IBM Software

Rational Developer for i Sandbox for IBM i Lab Exercise Workbook

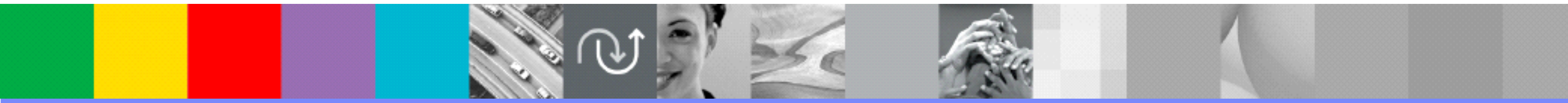
Rational Developer for i

Lab 08 – Working offline

This lab covers working offline using i Projects, working with source members offline and using remote actions to compile source.

Version 6, January 2021

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.



Lab 08 – Working offline with i Projects

Overview

In this module, you learn how to use the i Projects perspective in a typical development cycle for offline application development.

When you do i Project based development you will want to work in the i Projects perspective. This perspective serves two main purposes, namely for performing IBM i offline development on Windows® and Linux clients and for enabling team development.

Offline development allows for a disconnected mode of development where a live connection to a host is only required when source code updates or compiles on the IBM server are needed. Team development is needed when code changes need to be shared between a team of developers and synchronization of these changes is needed as part of the development cycle. Team Development with sharing source is not covered in this tutorial. However there is a hands-on Lab available that shows how to use i Projects with Rational Team Concert for IBM i in a Team development environment.

Typically, when using i Projects, you create local source physical files and members and edit them on your workstation. You can also download existing members from any remote library into your project. Once done with the local editing, you can submit a build that will push all your changes to the associated library of the i Project and perform a build on the remote members. The code pushed to this scratch library is only pushed there for the purpose of performing that build. If source code management is needed, the i Project could be associated with any Team management tool provider preferable Rational Team Concert for IBM i.

This Lab is divided into 2 parts:

- The first part describes how to use i Projects in a casual way to get development work done offline. For example, take your work home over the weekend and then push the changes back onto the IBM i server on Monday morning, or maybe working on the train.
- The second part describes how to use i Projects for your regular development. Where your developers will create and maintain code on their individual workstations. The source code will only be pushed onto the IBM i server for compiles. If you work in a team, you will most likely use this form of development in a managed team environment for example using RTCi.

Learning objectives

- Make source available for offline or disconnected development
- Edit and verify source in disconnected mode
- Compile a changed member
- Create a new i Project and populate with new source physical files and members
- Show remote objects or local objects or both
- Submit a build for the entire i Project.

Skill level and prerequisites

Introductory.

Important!

You should complete **RDi 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
Italic font	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.
ℹ	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. As of version 9.5, RDi includes a built-in emulator so you will not need any additional software. If you are using a previous version, then any 5250 emulator will work. The IBM i Access Client Solutions contains a best of breed emulator that is freely available to those who have an IBM i that is V6R1 or later.

Host System requirements

The easiest way to ensure you have everything you need, is to use the EM Sandbox demonstration IBM i server that is set up and ready to use with these lab exercises.

☒ The picture can't be displayed.
ℹ

Tip
If this is **not** an instructor led class with PC's provided, you may need to install and setup the IBM software on your PC first.

120 day Trial of Rational Developer for i can be downloaded here:
http://ibm.biz/rdi_trial
Page to request userid for IBM i demonstration system:
http://ibm.biz/rdi_labs_getuserid

1 Using i Projects for working offline

In this module, you will:

- Download selected files or members to your workstation.
- Verify downloaded source.
- Launch the editor on a local source member in an i Project.
- Create a new i Project for working local on your workstation.
- Edit a local source member in i Project.
- Work with local source members using the i Project Navigator
- Verify changed source members locally.
- Push a source member to the IBM i sever and compile it

1.1 Making source available offline

You want to edit and verify your source on a workstation, disconnected from an IBM i server, you will need to download the source to the workstation. You will need to store the source in an i Project. After a successful download you will be able to work offline with the source.

Since you don't have an existing i Project, the easiest is to use the **Make Available Offline** option in the RSE.

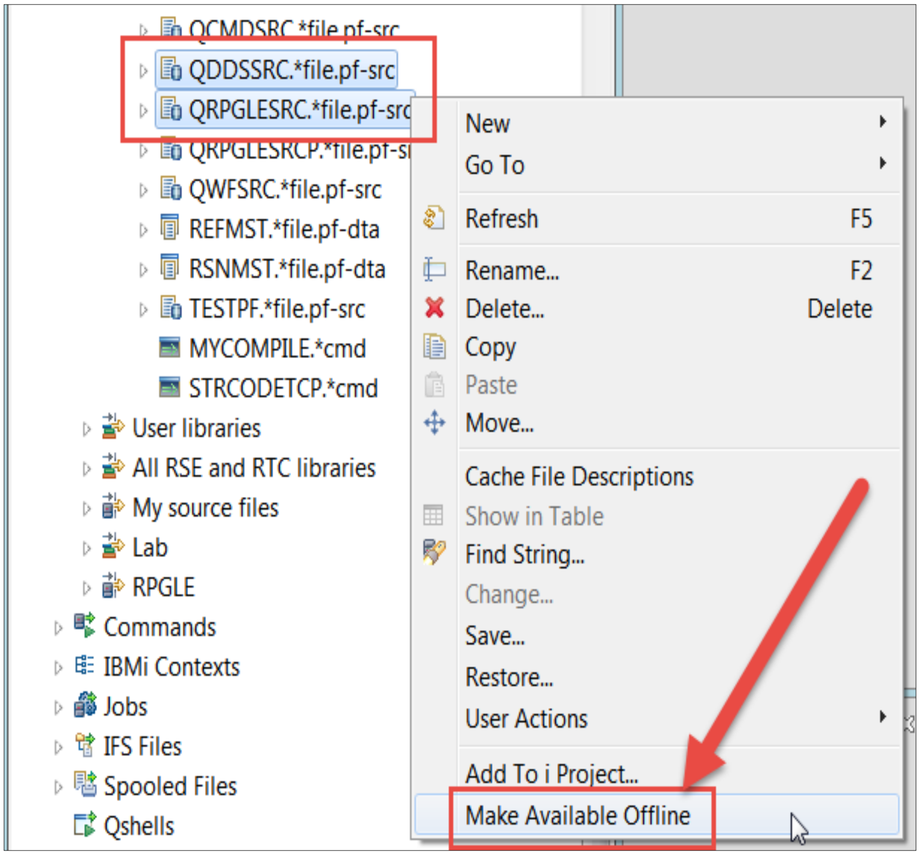
The **Make Available Offline** option downloads the selected files or members locally to their corresponding i Project. The corresponding i Project that gets created uses the connection's host and library names of the selected source physical files in the RSE view. If such an i Project is not found, one will automatically be created.

To make source available offline, in the RSE view, using the connection you created before in Lab 01:

__1. In the library list, expand your **RSELABxx** library. It contains the source files that you want to work with offline.

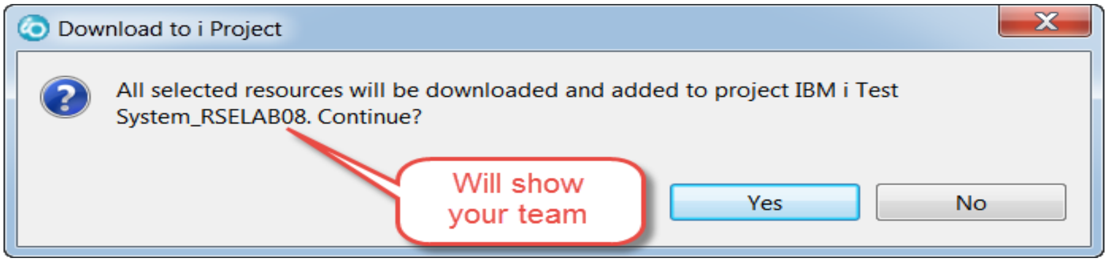
__2. Select the source physical files **QDDSSRC** and **QRPGLESRC** as you want the members in these source files to be made available for offline development. You can use the Control key to make multiple selections.

__3. Right-click and select **Make Available offline** on the pop-up menu.



The Download to i Projects dialog opens.

__4. Click the **Yes** button to proceed.


Download to i Project

All selected resources will be downloaded and added to project IBM i Test System_RSELAB08. Continue?

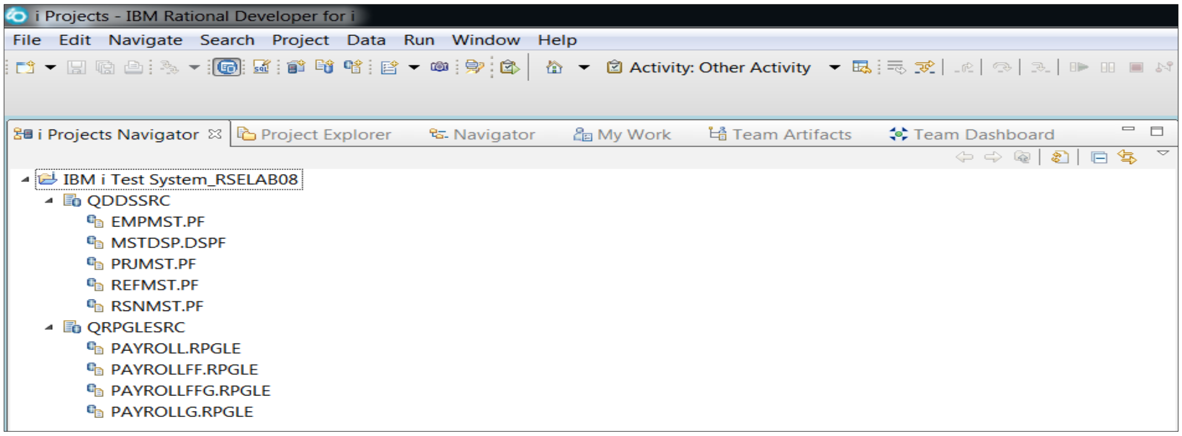
The i Projects perspective opens with your new i Project named **IBM i Test System_RSELABxx**.

IBM i Test System being the connection name and RSELABxx the library containing the objects to be downloaded.

Troubleshooting

If the i Projects perspective does not open automatically, click **Window > Open Perspective > iProjects.**

This project **IBM i Test System_RSELABxx** is created for you automatically and the source files **QDDSSRC** and **QRPGLESRC** are added to this project.



- IBM i Test System_RSELAB08
  - QDDSSRC
    - EMPMST.PF
    - MSTDSP.DSPF
    - PRJMST.PF
    - REFMST.PF
    - RSNMST.PF
  - QRPGLESRC
    - PAYROLL.RPGLE
    - PAYROLLFF.RPGLE
    - PAYROLLFFG.RPGLE
    - PAYROLLG.RPGLE

Tip:

If you want to add more source files later to this i Project, you can use the **Make Available Offline** option again.

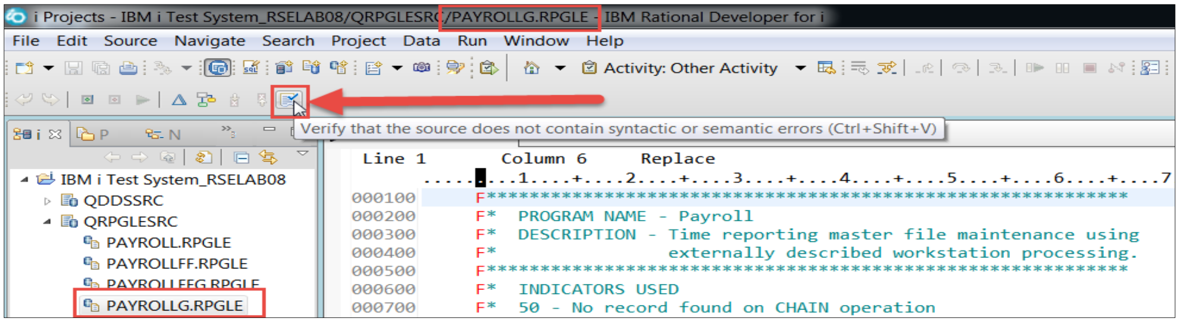
1.2 Caching reference data

You need to verify that you have the latest cached reference data available before you begin to work offline. You need cached external data descriptions of files used in the RPG program. That allows, even offline without a connection to an IBM i system, to run verifies for programs that contain external described files.

__1. In the i Projects view, expand **QRPGLESRC**.

__2. Double-click **PAYROLLG** to open this source in the source editor.

__3. Click anywhere in the editor to give it focus and click **Verify** on the workbench menu.


i Projects - IBM i Test System_RSELAB08/QRPGLESRC/PAYROLLG.RPGLE - IBM Rational Developer for i
File Edit Source Navigate Search Project Data Run Window Help
Activity: Other Activity
IBM i Test System_RSELAB08
QDDSSRC
QRPGLESRC
PAYROLL.RPGLE
PAYROLLFF.RPGLE
PAYROLLFFG.RPGLE
PAYROLLG.RPGLE
Line 1 Column 6 Replace

Verify that the source does not contain syntactic or semantic errors (Ctrl+Shift+V)

```
      .....A...1....+....2....+....3....+....4....+....5....+....6....+....7
000100     F*************************************************************
000200     F*   PROGRAM NAME - Payroll
000300     F*   DESCRIPTION - Time reporting master file maintenance using
000400     F*                  externally described workstation processing.
000500     F*************************************************************
000600     F*   INDICATORS USED
000700     F*   50 - No record found on CHAIN operation
```

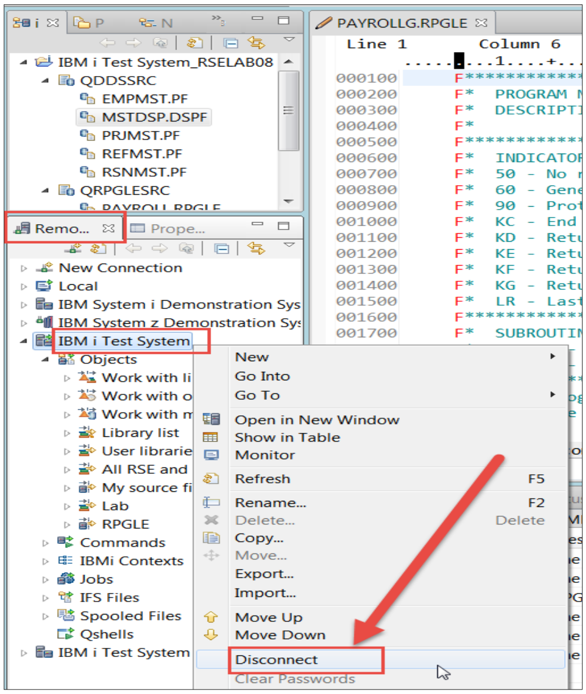
This action will check your member for syntax and semantic errors and any errors will appear in the Error List view and it caches all information required into the local workspace for subsequent offline verifies.

Tip: As you are now in i Projects perspective your Remote Systems pane is now to the bottom left corner of your Workbench. You can easily switch perspectives with Window / Open Perspective if you need to.

Now you are ready to disconnect from the IBM i server.

__4. From the Remote Systems view, look below the i Project Navigator pane for the RSE pane, right-click on the connection and click **Disconnect**.

This action disconnects the session from the IBM i server.



Tip:

You can also put an entire IBM i connection, and all the contents defined with that connection, into offline mode by right-clicking the connection and clicking Work Offline on the pop-up menu. This method of working offline prevents the Remote System Explorer from attempting to connect to the IBM i server if a request is made for remote information. For example, if you are verifying a local source file or member in an i Project, the project would attempt to connect to the server if the required information was not available in the cache. This can be prevented by switching the connection to offline mode.

You have downloaded selected files or members to your workstation, verified downloaded source to cache reference data, and put an IBM i connection into offline mode.

1.3 Editing local source members in disconnected mode

In this lesson, you learn how to edit the member **PAYROLLG**, save that member, and display an outline of that member, all disconnected from an IBM i server. You also learn how to open a local copy of the DDS source member **MSTDSP** in the Screen Designer.

Editing local source members in i Projects is the same as editing remote source members in the Remote System Explorer. The LPEX Editor can be launched on any local member and the same functionality is available, such as the Outline view, prompter and the content assist feature.

There is one major difference though when editing source members using the LPEX Editor in the Remote System Explorer perspective as opposed to using the LPEX Editor in the i Projects perspective.

- When a source member is opened with the editor in the **Remote System Explorer** perspective, it is locked, and it cannot be modified on the host while the local edit session is active. Any code changes that you make locally will be saved to the host when the Save action is performed.
- On the other hand, when a member is opened with the LPEX Editor in the **i Projects** perspective, the member is not locked on the host. It can be modified by anyone with enough authority to the object. If you do a **Refresh** on the i Project, a double-sided red arrow will indicate that the member has been modified on the host. When you push changes back to the host, (something you will do when you are connected again), you will be warned that you will be overwriting remote changes, and you are given the chance to cancel the operation.

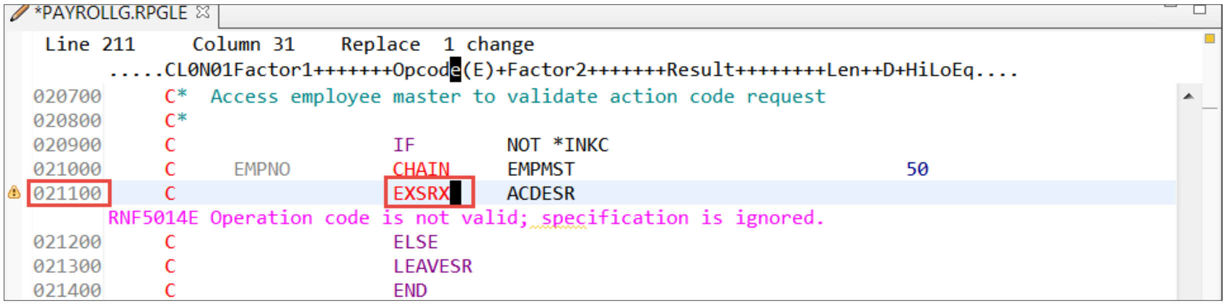
To edit local source members in disconnected mode:
In the i Project perspective:

__1. Open the PAYROLLG member in the LPEX editor if it is not open already.

__2. In the PAYROLLG editor window move the cursor to line 211 which contains EXSR ACDESR.

__3. Append an **X** to the **EXSR** op-code to make it **EXSRX**.

__4. Click **File > Save** from the workbench menu to save this change.



```
 Line 211      Column 31     Replace   1 change
        .....CL0N01Factor1+++++++Opcode(E)+Factor2+++++++Result++++++++Len++D+HiLoEq....
020700       C*  Access employee master to validate action code request
020800       C*
020900       C                   IF        NOT *INKC
021000       C     EMPNO         CHAIN     EMPMST                             50
021100       C                   EXSRX     ACDESR
        RNF5014E Operation code is not valid; specification is ignored.
021200       C                   ELSE
021300       C                   LEAVESR
021400       C                   END
```

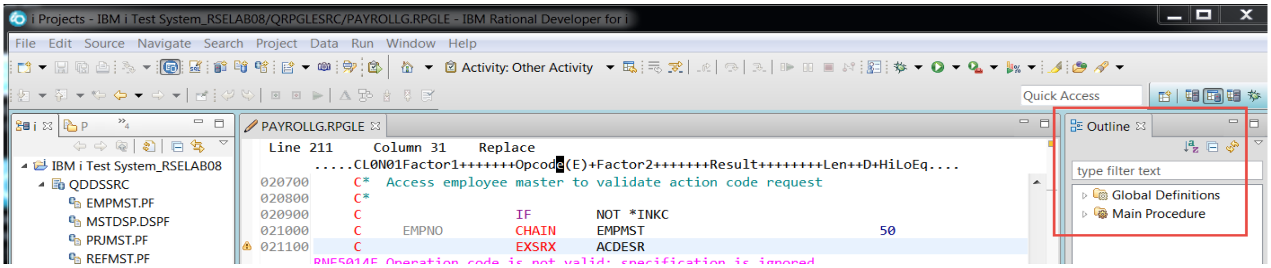
You will fix this error later.

Note:
The file is updated in the local workspace on the workstation you are working on, it has **not** been updated the file on the IBM i server.

Next, let’s display an outline of this ILE RPG member.

The next couple of steps are not i Projects specific, they just show some of the features of Rational Developer, if you are already familiar with Rational Developer you might want to skip some of these steps.

The Outline view acts as an excellent resource when you want to edit RPG and COBOL source. The Outline view displays a structural outline of items defined in the source that you currently have open in the editor. 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.

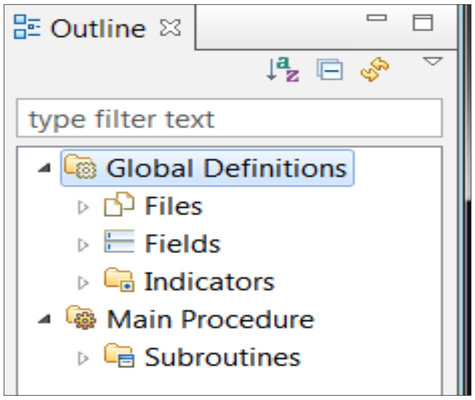

i Projects - IBM i Test System_RSELAB08/QRPGLESRC/PAYROLLG.RPGLE - IBM Rational Developer for i
File Edit Source Navigate Search Project Data Run Window Help
Activity: Other Activity
Quick Access
i
P
IBM i Test System_RSELAB08
QDDSSRC
EMPMST.PF
MSTDSP.DSPF
PRJMST.PF
REFMST.PF
PAYROLLG.RPGLE
Outline
type filter text
Global Definitions
Main Procedure

```
 Line 211      Column 31     Replace
       .....CL0N01Factor1+++++++Opcode(E)+Factor2+++++++Result++++++++Len++D+HiLoEq....
020700      C*   Access employee master to validate action code request
020800      C*
020900      C                    IF        NOT *INKC
021000      C     EMPNO          CHAIN     EMPMST                             50
021100      C                    EXSRX     ACDESR
       RNE5014E Operation code is not valid; specification is ignored
```

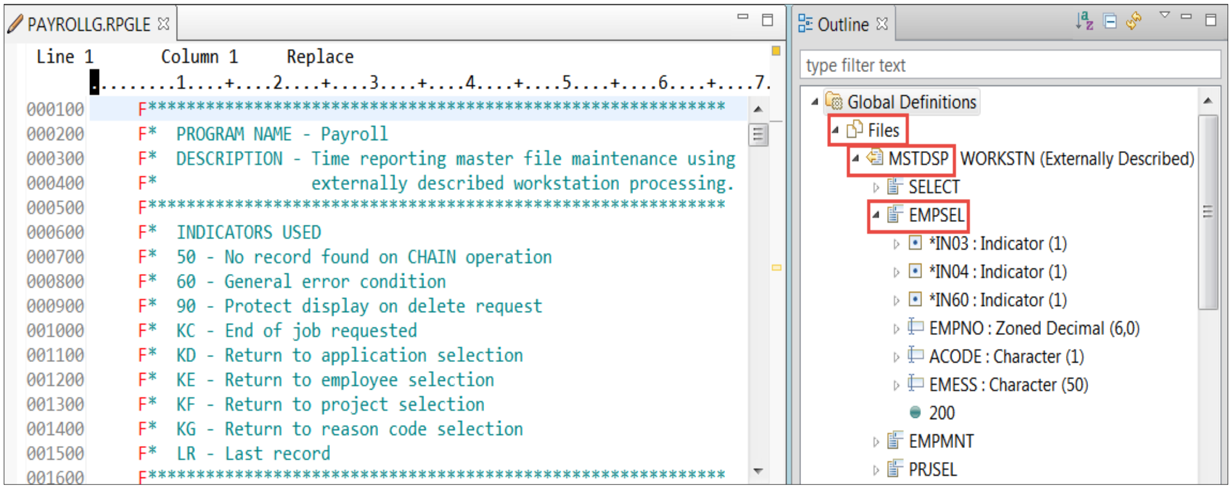
To see an Outline view of your RPG source:

__5. click the **PAYROLLG** tab in the editor

__6. Expand some of the elements in the Outline view.
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.



```
 Line 1       Column 1     Replace
.........1....+....2....+....3....+....4....+....5....+....6....+....7.
     F*************************************************************
     F*  PROGRAM NAME - Payroll
     F*  DESCRIPTION - Time reporting master file maintenance using
     F*                externally described workstation processing.
     F*************************************************************
     F*  INDICATORS USED
     F*  50 - No record found on CHAIN operation
     F*  60 - General error condition
     F*  90 - Protect display on delete request
     F*  KC - End of job requested
     F*  KD - Return to application selection
     F*  KE - Return to employee selection
     F*  KF - Return to project selection
     F*  KG - Return to reason code selection
     F*  LR - Last record
     F*************************************************************
```

__7. Expand **Files**.

__8. Expand the **MSTDSP** workstation file.

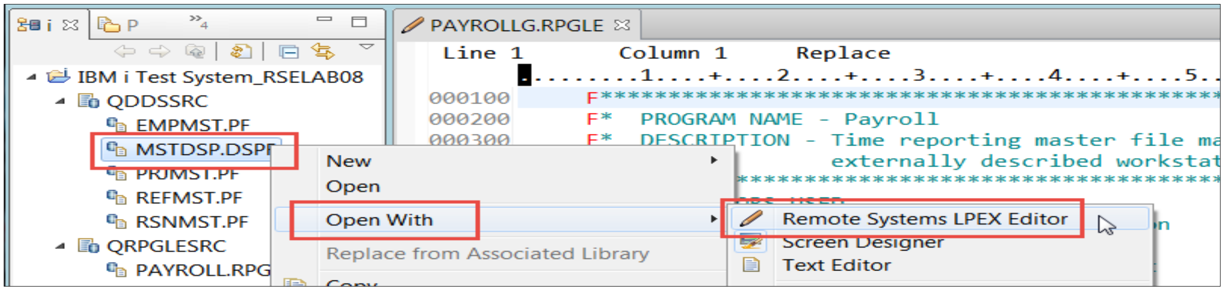
__9. Expand the **EMPSEL** record format.

__10. Double-click on any of the entries in the Outline view. This will position the source editor accordingly.

You can also edit DDS members locally from the i Project Navigator.
To open a DDS member from the i Project Navigator:

__11. Expand **QDDSSRC**, if it is not already expanded.

__12. Right-click **MSTDSP** member and select **Open With**.



```
Line 1          Column 1      Replace
           .........1....+....2....+....3....+....4....+....5..
000100      F***********************************************
000200      F*  PROGRAM NAME - Payroll
000300      F*  DESCRIPTION - Time reporting master file ma
                          externally described workstat
```

As in the Remote System Explorer perspective, you now have the options to open the LPEX Editor or other editors.

Rational Developer for i now includes special editors for DDS source it can handle display file source as well as printer File source. You might want to give these a try by selecting the **Open with Screen/Report Designer** actions when right clicking on a DSPF or PRTF type member.

You have edited a local source member from an i Project, viewed an outline of the local RPG source and opened a local DDS member for edit from the i Project Navigator.

1.4 Verifying RPG source in disconnected mode

In this lesson, you learn how to verify the RPG source member **PAYROLLG** while disconnected from an IBM i system. You then learn how to fix a problem in the source and verify that the source is fixed correctly.

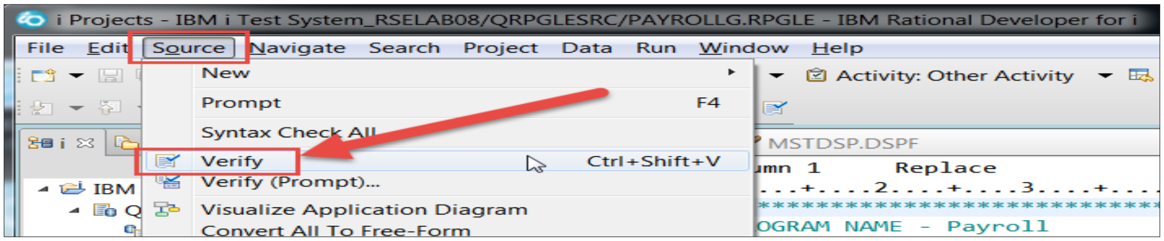
While you are disconnected from an IBM i system, you can make certain that there are no semantic and syntactic errors in your code by invoking the **Program Verifier**. The verifier checks for syntactic and semantic (compile) errors on your workstation, so that you can guarantee a clean compile when you are connected again. The **Error List** view lists the errors that are found and their severity, inserts the error messages directly into the source and helps you to navigate between the errors.

To verify source:

__1. Click the **PAYROLLG** editor tab to bring the editor in focus.

__2. Click **Source > Verify** from the workbench menu.

Tip: If you are prompted to login to the IBM system, click Cancel. You can avoid this pop-up by right clicking on your connection in RSE (IBM i Test System) and selecting 'Work Offline'

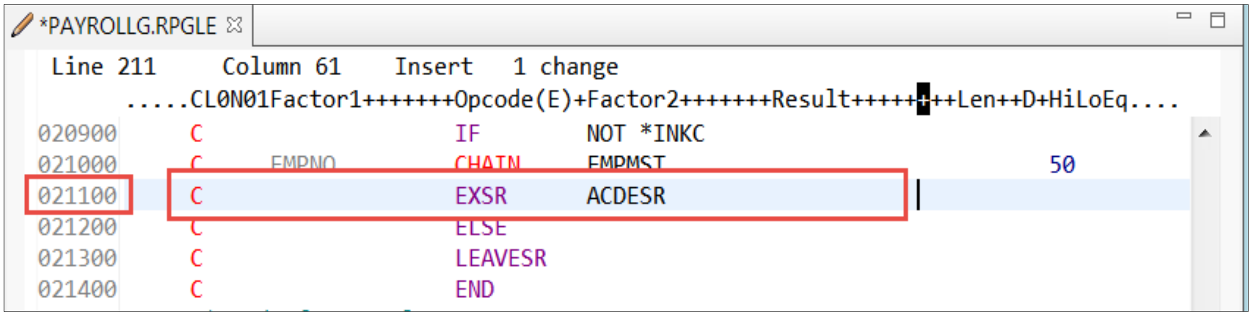


After a moment the verifier will display an **Error List** view below the Editor window.

__3. Use the Error List to locate the error you created earlier and fix it (remove the X you put in line 211) ensuring you don't remove/add any spaces.

Tip: Double click on the error to move focus the editor and position the cursor on the line in error

__4. Save the change to the source that you just made.



```
  Line 211      Column 61     Insert     1 change
       .....CL0N01Factor1+++++++Opcode(E)+Factor2+++++++Result++++++++Len++D+HiLoEq....
020900     C                   IF        NOT *INKC
021000     C     EMPNO         CHAIN     EMPMST                             50
021100     C                   EXSR      ACDESR
021200     C                   ELSE
021300     C                   LEAVESR
021400     C                   END
```

__5. Verify the source again.

You may ignore the six Severity 0 informational messages for now.

You have locally verified changed RPG source, whilst not needing to be connected to the IBM i system.

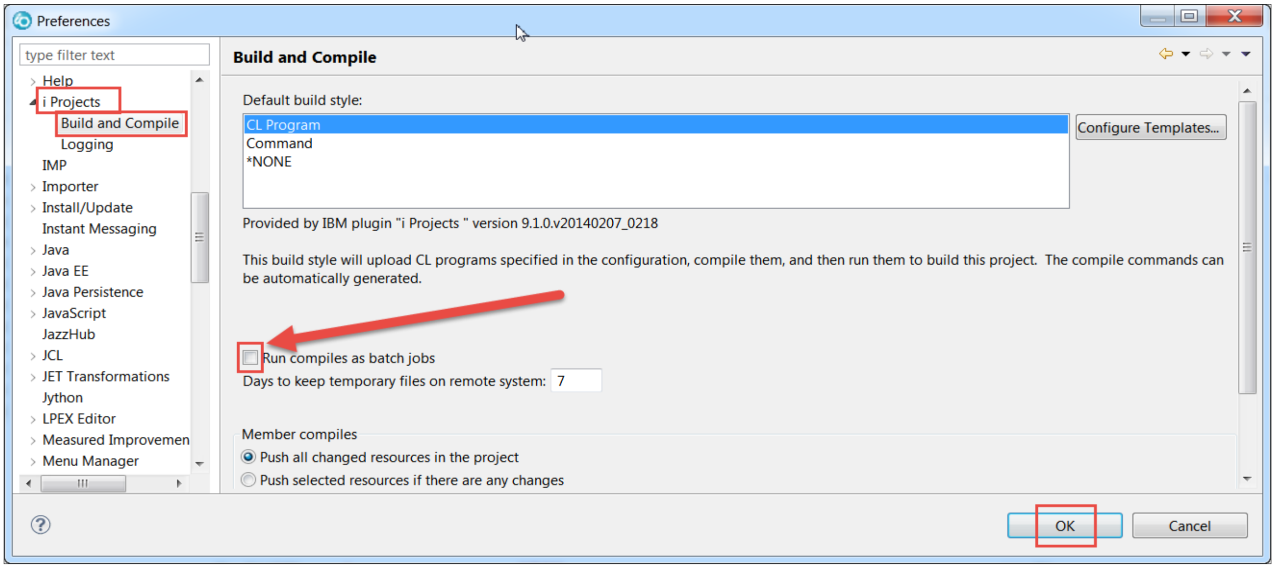
1.5 Compiling a member

In this lesson, you learn:

- how to change the compile preferences to compile interactively
- how to select the RPG source member **PAYROLLG** to remotely compile this source into the **PAYROLLG** program.

You will see that during compile, you are automatically connected to your IBM i system to push the changed source to the IBM i server and to invoke the compiler. So now that the code has been edited locally and verified, you are ready to perform a single member compile on the source member in your i Project.

To compile a single member, first change the preferences to compile interactively:
__1.	Click **Window > Preferences** from the workbench menu.
__2.	Expand **i Projects.**
__3.	Select **Build and Compile.**
__4.	Clear the **Run compiles as batch jobs** check box.
__5.	Click **OK**.



Default build style:
CL Program
Command
*NONE

Provided by IBM plugin "i Projects " version 9.1.0.v20140207_0218

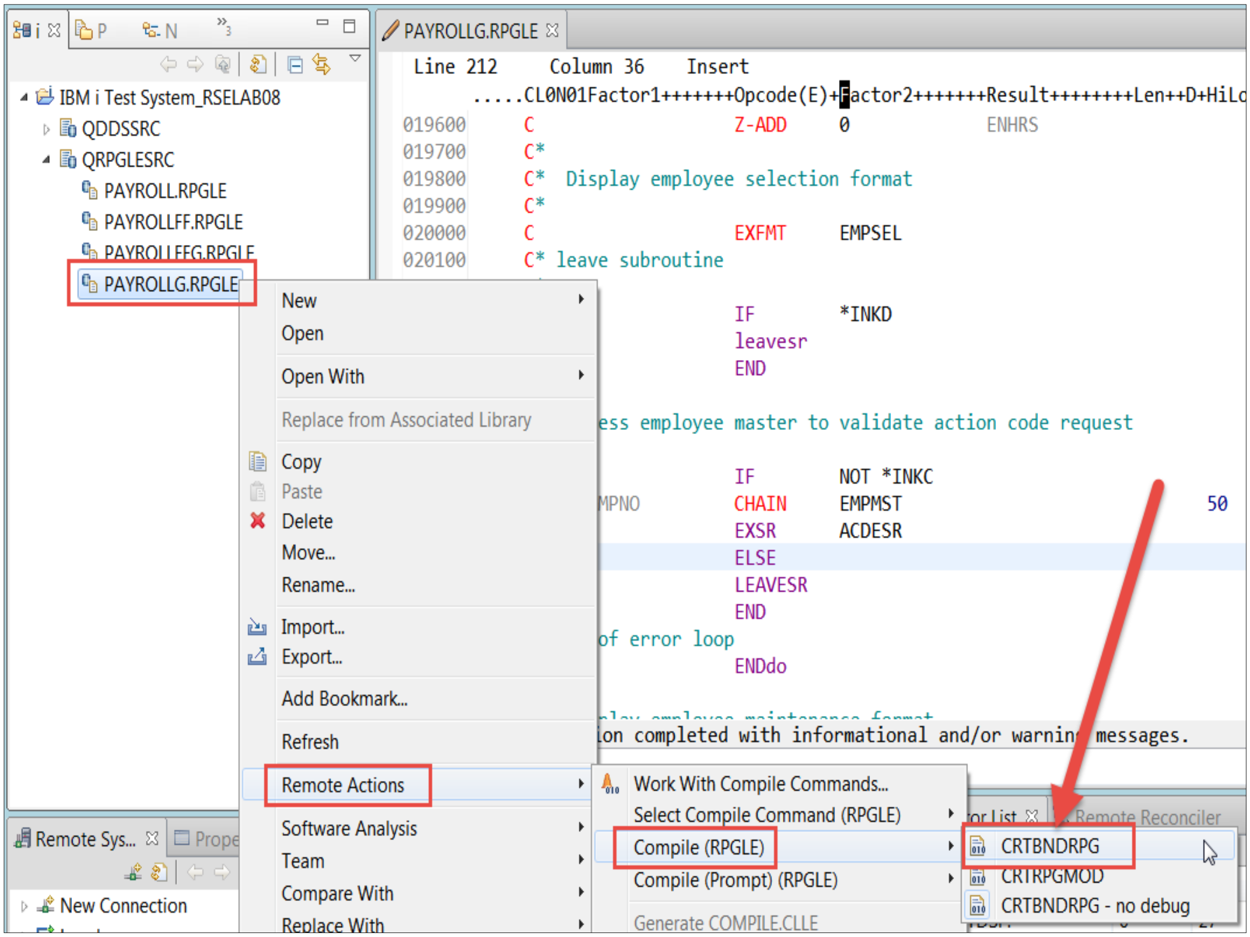
This build style will upload CL programs specified in the configuration, compile them, and then run them to build this project. The compile commands can be automatically generated.

□ Run compiles as batch jobs
Days to keep temporary files on remote system: 7

Member compiles
● Push all changed resources in the project
○ Push selected resources if there are any changes

__6.	Expand **QRPGLESRC** if it is not already
__7.	Right-click **PAYROLLG.**

__8. Select **Remote Actions > Compile (RPGLE) > CRTBNDRPG** on the pop-up menu.

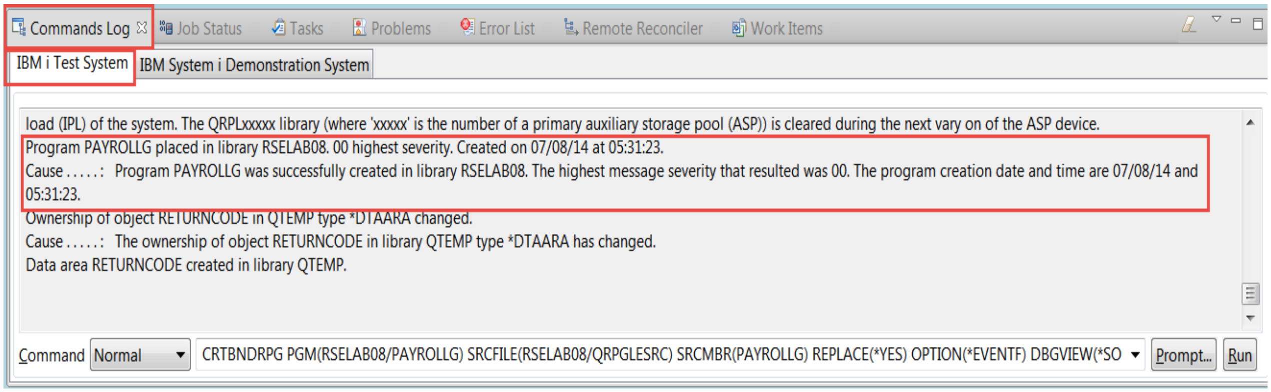


```
Line 212     Column 36     Insert
     .....CL0N01Factor1+++++++Opcode(E)+Factor2+++++++Result++++++++Len++D+HiLo
019600     C                    Z-ADD     0              ENHRS
019700     C*
019800     C*  Display employee selection format
019900     C*
020000     C                    EXFMT     EMPSEL
020100     C* leave subroutine
                                IF        *INKD
                                leavesr
                                END
ess employee master to validate action code request
                                IF        NOT *INKC
MPNO                            CHAIN     EMPMST                        50
                                EXSR      ACDESR
                                ELSE
                                LEAVESR
                                END
of error loop
                                ENDdo
ion completed with informational and/or warnin  messages.
```

Now the connection will be activated and you may be prompted for a user ID and password. This will connect you to your IBM i system.

Any local changes are uploaded to the same file in the associated library on the IBM i system from which they were loaded. This action will then compile your member and any errors will appear in the Error List view.

You could now run or debug your changed application.



```
load (IPL) of the system. The QRPLxxxxx library (where 'xxxxx' is the number of a primary auxiliary storage pool (ASP)) is cleared during the next vary on of the ASP device.
Program PAYROLLG placed in library RSELAB08. 00 highest severity. Created on 07/08/14 at 05:31:23.
Cause . . . . . :   Program PAYROLLG was successfully created in library RSELAB08. The highest message severity that resulted was 00. The program creation date and time are 07/08/14 and
05:31:23.
Ownership of object RETURNCODE in QTEMP type *DTAARA changed.
Cause . . . . . :   The ownership of object RETURNCODE in library QTEMP type *DTAARA has changed.
Data area RETURNCODE created in library QTEMP.
```

Command Normal

```
CRTBNDRPG PGM(RSELAB08/PAYROLLG) SRCFILE(RSELAB08/QRPGLESRC) SRCMBR(PAYROLLG) REPLACE(*YES) OPTION(*EVENTF) DBGVIEW(*SO
```

2 Working with i Projects

The previous module guided you through the creation of a default i Project, which included using the default associated library, and the default compile commands. As we mentioned before, working with the default settings is ok for casual use of i Projects when you want to work offline for a couple of hours or days. If you use i Projects as the main environment for development, you will need to set it up in a way that works best for you. This module goes through some of the steps needed to customize i Projects.

In this module, you learn how to create a scratch library (sandbox) **PROJxx** for pushing local code changes to the remote host and for performing builds on that remote host.

You then learn how to create the i Project **MyProject** and populate it with a new RPG source file and new RPG source member. You also learn how to import remote objects such as DDS source and RPG source files into your existing i Project. As well, you learn about build styles and how they are used to build (compile) your project.

Next you learn about submitting a build for **MyProject** and displaying the status of this build job. Next, you learn how to show the remote objects, in particular, **PAYROLLG** program in the view of your i Project, **MyProject**. Further you learn how to filter this view, so you only see objects that are both local and remote. You also learn how to remove the local/ remote label decorators from the view.

Finally, you change **PAYROLLG** source again and submit another build to see how only the changed file is pushed to the remote host.

Instead of making remote objects available offline as you did with the **Make Available Offline** option, you now create an i Project and import or add objects to that project. To import objects into an i Project you must be connected to an IBM i system.

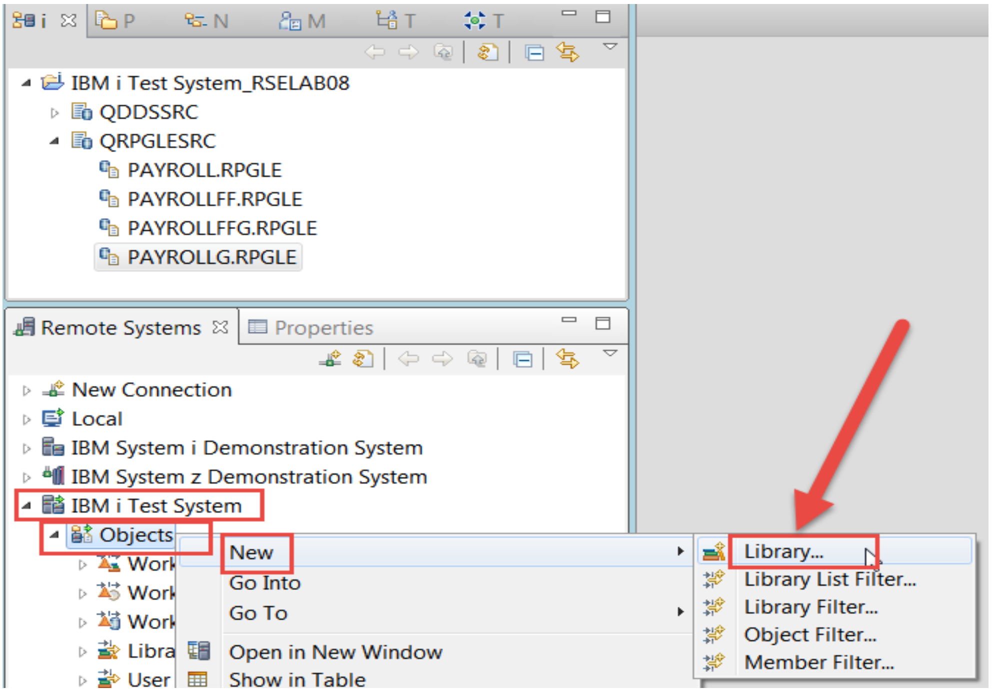
2.1 Creating a scratch library

In this lesson, you learn how to create a scratch library **PROJxx** and how to push local source code changes to the remote IBM i server.

You will need an associated library when you create an i Project. The associated library is a ″s**cratch**″ library on the remote IBM i system that the project maps to. The scratch library is used for pushing local code changes to the remote host and for performing builds on that remote host. It is expected that this library is a ″**personal**″ library. The goal is that the source in it will not be edited directly on the host. It is meant to be a sandbox in which a single developer can perform tasks, like compiling and running the program to test code changes.

To create a scratch library:
In the Remote Systems view below the i Project Navigator (if you are in i Projects perspective):
__1. Expand the IBM i Test System connection, if it is not already expanded.
__2. Right-click **Objects.**

__3. Select **New > Library** on the pop-up menu.



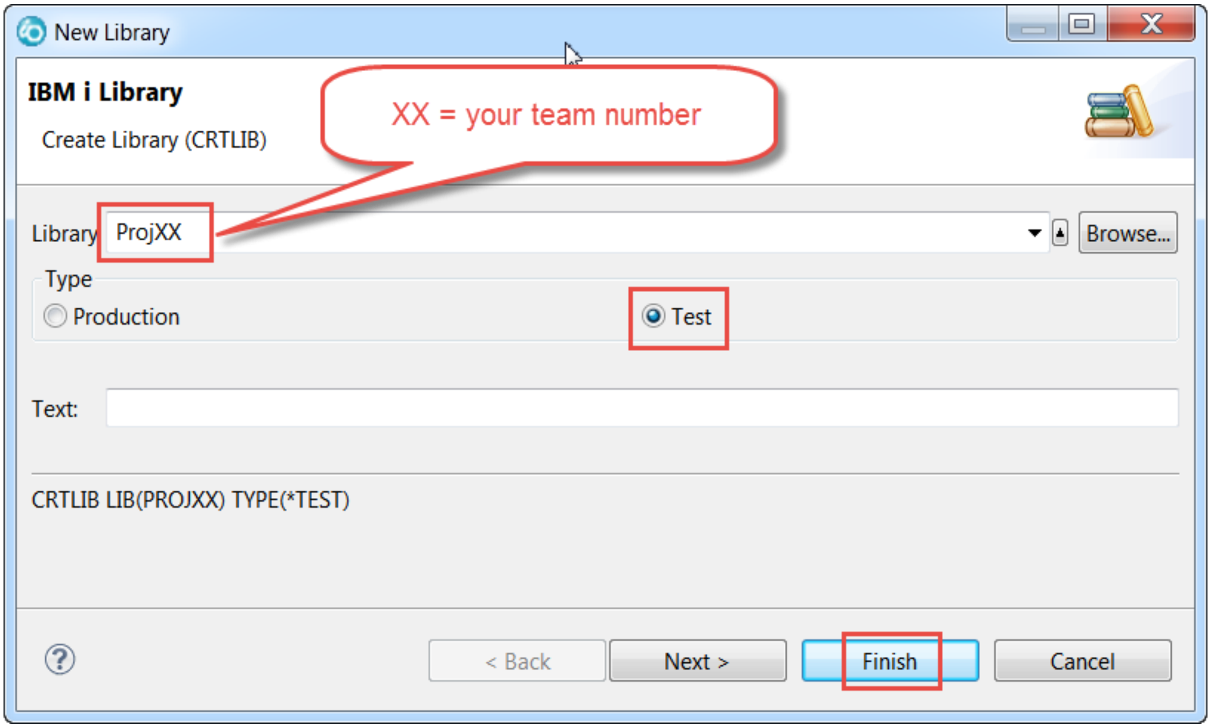
The New Library page opens.

__4. In the **Library** field, type **Projxx, xx** being your team number.

__5. Select the **Test** radio button to change the type of library to **Test**.

__6. Type your own comments such as **scratch library** into the **Text** field.

__7. Click **Finish**.



New Library

IBM i Library

Create Library (CRTLIB)

XX = your team number

Library: ProjXX

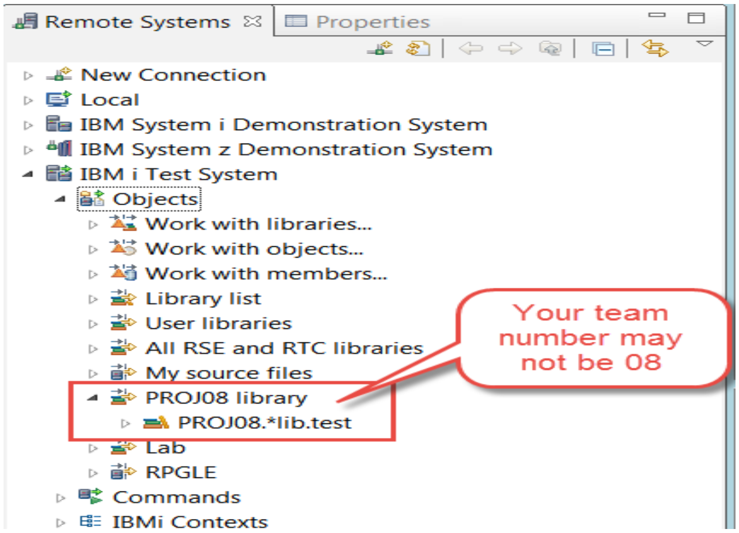
Type

○ Production ● Test

Text:

CRTLIB LIB(PROJXX) TYPE(*TEST)

This will create an empty IBM i Library.



Your team number may not be 08

2.2 *Creating an i Project*

In this lesson, you will learn how to create an i Project, **MyProject**, associate a scratch library **PROJxx** with that project, and select a build style for that project.

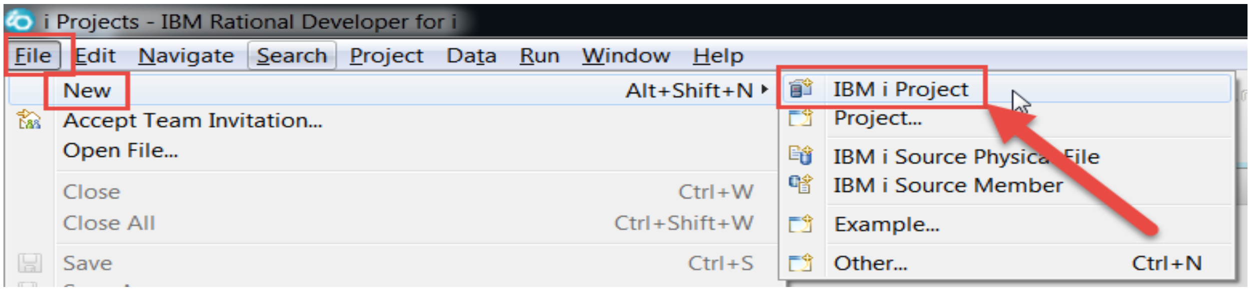
i Projects are projects that are dedicated for holding IBM i source members. When a new i Project is created three properties need to be associated with it. These are:

- An IBM i Connection
- A associated Library
- A Build Style.

To create an i Project:

__1. Make sure you are in the i Projects perspective

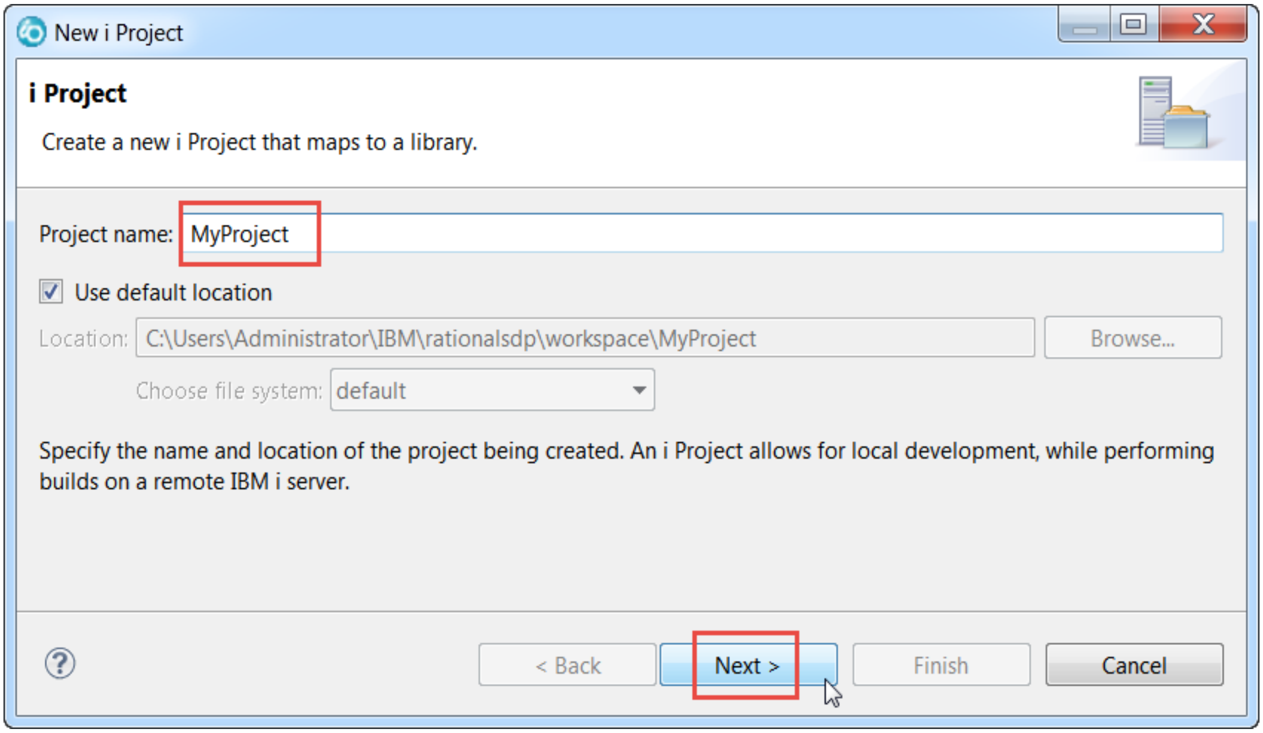
__2. Click **File > New > IBM i Project** on the workbench menu.


i Projects - IBM Rational Developer for i
File Edit Navigate Search Project Data Run Window Help
New Alt+Shift+N
Accept Team Invitation...
Open File...
Close Ctrl+W
Close All Ctrl+Shift+W
Save Ctrl+S
IBM i Project
Project...
IBM i Source Physical File
IBM i Source Member
Example...
Other... Ctrl+N

The **New i Project** page opens.

__3. In the **Project name** field, type **MyProject**.

__4. Click **Next**.



i Project

Create a new i Project that maps to a library.

Project name: MyProject

☑ Use default location

Location: C:\Users\Administrator\IBM\rationalsdp\workspace\MyProject

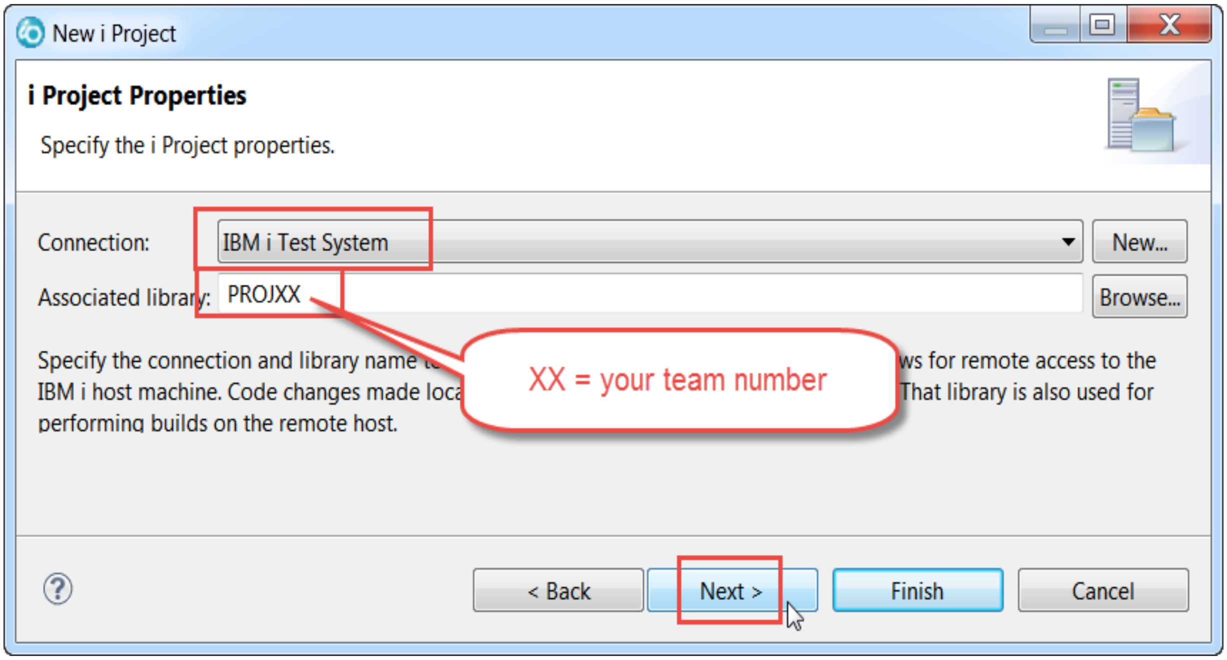
Choose file system: default

Specify the name and location of the project being created. An i Project allows for local development, while performing builds on a remote IBM i server.

__5. Select your connection from the **Connection** list, for example, **IBM i Test System**. The property **Connection** allows for remote access to the IBM i host, and handles for example user ID and password authentication to the remote host. It also provides the initial environment for builds, including the base library list.

__6. In the **Associated library** field, type **PROJXX**.
The associated library is the library on the IBM i system that your i Project maps to.

__7. Click **Next**.



New i Project

i Project Properties

Specify the i Project properties.

Connection: IBM i Test System

Associated library: PROJXX

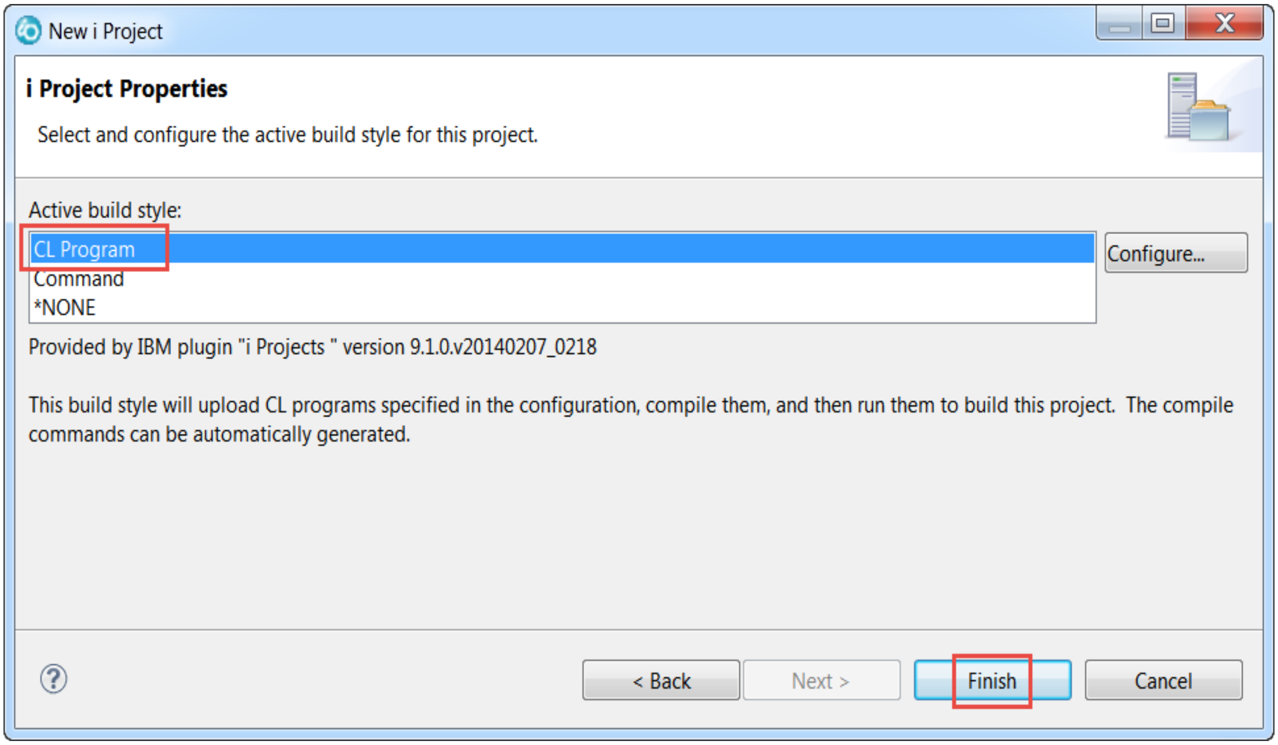
Specify the connection and library name t… …ws for remote access to the IBM i host machine. Code changes made loca… …That library is also used for performing builds on the remote host.

XX = your team number

On the next page:
Under **Active build style**:

__8. Select **CL Program**.
The property build style determines how a given i Project is built. It determines how source physical files and members are pushed to the remote host, and how these members are compiled there.

__9. Click **Finish**.



i Project Properties

Select and configure the active build style for this project.

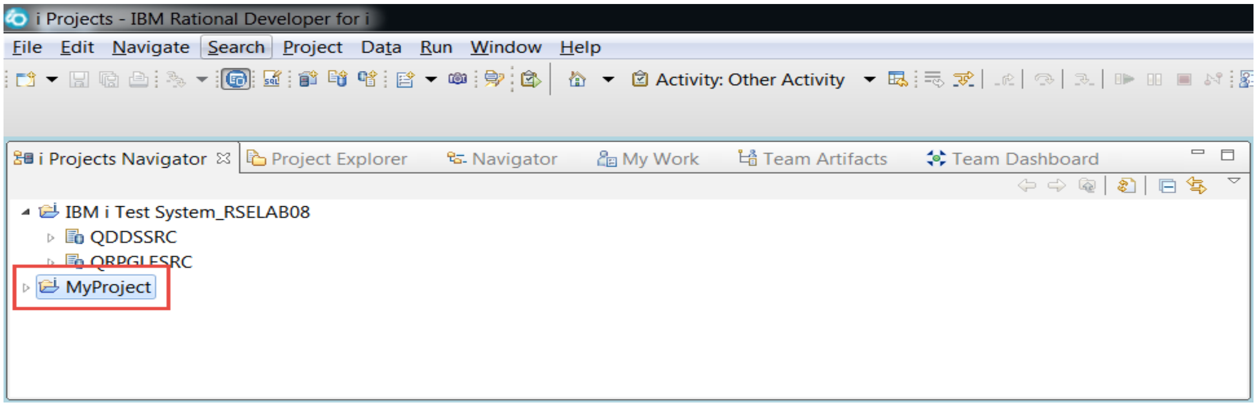
Active build style:

- CL Program
- Command
- *NONE

Provided by IBM plugin "i Projects " version 9.1.0.v20140207_0218

This build style will upload CL programs specified in the configuration, compile them, and then run them to build this project. The compile commands can be automatically generated.

This will create an empty i Project. This project is now your development environment instead of using RSE to remotely work with source you will use this Eclipse project to store and edit source members.

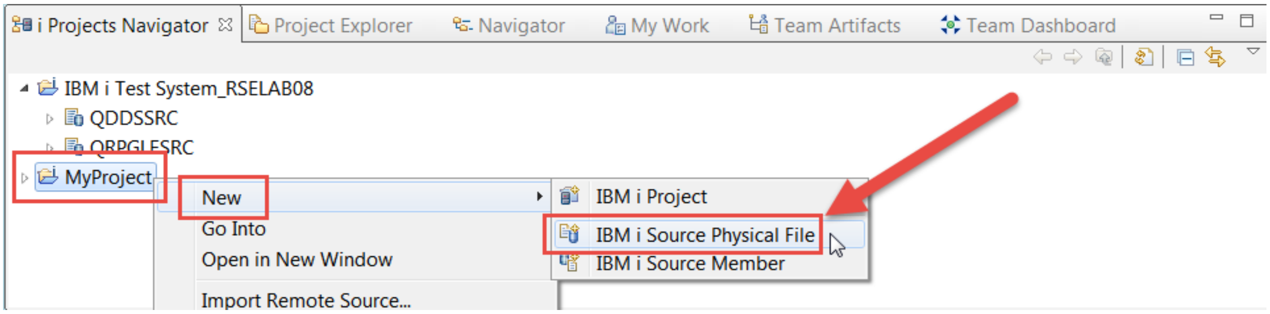


2.3 Creating a source file and a source member in an i Project

In this lesson, you learn how to create an RPG source file and an RPG source member in your i Project, **MyProject**.

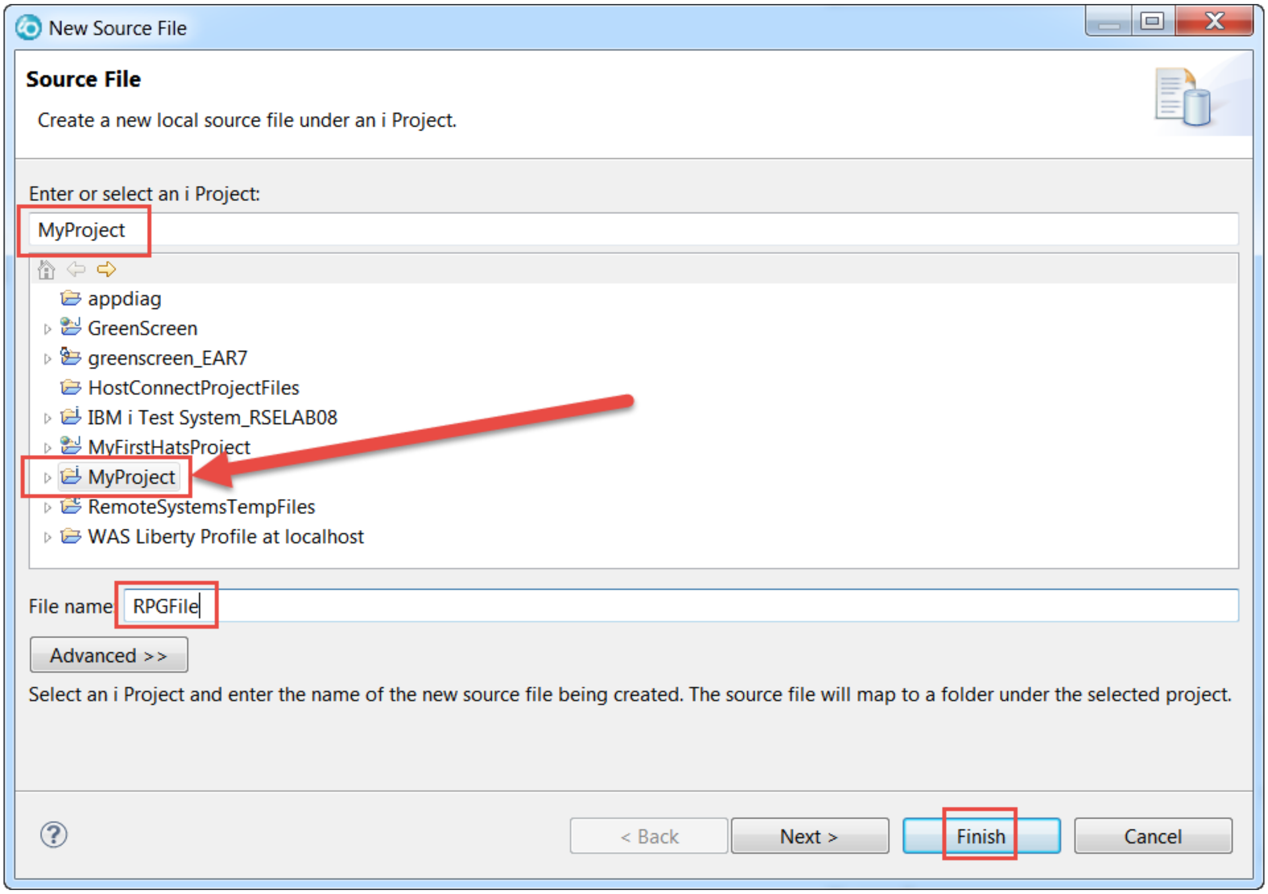
To create a source physical file:

__1. Right-click your i Project.
__2. Click **New** then click **IBM i Source Physical File** on the pop-up menu.



The **New Source File** page opens.

__3. Enter a name for your file in the **File name** field, for example **RPGFile**.
__4. Click **Finish**.
The file is added to your project.

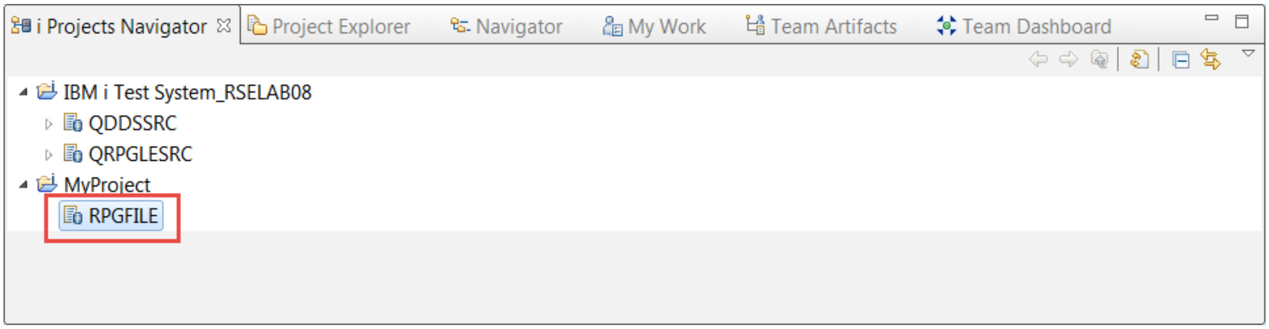


Enter or select an i Project: MyProject

File name: RPGFile

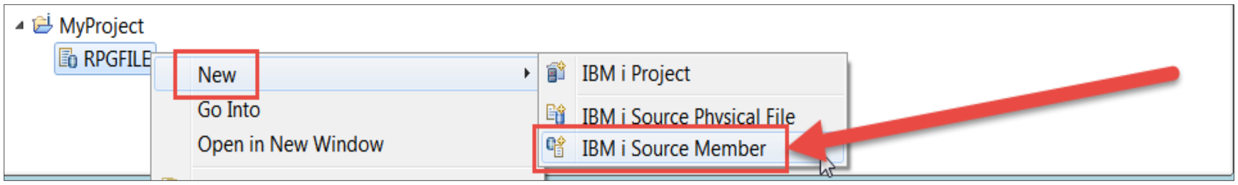
Select an i Project and enter the name of the new source file being created. The source file will map to a folder under the selected project.

You see the new file as part of your project.



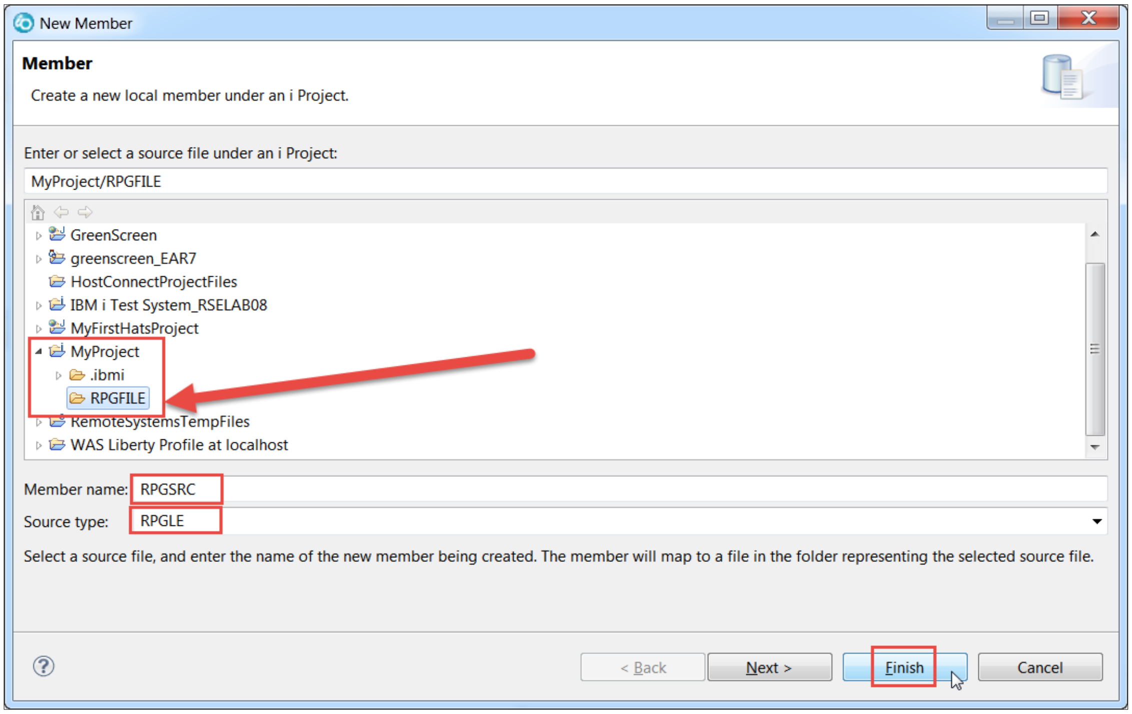
Next add a member to the file that you just created.

__5. Right-click your IBM i source physical file **RPGFile**.
__6. Click **New** then click **IBM i Source Member** on the pop-up menu.



The **New Member** page opens.

__7. Enter the name of the member in the **Member name** field, for example**, RPGSRC**.
__8. Enter the source type in the **Source type** field, for example, **RPGLE**.
__9. Click **Finish**.



New Member

Member

Create a new local member under an i Project.

Enter or select a source file under an i Project:

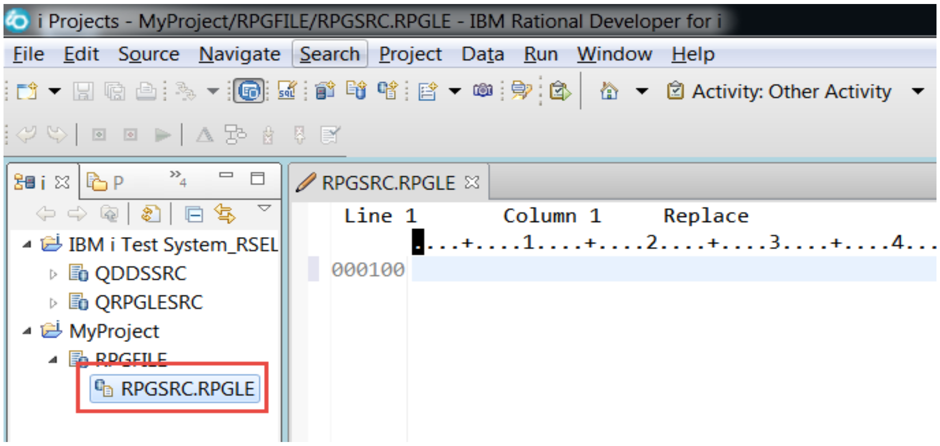
MyProject/RPGFILE

Member name: RPGSRC

Source type: RPGLE

Select a source file, and enter the name of the new member being created. The member will map to a file in the folder representing the selected source file.

The member is added to your project and opened in the editor so you could start writing your code.



Your i Project perspective should now look similar to the figure above.

2.4 Importing members into your i Project

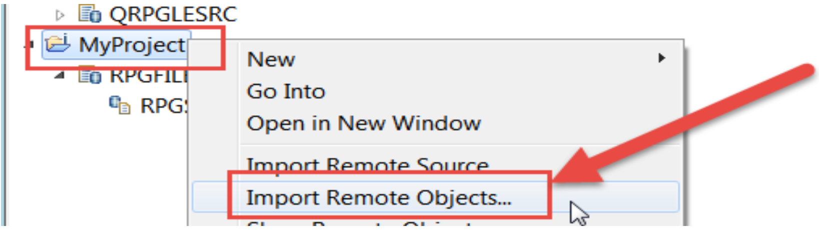
In this lesson, you learn how to import existing DDS and RPG source files and members from library RSELABxx into the i Project **MyProject**

Instead of creating new files and members, you can also import remote objects into an i Project. You use the **Import Remote Objects** action or the **Add to i Project** action for this.

To import remote objects:

__1. Right-click **MyProject.**

__2. Click **Import Remote Objects** on the pop-up menu.



On the Import remote Objects dialog:

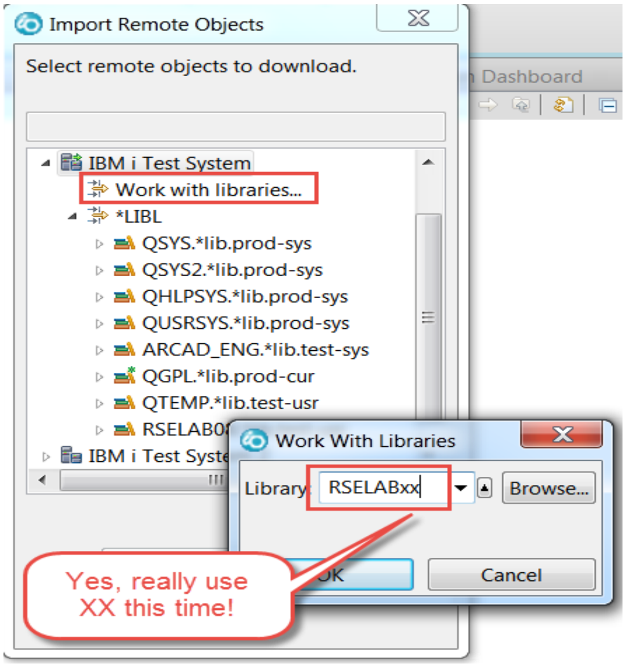
__3. Expand ***LIBL**.

__4. If you see a logon display, enter your user ID and password.

__5. If you don’t see RSELABxx in the library list, you will need to create a library filter or add this library to your library list in the RSE connection. To create a library filter:

(1) Expand **Work with libraries**.
(2) Type **RSELABxx** for the Library name.
(3) Click **OK**.

The library is added.



Import Remote Objects

Select remote objects to download.

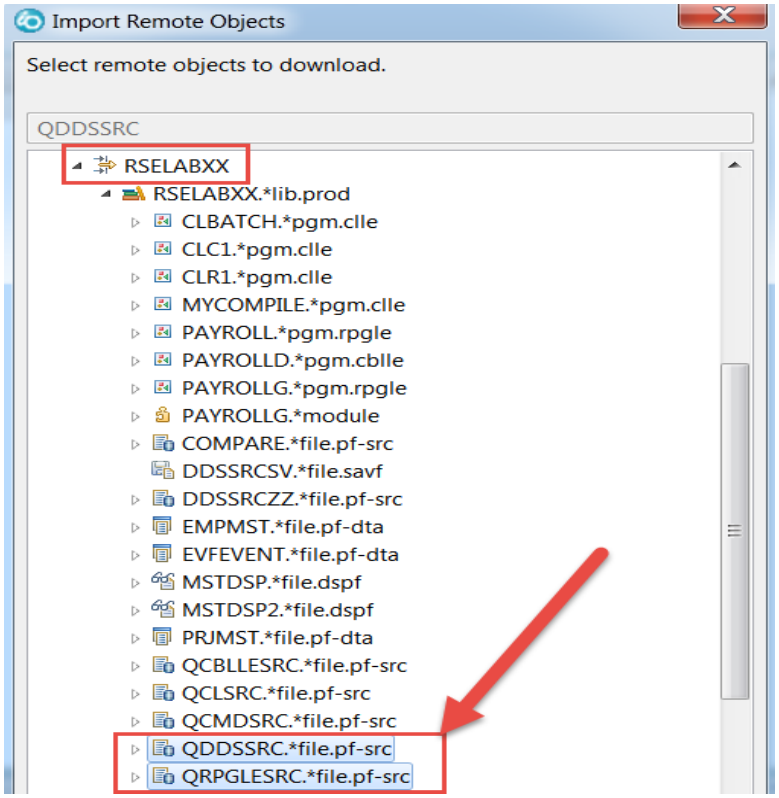
Library: RSELABxx

Yes, really use XX this time!

__6. Expand the library that contains the source files that you want to import. In this case select **RSELABxx**.

__7. Select the source physical files **QDDSSRC** and **QRPGLESRC** to be added to your project. You can use the **Ctrl** key to make multiple selections.

__8. Click **OK**.

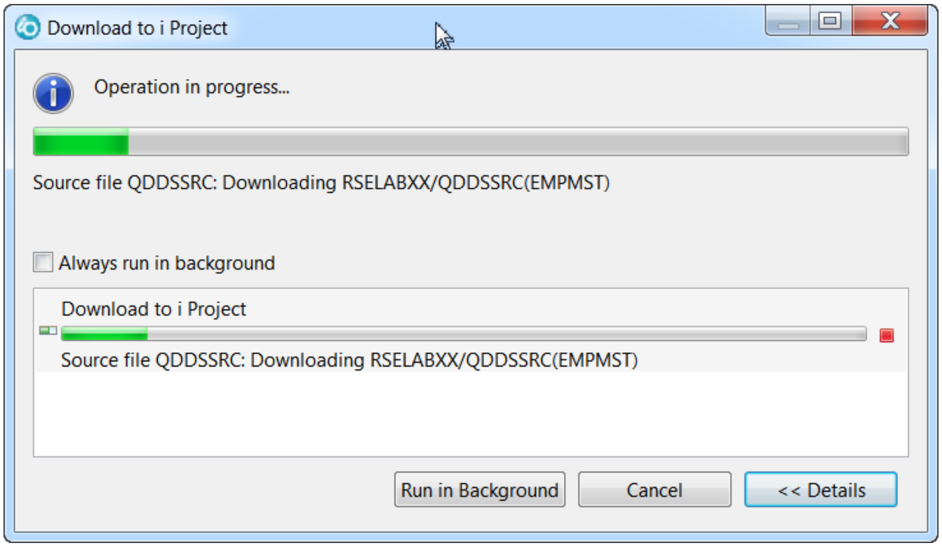


Select remote objects to download.

QDDSSRC

- RSELABXX
  - RSELABXX.*lib.prod
    - CLBATCH.*pgm.clle
    - CLC1.*pgm.clle
    - CLR1.*pgm.clle
    - MYCOMPILE.*pgm.clle
    - PAYROLL.*pgm.rpgle
    - PAYROLLD.*pgm.cblle
    - PAYROLLG.*pgm.rpgle
    - PAYROLLG.*module
    - COMPARE.*file.pf-src
    - DDSSRCSV.*file.savf
    - DDSSRCZZ.*file.pf-src
    - EMPMST.*file.pf-dta
    - EVFEVENT.*file.pf-dta
    - MSTDSP.*file.dspf
    - MSTDSP2.*file.dspf
    - PRJMST.*file.pf-dta
    - QCBLLESRC.*file.pf-src
    - QCLSRC.*file.pf-src
    - QCMDSRC.*file.pf-src
    - QDDSSRC.*file.pf-src
    - QRPGLESRC.*file.pf-src

The selected files are downloaded. The project now shows the copied files and they are ready for you to work with.



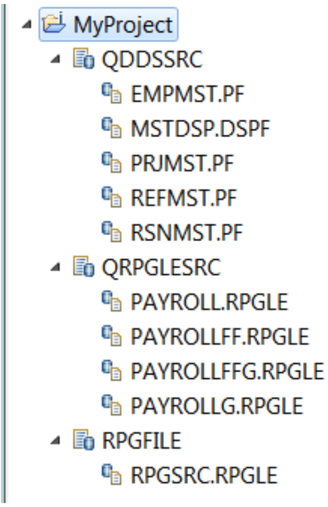
Operation in progress...

Source file QDDSSRC: Downloading RSELABXX/QDDSSRC(EMPMST)

☐ Always run in background

Download to i Project

Source file QDDSSRC: Downloading RSELABXX/QDDSSRC(EMPMST)



- MyProject
  - QDDSSRC
    - EMPMST.PF
    - MSTDSP.DSPF
    - PRJMST.PF
    - REFMST.PF
    - RSNMST.PF
  - QRPGLESRC
    - PAYROLL.RPGLE
    - PAYROLLFF.RPGLE
    - PAYROLLFFG.RPGLE
    - PAYROLLG.RPGLE
  - RPGFILE
    - RPGSRC.RPGLE

The figure above shows the source files added to **MyProject**.

2.5 Selecting the build style

In this lesson, you learn about build styles and the IBM i Build Status view.

So now that you know how to populate your i Project, you could disconnect and edit and verify the files on your workstation. Let's assume that you did just that and you changed multiple members and that you want to build (compile) the full i Project.

Associated with each i Project is a Build Style which determines how source members in that project will be pushed and compiled on the host. A build style is a set of actions that provide push and build operations for a given i Project.

There are three IBM-supplied build styles:
***NONE**
This build style contributes no actions and is useful if you want to disable the menu items associated with a build style. This style will always be available.

Command
The command build style contributes the following actions to the Remote Actions menu:

- **Push Changes** — Pushes any new or changed resources found in the selected project. An item is changed if it has been updated locally since the last time it was pushed, either by Push Selected or Push Changes. The first time it is done, all resources are uploaded to the associated library. Each subsequent upload is incremental.
- **Push Selected** — This action uploads all selected resources and their children to their corresponding IBM i source files and members in the associated library. It creates any resources that do not exist. It will overwrite any changes that have been made on the server only if confirmed by the user. Use this action to force the contents of the associated library to match the workspace.

- **Submit Build Command** — Submits the command found in this build style configuration to the server.

CL Program
This style uploads the COMPILE.CLLE and BIND.CLLE members from the source file that you designated in the style configuration for this project. It then compiles and runs them to build this project on the server. This build style contributes the following actions to the Remote Actions menu:

- **Push Changes** — Pushes any new or changed items found in the selected project. An item is changed if it has been updated locally since the last time it was pushed, either by Push Selected or Push Changes. The first time it is done, all resources are uploaded to the associated library. Each subsequent upload is incremental.
- **Push Selected** — This action uploads all selected resources and their children to their corresponding IBM i source files and members in the associated library. It creates any resources that do not exist. It will overwrite any changes that have been made on the server only if confirmed by the user. Use this action to force the contents of the associated library to match the workspace.
- **Submit Build** — Submits a job to compile the i Project on the server using the COMPILE and BIND programs from the source file you specify.

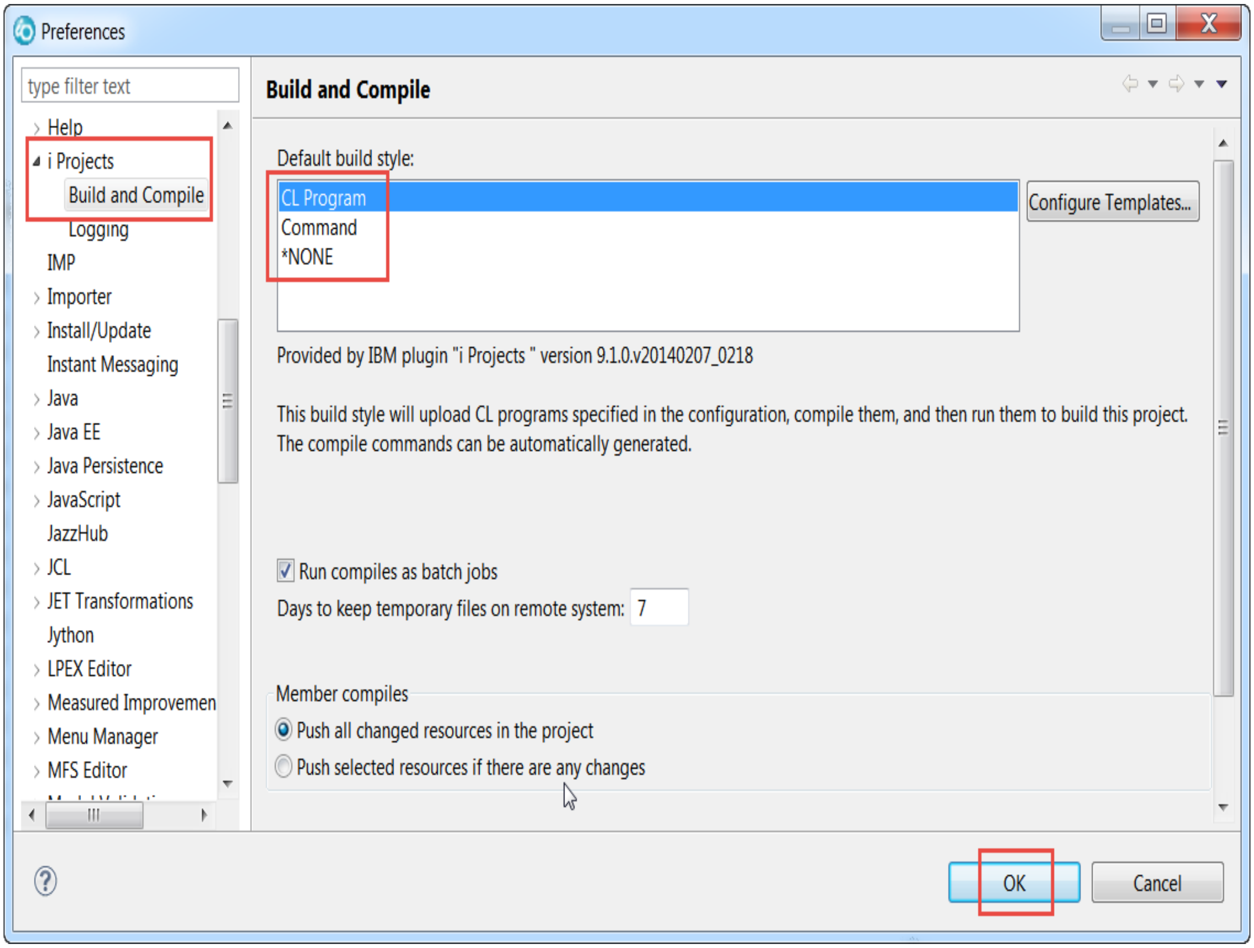
Each i Project can have only one active build style. This can be configured through the Properties page for that project (right-click on the i Project and select Properties).

By default, when a new i Project is created, it has the CL Program Build Style associated with it. This can be changed by going to **Window > Preferences > i Projects > Build and Compile**.

Once submitted, a build can be monitored through the Job Status View. This view can be set to update at regular intervals and monitors all i Project build jobs that you have submitted. Also compile errors can be retrieved from that view by right-clicking on the submitted build and selecting the Retrieve Errors action.

To select a default build style for new i5/OS projects: Select **Window > Preference > i Projects:**
__1. Then select **Build and Compile**.
__2. Select the build style that you want.

__3. Click **OK**.



Build and Compile

Default build style:

CL Program
Command
*NONE

Provided by IBM plugin "i Projects " version 9.1.0.v20140207_0218

This build style will upload CL programs specified in the configuration, compile them, and then run them to build this project. The compile commands can be automatically generated.

☑ Run compiles as batch jobs

Days to keep temporary files on remote system: 7

Member compiles

● Push all changed resources in the project

○ Push selected resources if there are any changes

You have selected a default build style for your new i Projects.

2.6 Submitting a build

In this lesson, you learn how to compile the i Project **MyProject** and how to view the Build Job Status for that project.

Besides compiling a single member, you can compile the project in full. The actual compile behavior depends on the Build Style associated with the project. The default build style for i Projects is the **CL Program** Build Style.

This build style will generate a **COMPILE**.CLLE member in a QCLSRC file that will contain a compile entry for each source member in the i Project.

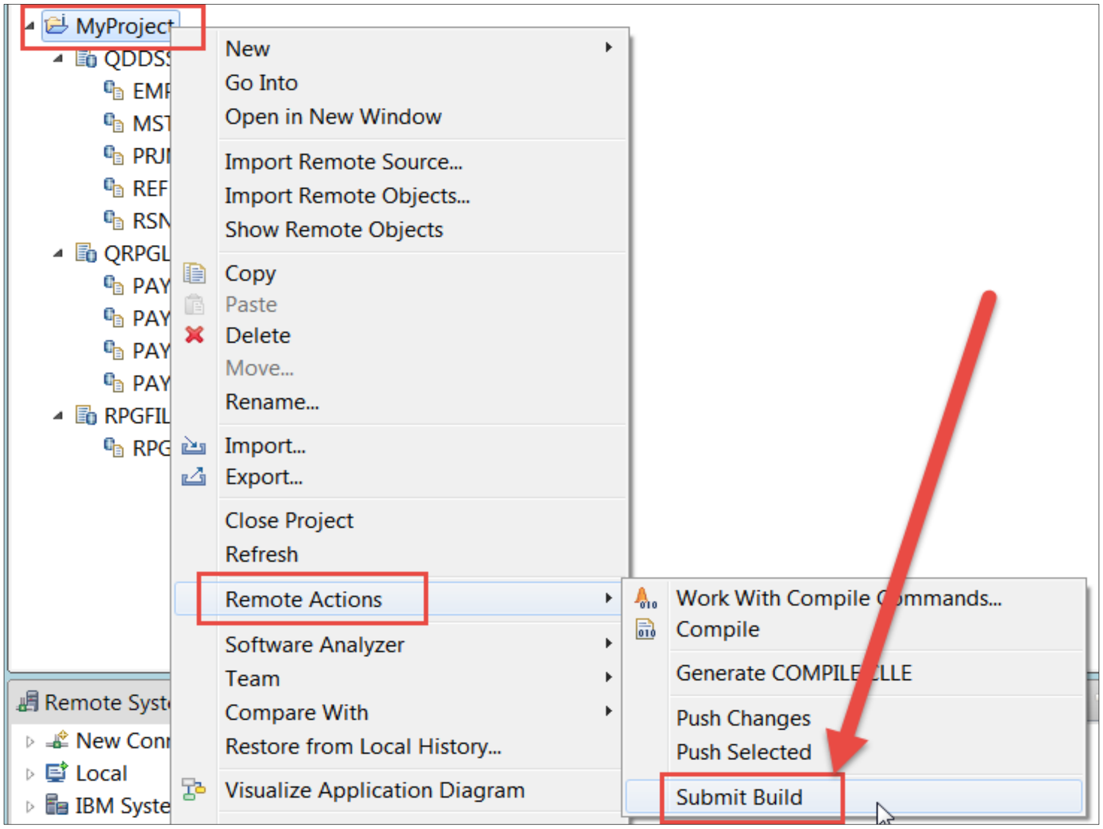
If you want to create a *PGM, you must create a **BIND**.CLLE member in QCLSRC. The member will usually just contain a CRTPGM command that binds the modules into a *PGM. The **BIND** program will only run if the source member exists and **COMPILE** runs successfully.

You can verify or change the configuration of a build style. You can specify the name of the source file to hold the **COMPILE**.CLLE member and whether or not you want to automatically push changes and re-generate the **COMPILE**.CLLE member before a push.

Tip: You must have a build style defined for your project before you can compile.

To compile a project in full:

__1. Right-click the i Project and click **Remote Actions** > **Submit Build**.

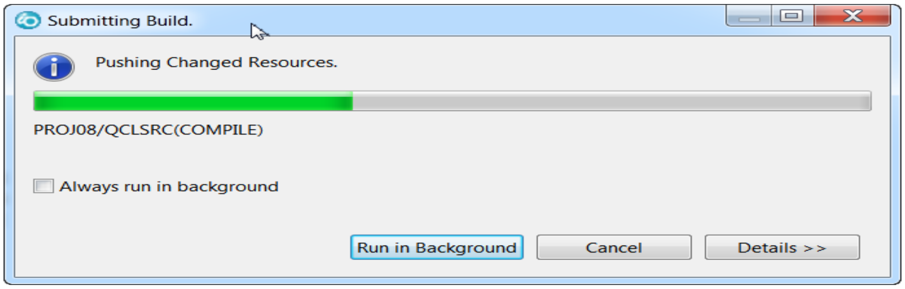


Now the connection that is associated with the project will be activated and you may be prompted for a **user ID** and **password** if you were disconnected.

__2. Enter your User ID and password.

The changes are pushed to the IBM i server.

Note: If your build fails due to a timeout connecting to the remote system, then just submit the build again. The first time a project is being pushed all files are pushed to the host. Subsequent builds only push changed files.


Submitting Build.

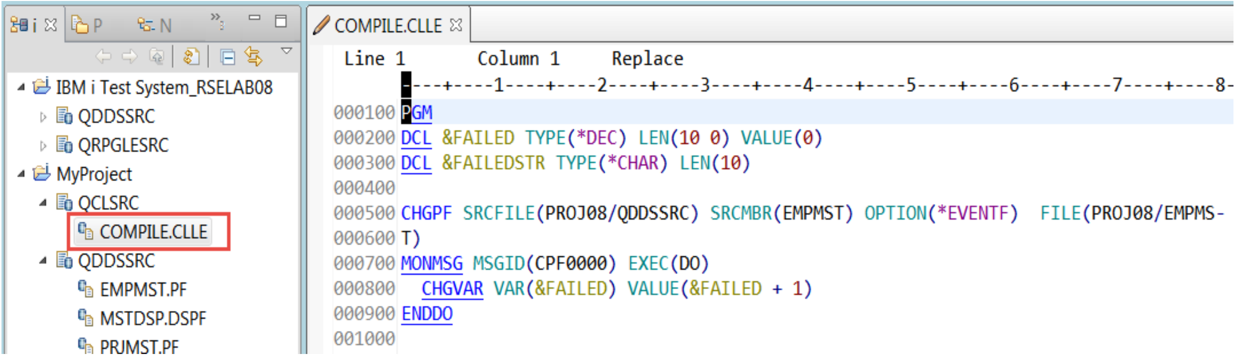
Pushing Changed Resources.

PROJ08/QCLSRC(COMPILE)

□ Always run in background

This action, with the default configuration, will perform all of the following:

__a. Generate the following COMPILE.CLLE member:



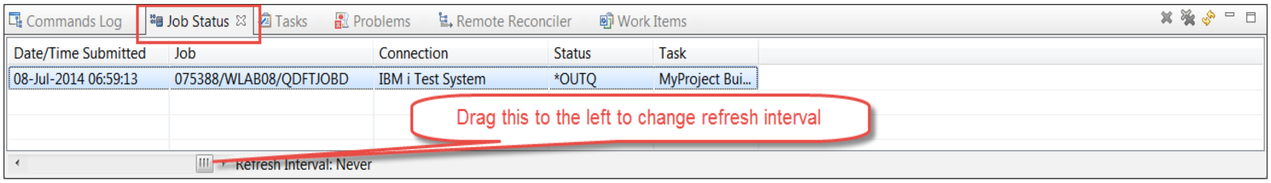
```
 Line 1       Column 1      Replace
 ----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8-
PGM
DCL &FAILED TYPE(*DEC) LEN(10 0) VALUE(0)
DCL &FAILEDSTR TYPE(*CHAR) LEN(10)

CHGPF SRCFILE(PROJ08/QDDSSRC) SRCMBR(EMPMST) OPTION(*EVENTF)  FILE(PROJ08/EMPMS-
T)
MONMSG MSGID(CPF0000) EXEC(DO)
  CHGVAR VAR(&FAILED) VALUE(&FAILED + 1)
ENDDO

```

__b. Display a Build Job entry in the Job Status view indicating that a build has been submitted.

The entry will look like this:



Date/Time Submitted	Job	Connection	Status	Task
08-Jul-2014 06:59:13	075388/WLAB08/QDFTJOBD	IBM i Test System	*OUTQ	MyProject Bui...

Drag this to the left to change refresh interval

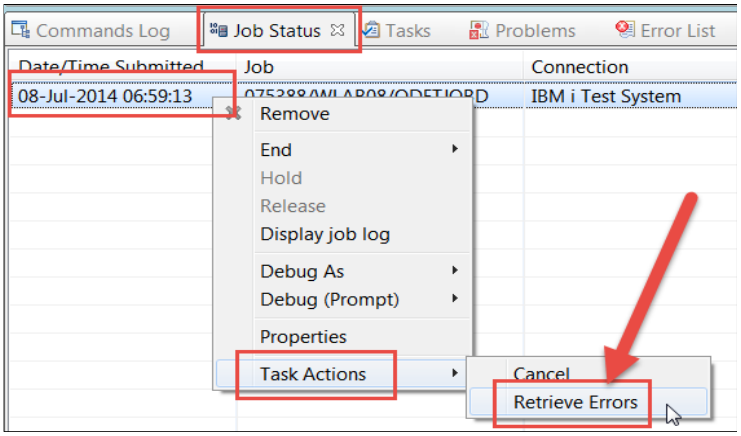
Refresh Interval: Never

You can change the Refresh Interval using the bottom arrows next to the **Refresh Interval** field shown above.

__c. Push all project changes to the host, including the newly created COMPILE.CLLE member.
__d. Compile COMPILE.CLLE into a program in the QTEMP library.
__e. Run it against the source in the PROJxx project library.

If there were any errors during the submitted build:

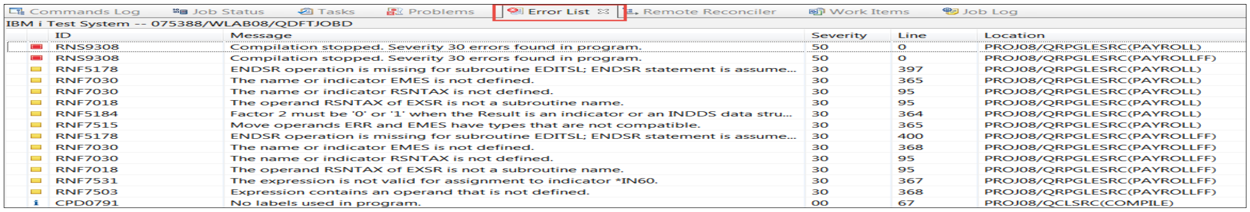
__3. After the job completes, refresh the Job Status view



Date/Time Submitted	Job	Connection
08-Jul-2014 06:59:13	075388/WLAB08/QDFTJOBD	IBM i Test System

__4. Right-click on the entry in the Job Status view and select **Task Actions --> Retrieve Errors**.

This will open the Error List view and you will be able to double-click the error to open the corresponding member.



IBM i Test System -- 075388/WLAB08/QDFTJOBD

	ID	Message	Severity	Line	Location
🟥	RNS9308	Compilation stopped. Severity 30 errors found in program.	50	0	PROJ08/QRPGLESRC(PAYROLL)
🟥	RNS9308	Compilation stopped. Severity 30 errors found in program.	50	0	PROJ08/QRPGLESRC(PAYROLLFF)
🟨	RNF5178	ENDSR operation is missing for subroutine EDITSL; ENDSR statement is assume...	30	397	PROJ08/QRPGLESRC(PAYROLL)
🟨	RNF7030	The name or indicator EMES is not defined.	30	365	PROJ08/QRPGLESRC(PAYROLL)
🟨	RNF7030	The name or indicator RSNTAX is not defined.	30	95	PROJ08/QRPGLESRC(PAYROLL)
🟨	RNF7018	The operand RSNTAX of EXSR is not a subroutine name.	30	95	PROJ08/QRPGLESRC(PAYROLL)
🟨	RNF5184	Factor 2 must be '0' or '1' when the Result is an indicator or an INDDS data stru...	30	364	PROJ08/QRPGLESRC(PAYROLL)
🟨	RNF7515	Move operands ERR and EMES have types that are not compatible.	30	365	PROJ08/QRPGLESRC(PAYROLL)
🟨	RNF5178	ENDSR operation is missing for subroutine EDITSL; ENDSR statement is assume...	30	400	PROJ08/QRPGLESRC(PAYROLLFF)
🟨	RNF7030	The name or indicator EMES is not defined.	30	368	PROJ08/QRPGLESRC(PAYROLLFF)
🟨	RNF7030	The name or indicator RSNTAX is not defined.	30	95	PROJ08/QRPGLESRC(PAYROLLFF)
🟨	RNF7018	The operand RSNTAX of EXSR is not a subroutine name.	30	95	PROJ08/QRPGLESRC(PAYROLLFF)
🟨	RNF7531	The expression is not valid for assignment to indicator *IN60.	30	367	PROJ08/QRPGLESRC(PAYROLLFF)
🟨	RNF7503	Expression contains an operand that is not defined.	30	368	PROJ08/QRPGLESRC(PAYROLLFF)
i	CPD0791	No labels used in program.	00	67	PROJ08/QCLSRC(COMPILE)

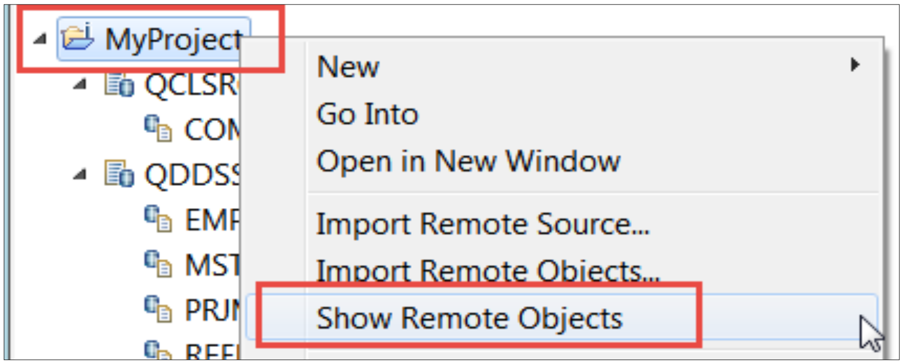
2.7 Showing remote objects

In this lesson, you learn how to see all the remote objects in the i5/OS project, **MyProject**.

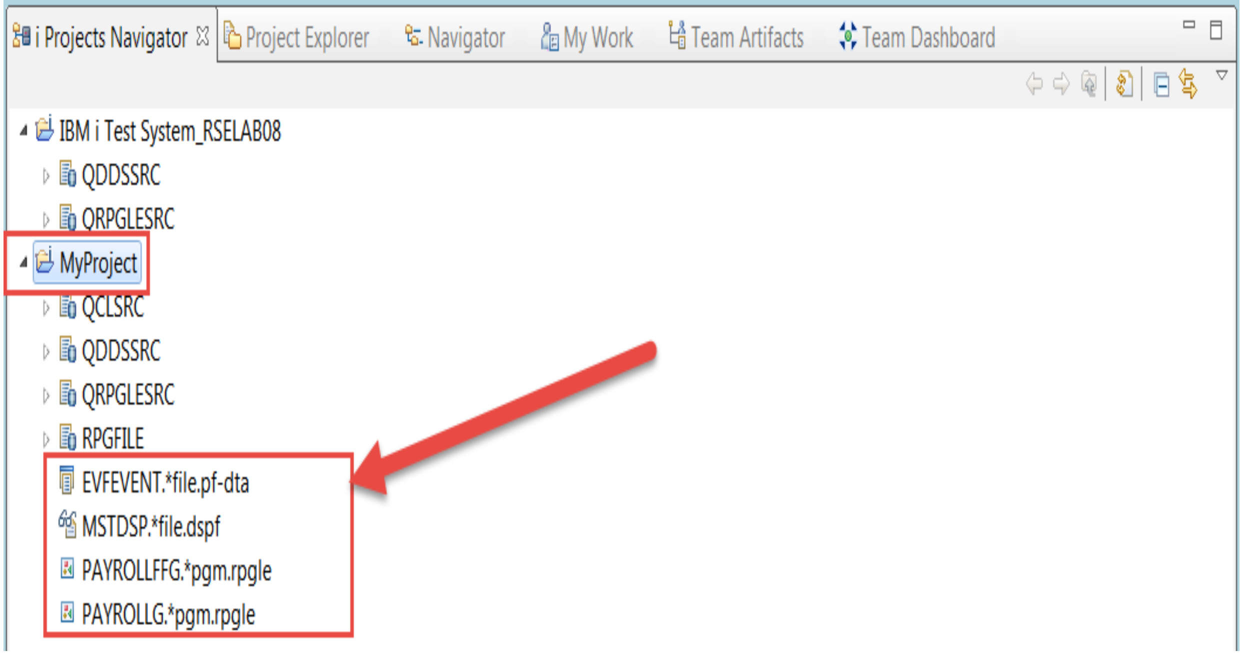
In particular, you see the results of the project compile (PAYROLLG program) that you just completed in the previous lesson. You can refresh your i Project Navigator and look at all the remote objects.

To show remote objects:
In the **i Project Navigator:**
__1. Right click **MyProject**.

__2. Click **Show Remote Objects** on the pop-up menu.



Your i Project Navigator will now look like this:



You can see now in the i Project Navigator:

(1) Local only objects (you don't have any)
(2) Remote only objects ((like **PAYROLLG *pgm**)
(3) Remote and local objects (like **QCLSRC**)

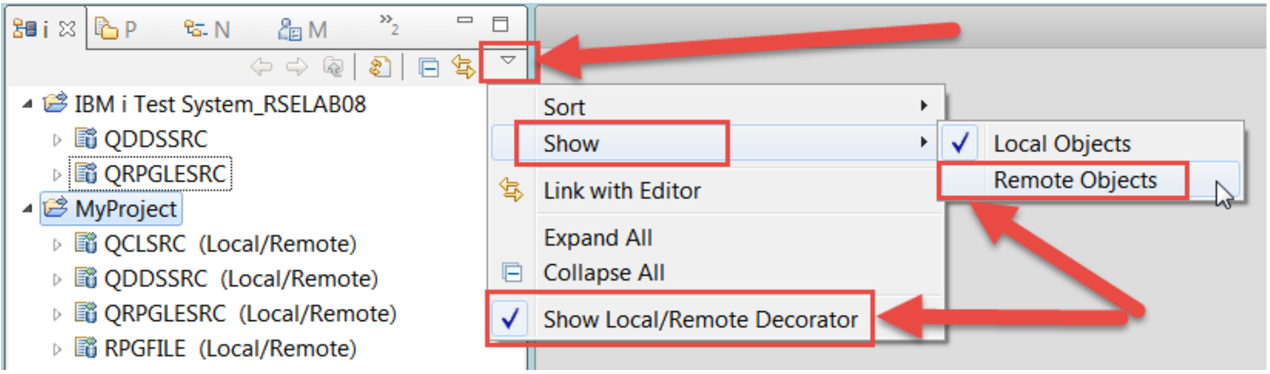
2.8 Filtering out remote objects

In this lesson, you learn how to remove remote only objects from the i Project Navigator view. You also learn how to remove the flags that identify local and remote objects in the i Project Navigator view.

To filter out remote only objects:

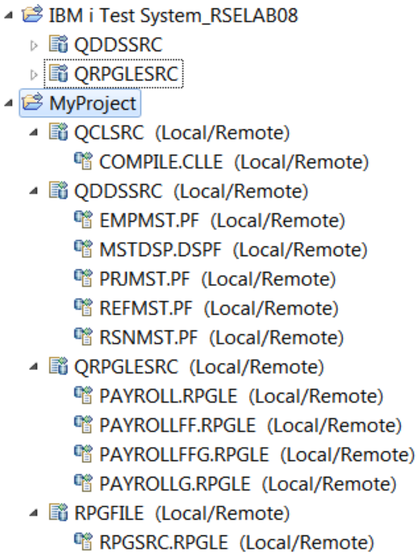
__1. Go to the **i Project Navigator** toolbar.

__2. Click the **drop-down arrow**.
__3. Click **Show > Remote Objects** on the drop-down menu, to de-select it.
__4. Select and de-select the **Show Local/Remote Decorator** to see the effect.



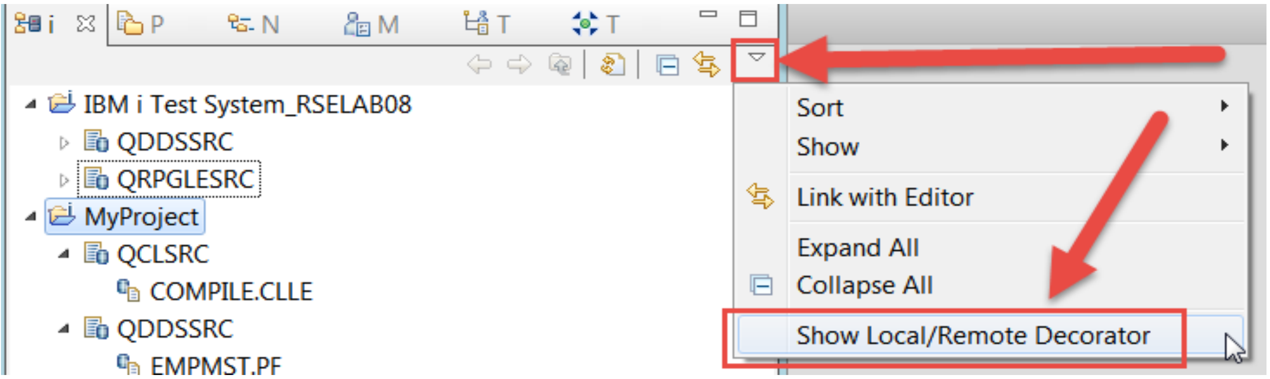
This removes all objects that are remote only from the view.

__5. Expand QCLSRC, QDDSSRC, QRPGLESRC and RPGFILE.


IBM i Test System_RSELAB08
QDDSSRC
QRPGLESRC
MyProject
QCLSRC (Local/Remote)
COMPILE.CLLE (Local/Remote)
QDDSSRC (Local/Remote)
EMPMST.PF (Local/Remote)
MSTDSP.DSPF (Local/Remote)
PRJMST.PF (Local/Remote)
REFMST.PF (Local/Remote)
RSNMST.PF (Local/Remote)
QRPGLESRC (Local/Remote)
PAYROLL.RPGLE (Local/Remote)
PAYROLLFF.RPGLE (Local/Remote)
PAYROLLFFG.RPGLE (Local/Remote)
PAYROLLG.RPGLE (Local/Remote)
RPGFILE (Local/Remote)
RPGSRC.RPGLE (Local/Remote)

You can see Local/Remote objects only.
Now you want to remove the Local/Remote Label Decorators from the view.
__6. Go to **the i Project Navigator** toolbar.
__7. Click the **drop-down arrow.**

__8. In the drop-down menu, click **Show Local/Remote Decorator,** to deselect it.



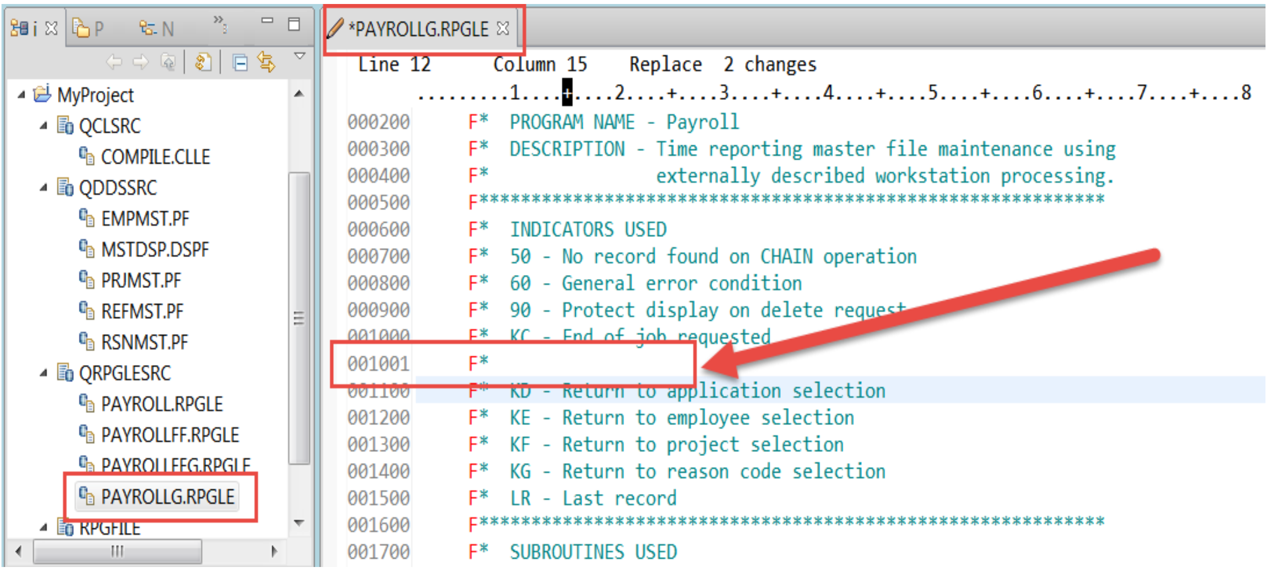
Now you see your objects without the decorators that indicate whether the object is local, remote or both local and remote.

2.9 Changing PAYROLLG and submitting another build

In this lesson, you learn how to change PAYROLLG and push this changed file to the IBM i system.

Now let's change PAYROLLG again and then submit another build. You will see that only the changed files are pushed to the IBM i server.

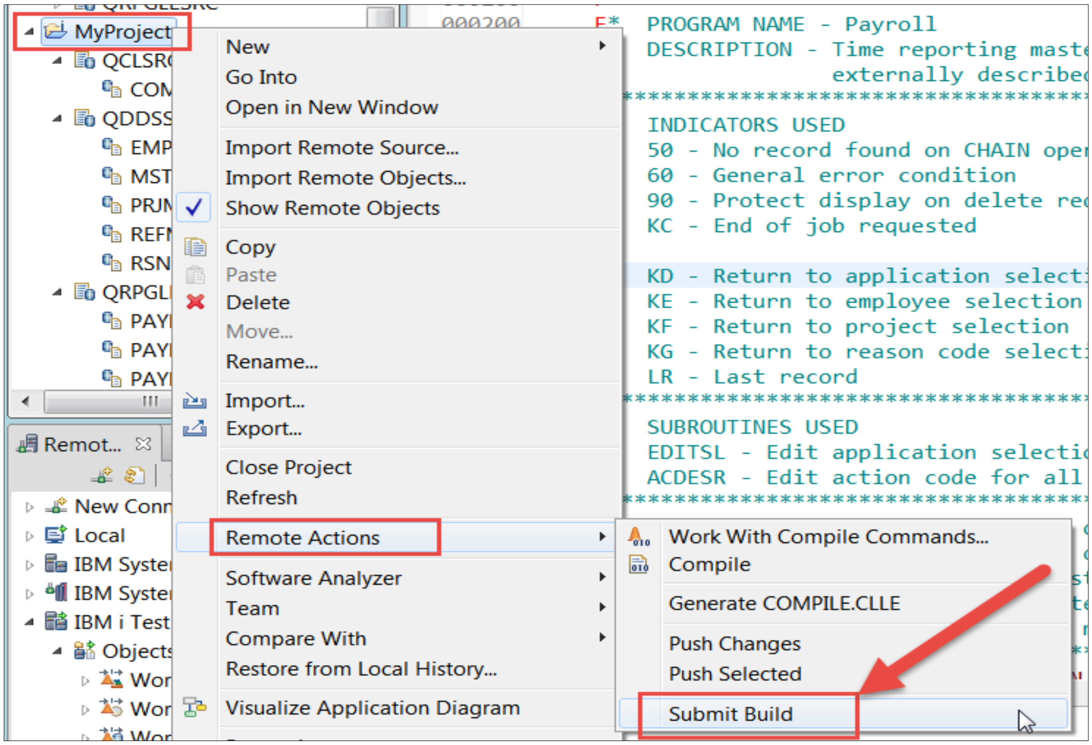
To change PAYROLLG edit it and submit another build:
__1. Double-click **PAYROLLG** in QRPGLESRC.
__**2.** In the Editor add a comment line to the source.
__3. **Save** the file by clicking Ctrl+S.



```
 Line 12      Column 15     Replace   2 changes
      .........1....+....2....+....3....+....4....+....5....+....6....+....7....+....8
000200      F*  PROGRAM NAME - Payroll
000300      F*  DESCRIPTION - Time reporting master file maintenance using
000400      F*               externally described workstation processing.
000500      F************************************************************
000600      F*  INDICATORS USED
000700      F*  50 - No record found on CHAIN operation
000800      F*  60 - General error condition
000900      F*  90 - Protect display on delete request
001000      F*  KC - End of job requested
001001      F*
001100      F*  KD - Return to application selection
001200      F*  KE - Return to employee selection
001300      F*  KF - Return to project selection
001400      F*  KG - Return to reason code selection
001500      F*  LR - Last record
001600      F************************************************************
001700      F*  SUBROUTINES USED
```

__4. Right-click **MyProject**.

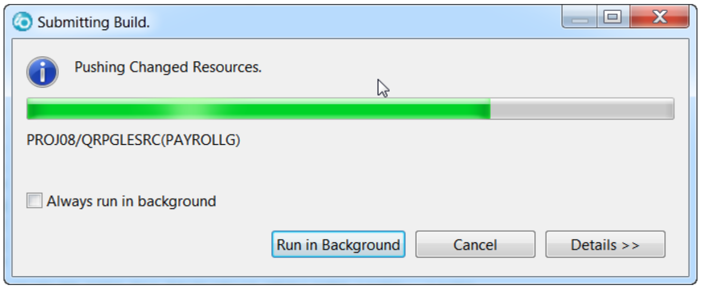
__5. Click **Remote Actions > Submit Build** on the context menu.



```
000200    F*  PROGRAM NAME - Payroll
              DESCRIPTION - Time reporting maste
                            externally describe
          *********************************
              INDICATORS USED
              50 - No record found on CHAIN ope
              60 - General error condition
              90 - Protect display on delete re
              KC - End of job requested

              KD - Return to application select
              KE - Return to employee selection
              KF - Return to project selection
              KG - Return to reason code select
              LR - Last record
          *********************************
              SUBROUTINES USED
              EDITSL - Edit application selecti
              ACDESR - Edit action code for all
          *********************************
```

Only the member and COMPILE.CLLE are pushed to the IBM i system.



Pushing Changed Resources.

PROJ08/QRPGLESRC(PAYROLLG)

Congratulations!

You have successfully completed the RDi Working Offline lab exercises.

This tutorial has shown you how to use the i Projects perspective in a typical development cycle for offline application development. After providing you information about the perspective, the tutorial outlined the development cycle working offline with an i Project, then elaborated on each step in maintaining an ILE RPG project-based application.

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

Appendix A Notices

This information was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not grant you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A.

For license inquiries regarding double-byte (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

IBM World Trade Asia Corporation
Licensing
2-31 Roppongi 3-chome, Minato-ku
Tokyo 106-0032, Japan

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law: INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental. All references to fictitious companies or individuals are used for illustration purposes only.

Appendix B Trademarks and copyrights