 005600 EMPAPL = *BLANK;
+ 007900 // If EMPAPL (employee maintenance) equals X,
+ 008000 // branches to label EMPTAG.
+ 008100 // If PRJAPL (project maintenance) equals X, t
+ 008200 // branches to label PRJTAG.
+ 008300 // If the prior two tests were not successful,
+ 008400 // reason code maintenance. The program will
+ 008500 // next executable operation.
+ 008600 //
+ 008700 Select;
+ 008800 When EMPAPL = 'X';
+ 035800 If EMPAPL = 'X'
+ 036000 or EMPAPL = 'X'
+ 037300 If EMPAPL = ' '
+ 038300 If EMPAPL <> ' '
+ 038400 and EMPAPL <> 'X';

```

This expands the section up to the next instance of EMPAPL.

Now you want to show the entire source again:

- 4. Click **Edit > Show all** from the workbench menu, or right click in the editor and select **Show all** from the context menu, or press **Ctrl+W**.

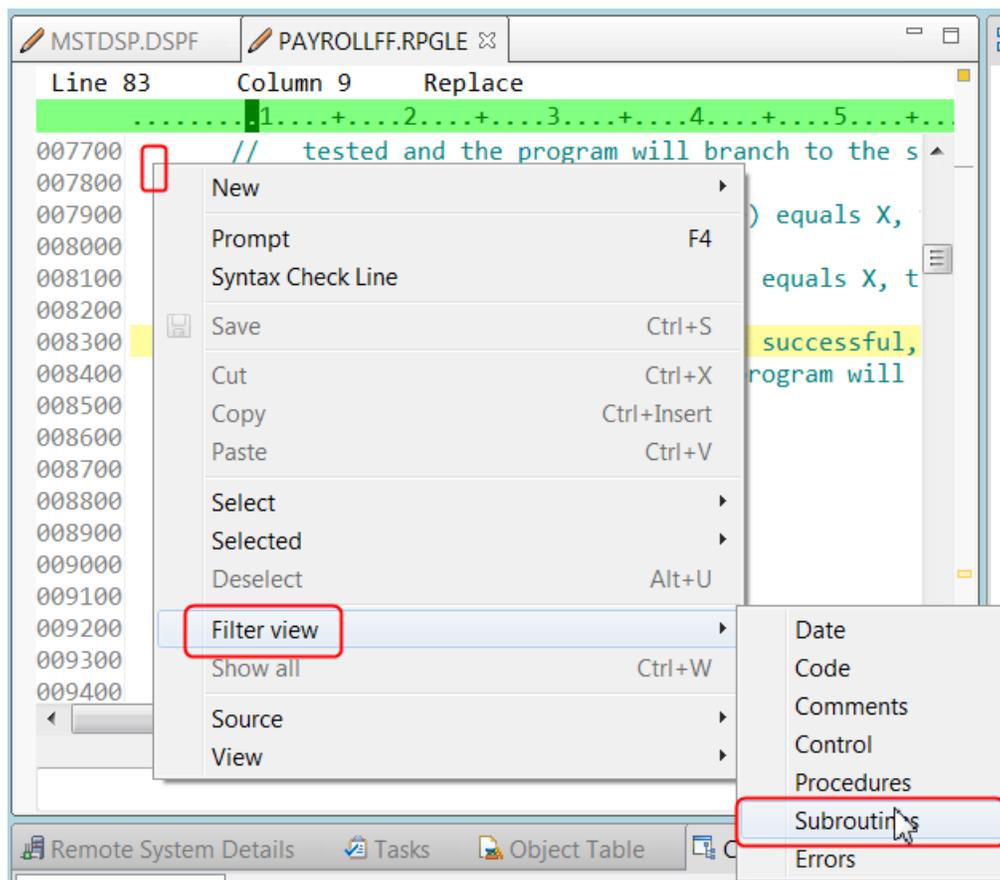


The entire source member is displayed again.
You have filtered your source so that you see only lines containing a given string.

2.10 Filtering lines by type

To help you navigate quickly through your ILE RPG source the editor allows you to filter lines based on the line type. Imagine you want to see where all the subroutines are defined in your source. To filter lines by type:

1. Right-click in the Editor view for the PAYROLL member.
2. Click **Filter view** > **Subroutines** in the context menu.



All source lines containing the BEGSR or ENDSR operation codes are displayed allowing you to move quickly and easily to the desired subroutine in your file.

```

MSTDSP.DSPF  PAYROLLFF.RPGLE
Line 52      Column 15  Replace
..... Free-Form+++++
+
+ 005200     BegSr MAIN;
+ 010200     EndSr;
+ 011000     BegSr RSNTAG;
+ 017600     EndSr;
+ 018300     BegSr EMPTAG;
+ 025700     EndSr;
+ 026400     BegSr PRJTAG;
+ 033500     EndSr;
+ 034700     BegSr EDITSL;
+ 040400     BegSr ACDESR;
+ 042700     EndSr;
+ 043100     BegSr ADDCDE;
+ 044000     EndSr;
+ 044400     BegSr CHGCDE;
+ 045400     EndSr;
+ 046100     BEGSR DELCDE;
+ 047200     ENDSR;
+ 047600     BEGSR INVCDE;
  
```

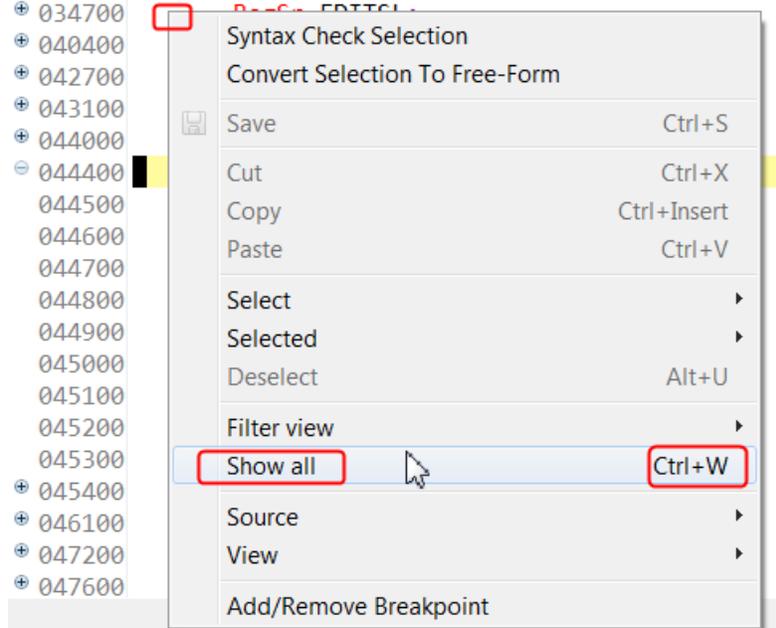
__3. Expand the subroutine declaration for **CHGCDE** (line 444). to show all lines in this subroutine.

```

MSTDSP.DSPF  PAYROLLFF.RPGLE
Line 447     Column 1   Replace
..... Free-Form+++++
+ 034700     BegSr EDITSL;
+ 040400     BegSr ACDESR;
+ 042700     EndSr;
+ 043100     BegSr ADDCDE;
+ 044000     EndSr;
+ 044400     BegSr CHGCDE;
+ 044500         If *IN50;
+ 044600             *IN60 = *ON;
+ 044700             EMESS = ERR(7);
+ 044800         Else;
+ 044900             If NOT *IN50 AND ACREC = 'D';
+ 045000                 *IN60 = *ON;
+ 045100                 EMESS = ERR(8);
+ 045200             EndIf;
+ 045300         EndIf;
+ 045400     EndSr;
+ 046100     BEGSR DELCDE;
+ 047200     ENDSR;
+ 047600     BEGSR INVCDE;
  
```

Now you could work with the source inside this subroutine.

- __4. Right-click in the Editor window and click **Show all** on the context menu (or hit **Ctrl-W**) to show all lines.



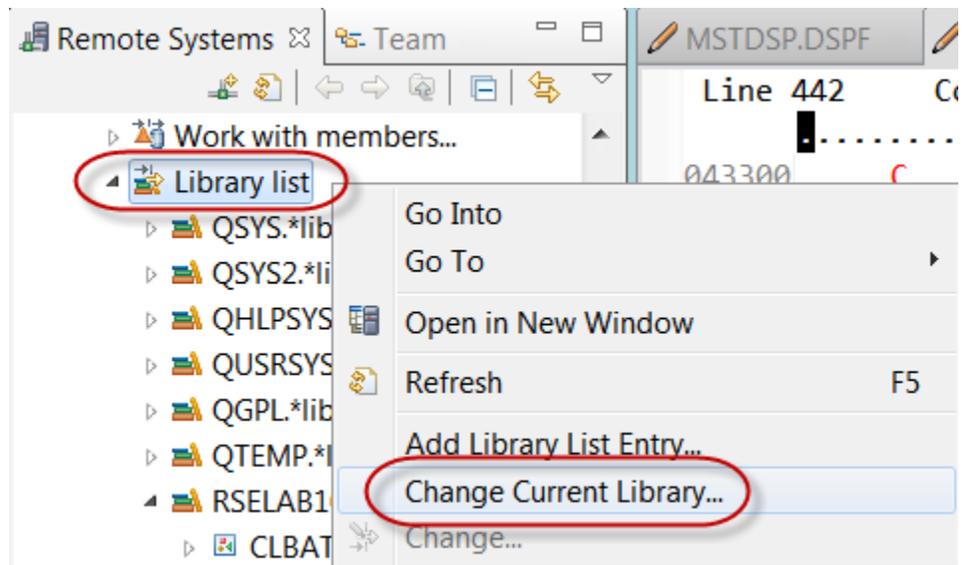
You have filtered lines in your source by line type.

2.11 Searching multiple files

If you would like to search through the members in a source physical file or through the files in a local directory, you can use the Search tool. The Multi-File Search utility allows you to search for a particular string of text in many members on the host. This function can also be used on local files. You need to change the current library for your RSE job to your development library, so the results of the SEARCH are placed in this library and not into the default current library QGPL.

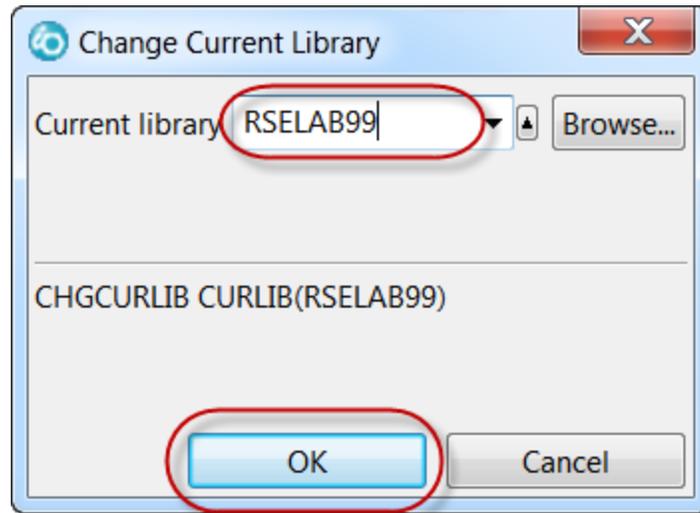
To change the current library:

- __1. In the RSE view, right click on the Library List filter
- __2. Click on the Change current library action

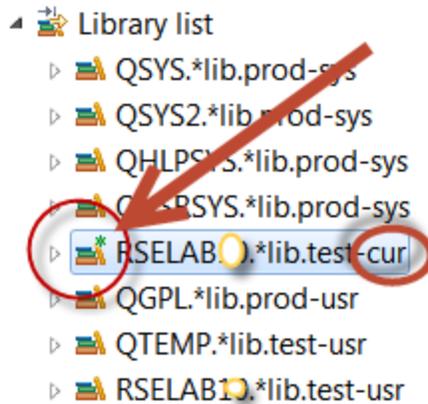


- __3. In the **Change Current Library** dialog

- _4. Key in the library name RSELABxx (do not use xx or 99, use your team number)
- _5. Click the **OK** button

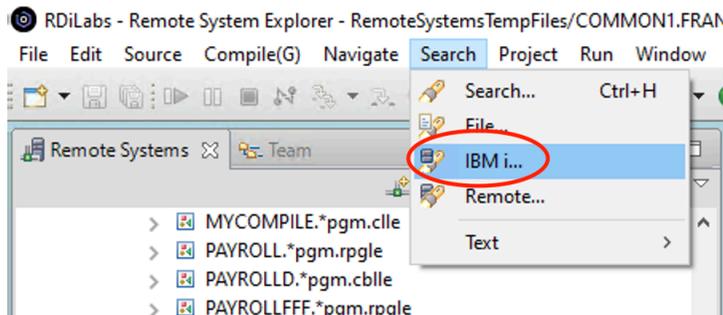


You are done setting the current library, RSELABxx now shows a decorator (a little star) that indicates this is the current library.



To search multiple files:

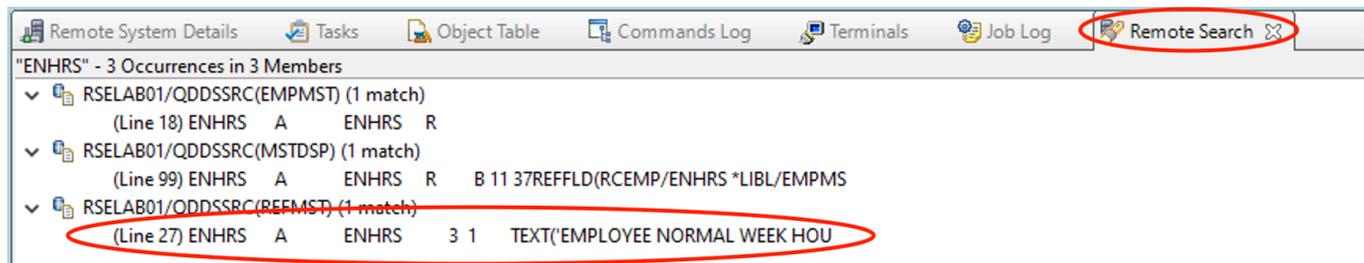
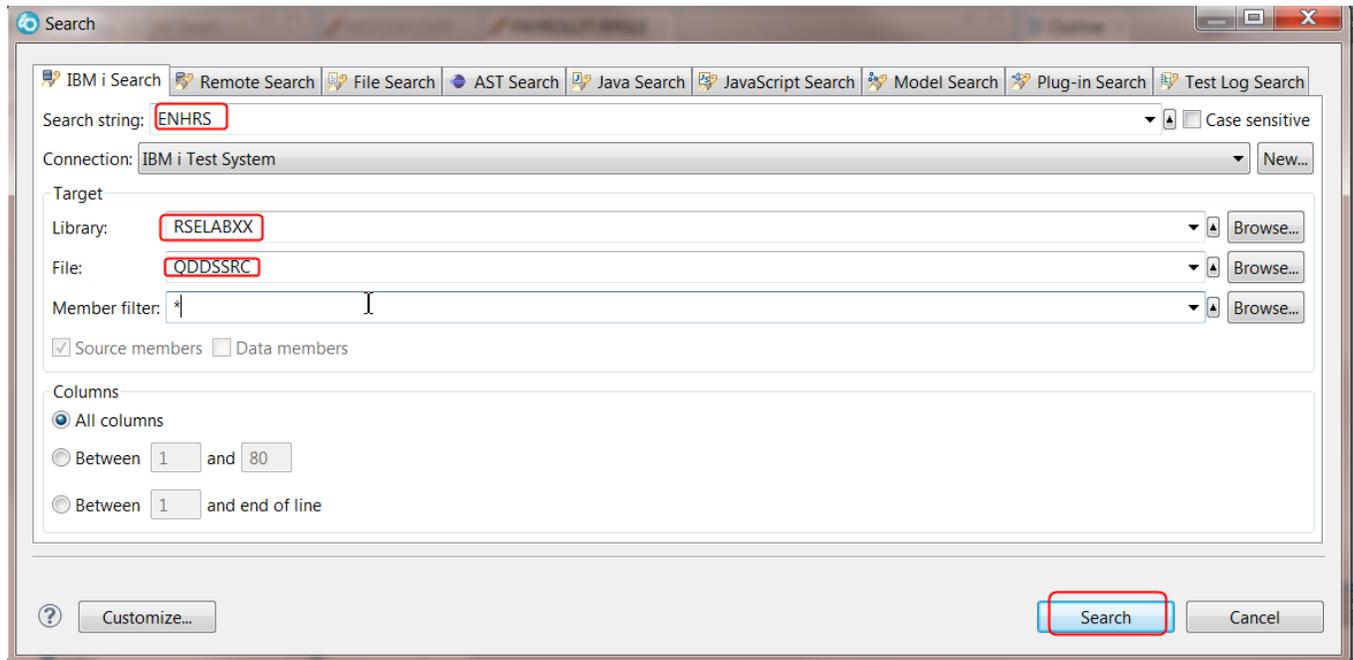
- _6. Click **Search** --> **IBM i** on the workbench menu.



The Search window opens

- _7. In the **Search string** field, type ENHRS.

- __8. Use the drop-down list for **Connection** and ensure you use your **IBM i Test System**.
- __9. Under **Target** in the **Library** field, type RSELABxx. (do not use xx or 99, use your team number)
- __10. Under **Target** in the **File** field, type QDDSSRC to search all members in this source physical file.
- __11. Under **Target** in the **Member** field, select ***ALL**.
- __12. Click **Search**.



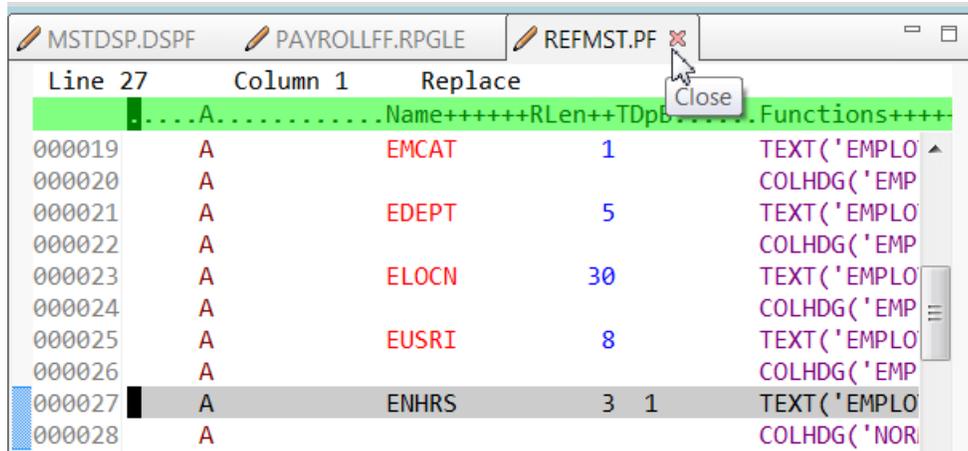
The Multi-File Search window lists all the lines in all the files that reference ENHRS.

- __13. Double-click the last line in the list at

```
A          ENHRS 3 1          TEXT('EMPLOYEE NORMAL WEEK HOURS')
```

The member REFMST is automatically loaded into the editor (it may take a few seconds to load, see messages at bottom of workbench) and the cursor is placed on the correct line.





__14. Click the X in the **REFMST** tab to close the REFMST file.

You have searched through members in a source physical file.

2.12 Comparing files using the Remote System Explorer

If your code undergoes many changes, you will find the Compare utility useful. It allows you to compare different versions of a program and find the differences.

Using the compare utility in the workbench you can view the differences between two files by comparing them. You can compare different files, and you can compare versions in the workbench with versions in the repository or with the local edit history.

After a comparison is carried out, the Compare Editor opens in the editor area. In the compare Editor, you can browse through all the differences and copy highlighted differences between the compared resources. You can save changes to resources that are made in the comparison editor.



Tip:

Make sure all lines show in the source before starting the Compare tool.

We are going to compare the fixed-format version of the PAYROLL member with the free-format version which is member PAYROLLFF.

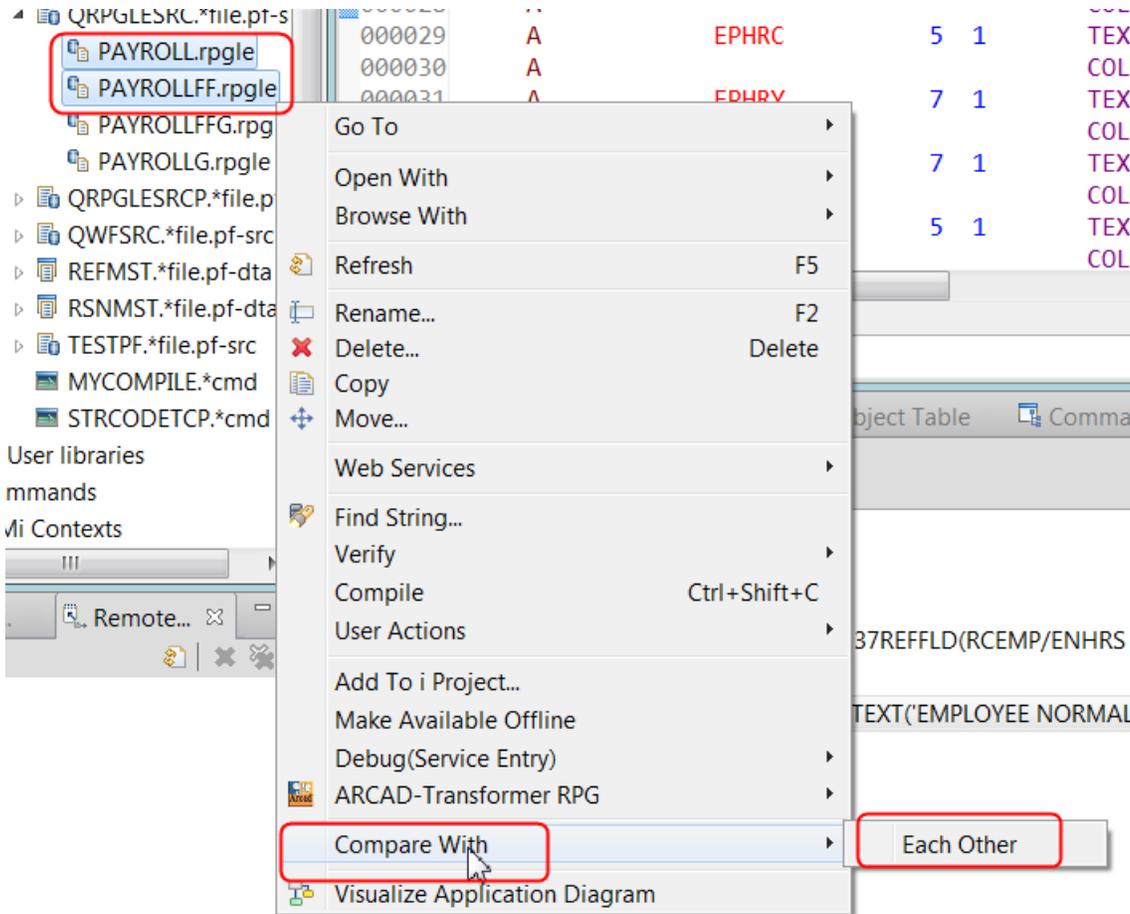
__1. Click on the PAYROLL member in source file QRPGLSRC in library RSELABxx (use your team number, not xx)

To select a second member to compare with:

__2. Press the CTRL key then select member PAYROLL and PAYROLLFF in the same source file.

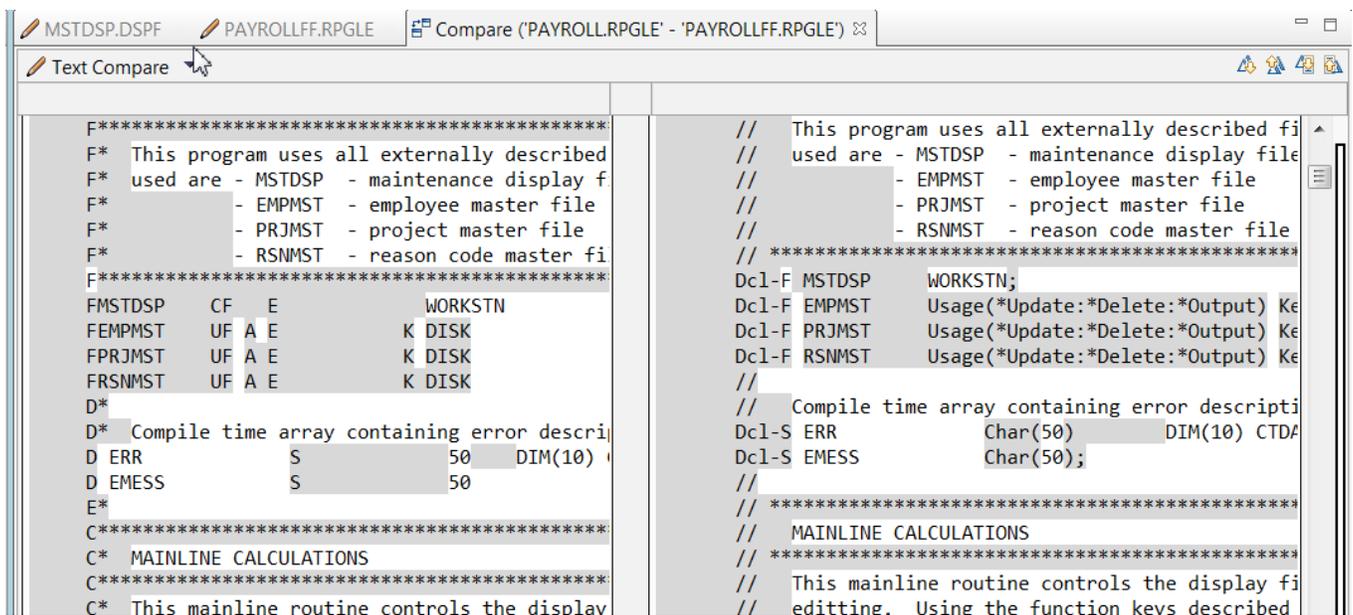
__3. Once both members are highlighted, right click on them for the context menu

__4. Click the **Compare with --> Each other** actions on the content menu



The compare editor displays, it is best to maximize this view:

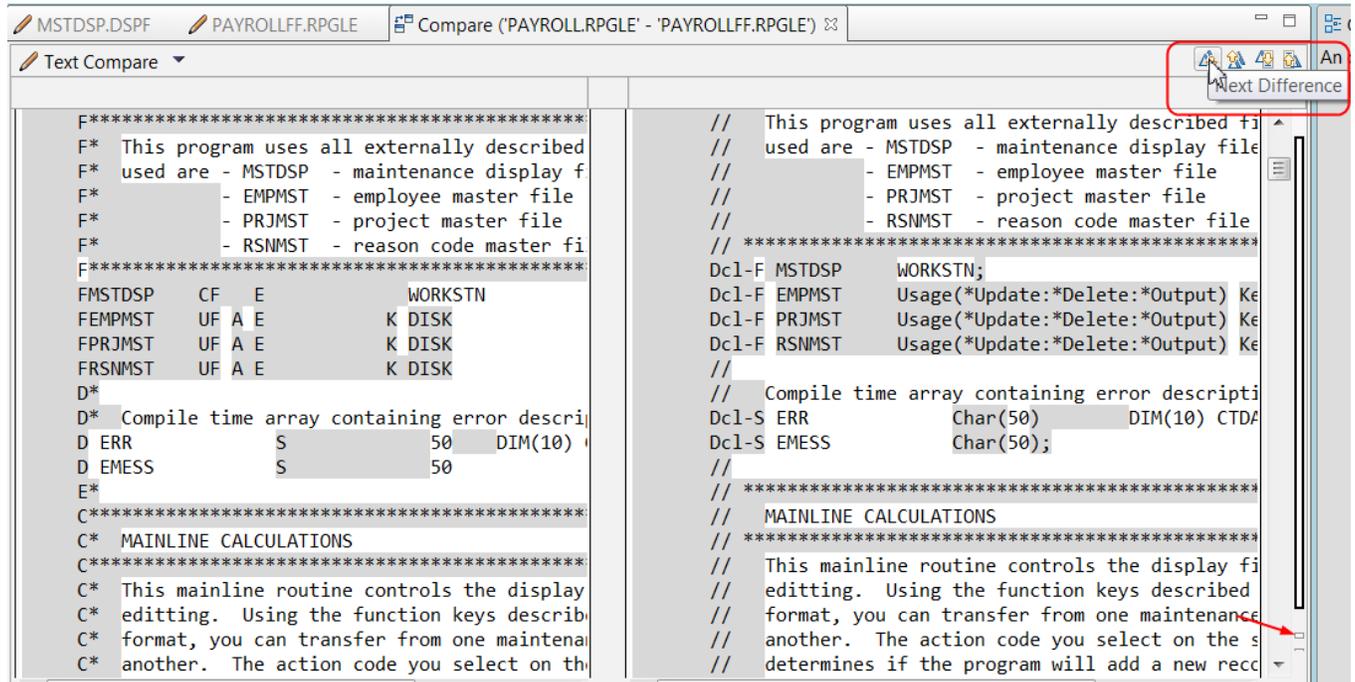
5. Double-click on the Compare editor tab.



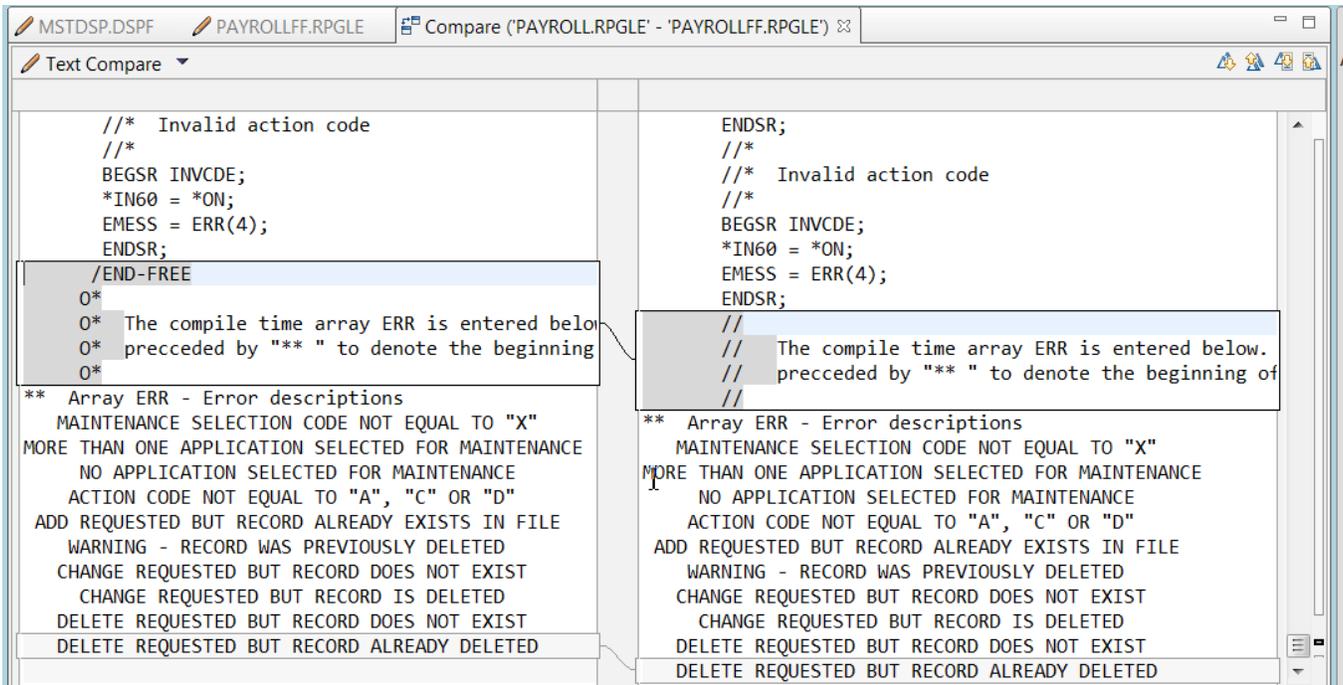
You see both members side by side, the differences are marked by markers in the right-side bar. The tool buttons allow you to position to next or previous line with a difference. Scroll up and down to see the difference between equivalent fixed and free format RPG.

The editor is positioned at the first difference

__6. To position the editor on the next difference on the next difference button.

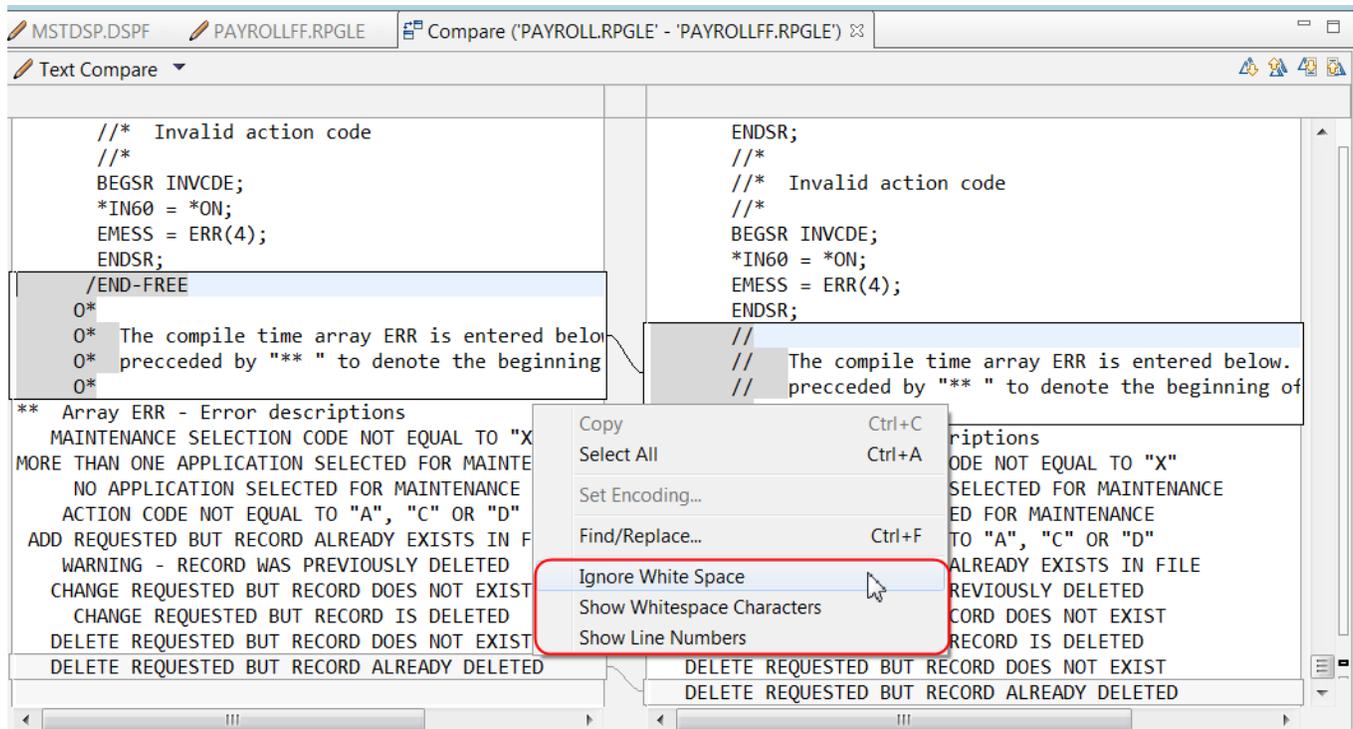


It now shows the next line with differences



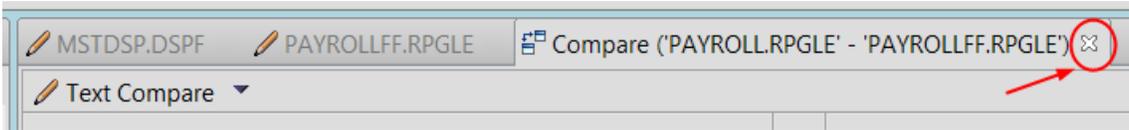
To change preferences on the compare, used the context menu by right clicking.

7. Right click to see how the compare can be customized



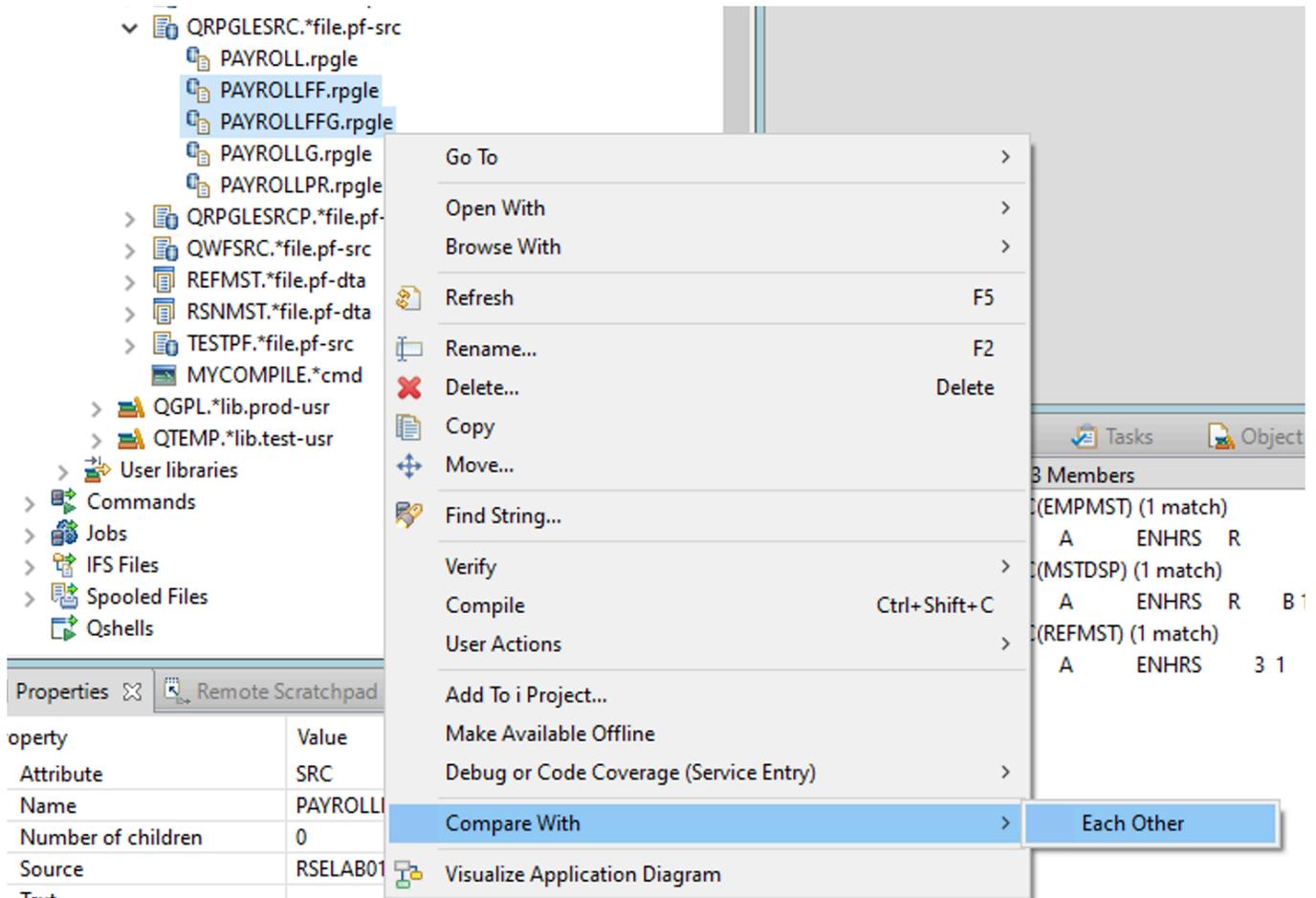
To close the Compare Editor.

- __8. Click the **X** on the Editor tab

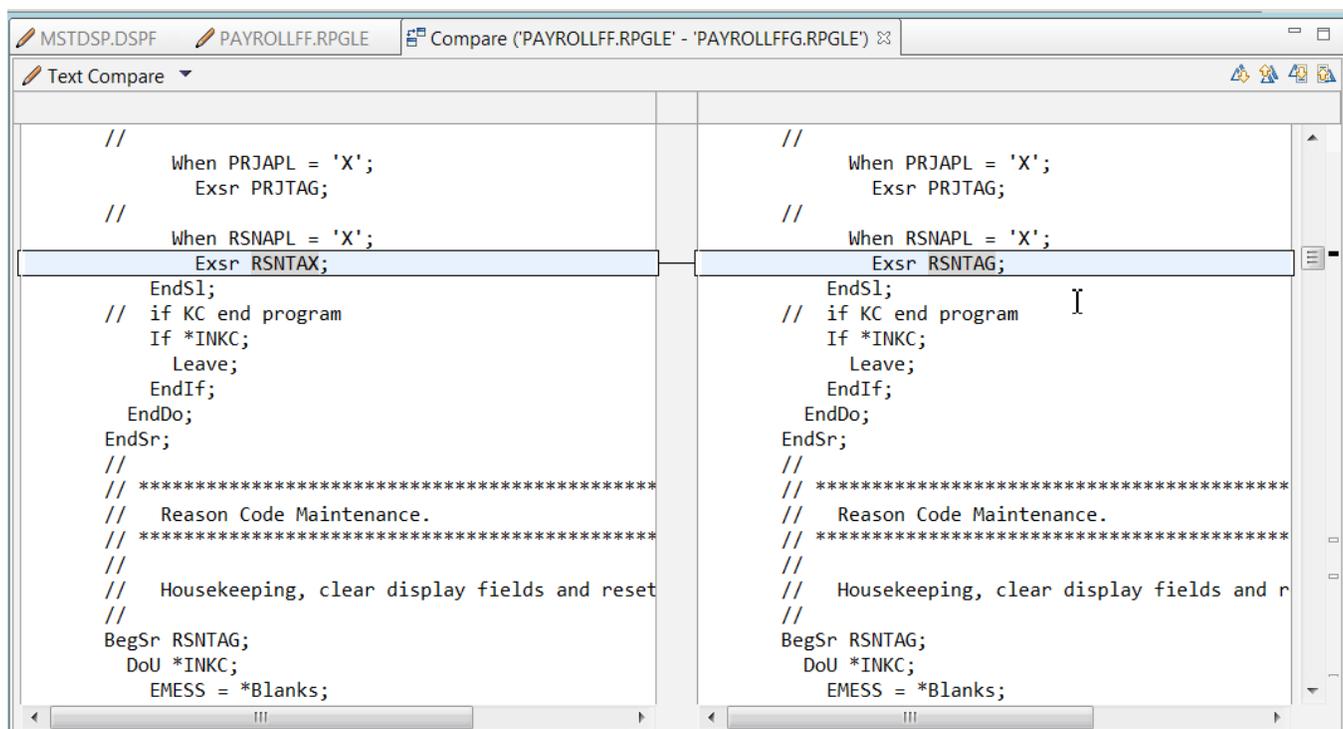


For a more typical compare

- __9. Compare the PAYROLLFF and PAYROLLFFG members



- __10. Explore the differences between the ‘good’ version of the program **PAYROLLFFG** and the one with the bugs, you have yet to fix, **PAYROLLFF**.



__11. Click the **X** on the Editor tab

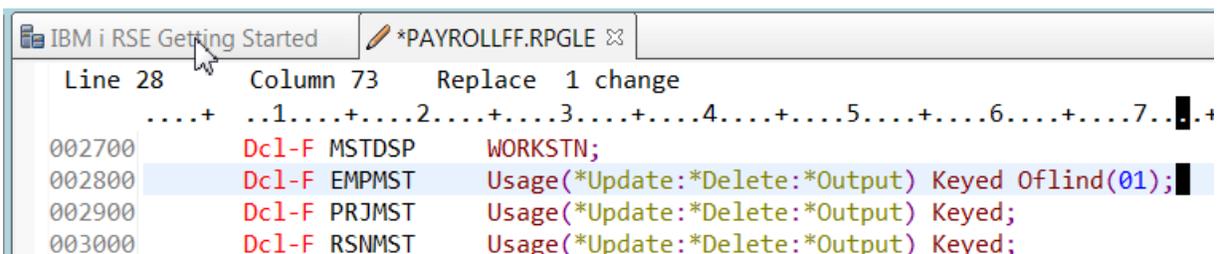
Let's have a look at the syntax checker

2.13 Checking syntax

One of the powerful features that the LPEX Editor shares with SEU is its ability to syntax check your source. Syntax checking can be done either when the cursor leaves each line of source or all at once on either the currently selected source or on the entire source member.

Now you will create a syntax error and watch for the prompt to correct it. To syntax check the file:

- __1. In the PAYROLL Editor window move the cursor to line 28 by typing the line number in the sequence number column or scrolling down.
- __2. Add the **Oflind(01)** keyword to the end before the semicolon ‘;’.



__3. Move the cursor off the line.

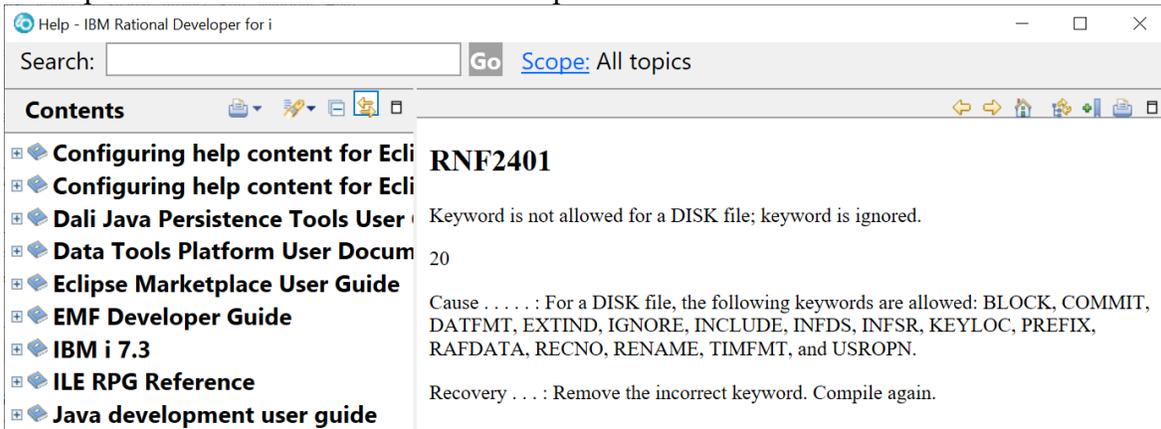
A red annotation appears in front of line 28 and the token in error is underlined.

__4. If you hover the cursor over **Ofind(01)**, a hover containing the error message appears.

```

PAYROLLFF.RPGLE
Line 50      Column 32      Insert
.....1.....2.....3.....4.....5.....6.....7.....8
002700      Dcl-F  MSTDSP      WORKSTN;
002800      Dcl-F  EMPMST      Usage(*Update:*Delete:*Output) Keyed Ofind(01);
002900      Dcl-F  PRJMST      Usage(*Update:*Delete:*Output)
003000      Dcl-F  RSNMST      Usage(*Update:*Delete:*Output)
003100      //
003200      //  Compile time array containing error descriptions.
003300      Dcl-S  ERR          Char(50)          DIM(10)  CTDATA  PERRCD(1);
    
```

__5. Click the link **RNF2401** in the error message in the hover. This opens a window with second level help for the error.



__6. Close the Help window.

__7. Remove the **Ofind(01)** keyword to correct the error. (Alternatively, you can use **Edit > Undo** to correct this).

__8. Move the cursor off the line you just fixed.

The error message is automatically removed from the editor.

Tip:



You can toggle automatic syntax checking. Click **Window > Preferences** from the workbench menu and then expand **Remote Systems > Remote Systems LPEX Editor > IBM i Parsers**. Now, select the language you want to change the settings for in the left pane of the Preferences window, select or deselect the **Automatic syntax checking** check box and then click **OK**

Tip:



You can syntax check the whole source member currently in the editor by clicking **Source > Syntax Check All**.

Congratulations!

You have successfully completed the introduction to editing IBM i source members using the LPEX editor.

We recommend that you move on to the next lab in the sequence; or browse the list of labs on Rational Developer for i - Hands-On Labs at http://ibm.biz/rdi_labs to choose a lab of interest.

More information, material and opportunities to discuss the product can be found at our RDi Hub:

http://ibm.biz/rdi_hub

Enjoy working with Rational Developer for i!

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