UNISYS

ClearPath OS 2200 IDE for Eclipse
Getting Started Guide

Version Control

Version	Date	Summary of Changes
1.0	4 Mar 2011	Initial draft
1.1	20 Apr 2011	Added template notes plus C and FORTRAN info.
1.2	5 May 2011	Added info on obtaining updates
1.3	25 May 2011	Minor updates
2.0	Feb 2012	Upgrade for Eclipse 3.7. Added UCOB debug notes.
2.1	Mar 2012	Added more Unisys branding. Added RDMS-JDBC client information.
2.2	June 2012	Updated for Eclipse 3.7.0.4 IC. Includes MHFS topics.
2.3	Oct 2012	Added info on Java and Unisys RAs
3.0	July 2013	Based on 3.7.2 IC2. Moved Java and Unisys RAs to another guide.
4.0	March 2017	Based on 4.6.1 IC1.

Contents

Introduction

Overview

Traditionally many OS 2200 clients have used editors like ED and IPF to maintain their 3GL programs such as COBOL, FORTRAN and C. Eclipse is the leading open source IDE and is based on Java. Unisys has added a plug-in to Eclipse to support the development of legacy 3GL programs developed in COBOL, FORTRAN, C and other languages. The Unisys plug-in also assists in the development of composite applications.

The Unisys ClearPath OS 2200 IDE for Eclipse provides many features including:

- Windows containing the entire program source
- Easy navigation being open windows
- Windows GUI features like search, copy/paste & drag/drop
- Content Assistant to provide COBOL structures and statements for the programmer
- Use of different colours for reserved words, comments and variables
- Error windows for compilations with links to source code lines
- Ability to update OS 2200 source files including ECL and COBOL
- Ability to build a project (e.g. compile programs) with compilation on the OS 2200 host
- Compare differences with older code versions
- Support COBOL, Java, Java EE, C and other development languages from a single tool
- Supports interactive PADS debugging for UCS programs.

As the ClearPath OS 2200 IDE for Eclipse runs on the programmer's PC, OS 2200 CPU cycles associated with editing code are off-loaded from the OS 2200 host. The productivity of OS 2200 programmers is expected to improve from using the IDE. The ClearPath OS 2200 IDE for Eclipse should also assist OS 2200 clients in finding new programmers as many OS 2200 proprietary commands and tools are not used.

Purpose

The purpose of this document is to assist OS 2200 programmers in understanding and using the Unisys ClearPath OS 2200 IDE for Eclipse for 3GL development through screen snapshots and written descriptions. This document is based on the Unisys ClearPath OS 2200 IDE for Eclipse 4.6.0 IC1 release. This document is based on the All-In-One

This document was compiled with the help of numerous Unisys colleagues both in the Eclipse engineering team and field delivery staff. Any changes or suggestions to this document should be emailed to OS2200EclipseIDESupport@unisys.com.

Projects are the Core of an IDE

Eclipse is an open source IDE that Unisys has developed plug-ins for so it works with OS 2200 environments. IDEs are designed to work with projects and Eclipse is no different. However Unisys has provided some additional features like the OS 2200 File Explorer (OFE) to assist to the OS 2200 developer. OFE does not use Eclipse projects and therefore some functionality may not be available when using OS 2200 files and elements that do not belong to an OS 2200 project in your workspace.

Terminology

Throughout this document, the Unisys ClearPath OS 2200 IDE for Eclipse is often referred to as simply Eclipse.

Related Documents and Information

ClearPath OS 2200 IDE for Eclipse Installation Guide (47292107-011)

CIFS for ClearPath OS 2200 User, Programmer and Administrator Reference Manual (78596137-nnn)

Definitions and Acronyms

Acronym	Definition
Eclipse	Open Source IDE
IDE	Integrated Development Environment
Dorado	Unisys ClearPath Plus server running OS 2200 and Windows OS
ACOB	ANSI COBOL-74 compiler with Unisys extensions
UCOB	ANSI COBOL-85 compiler with Unisys extensions
CIFS	Common Internet File System
MHFS	Multi-Host File Sharing
OFE	OS 2200 File Explorer
TOC	Table of Contents

Table 1 - Definitions and Acronyms

Installation

This section describes how to install the Unisys ClearPath OS 2200 IDE for Eclipse and related software products on a developer's workstation. For a more detailed description of the installation process please refer to the related production information mentioned earlier.

Hardware Requirements

The workstation should have at least 2GB memory to perform at a satisfactory level. However 4GB memory is recommended. Please refer to the PC Hardware and Software Requirements section of the Installation Guide.

Download Files to Install

Download for the ClearPath OS 2200 IDE for Eclipse All-In-One is available from official channels.

There are two options for installing Eclipse.

Choose one of the following options:

1. Install ClearPath OS 2200 IDE for Eclipse All-In-One – either 32 or 64 bit
   eclipse-2200-4-6-0-170220.zip
   A package containing a complete installation of Eclipse, Web Tools, Data Tools, and other associated features including the Unisys Composite Application. For details and configuration instructions, see Section Three of the Installation Guide.
   Use this option if you are not currently using Eclipse as an IDE.
2. Install ClearPath OS 2200 IDE for Eclipse Composite Application Feature
   eclipse-2200-ca-4-6-0-170220-updatesite.jar
   The ClearPath OS 2200 IDE for Eclipse Composite Application Feature is ready to install in your existing installation of Eclipse. For details and configuration instructions, see Section Three of the Installation Guide.
   Use this option if you are using Eclipse already as an IDE and just want to add the Unisys OS 2200 feature.

Install the Java Environment

Install Java SE 8. Installable is available from http://www.oracle.com/index.html. While installing use the defaults (recommended).

Installing ClearPath OS 2200 IDE for Eclipse using the All-In-One

- Identify a folder under the root (e.g., C:\ or D:\) on your workstation to install Eclipse.
- Unzip the eclipse-2200-all-in-one-4-6-0-170220.zip file to this folder.

Host OS 2200 Software Dependencies

The host OS 2200 Software Dependencies can be found in the Installation Guide. Basically you need CIFS (6R3 or later) and CPCOMM/CPCOMMOS.

Configuring an OS 2200 Telnet Session

Eclipse uses a Telnet session to the OS 2200 host for some functions so a Telnet process needs to be configured in CPCOMM/CPCOMMOS. An example is:

```
PROCESS,TELRSI PASSWORD,RSI                              . Telnet
```

SILAS also needs to be configured for Telnet. For example:

```
PROCESS,RSDCSU   INTERNET-ADR,INTADD ;
                 TELNET-ATTACH-NAME,TELRSI TELNET-ATTACH-PASSWORD,RSI ;
                 TP0-ATTACH-NAME,TP0RSI    TP0-ATTACH-PASSWORD,RSI
```

CIFS Parameter Setting

The CIFS parameter CIFS$WAITROLBAK determines how long before CIFS responds to Eclipse when the OS 2200 file is rolled-out. By default, this parameter has a value of 600 seconds. It is recommended to set this value to 1 in the CIFS-BACK runstream so the user gets an immediate response.

Starting ClearPath OS 2200 IDE for Eclipse

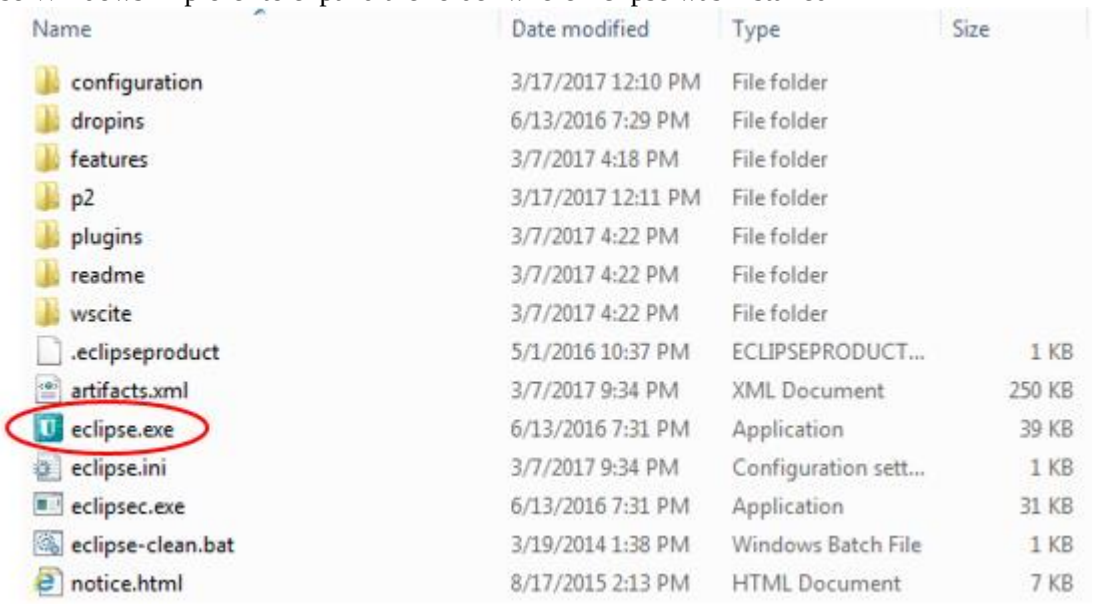
Eclipse 4.6.0 Migration Considerations

Refer to the release notes for any migration considerations from previous releases.

Launching Eclipse

Eclipse can be launched by the following steps:

- Use Windows Explorer to expand the folder where Eclipse was installed



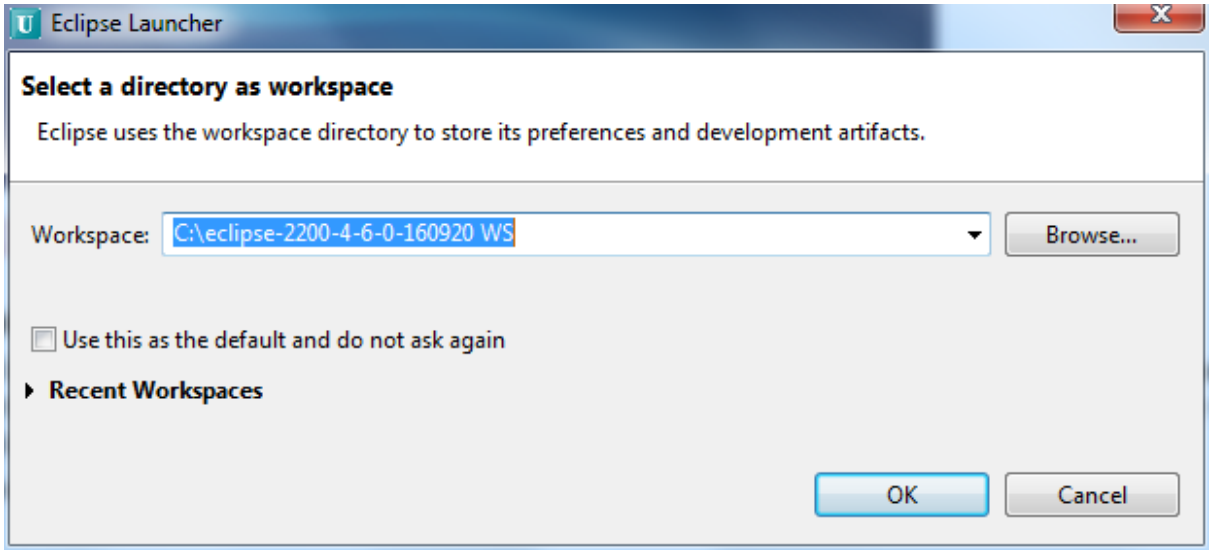
- Double-click on the **eclipse.exe** file

Note: It is recommended to create a short-cut from the Eclipse.exe file and place on your desktop.

Eclipse will display the following screen. Note that Eclipse 4.6 is based on the Neon release from the Eclipse Foundation.

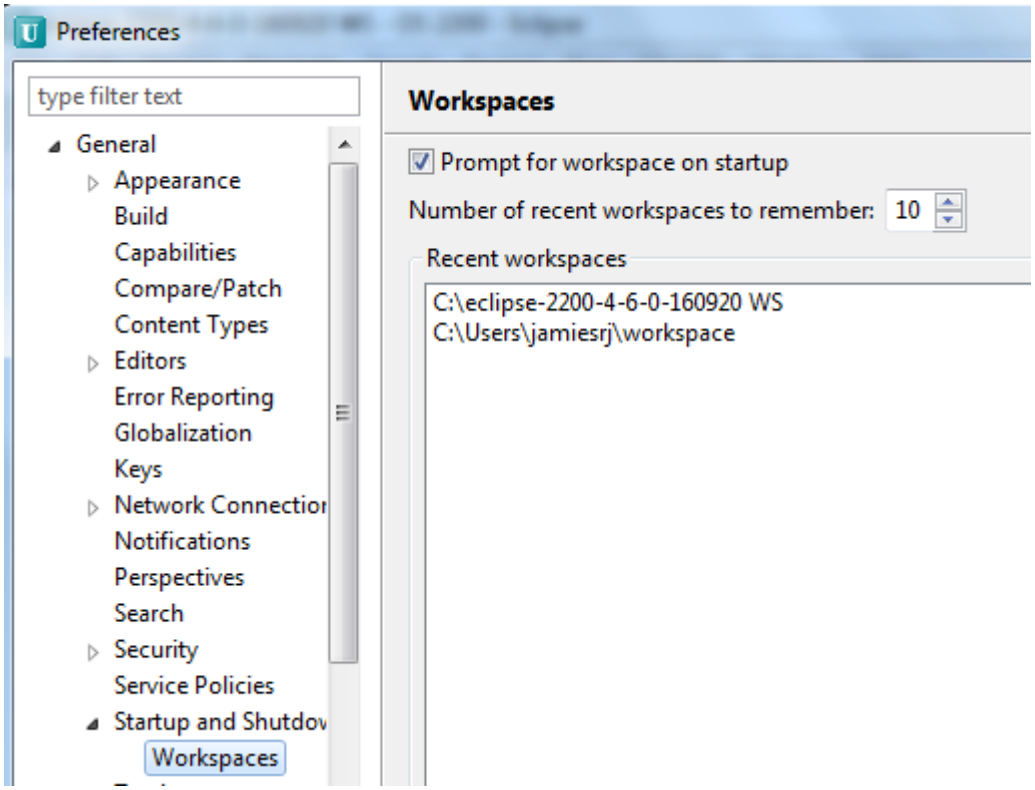
Selecting the Eclipse workspace

Eclipse will display the following window asking for the workspace location. Normally this is found in the Documents and Settings folder for the user but you can use another location. In the example below, the workspace is **C:\eclipse-2200-4-6-0-160920 WS**.



Check the box if you don't want this window to appear in future.

The start-up option to prompt for the workspace can be set in the Eclipse preferences. Go to **Window → Preferences → General → Startup and Shutdown.**



No Workspace Prompt

On occasions, Eclipse will launch with a Workspace even when the user has requested to prompt for the workspace. There have been issues with the prompt for workspace at the startup. Some of the forums they have been discussing about this and one of them is:
http://stackoverflow.com/questions/7058782/eclipse-default-workspace-problem

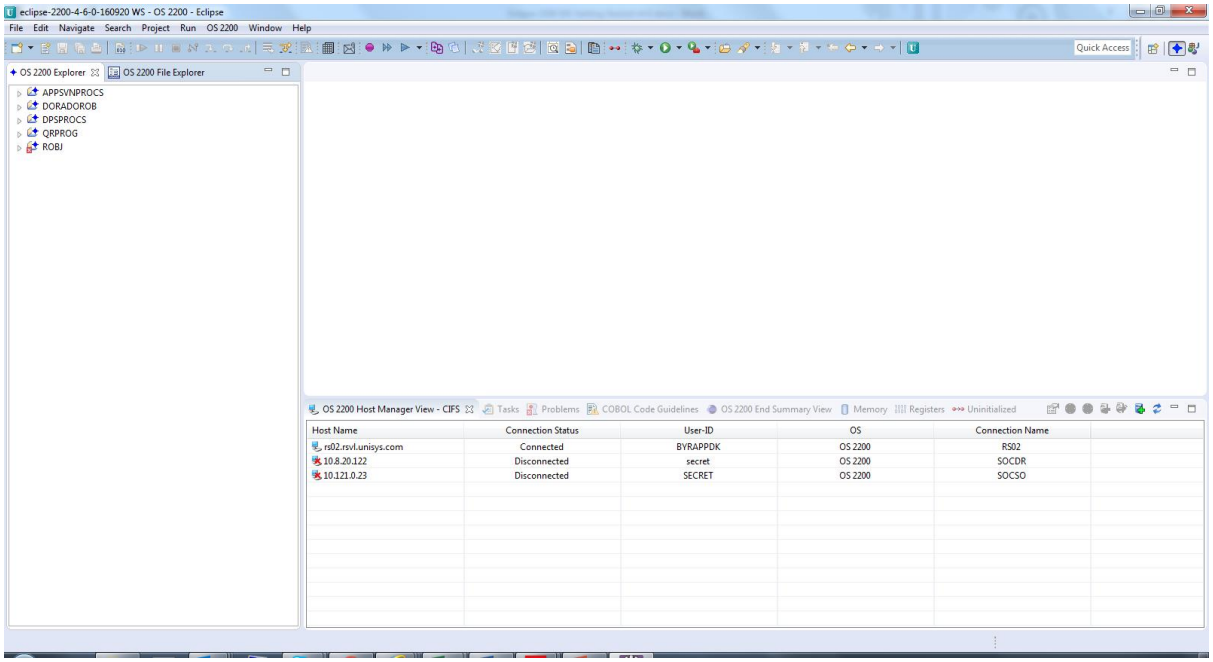
One option is to start Eclipse with the following option.

<eclipseInstallDir>/eclipse.exe -clean

If you have created a shortcut on the desktop, right click on the shortcut and click on properties and append the key "-clean" to the target path.

Selecting the Eclipse workbench

For first time users, Eclipse will display the OS 2200 perspective similar to the following.



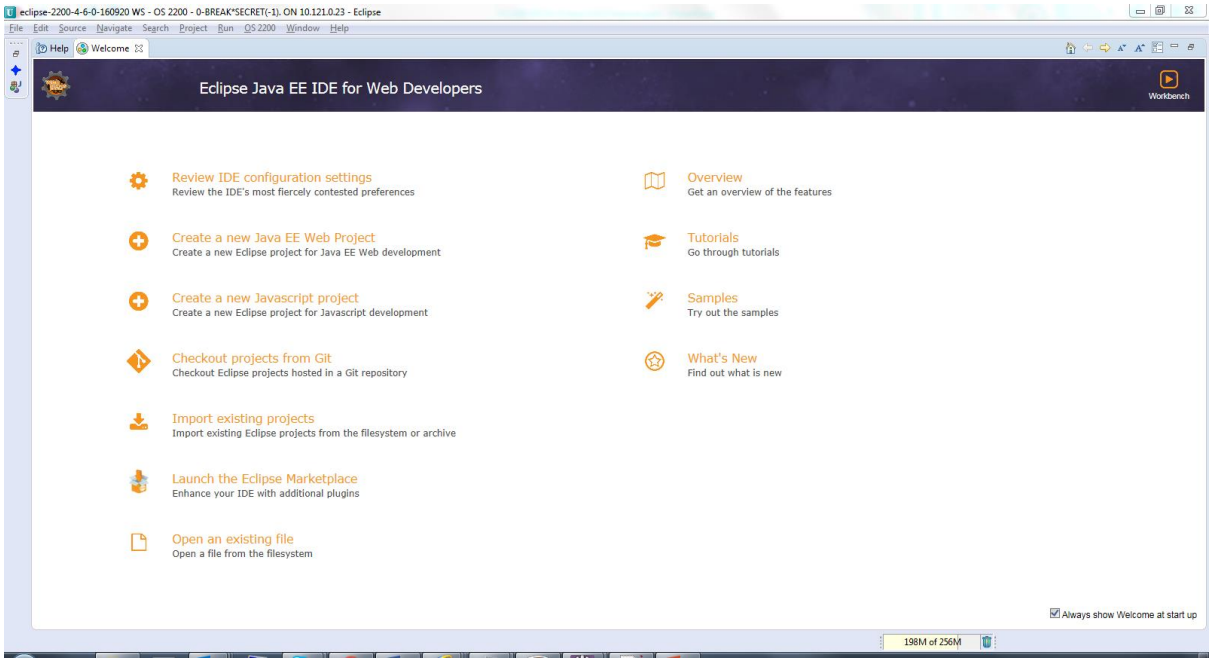
At the top right, you will see the area where the Eclipse perspective can be selected:

The first icon allows the user to select a perspective while the 2nd icon is for the OS 2200 perspective as shown by the hover text:

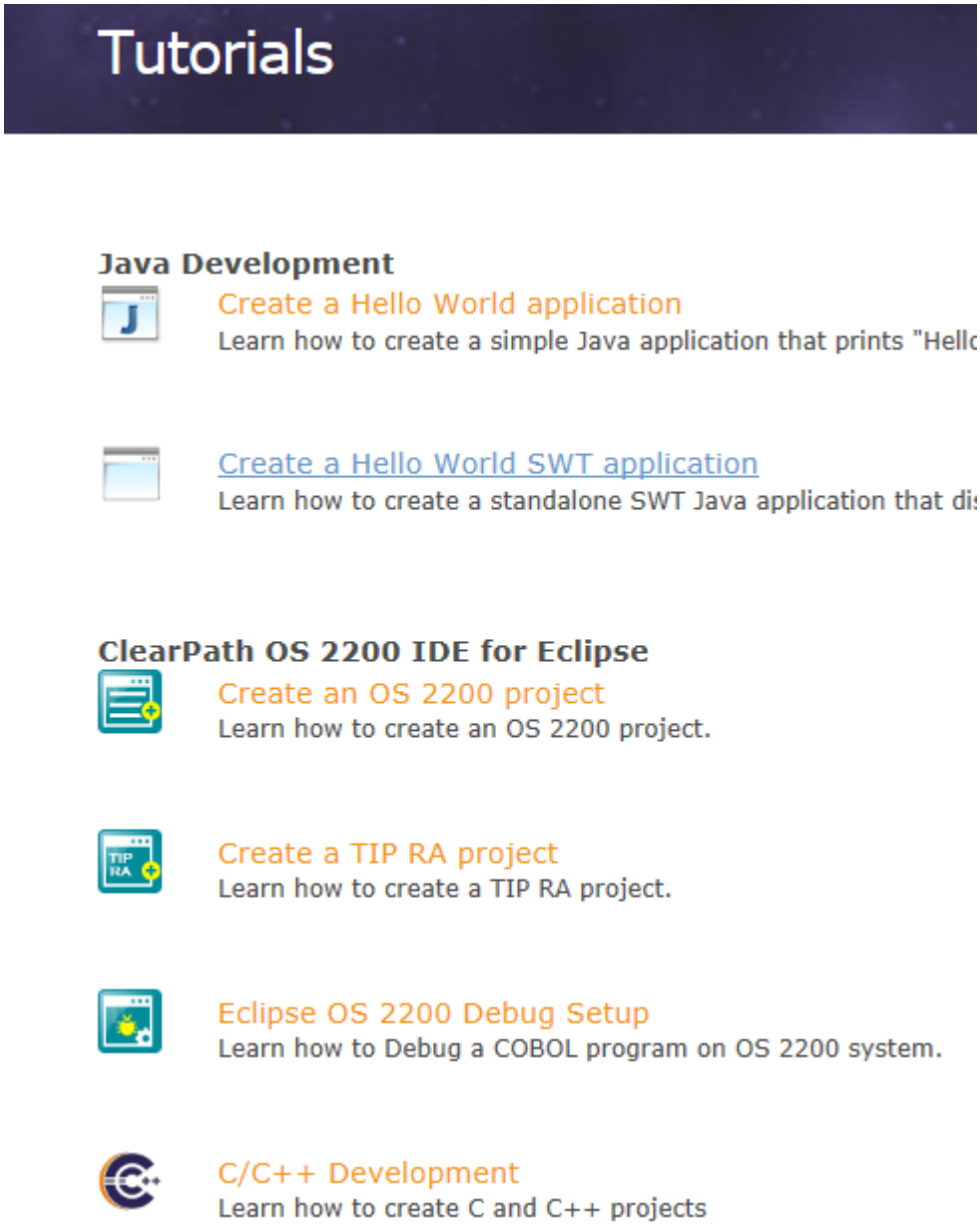
Note that other perspectives such as Java and Debug are often used with the OS 2200 IDE.

OS 2200 IDE for Eclipse Information

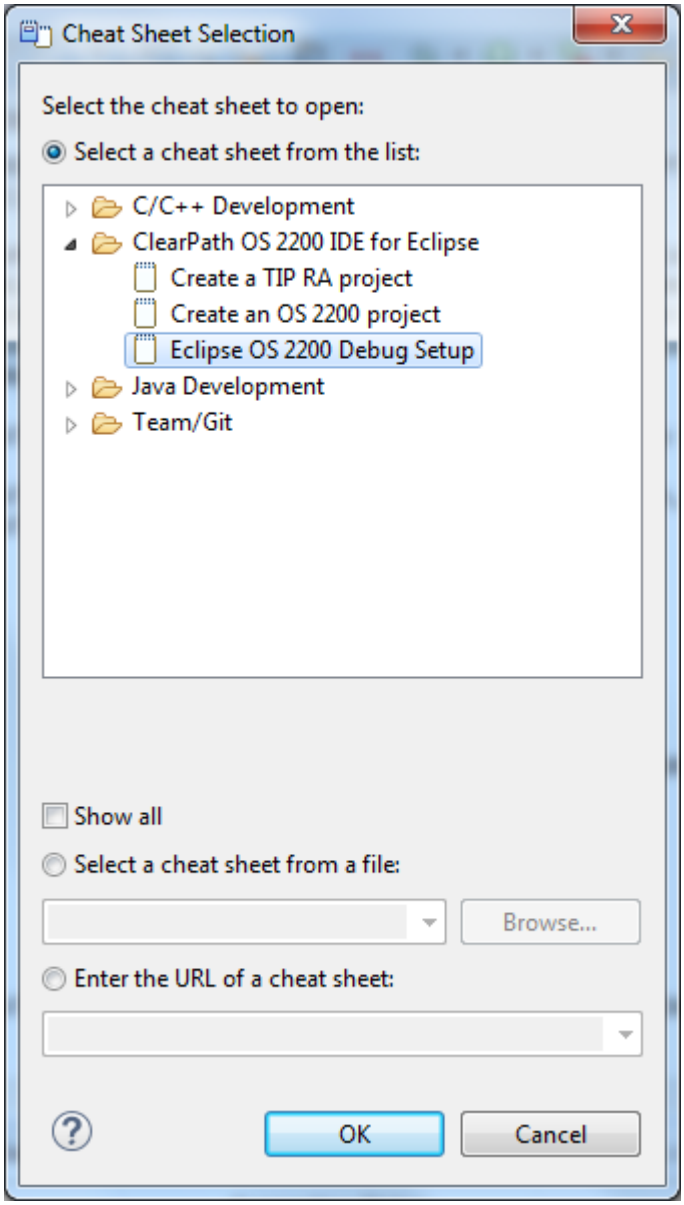
Various information on the Unisys IDE are available from the Eclipse Welcome page (**Help -> Welcome**).



Check the Overview, What's New and Tutorial links. The following is from **Tutorials**:

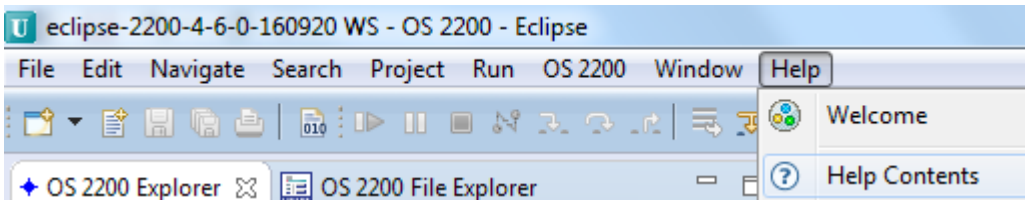


Additional information can be found under **Help -> Cheat Sheets**:

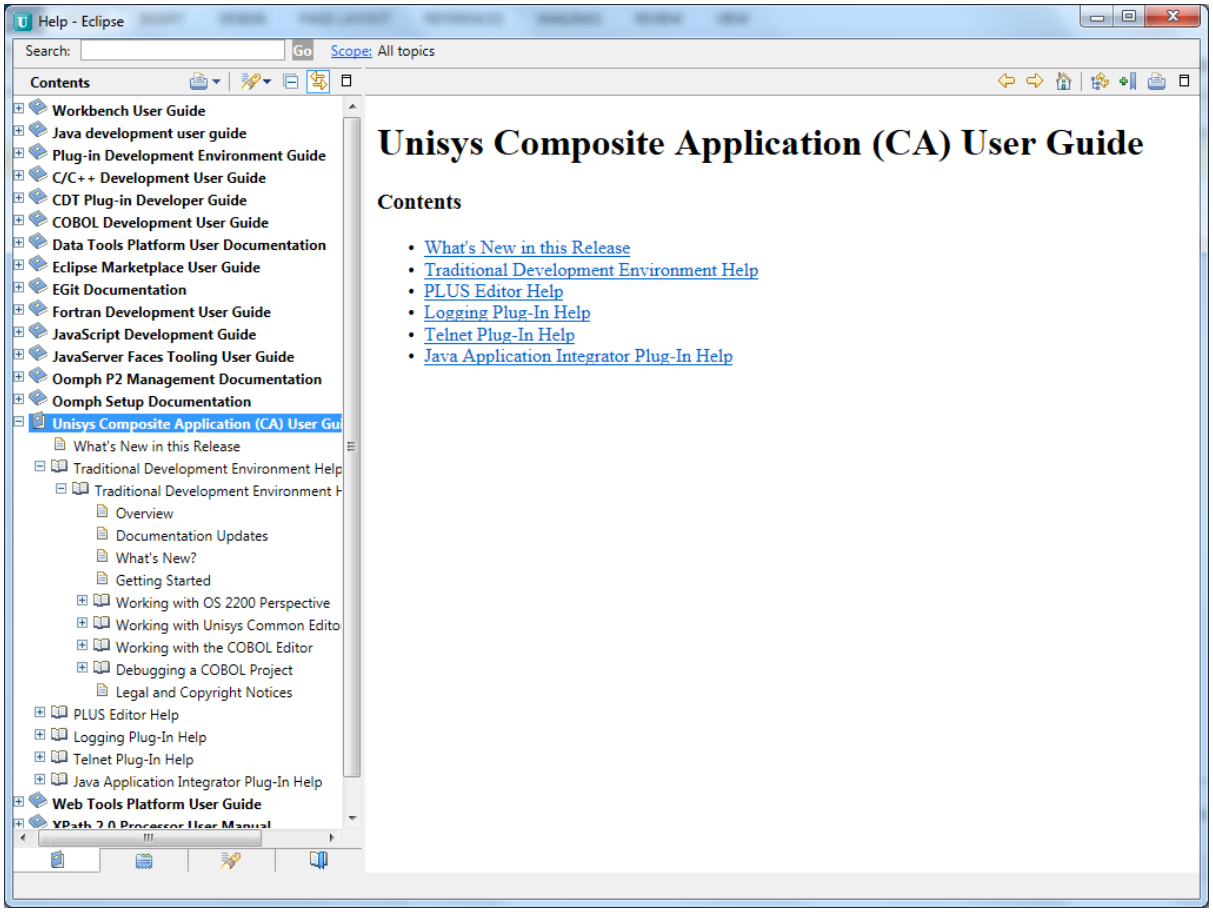


Eclipse Help for Unisys Plug-ins

Go to **Help → Help Contents**.



Then expand the **Unisys Composite Application (CA) User Guide** and then expand the **Traditional Development Environment Help** to get the OS 2200 IDE information. Note that context help can be invoked by clicking **F1** or clicking the help icon when shown:



Configuring Eclipse Memory Management

Eclipse runs within a Java Virtual Memory (JVM) so this means it has a maximum heap memory size. If an application reaches the maximum heap memory, the JVM throws an OutOfMemoryException error.

The main aim of this feature is to check for memory availability before performing an operation. Memory availability check is performed while opening a file using File Open with

- from the project in OS 2200 Explorer
- from OS 2200 File Explorer

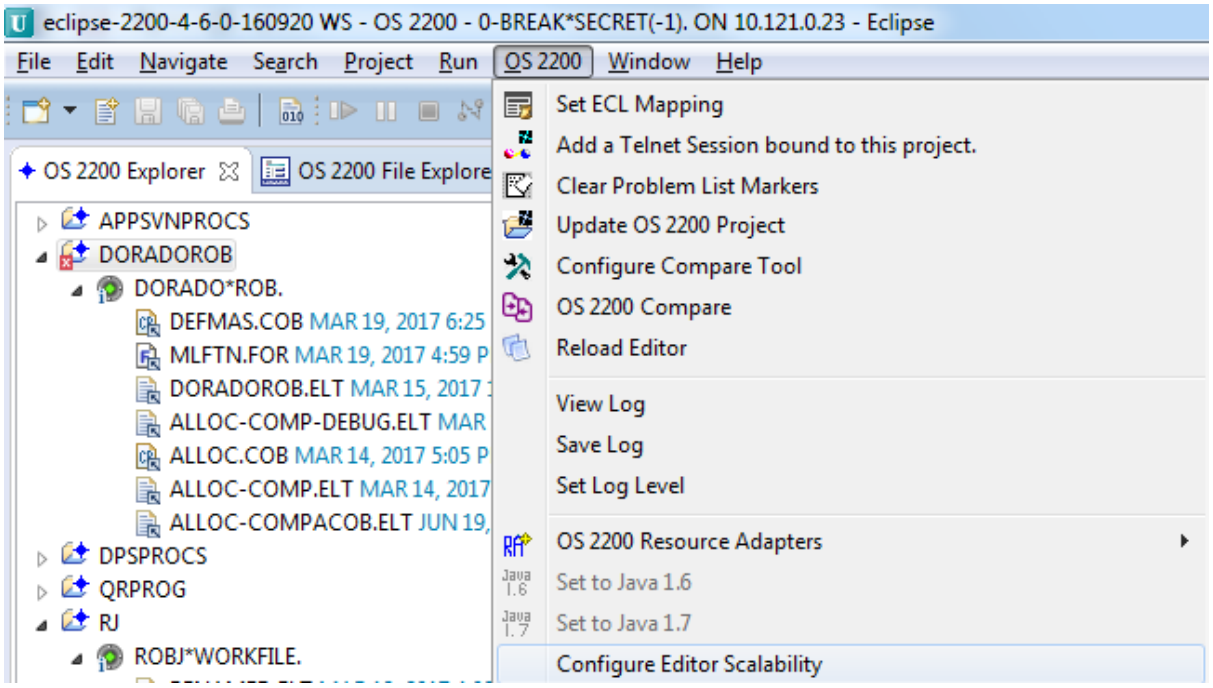
Additional memory availability check is performed in:

- UDT Editor
- COBOL editor

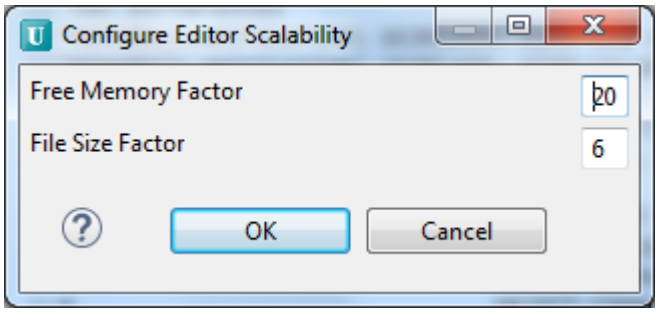
The feature provides early warning to the users about low memory to assist in avoiding Eclipse running out of memory. For certain cases, it allows the opening and editing a file in an external editor in the event of low memory when the file is opened from:

- File -> Open File with… menu option
- Project Explorer
- OS 2200 File explorer
- Search operation

To configure memory management, use **Menu -> OS 2200**



Select **Configure Editor Scalability**



Free Memory Factor (FMF)

- It is the percentage of free memory against the total available memory required to perform a memory-intensive operation.

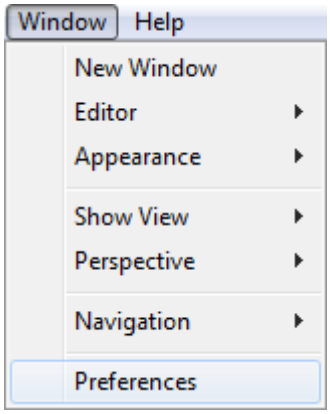
File Size Factor (FSF)

- It is the free memory to the file size ratio. The default value is 6. A value between 6-15 is sufficient.

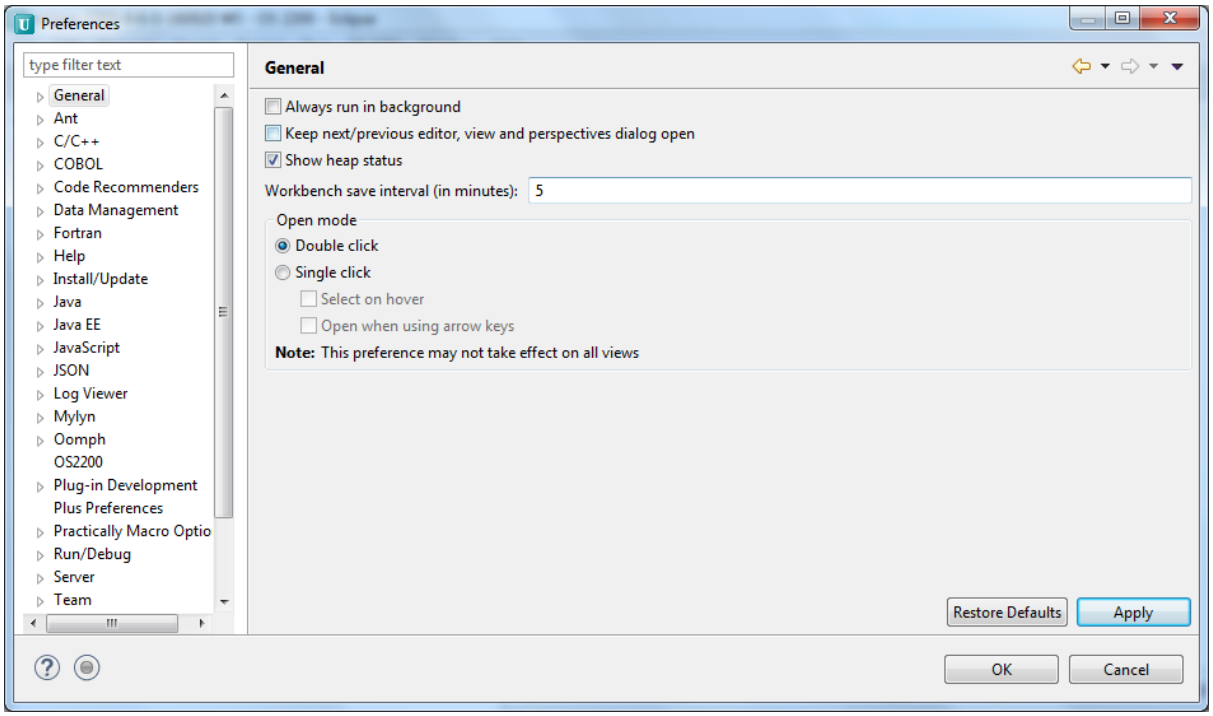
Understanding OS 2200 Projects

Configuring Eclipse Preferences

Before we start defining an OS 2200 project, we have to configure Eclipse to support the OS 2200 environment. In the menu bar, go to **Window → Preferences** and click.

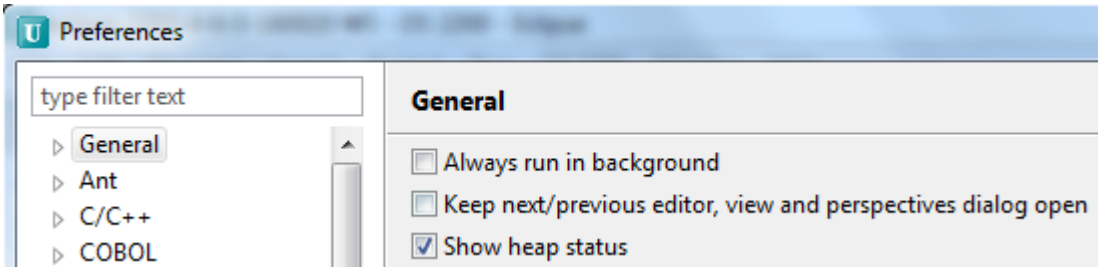


The following screen will appear:

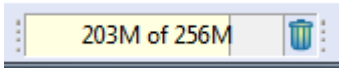


Displaying the Java Heap Status

The "Show heap status" option in the General Options can be checked to show the the heap status:



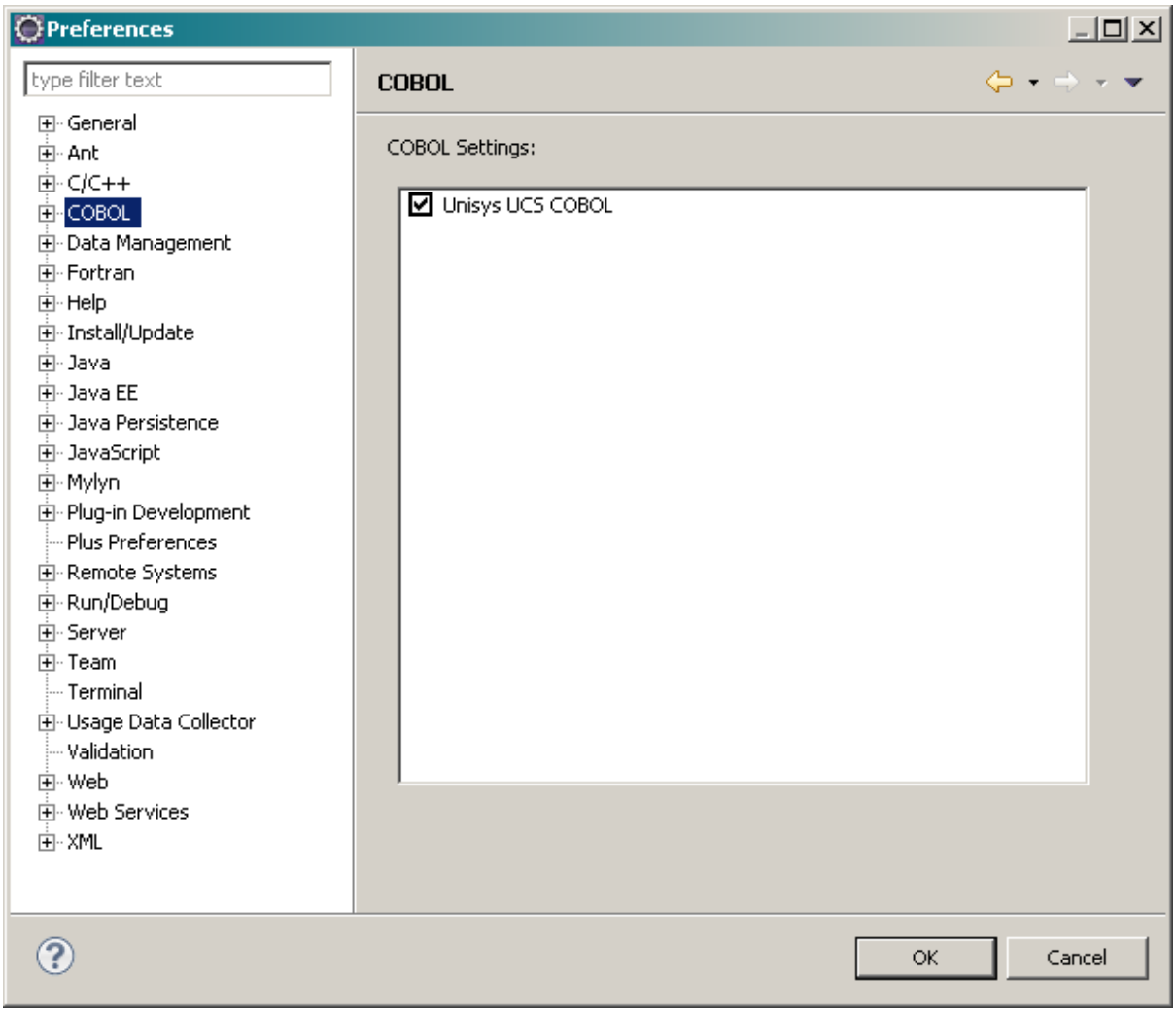
Eclipse will show the Java heap status in the status line:



This information can be useful to provide in some cases as requested by Engineering. Clicking the garbage bin icon will initiate a Garbage Collection task.

Configuring the Unisys COBOL preferences

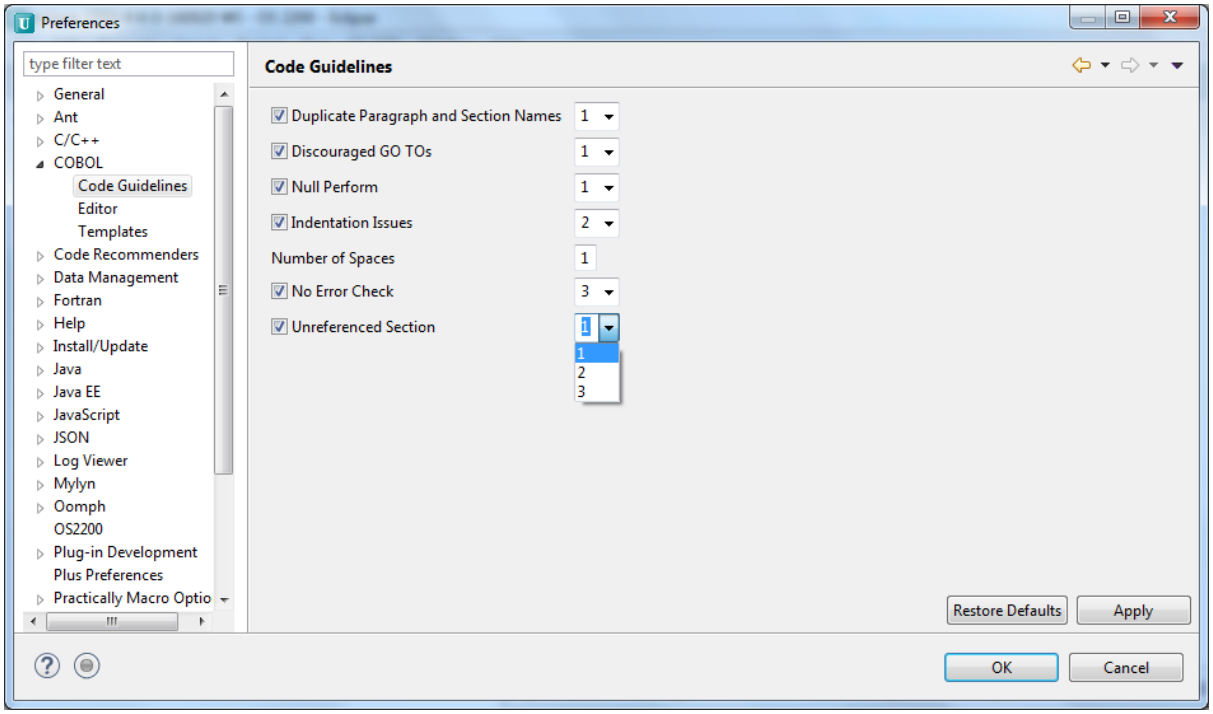
Click on the entry COBOL (and not the '+' sign) to display this screen:



Check the Unisys UCS COBOL entry. This selects the editor template that matches UCOB – the ANSI COBOL-85 compiler on the OS 2200 system. Note that ACOB (ANSI COBOL-74) source can be used with the COBOL editor as there are only minor differences between the compilers regarding the language structure e.g. format of statements. For example, TALLY is an ACOB verb but not a UCOB verb so it will not be handled as a verb when the COBOL editor displays the source.

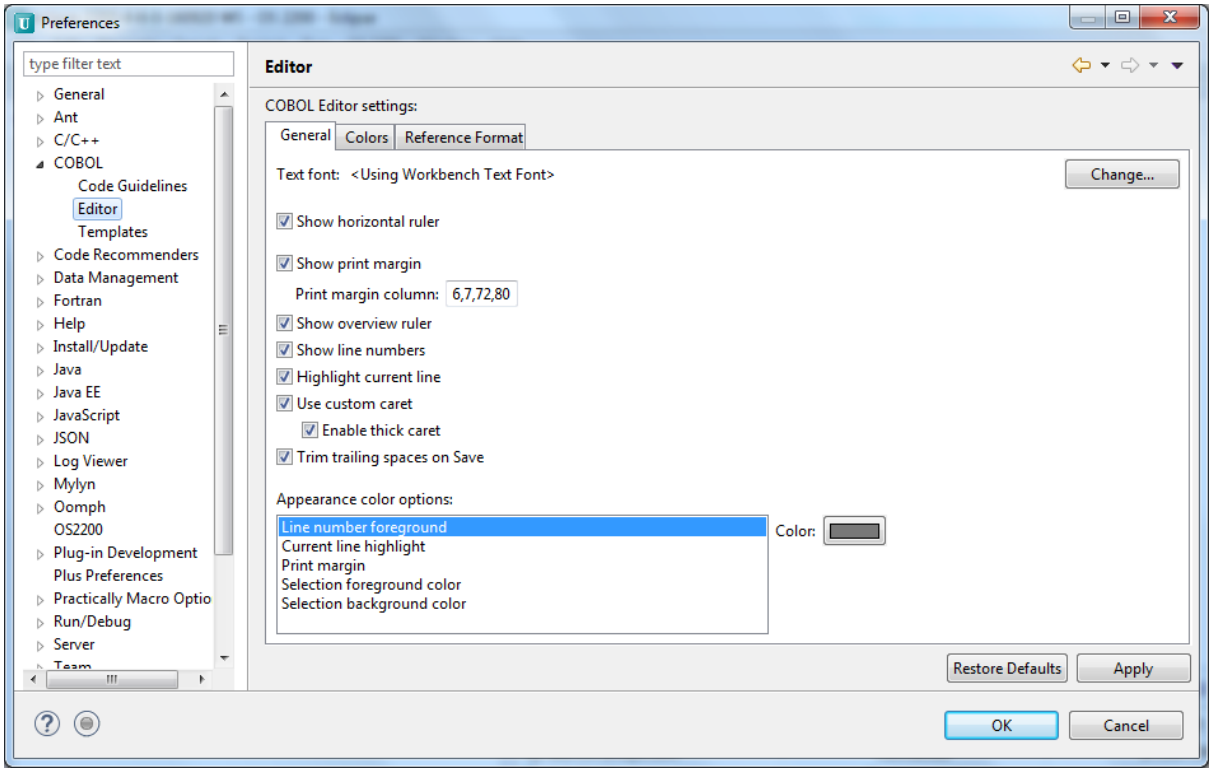
COBOL Code Guidelines

Expand the COBOL entry and select COBOL Code Guidelines to allow Eclipse to provide some guidance when working with COBOL sources. Each options has a priority of 1, 2 or 3 to control the order in which the guidelines are displayed.



COBOL General Editor Preferences

Now expand the COBOL entry and click the Editor entry.

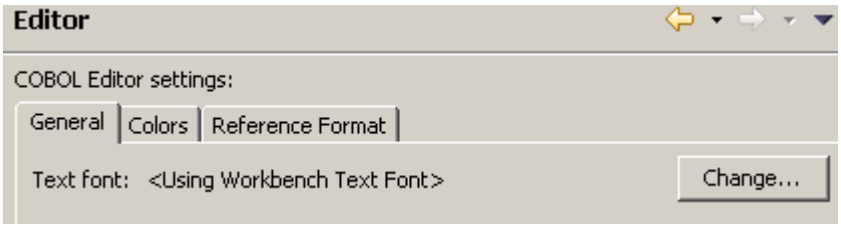


The General tab is used to set various options on how the COBOL edit pane is prepared and handled. Modifying these settings affects only the current workspace, so each user can have their own preferences.

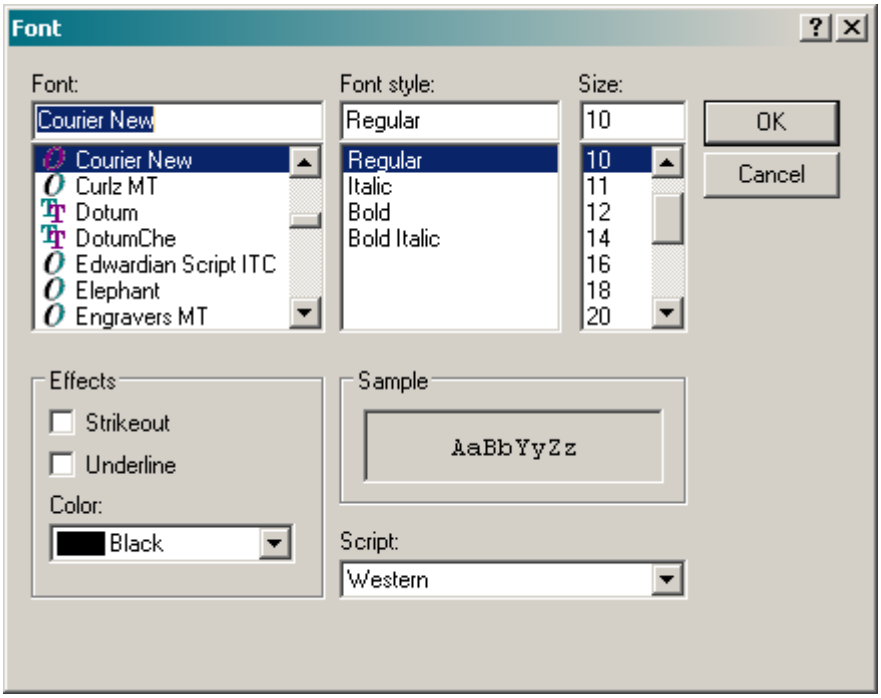
Preference	Description
Show horizontal ruler	Displays a horizontal rules in the edit pane
Show print margin	Puts vertical divider lines as the margins mentioned
Show overview ruler	

Show line numbers	Line numbers are displayed on the left edge of the edit window
Highlight current line	Highlights the current line for easier identification
Use custom caret	Cursor being used
Trim trailing spaces on save	When a COBOL file is saved, Eclipse will trim trailing spaces from each line

On the top of the General tab, Eclipse displays the current font. You can change the font by clicking on the Change button:

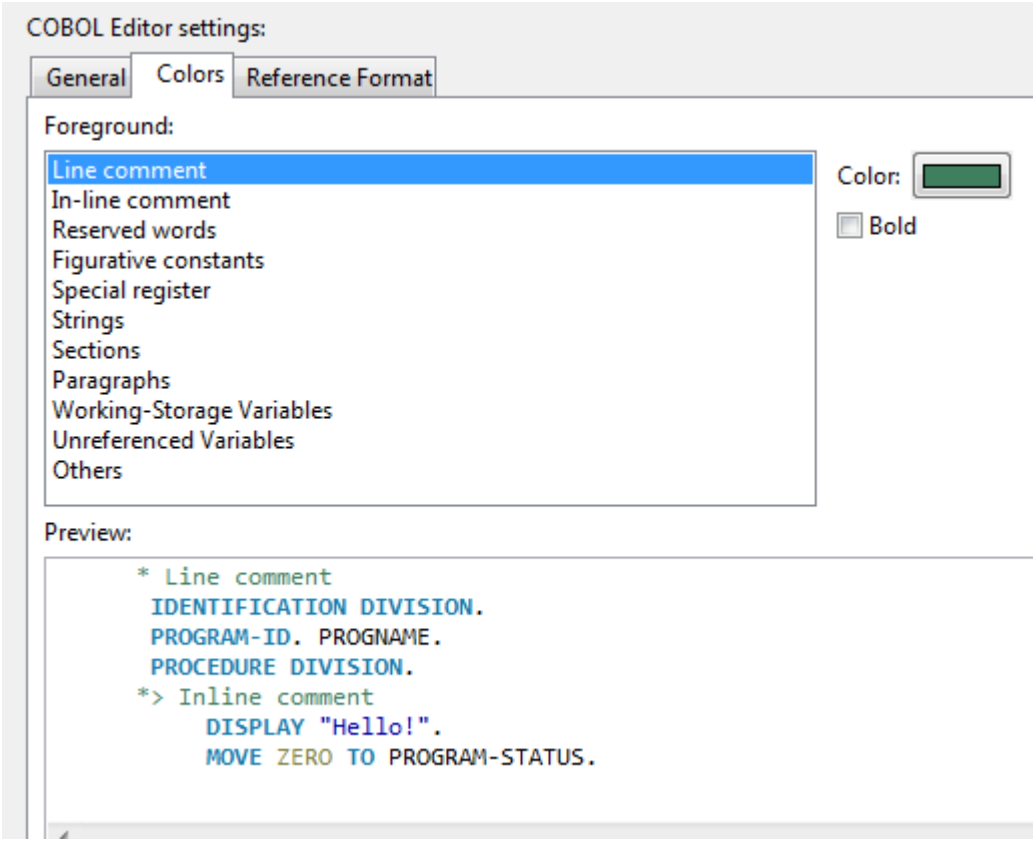


Eclipse allows you to set the font. This might be important when Character Conversion is used. For example, with Japanese it might be preferred to use the MS MINCHO or MS Gothic font. If you want to preserve columns etc then use a fixed font rather than proportional.



COBOL Colors Preferences

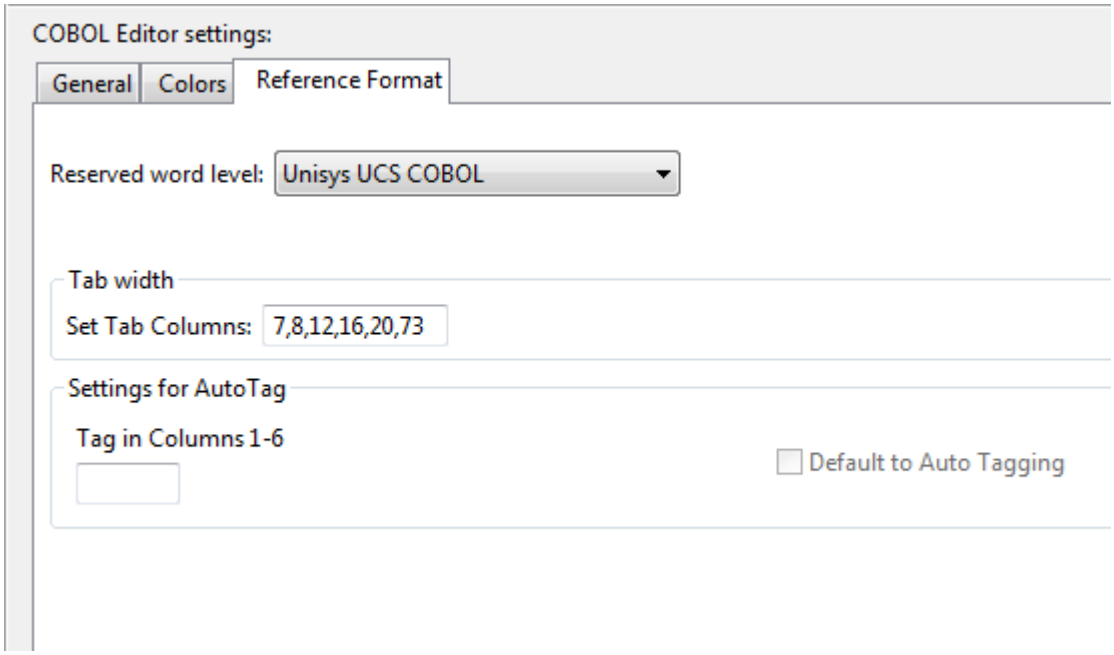
Click the Colors tab.



Note that Sections, Paragraphs and Working-Storage Variables do not have their colors set in real-time. From the COBOL editor, you must do a F4 to refresh the colors.

COBOL Reference Format Preferences

Click the Reference Format tab.



The developer can modify the Tab Columns as required.

The Auto Tag feature allows you to end a value to a placed in columns 1-6 of any COBOL code updated using the Eclipse editor. The Default check box allows the feature to be turned on or off. Got to Help and search for Auto Tag for more information.

COBOL Templates

The topic is discussed later in this guide.

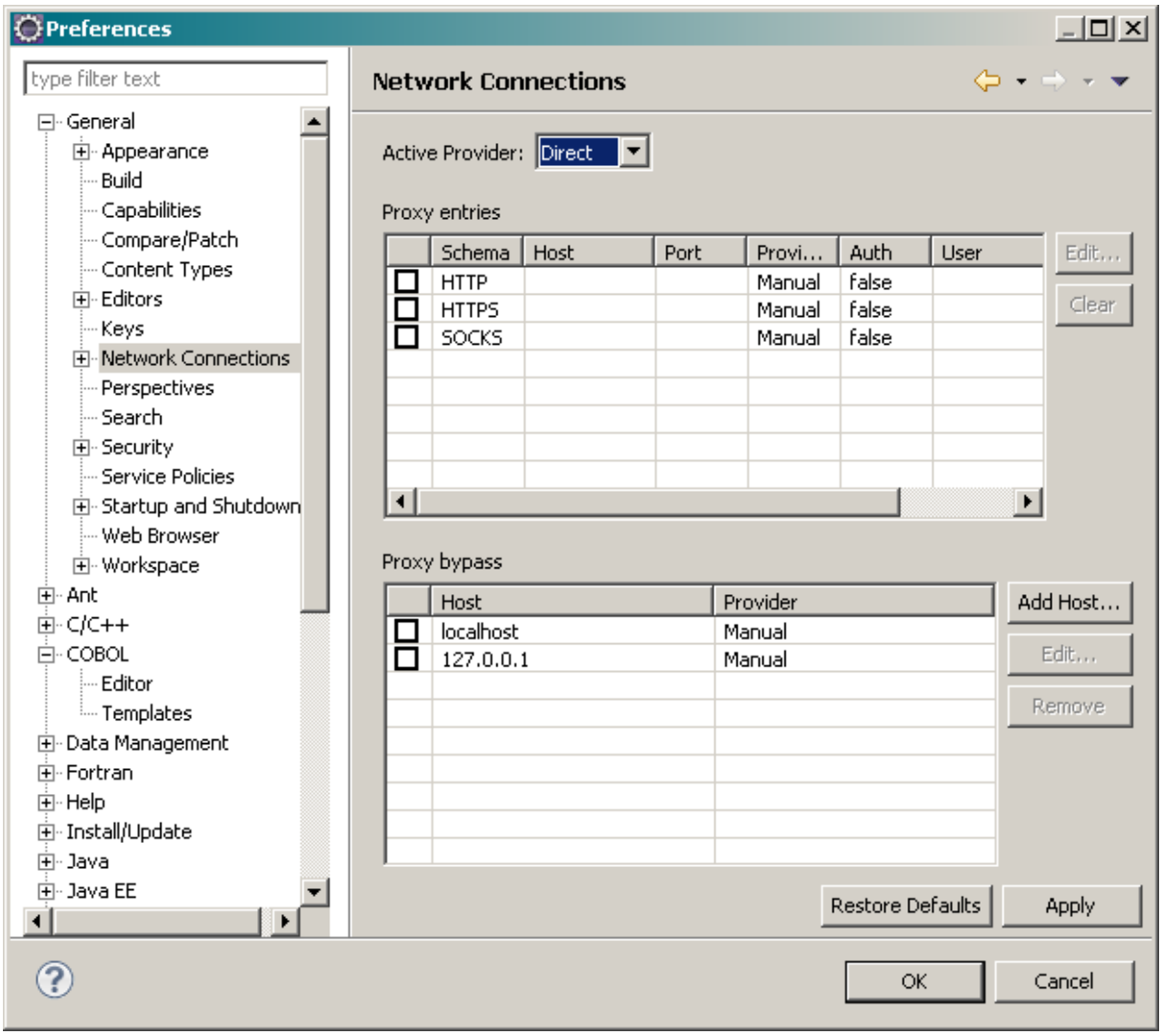
Configuring the Proxy Preferences

Some sites use a proxy server to provide internet access. When this is configured on the workstation, Eclipse will get an error message when trying to connect a telnet session to the OS 2200 host.

The problem can be resolved by setting the Eclipse network settings to the correct value.

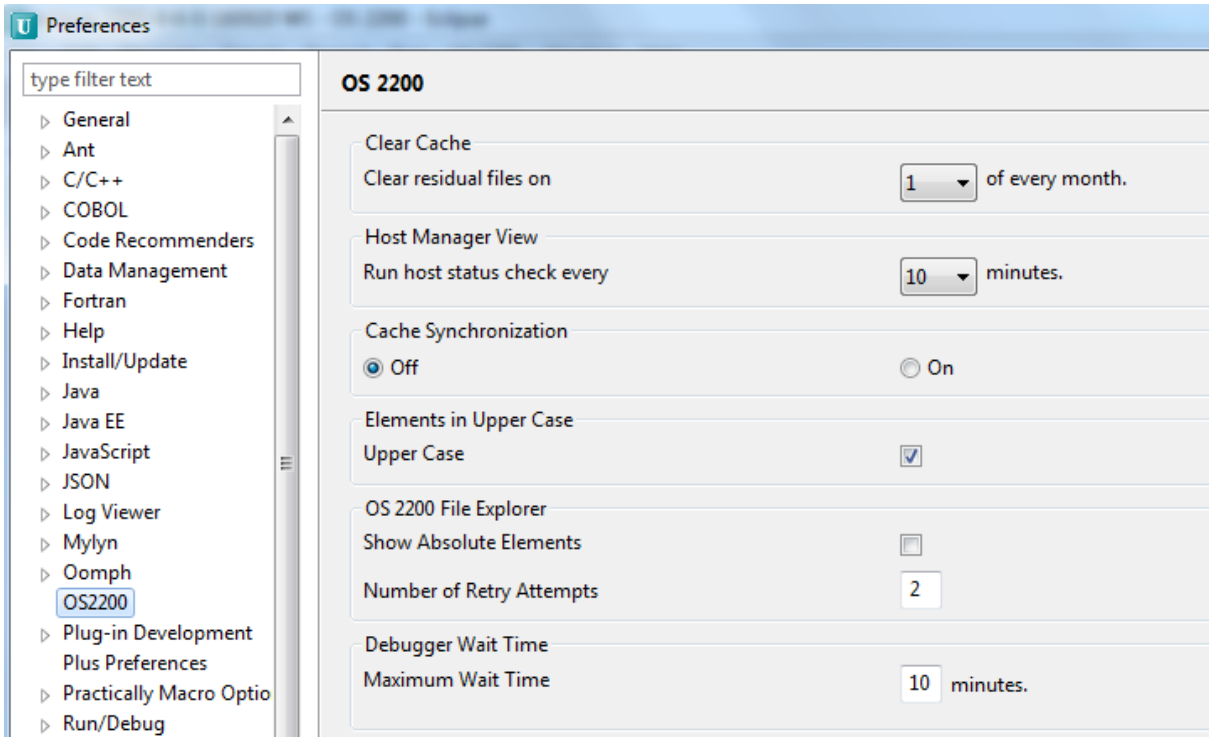
Go to **Window → Preferences** and then expand General in the tree structure. Then highlight Network Connections. Set the Active Provider to Direct.

Refer to the figure below.



Setting the OS 2200 Preferences

Select the OS2200 entry:



Search the Help for each of the topics but some information is provided below.

Clear Cache

This the day of the month when Eclipse will clear the unreferenced cache elements in a project.

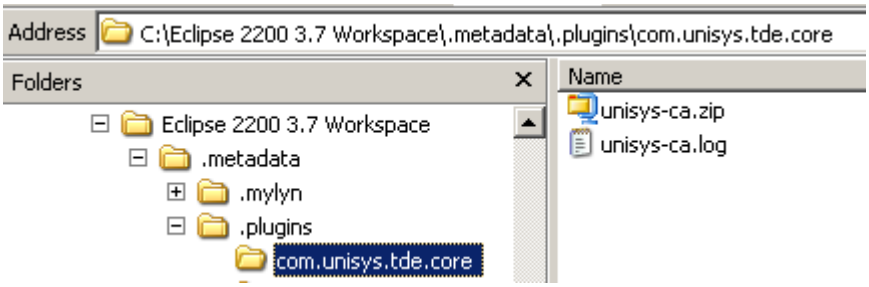
Cache Synchronization

This feature enables the elements that are added to the project to be downloaded while creating, updating, or importing an OS 2200 project. This happens in the background.

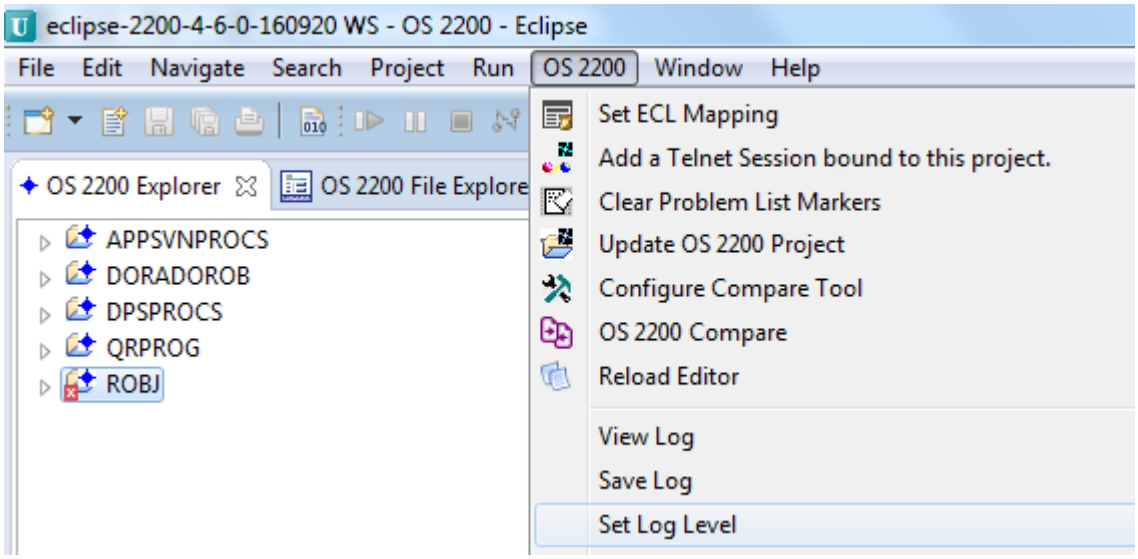
Cache Synchronization is turned off by default. If Cache Synchronization is turned on, the elements are downloaded automatically to the cache. If Cache Synchronization is turned off, the user must open the elements by clicking them, and then they will be downloaded instantly. Once it is downloaded, the element will remain in the cache.

Setting the OS 2200 Log Level

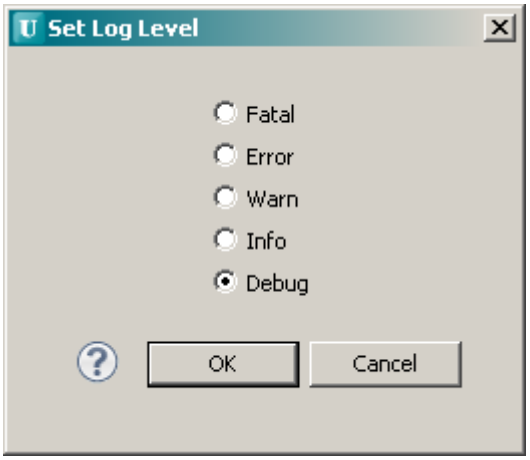
Eclipse writes a log file for the Unisys plug-ins to a file called **unisys-ca.log** into the selected workspace folder:



This log file could grow in size so the ability to set the log level was introduced. To set the log level, go to **Menu → OS2200 → Set Log Level:**



The current log level setting is displayed.



The user can choose the logging level to be logged. There are 5 different options arranged according to the priority.

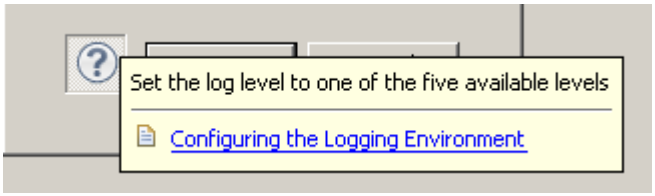
- Fatal
  This level will designate very severe error events that will presumably lead the application to abort. Logs only Fatal data.
- Error
  This level will designate error events that might still allow the application to continue running. Logs Error and Fatal data.
- Warn
  This level will designate potentially harmful situations. Logs Warn, Error and Fatal data.
- Info
  This level will designate informational messages that highlight the progress of the application at coarse-grained level. Logs Info, Warn, Error and Fatal data.
- Debug
  This level will designate fine-grained informational events that are most useful to debug. Logs everything (Info, Warn, Debug, Error and Fatal).

Debug is the default setting.

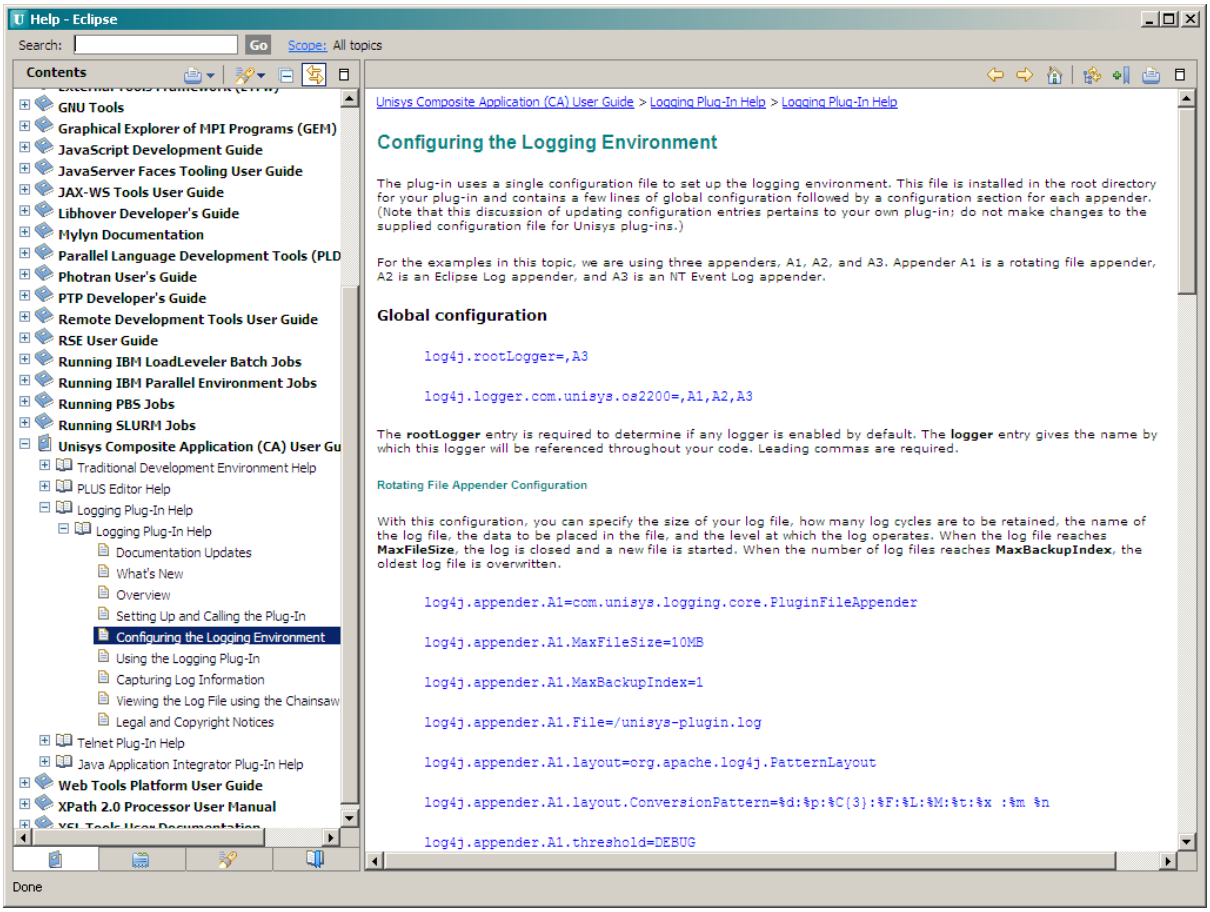
If the Eclipse OS 2200 IDE encounters a problem or issue, the user can change the log level accordingly to gather more information to assist in analyzing the issue. Unisys may recommend clients to set the log level in response to reported problems. At present the log file has to be deleted or the contents of the log file has to be emptied to create a fresh log file. Note: the mechanism to clear the log automatically or to create another log after exceeding certain size does not currently exist but is being considered as an enhancement for a future release.

Log Level Help

Click on the question mark to launch the help. Then click on the 'Configuring the Logging Environment'.



Eclipse will display the online help information.



Configuring OS 2200 connections

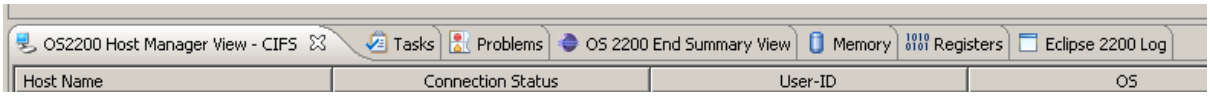
Eclipse uses two connection methods to the OS 2200 host:

1. Telnet is used to send commands to the host. You can open a demand session via telnet at any time.
2. CIFS is used to access the OS 2200 program file that contains the program source and other elements e.g. ECL. CIFS allows OS 2200 files to be exposed as network shares and then accessed from Windows using mapped drives.

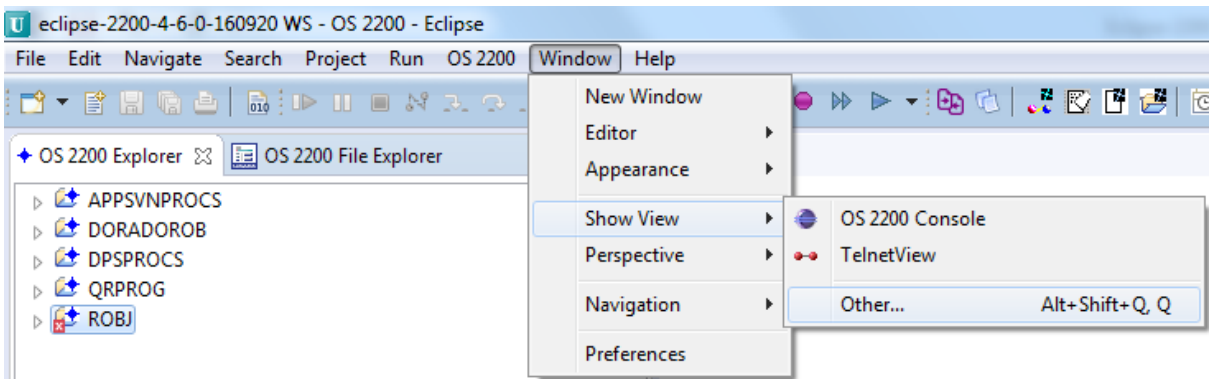
There are two methods to define OS 2200 connections as explained below.

OS2200 Host Manager View

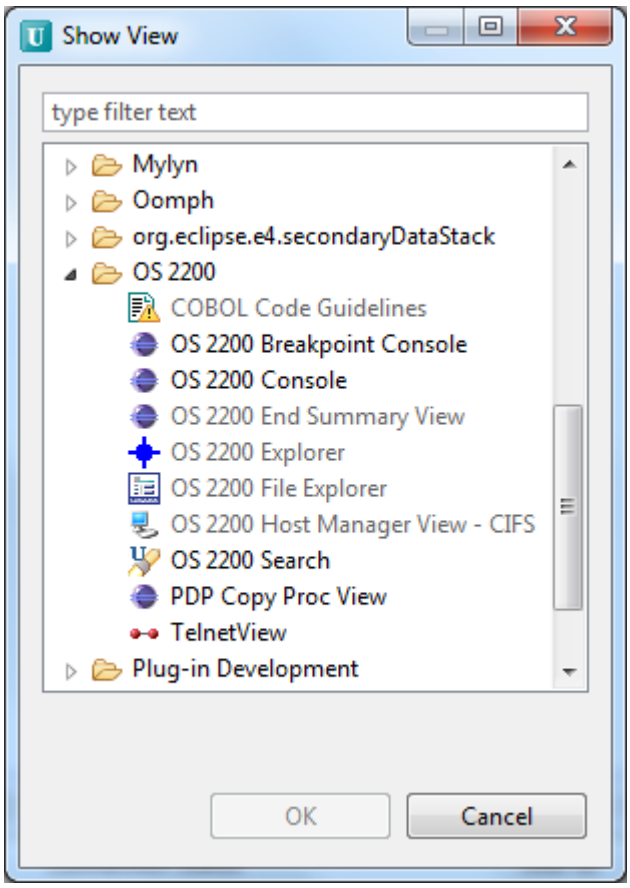
At the bottom of your Eclipse window, you should a number of tabs including the OS2200 Host Manager View:



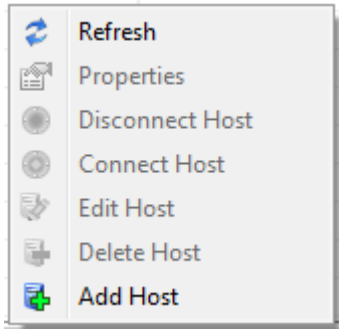
If you do not see this tab, go the menu bar and select **Window → Show View.**



Click **Other** then scroll down to OS 2200 and expand the node.

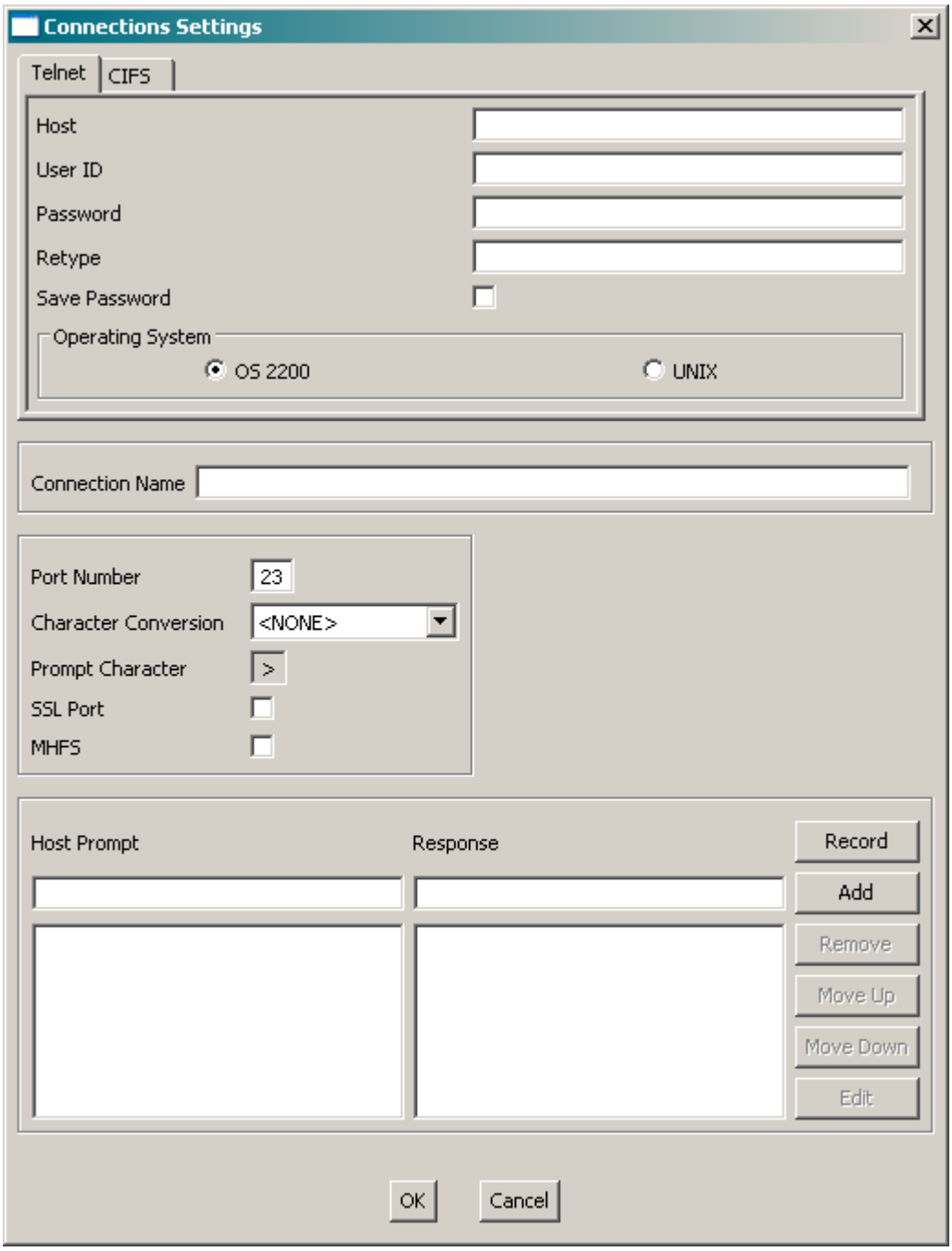


Now click the **OS 2200 Host Manager View- CIFS** entry.
In the OS 2200 Host Manager View tab, right click. Eclipse will present a dialog:



Click **Add Host**

The Connection setting dialog appears with 2 tabs – one for Telnet and one for CIFS. As you fill in the Telnet tab, the CIFS tab is also populated with the same details.



The Host field contains the DNS name or IP address for the OS 2200 host.

In the User ID field, enter your OS 2200 demand userid. Enter your demand password in the Password and Retype fields. Check the Save Password box. *Note: For Windows 7, your userid and password must be entered in upper case.*

Enter a Connection Name.

The port number must be 23 for Telnet so don't change this value.

If your OS 2200 supports a language requiring character conversion e.g. Japanese, use the list box to select the entry otherwise leave as <NONE>.

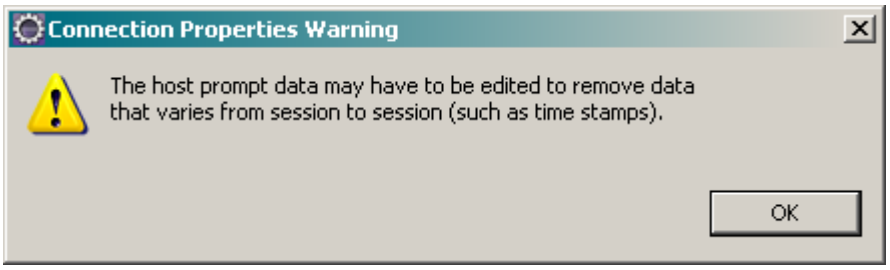
Check the SSL Port box if using secure Telnet.

Check the MHFS box if your system uses Multi-Host File Sharing. This implies that your system runs XTC or PAEXEC.

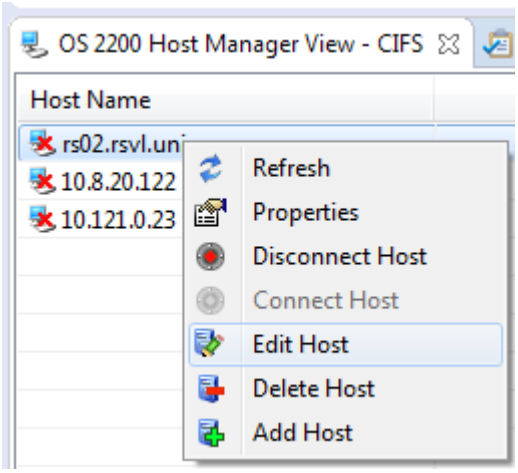
The Record button can be used to record your normal responses to OS 2200 generated prompts when you sign-on to a demand session. For example, “Enter your project-identifier” might be a prompt. After clicking the record button, Eclipse will open a demand session via Telnet. Perform your usual steps and responses when using demand session.

Check the CIFS tab information and then click OK.

The following warning window appears when you finish the recording.



To edit the OS 2200 Connection, you can highlight the connection in the OS 2200 Host Manager View and right click. Then select Edit Host.



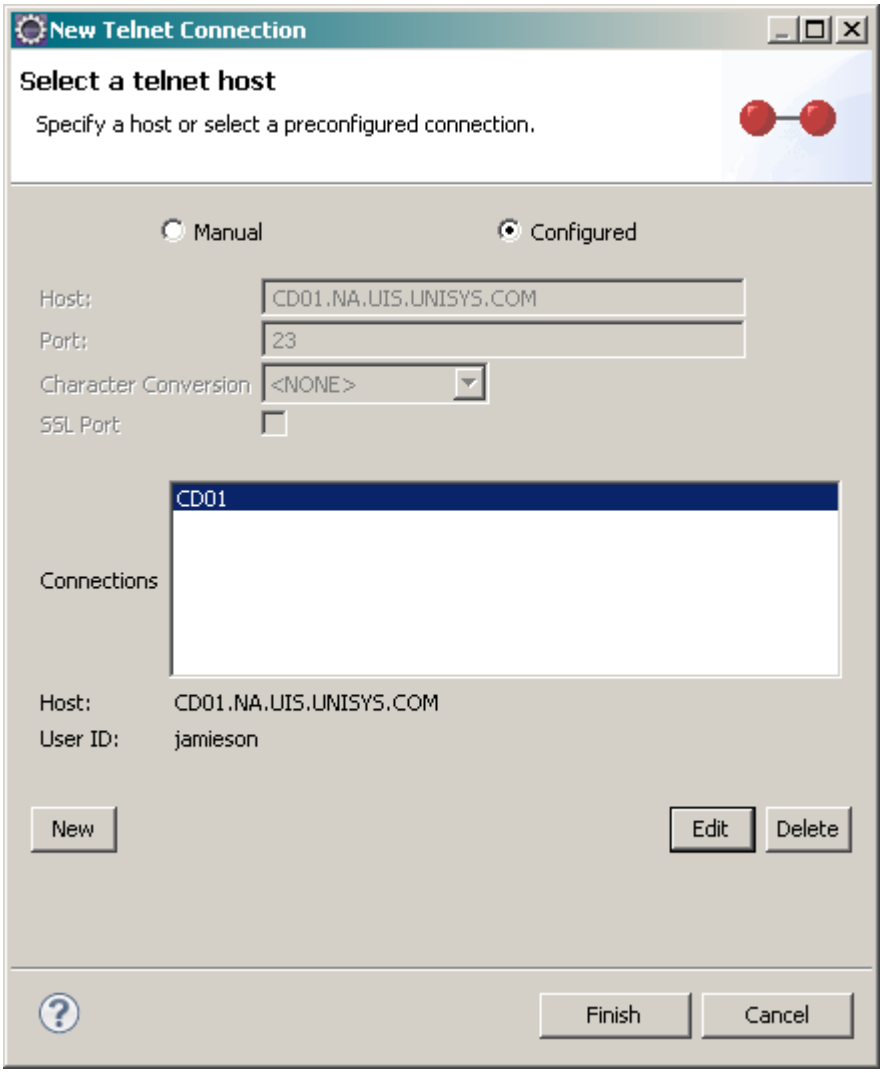
At the right side of these tabs are some icons. When OS 2200 Host Manager View is in focus, the following icons are displayed:

The sixth icon from the left can be used to add a new host. Hover text will display the function of the icon.

Or when using the Telnet Connection method below, highlight the Connection and then click Edit.

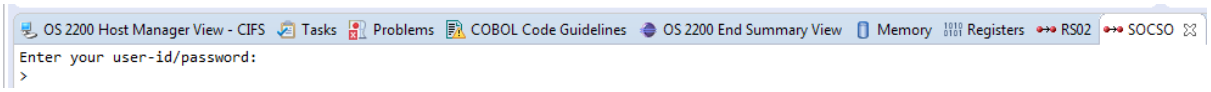
Using the Telnet Connection method

In the Icon menu, click the Telnet connection icon:



Click **New** to display the Connection Settings window as shown earlier. Follow the above steps to configure a new connection.

Click **Finish** to open a Telnet session to the selected host. The recorded login details are applied.



Commands are submitted as if you are using a demand session such as via a terminal emulator except that full screen mode is not supported. The session can be closed by clicking on the "X" in the tab.

If you want to save the contents of the Telnet pane, there is the following icon on the right side of the pane title bar:

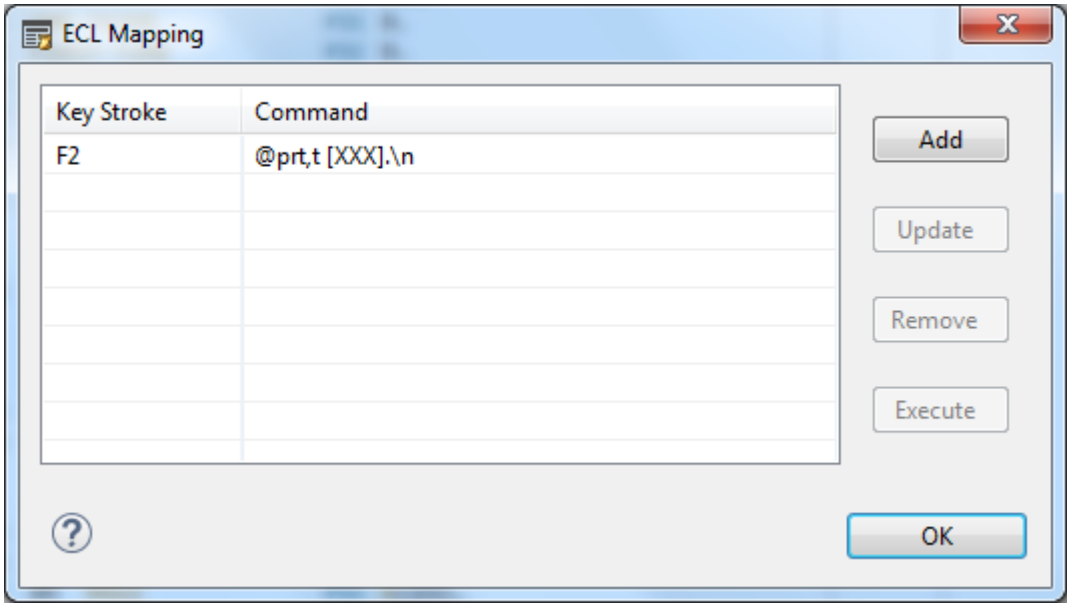
Using Previous Telnet Commands

You can use Ctrl+UpArrow or Ctrl+DownArrow to resubmit previous commands. The Telnet session stores the last 20 commands used.

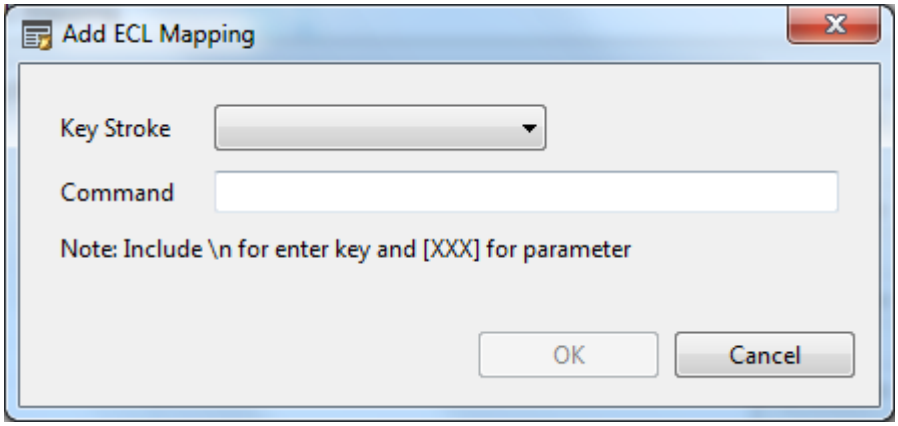
Using ECL Mappings

Eclipse OS 2200 provides 25 shortcut keys that can be used to store ECL commands to be used in the Telnet session.

Open the ECL Mapping by using Menu -> OS 2200 -> ECL Mapping or by using the  icon from the Telnet view. This opens the dialog:



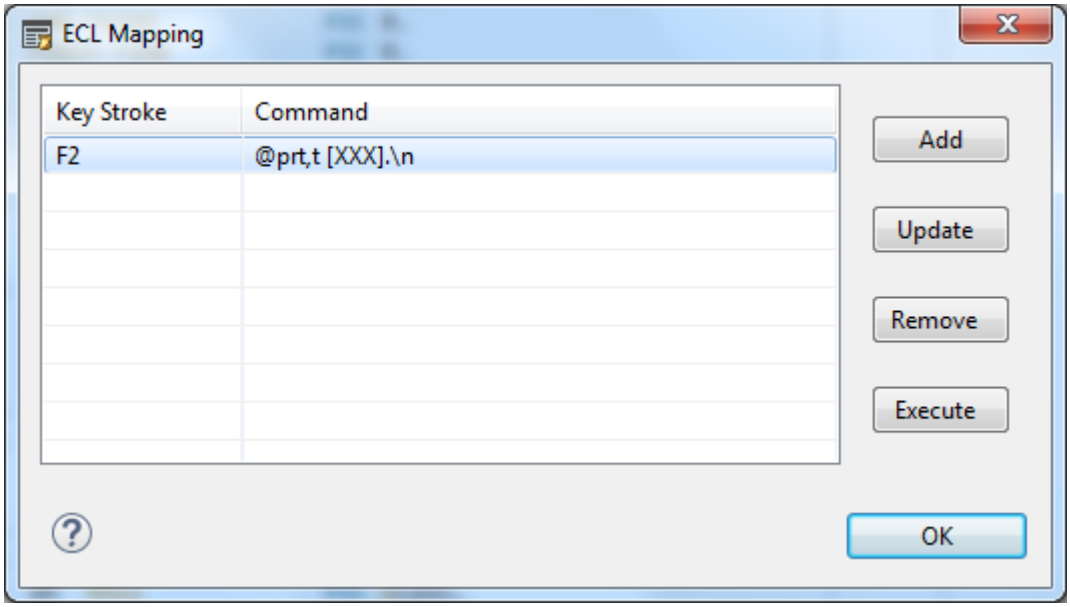
Click Add to see the shortcut keys available:



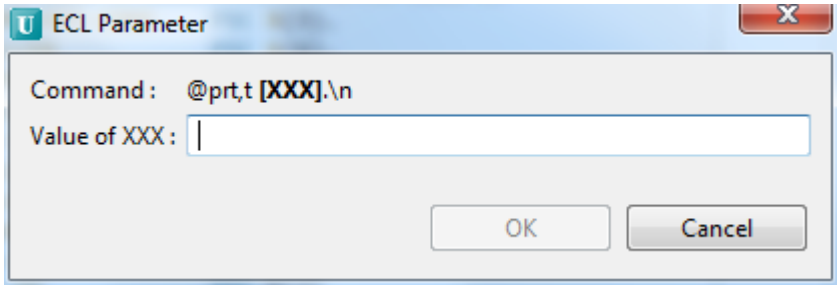
Expand the list box and select a shortcut key.

Then enter the command as required.

If a configured shortcut is selected then the option to execute the command is provided:



Note that when the parameter field [XXX] is used, Eclipse prompts for the runtime value:

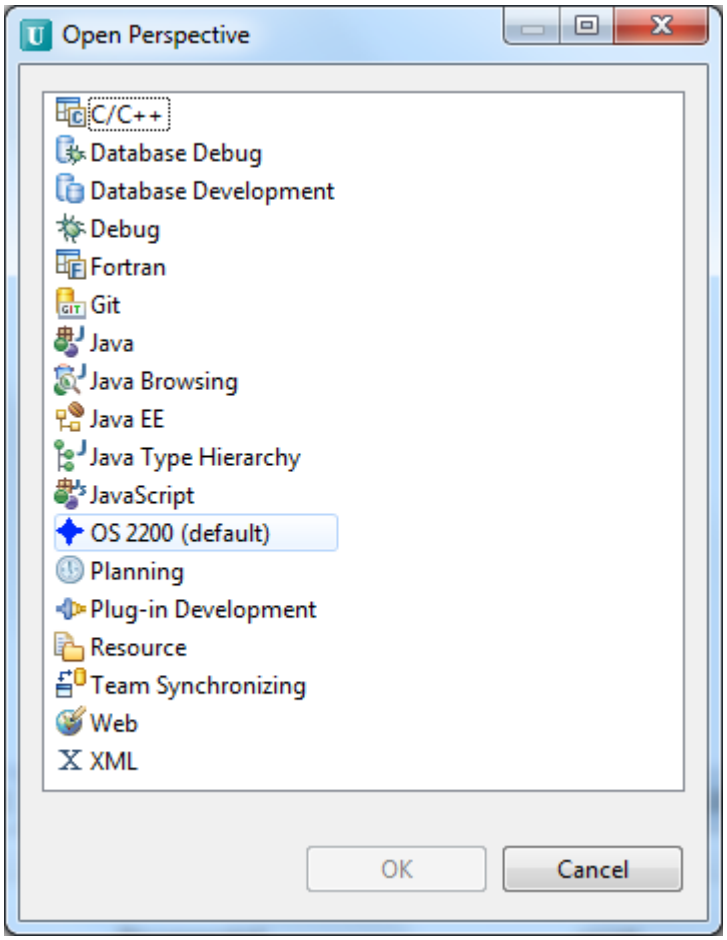

ECL Parameter
Command : @prt,t [XXX].\n
Value of XXX :
OK
Cancel

Using the OS 2200 Perspective

Eclipse has different layouts for the IDE that are designed for the type of work being performed e.g. Java, Debug, and OS 2200 etc. After the Unisys Eclipse OS 2200 features have been installed (and at this stage they have), there is a perspective called OS 2200.

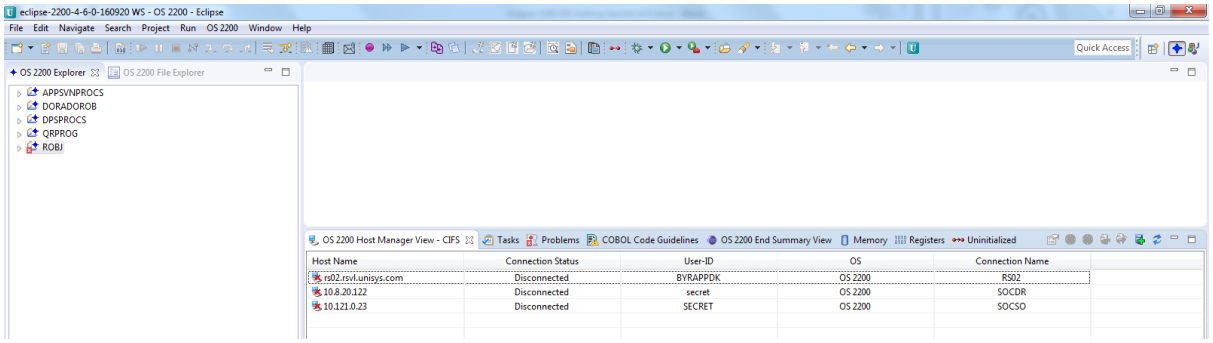
The perspective can be selected from the top right of the screen. In the following case, OS 2200 is greyed out as it is the default perspective that is open.

You can also go to the menu and click **Window → Open Perspective → Other**

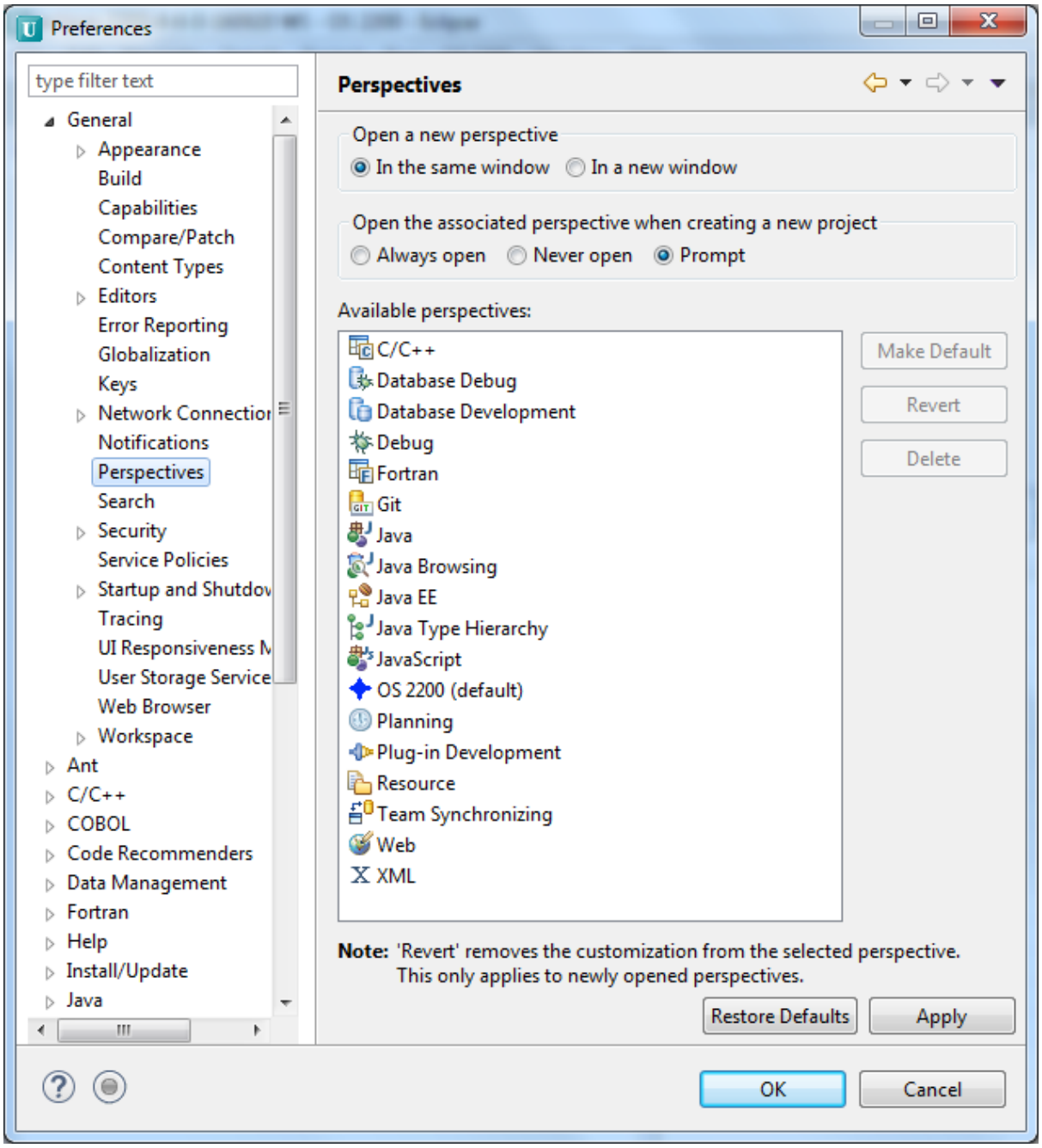


Then select OS 2200

When the OS 2200 perspective is open, the IDE should look like:



Or you can open a perspective by **Windows -> Preferences -> General -> Perspectives.**



Preparing Your OS 2200 Program File

Your OS 2200 program file that contains the program source code needs to be shared with CIFS so Eclipse can access the file. This is accomplished by creating a share using the CIFSUT processor in an OS 2200 demand session.

```
@CIFSUT
share /os2200/<qual>/<filename>          <sharename>
```

In the following example, the OS 2200 program file is dorado*rob. The commands are:

```
@CIFSUT
share /os2200/dorado/rob    doradorob
```

In this example, a Windows network drive could be mapped to \\<server>\doradorob.

To unshare the program file, enter the commands:

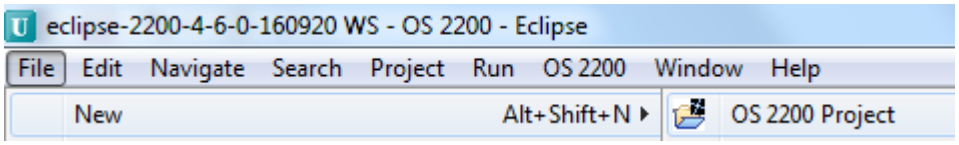
```
@CIFSUT
unshare doradorob
```

However it can be easier than this. A default share called “os2200” is recommended to be created over the OS 2200 MFD and we will use this share for the examples. This means that you don’t have to define your own shares.

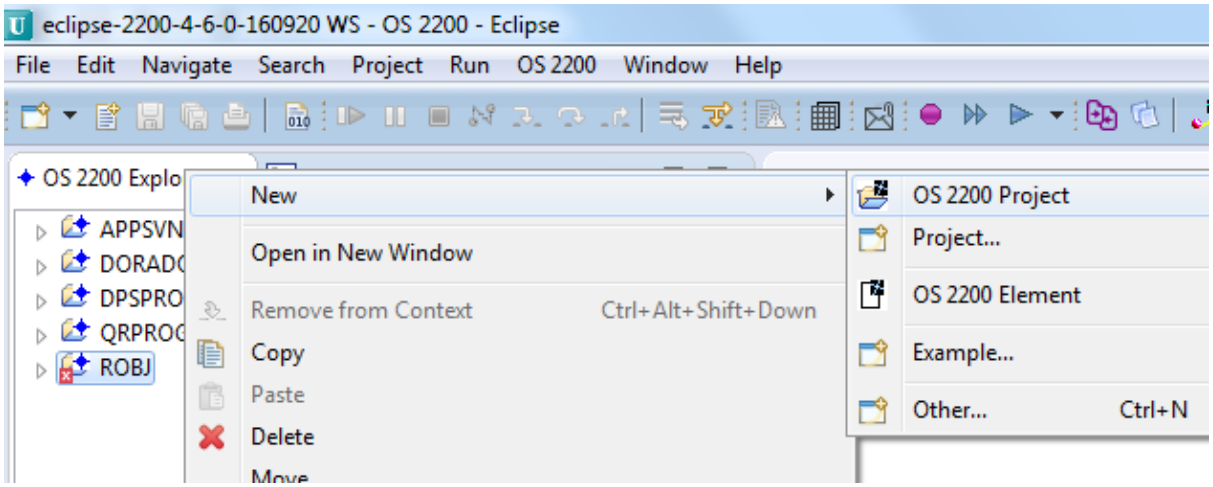
More details on CIFS can be found in the CIFS manual.

Creating an OS 2200 Project

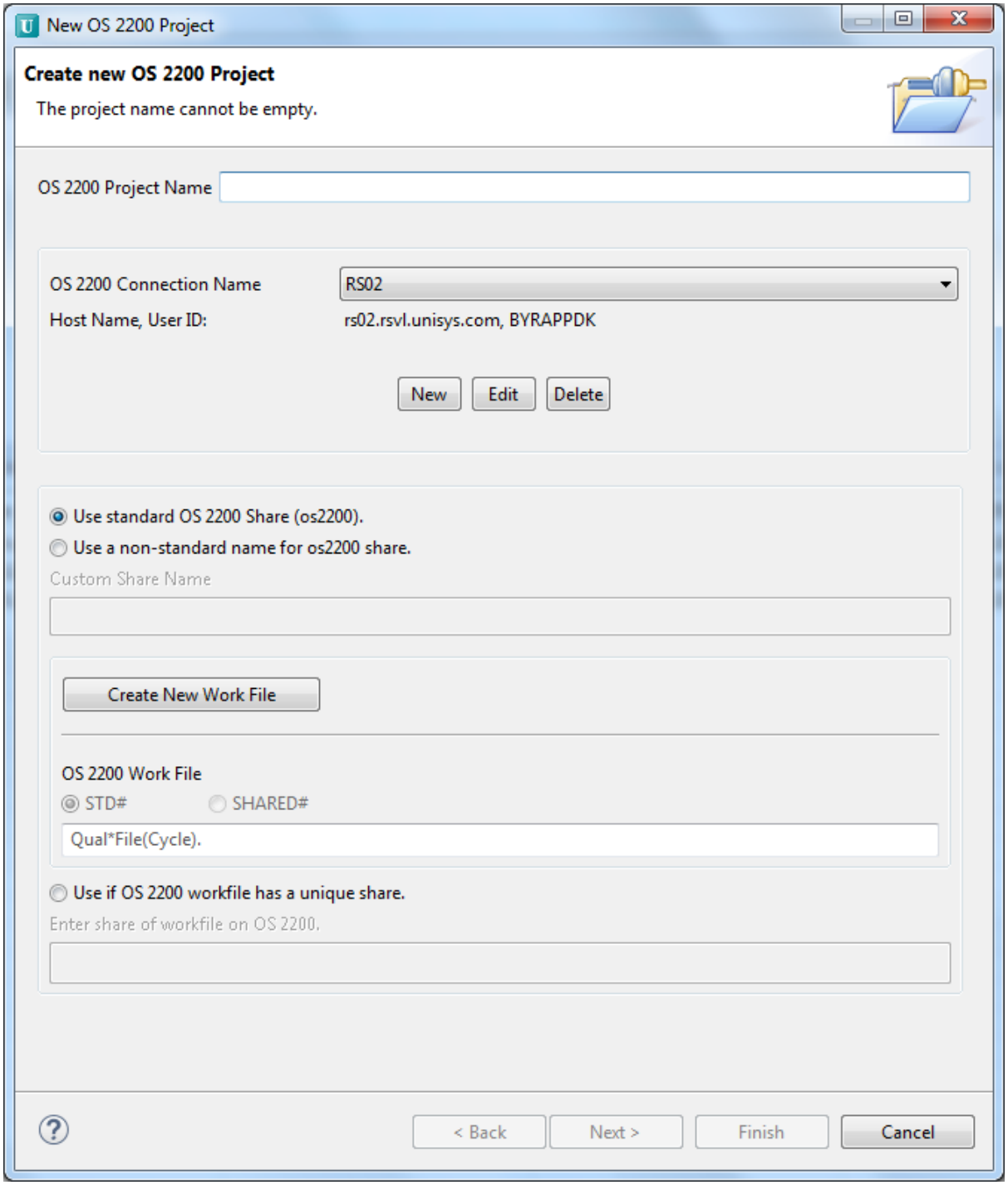
Now that a CIFS share has been created for the OS 2200 program file to be used for OS 2200 3GL development, Eclipse can be used to define the OS 2200 project. From the Eclipse workbench and in the OS 2200 perspective, go to the menu bar and do **File → New → OS 2200 Project** and click.



Alternate Option: Right click in the OS 2200 Explorer View and choose **New → OS 2200 Project**.



The following Window appears:



Enter a name for your project in the field “OS 2200 Project Name”.

Select the OS 2200 Connection to be used.

Check the radio button called “Use standard OS 2200 Share (os2200)” if your site is using the os2200 share in CIFS. However if your site has used a different name for the share, then check the “Use a non-standard name for os2200 share” and enter the share name in the Custom Share Name field. Both of these options provide access to the entire OS 2200 MFD directory. However you may have a share defined over a single OS 2200 file. For example:

```
@CIFSUT
share /os2200/unisys/rob    robj
```

would create a share called ‘robj’ over file unisys*rob. In this case, check the ‘os2200 share cannot be used” radio button.

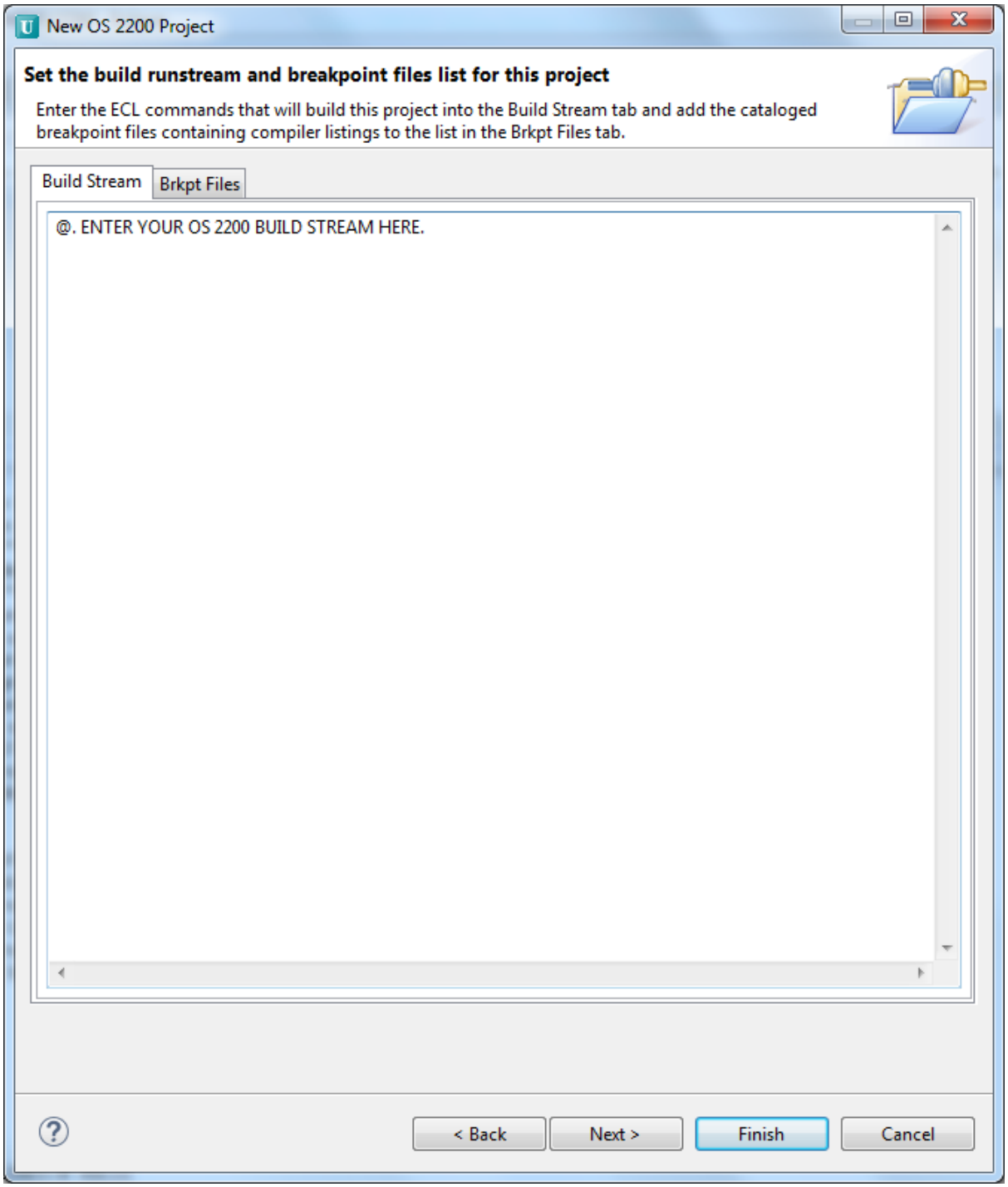
If using MHFS, refer to the MHFS Considerations section later in this document.

If using an existing OS 2200 Program File, enter the name in the OS 2200 Work File text box. Creating your own workfile is described later.

Now click **Next**.

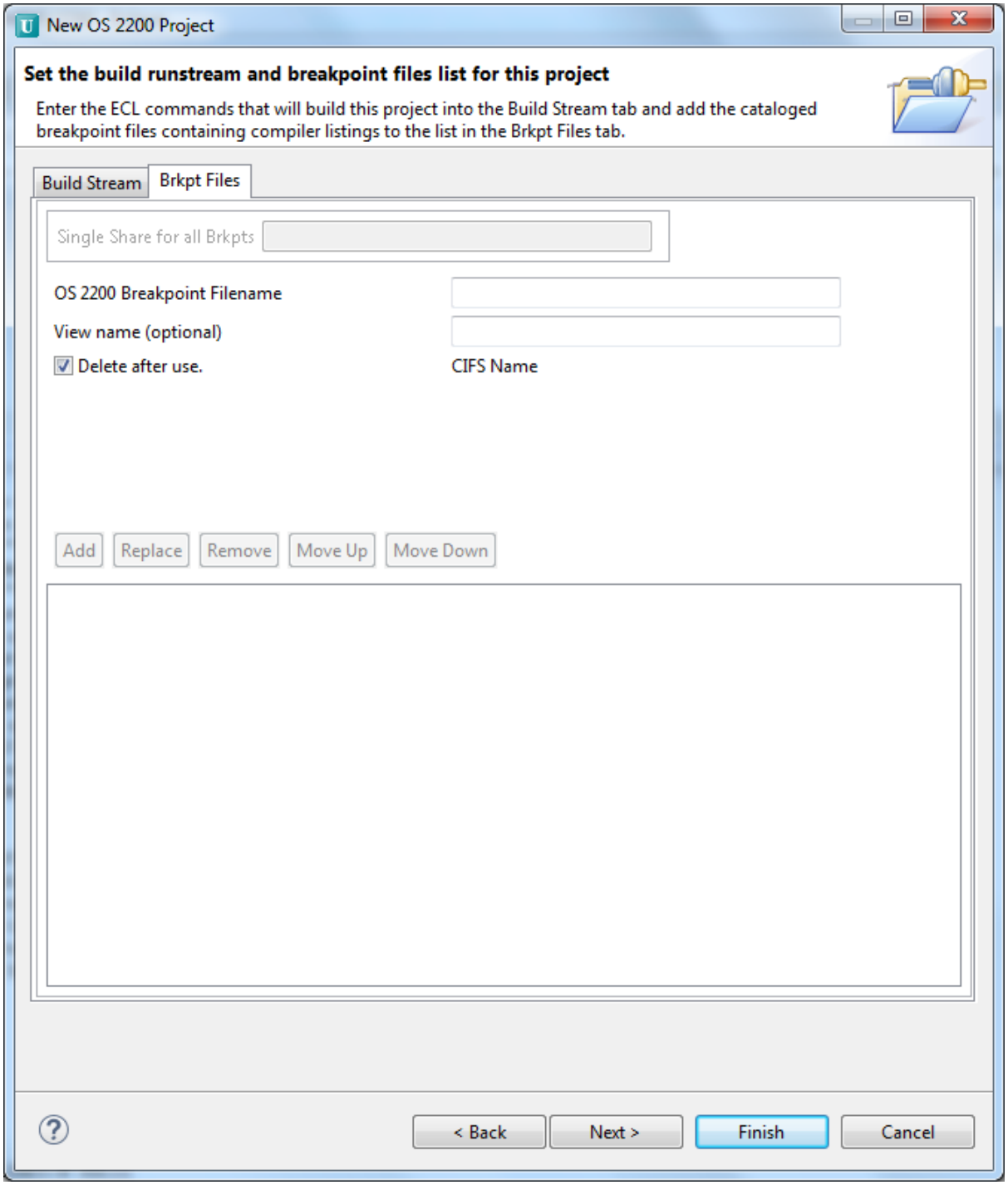
If Eclipse can't access the OS 2200 Work File, an error will be presented. Check the Unisys-CA log (access via the menu option **OS2200→View Log** if additional information on the cause of the error is needed.

After associating an OS 2200 Work File with your Eclipse project, a wizard displays a screen for the build runstreams and breakpoint files to be used as shown below.



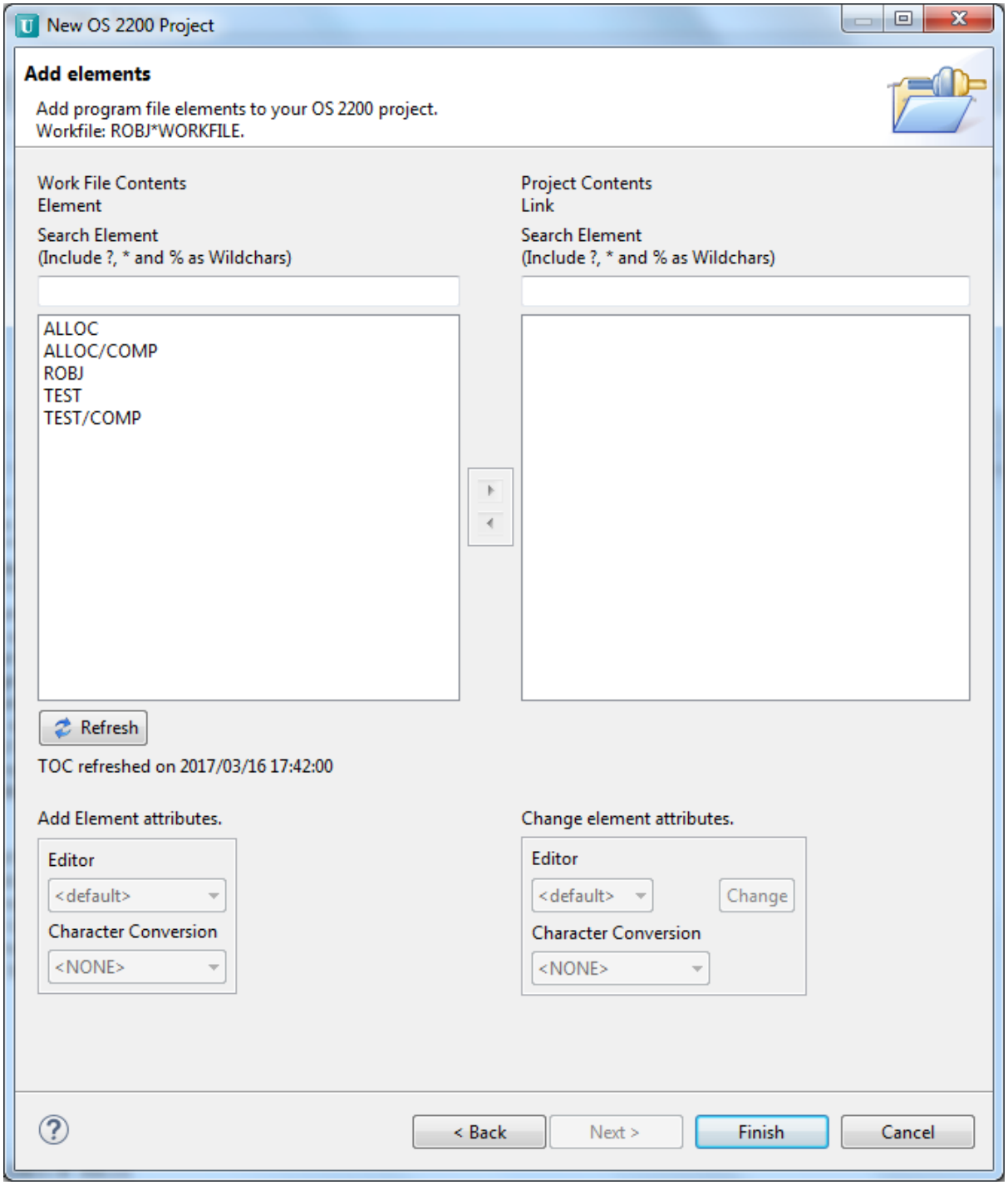
We will define the build steam later.

Click the "Brkpt Files" tab.



We will return to define these later.

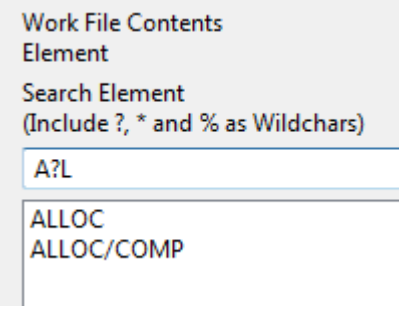
Click ‘Next’. It may take Eclipse a little time to access the OS 2200 program file and retrieve the names of all the source elements in the file. (ABS, REL, OM, ZM elements are not returned.)



The left pane shows the OS 2200 source elements in OS 2200 format.

Now highlight the elements that you want to be part of this project. You can use standard Windows selection methods to choose multiple elements. Note that after you have selected at least 1 element, the “>” arrow is displayed and the drop-down boxes for ‘Editor’ & ‘Character Conversion’ are enabled. The user may change the type (extension) for the selected elements from ‘Editor’ drop-down.

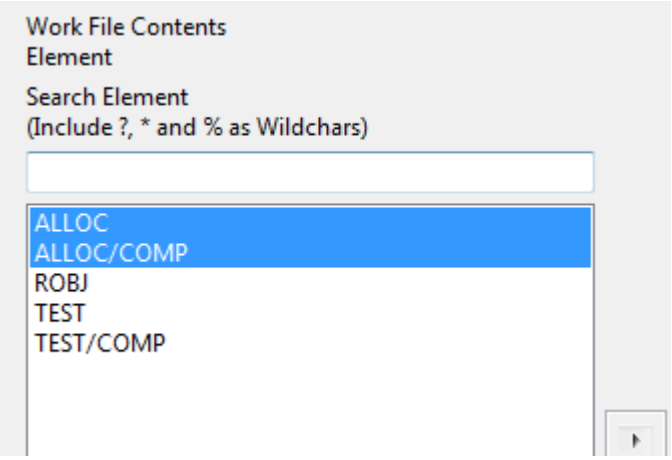
Use the Search Element text box to filter the elements you want to display by entering the starting characters of the element name. Wildcard searches using ‘*’ for any number of characters and ‘?’ for a single character. For example, using ‘?’:



Note all elements are set to same type and/or character conversion.

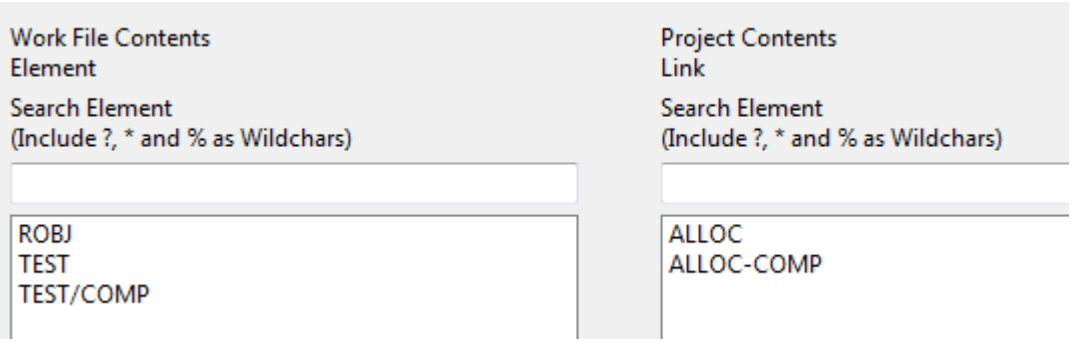
Eclipse shows the last timestamp when the work file table of contents (TOC) was refreshed. This can be refreshed when creating a new project if required.

Highlight the elements to move to the project work file.

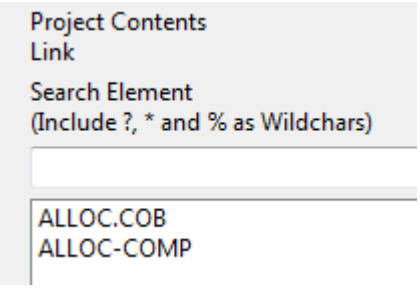


Click this arrow icon to add the selected files to your Eclipse project.

Note: Without selecting any elements, the user can create a project. Later, the user can either update the workfile or create a new element. This can be done by clicking 'Finish' from any of the screens in 'New OS 2200 Project' wizard, provided the project-details (Name, workfile & connection) have been furnished correctly on the first-screen.



The selected elements are moved from the left pane to the right pane. At this stage also, we can define the type of element. For example, for any COBOL source programs, highlight the element and select 'COB' from the Editor list box and then click 'Change'. Change any elements containing ECL etc to ELT editor type. Changing the type ensures that the element is opened in the desired editor, i.e. a COB element would open in the COBOL-editor and an ELT element would open in the general Text-editor. Eclipse will automatically detect COBOL source in most cases.

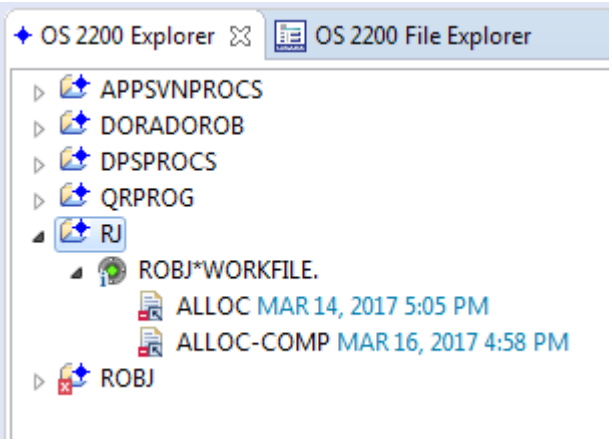


Note the Character Conversion should be set correctly if your OS 2200 supports a different language like Japanese.

Note: Even before moving elements from right pane to left pane, a user can change the element type. The user has to select file(s) and choose what type of element he wants from the drop down under "Add Element attributes" and then move to left pane

Click 'Finish'.

Eclipse opens your project in the OS 2200 Explorer View.



Note the TOC timestamp for each element is displayed. This is the shown in the local workstation time.

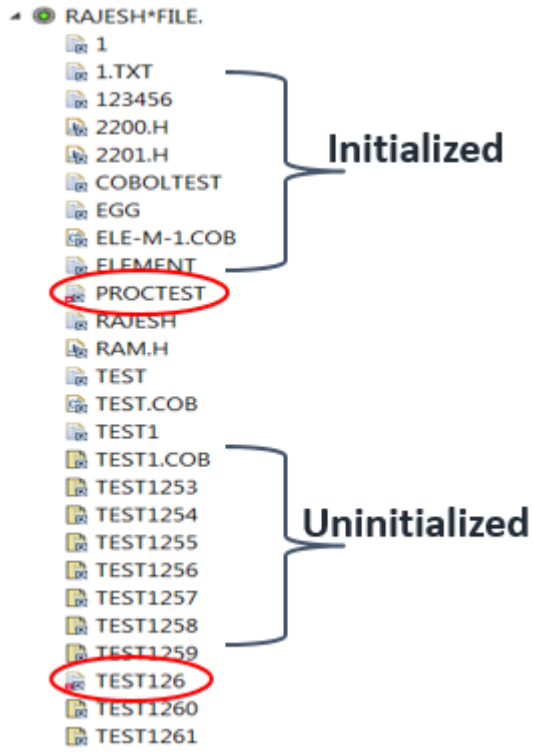
Element Caching

Eclipse will cache project work file TOC and elements. This feature allows developers to work on local copies of the elements plus reduces network latency. The local cache and the OS 2200 file can be synchronised as explained below.

When the elements are added to the project, elements have different states in the OS 2200 Explorer tree structure:

- Uninitialized
  Marked yellow, which indicates that the elements are not downloaded to the cached folder
- Initialized
  Marked white, which indicates that the elements are successfully downloaded and are in the cached folder
- Conflict
  Marked red, which indicates that an element is modified either locally or remotely on the host

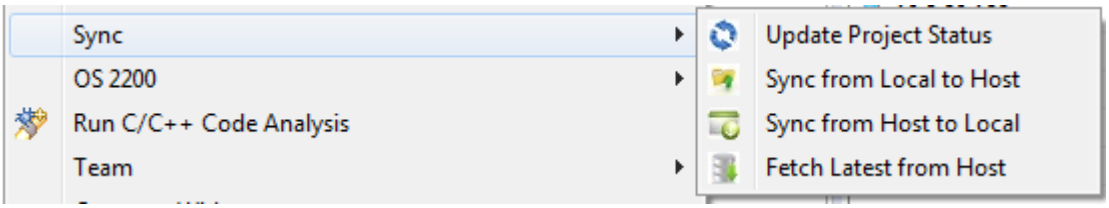
The following example shows the three states for a project:



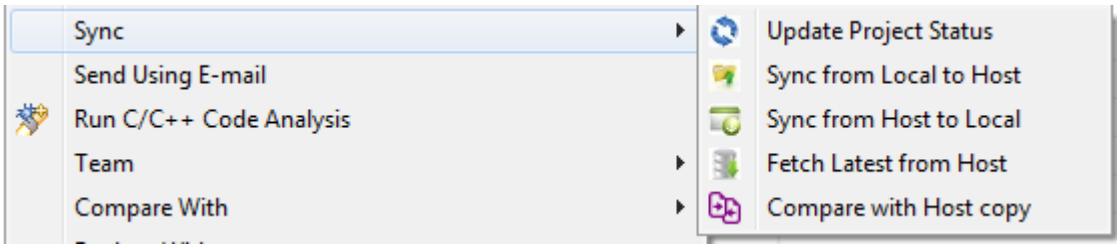
Conflict Resolution

The developer can perform conflict resolution at the project level or at the element level.

At the project level, right-click on the project name or work file in the OS 2200 Explorer view and select Sync. This dialog is displayed:



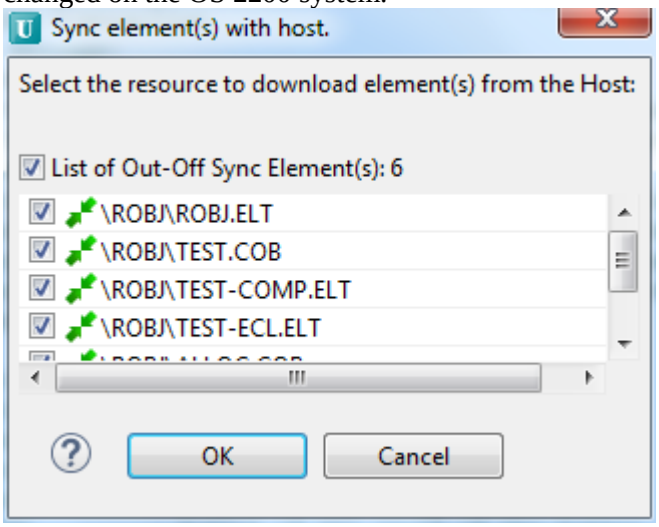
At the element level, right-click on the element name in the OS 2200 Explorer view and select Sync. This dialog is displayed:



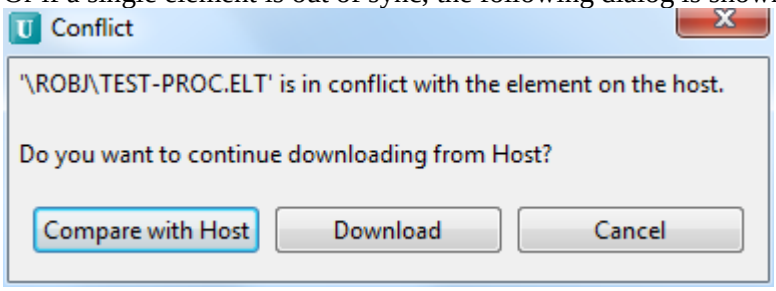
To use this feature, right-click on the selected project, work file, or element, and click **Sync**, and then click one of the following relevant context-sensitive menus:

- **Update Project Status:** This option updates the work file or element icons in the project tree. The color coding of the icons are updated accordingly depending on whether the elements are synchronized with the OS 2200 system.
- **Sync from Local to Host:**
  This option synchronizes the element, project, or work file that are modified locally by copying the contents of the element, project, or work file in the cache to the OS 2200 system.
  Note: If the selection is a work file or a project, this option lists all the elements that are changed in the local cache.

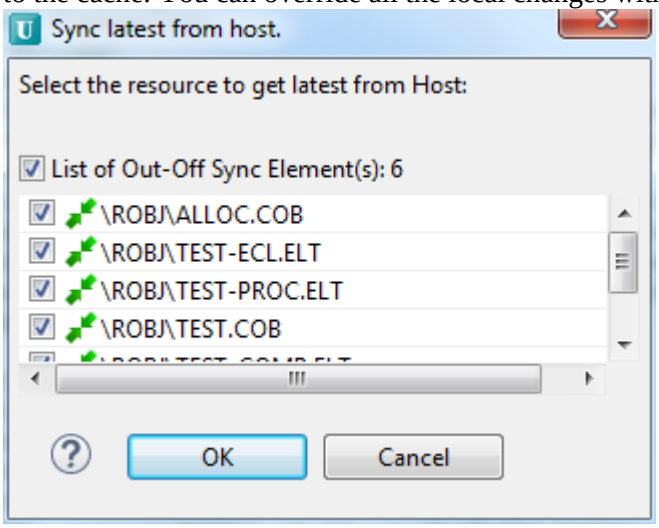
- **Sync from Host to Local:**
  This option synchronizes the element, project, or work file by copying the contents of the element, project, or work file that are modified on the OS 2200 system to the cache.
  Note: If the selection is a work file or a project, this option lists all the elements that are changed on the OS 2200 system.



Or if a single element is out of sync, the following dialog is shown:



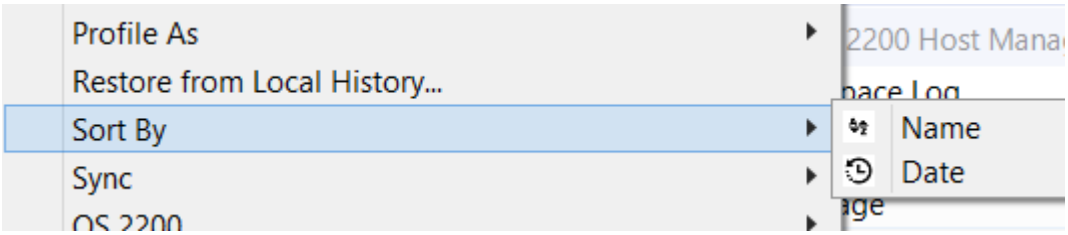
- **Fetch Latest from Host:**
  This option fetches the contents of the element, project, or work file from the OS 2200 system to the cache. You can override all the local changes with that of the OS 2200 system.



- **Compare with Host copy:** This option compares the cache copy with the OS 2200 system copy of an element. The results are opened in an editor window the same as using OS 2200 Compare.
  Note: This context-sensitive menu is available only for an element and not for a work file or project.

Sorting Project Files

The OS 2200 elements in the project work file can be sorted by Name or Date by right clicking on on the project in the OS 2200 Explorer view:



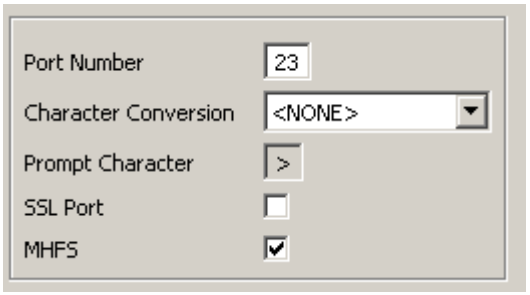
Name order is in ascending order while Date order is latest to oldest.

Automatic Open of a Single File

If a single source element is added to a project, Eclipse will automatically open the element with the appropriate editor.

MHFS Considerations

When a new OS 2200 Host is defined, there is a check box to indicate if the host uses MHFS:

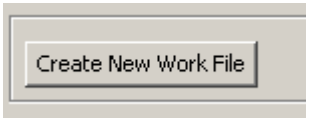


Eclipse does verify if the system is configured for MHFS. The incorrect setting for this option could lead to unexpected errors during other operations.

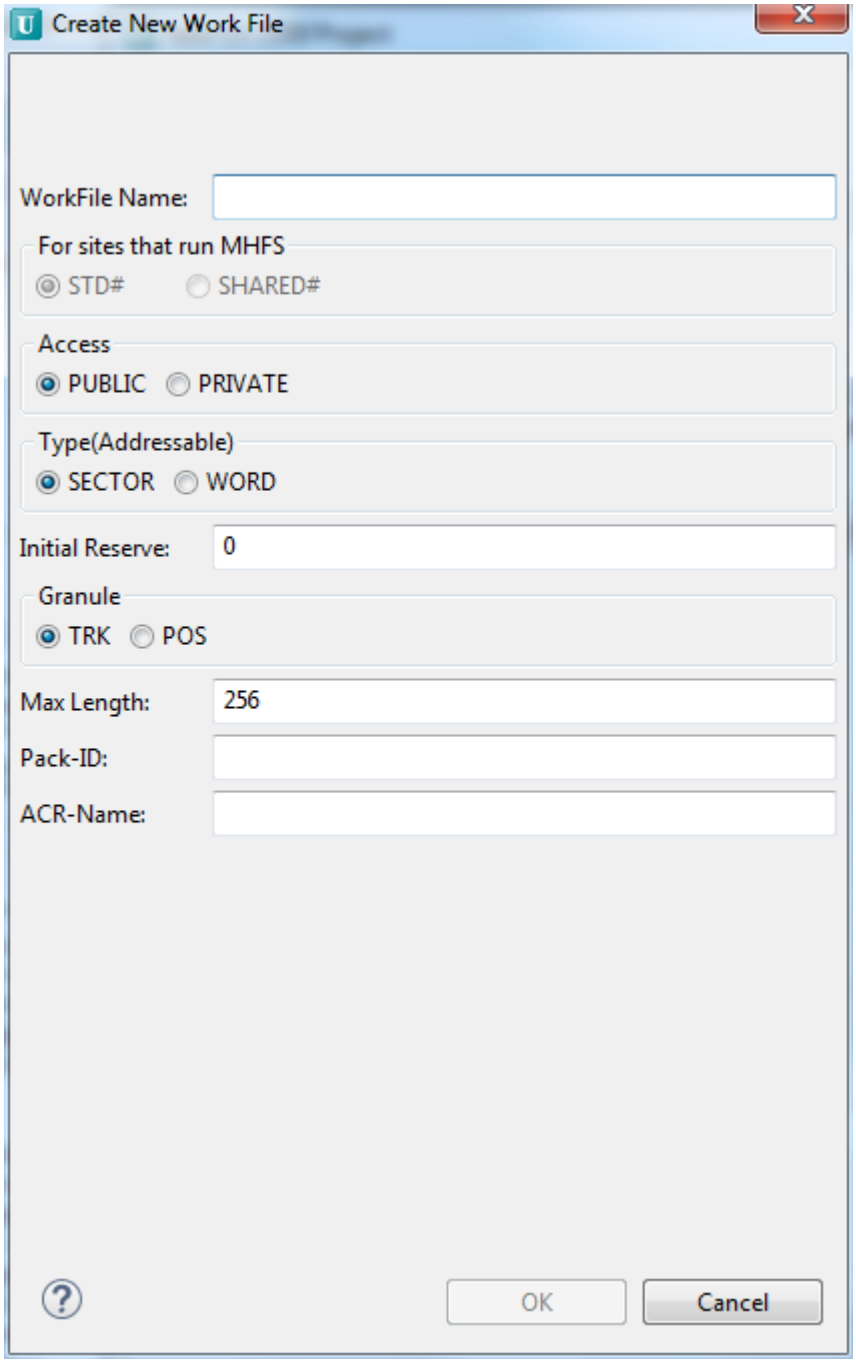
Select STD# for files stored on local discs or SHARED# for files on shared storage. Note that the same file name could exist in both STD# and SHARED#. Eclipse uses this setting to access to desired file.

Creating a new OS 2200 Work File.

When running the Create New OS 2200 Project wizard, an existing OS 2200 work file can be entered. However Eclipse has the option to create the OS 2200 work file. After entering the project name and connection, click on the Create New Work File button.



The next dialog allows you to enter the OS 2200 Work File name:



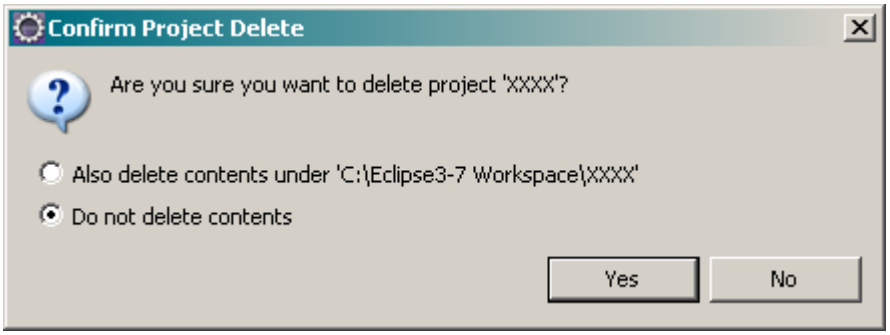
Enter the parameters as desired:

The 'Composed entry:' field can be further edited. Click OK.

After cataloguing the file on the 2200, Eclipse fills in the Work File name and then you proceed with the wizard as explained above.

Deleting an OS 2200 Project

Right click on the project and select Delete. Eclipse displays the following dialog.

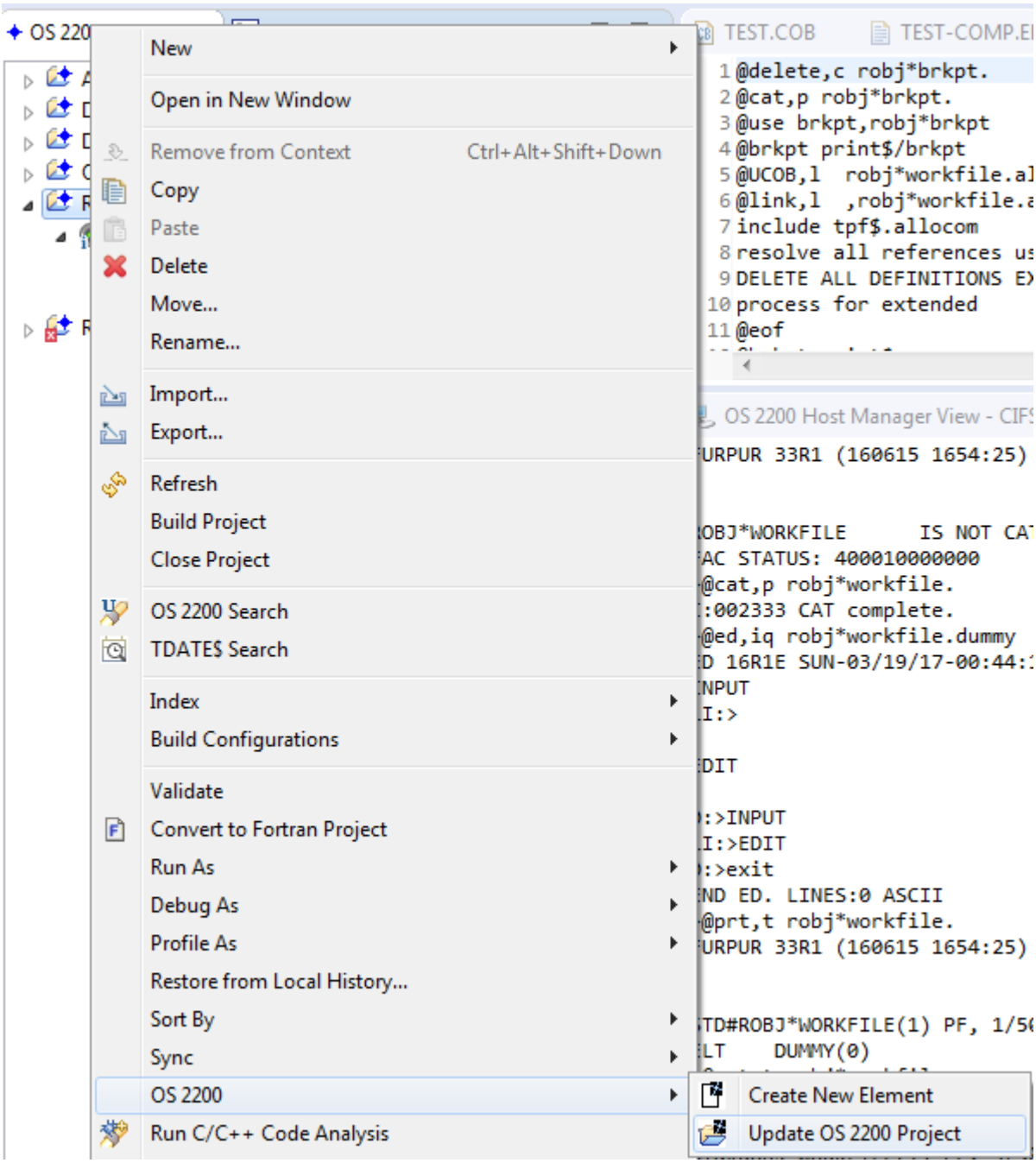


This operation does not delete the OS 2200 work file.

Maintaining your OS 2200 Project

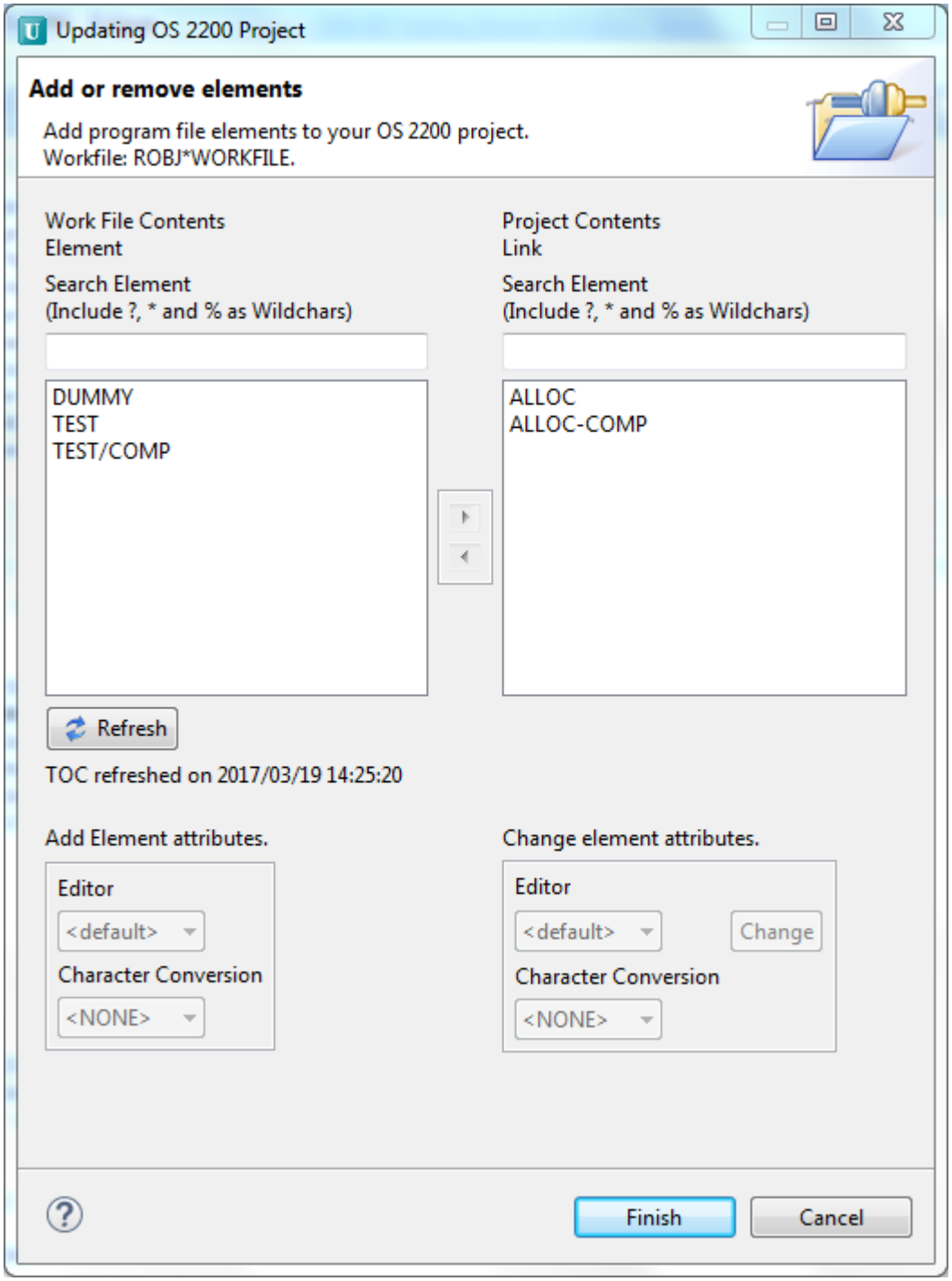
The wizard is used to define the initial project properties but these can be maintained later. In a later section there is an explanation of how to maintain the Build and Brkpt properties.

To maintain the existing project properties, right-click on the project name and then select OS 2200 and then Update OS 2200 Project as shown below.



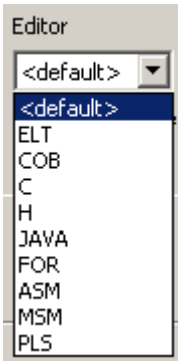
Or click the  icon in the menu bar.

This launches a wizard that is similar to the new project wizard.



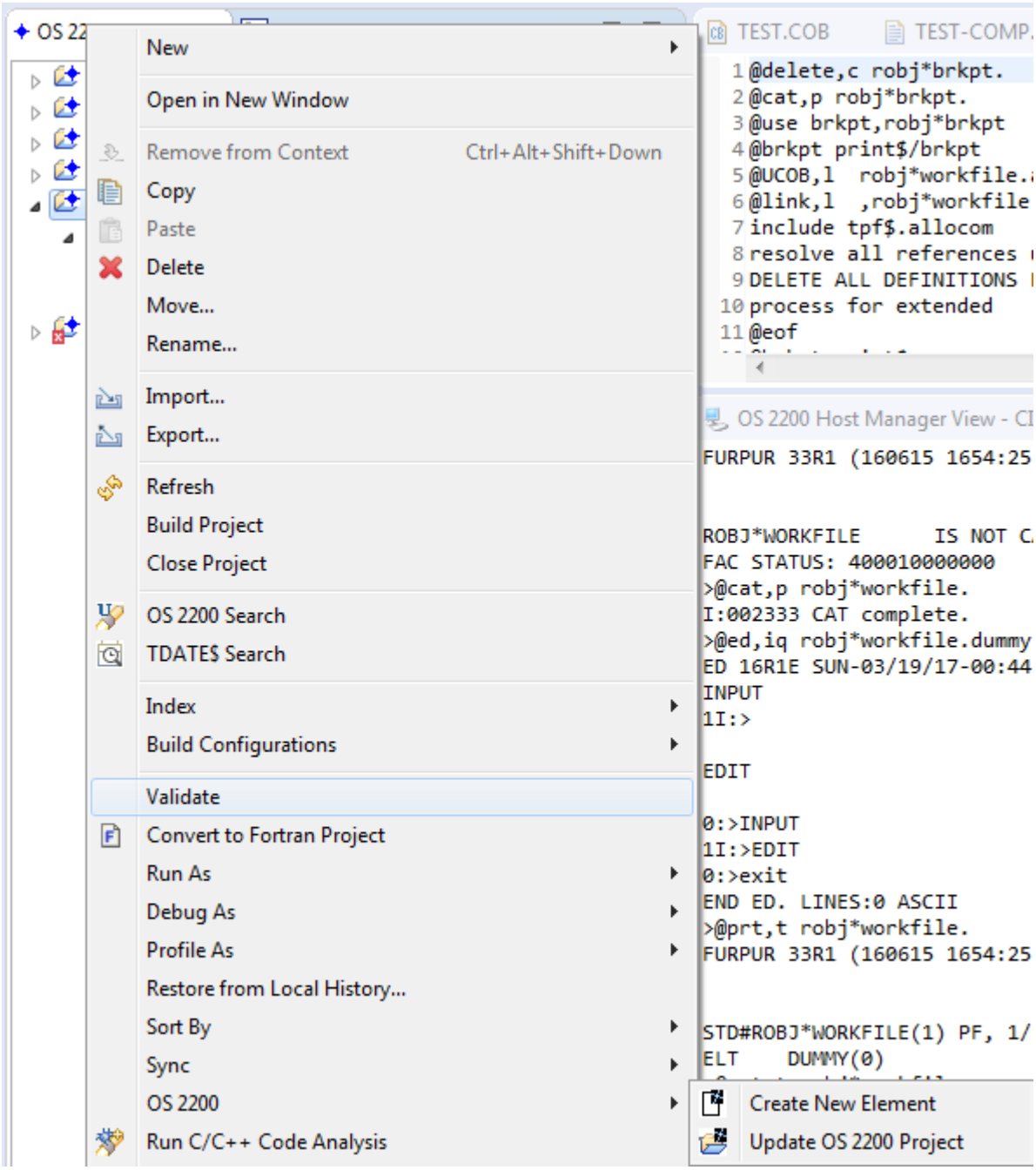
Note the Search text boxes can be used to filter the contents of either pane. Use '*' and '?' as wildcard characters.

Note to change the editor for a file, you must highlight the file, select the required editor and click Change. The available editors are:

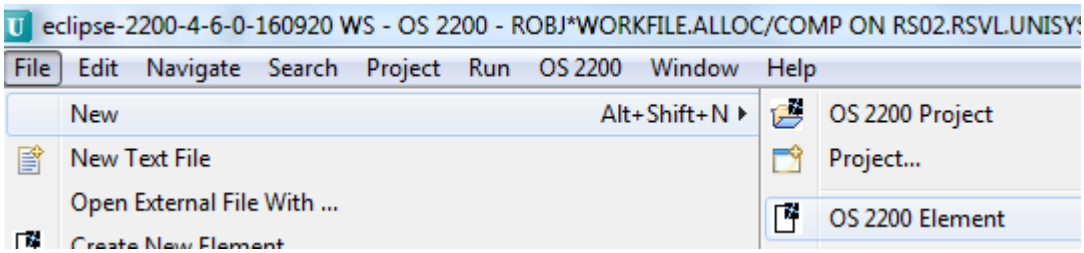


Adding a new OS 2200 Element to a Project

You can add a new element to your OS 2200 program file by creating an element in your Eclipse OS 2200 project. For example, you may want to write a new COBOL program. In the Explorer tree, right-click on the project name and then select **OS 2200 → New OS 2200 Element**.



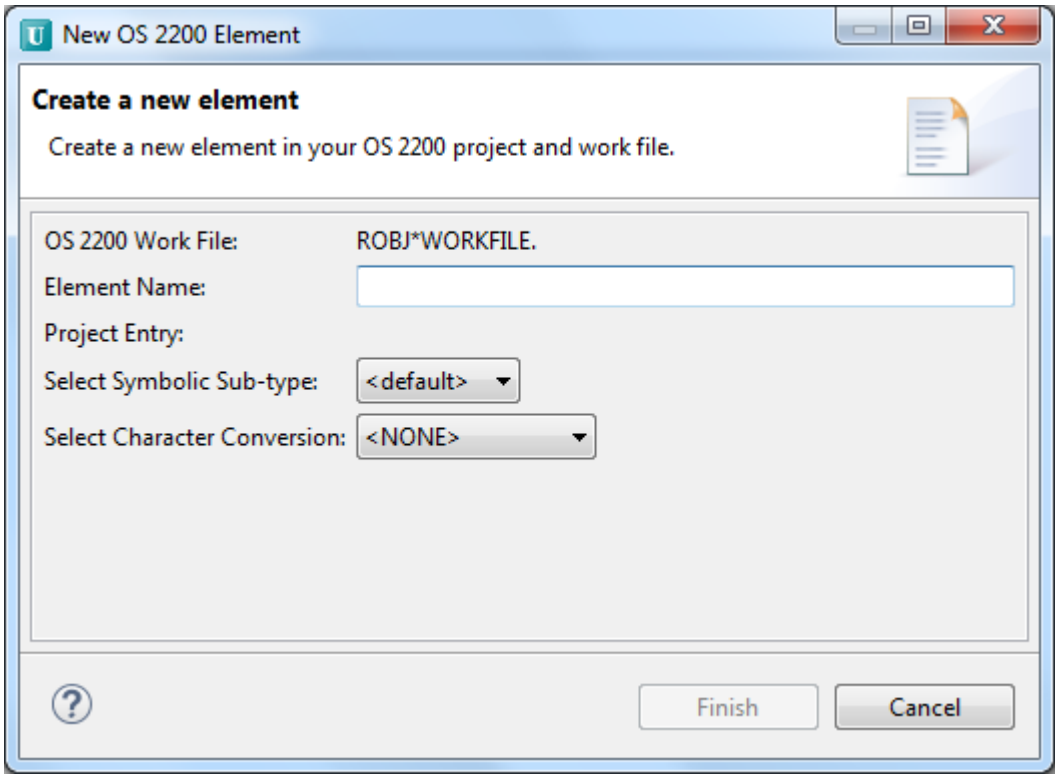
An alternate option is to use the menu **File → New → OS 2200 Element.**



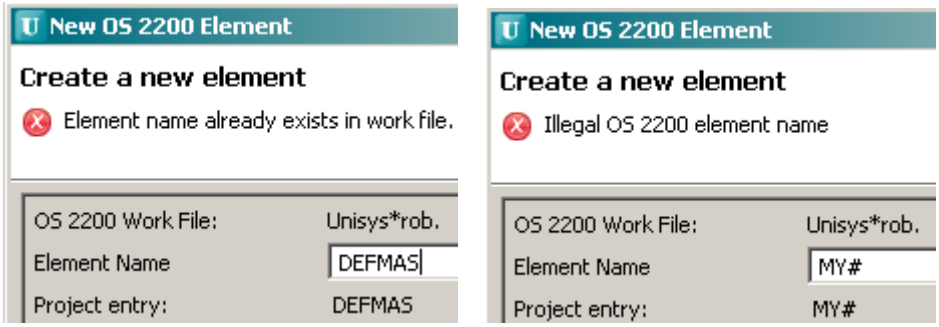
Yet another option is to right click the OS 2200 Work File in the Explorer View and select **New → OS 2200 Element.**

Yet another method is to click the  icon in the Icon menu bar.

Eclipse will respond with the following wizard:

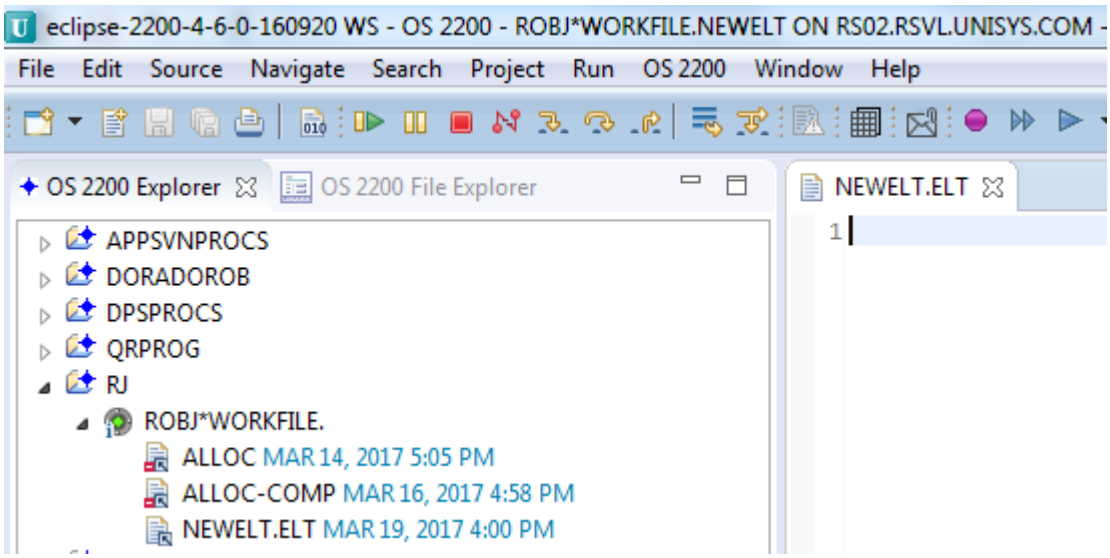


Enter your OS 2200 element name and select the symbolic subtype (choose COB for COBOL). If Character Conversion is required, please select the appropriate language otherwise leave as <NONE>. Note that the element name must comply with standard OS 2200 file naming conventions for syntax and characters etc. Using element/version is valid. Note the status message displayed in the window.



After entering a valid element name, click **Finish**.

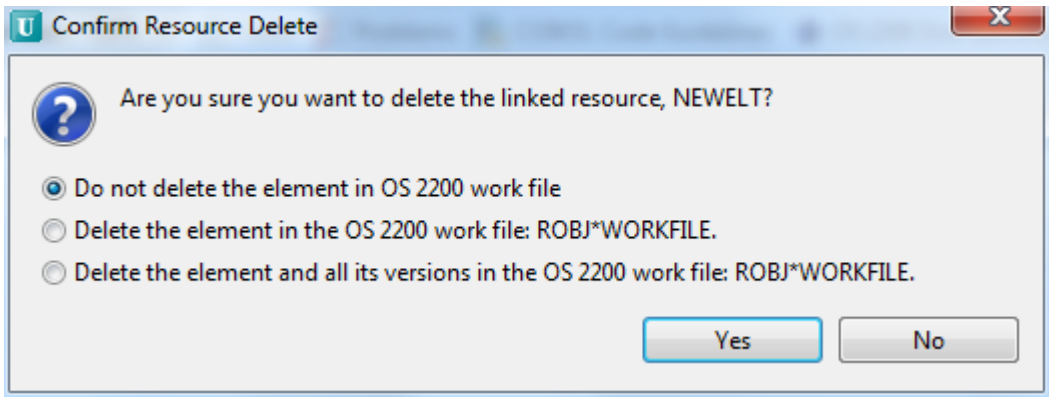
A new editor pane will be opened to allow the data entry of the source. Note the editor is based on the symbolic subtype that was used when creating the element.



Note that the navigation tree has been updated as well.

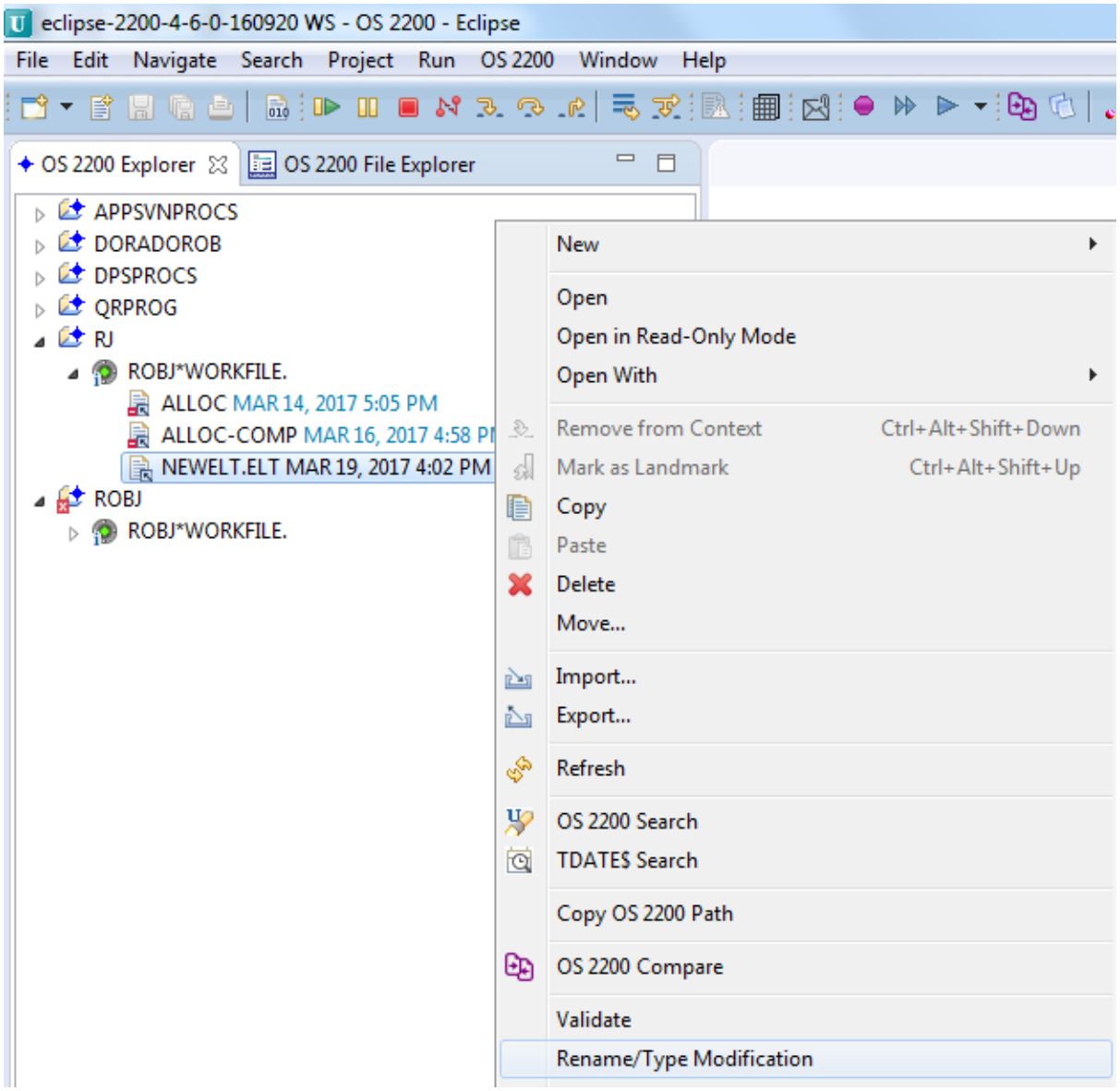
Deleting OS 2200 Elements from your Project

Right click on the file in the project and select **Delete**. Eclipse displays a dialog to control the actions to be performed. Select the appropriate option and click Yes.

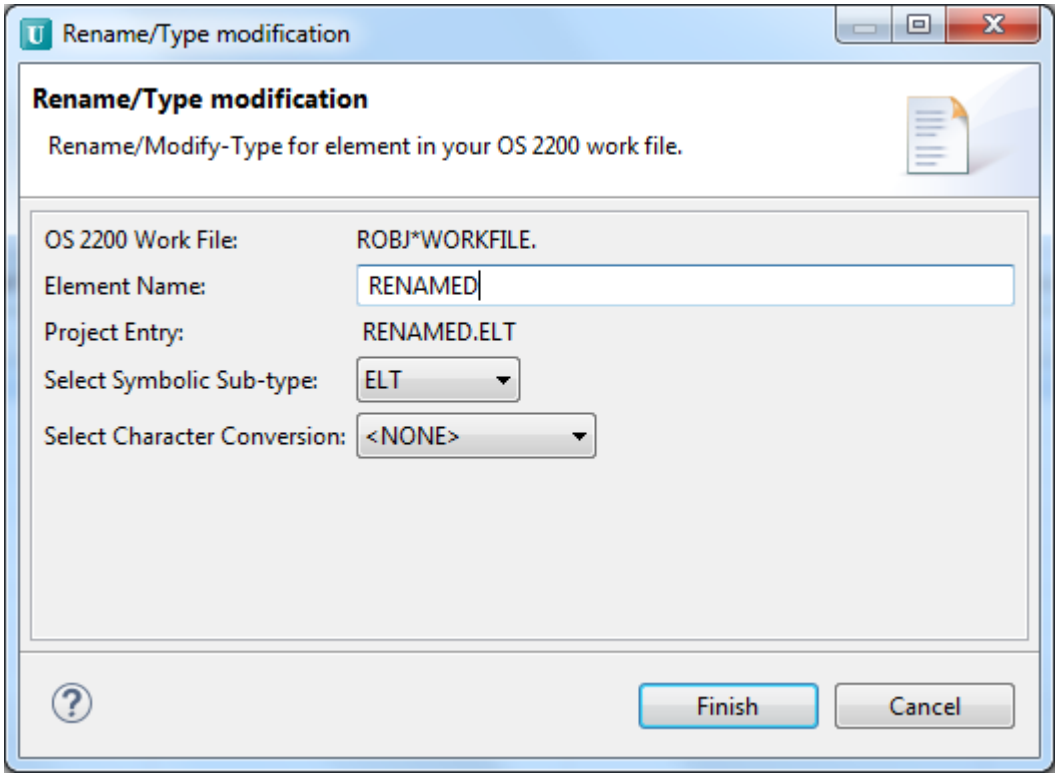


Renaming or Changing the Type of OS 2200 Elements

Right click on the file in the project and select **Rename/Type Modification**.



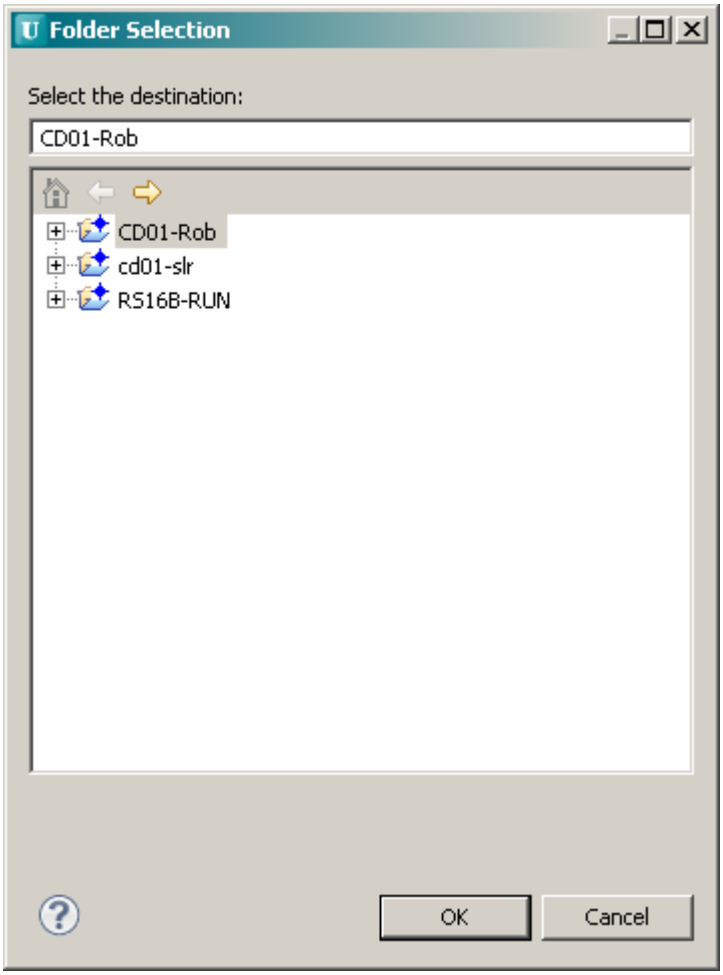
Eclipse displays a dialog where you enter the new element name, symbolic subtype and character conversion language.



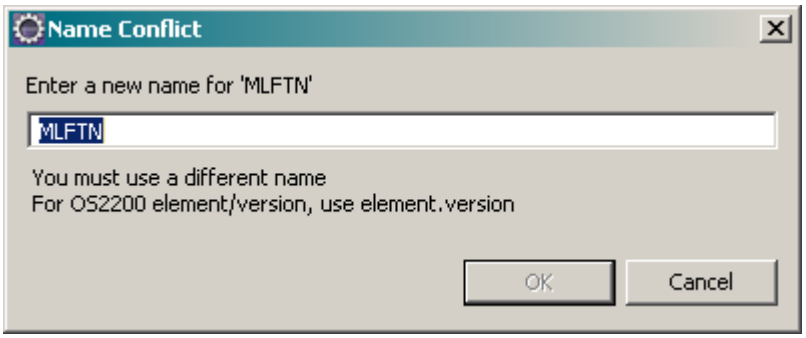
Click Finish to action.

Moving OS 2200 Elements

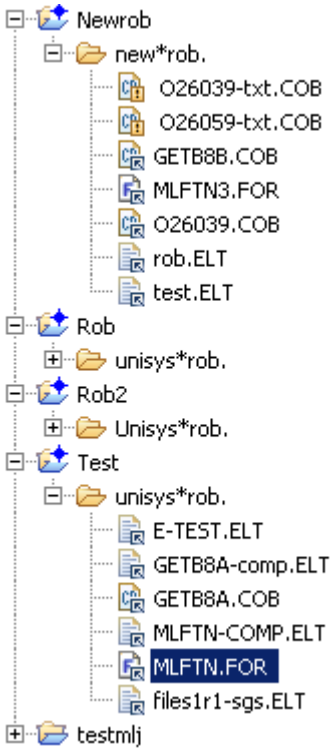
A file in one project can be moved to another project. Right click on the file in the project and select **Move**.



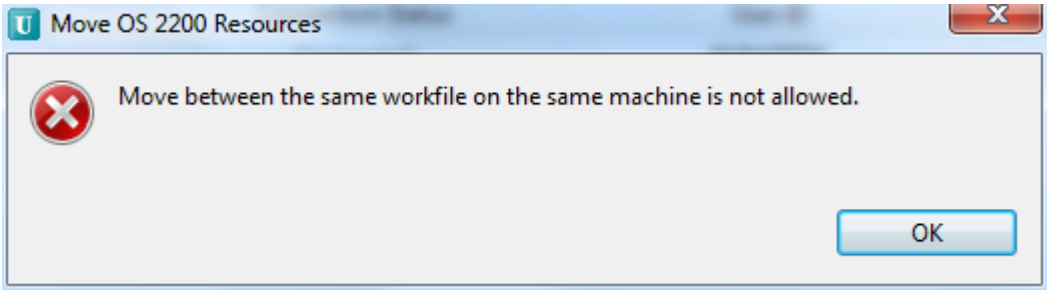
Eclipse will try to move the element to the new project. If the element already exists in the destination OS 2200 work file, the following dialog is displayed.



After the move, the destination project is updated with the new element. (Note MLFTN3 was used to overcome the name conflict in the example.)



Note an element can't be moved to a project using the same work file.

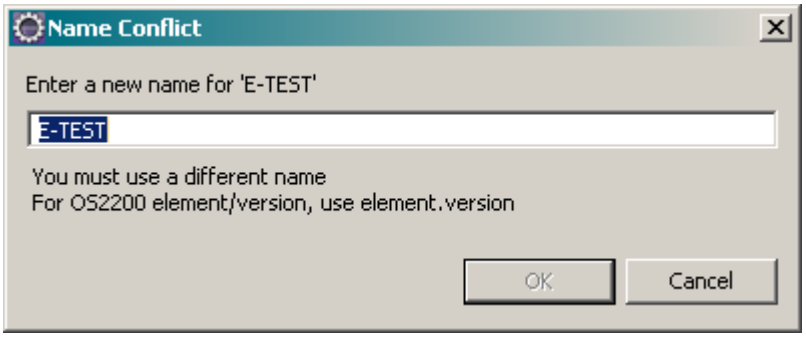


Copying OS 2200 Elements

Right click on a project file and select Copy.

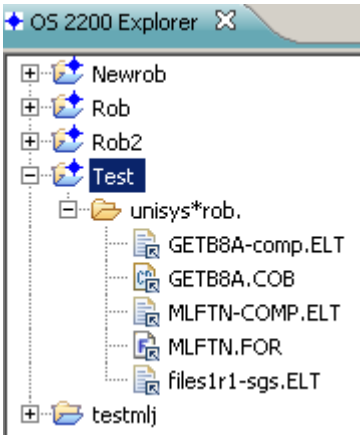
Highlight the destination project, right click and select Paste.

Eclipse will copy the file to the new project. If the element already exists in the OS 2200 work file, the following dialog appears.



Using the OS 2200 Explorer View

The Explorer View lists the OS 2200 Projects defined in this workspace. If you expand the node, the next level shows the OS 2200 work file name. If you expand this node, you will see the source elements that comprise the files in your project.

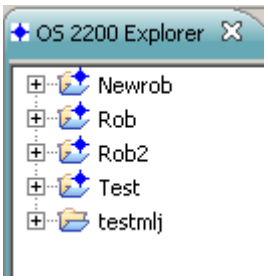


The project type is indicated by the icon next to the project name. Note the difference between testmlj and the other projects above – all are OS 2200 projects except for testmlj.

Note if the source element has a version, the version is appended to the element name after a hyphen. For example, element MLFTN/COMP becomes file MLFTN-COMP.ELT. The extension on the file is important as it determine what Eclipse editor is used. COB will launch the COBOL editor, FOR will launch the Photran editor (Eclipse Fortran editor). ELT will launch the generic editor. The editor to be used is displayed in the icon next to each file. Note that Eclipse will try to determine the editor to use if the extension is TXT.

Supporting Multiple Projects

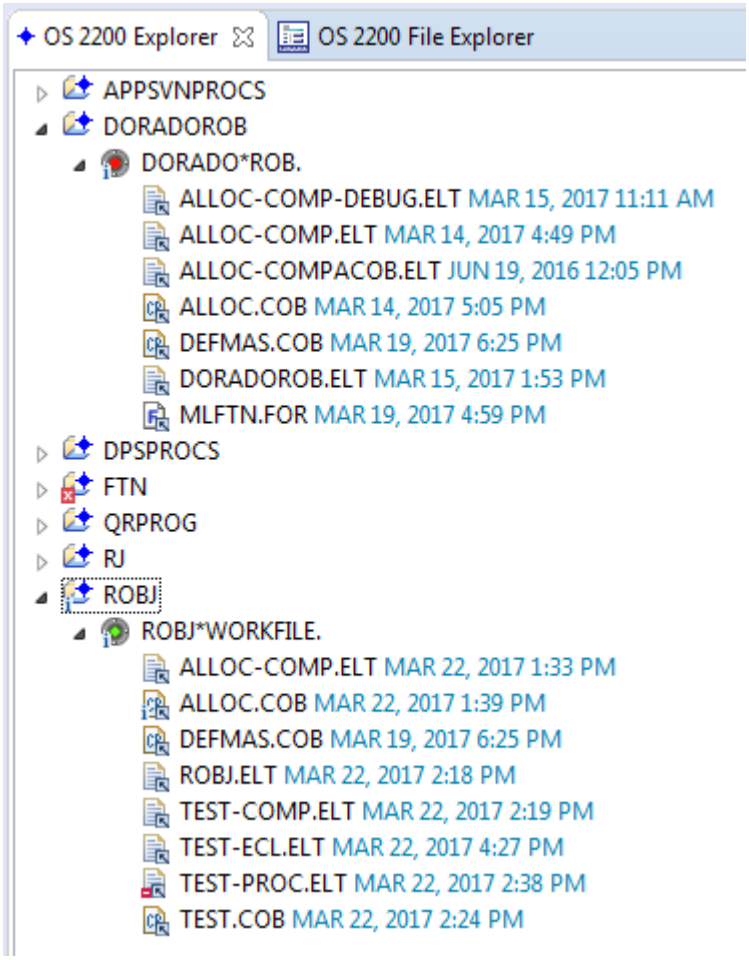
Follow the procedures above to add more projects. The projects are added to the navigation tree and sorted in project name order.



Note that the same OS 2200 Work file can be used in many different projects.

Using the OS 2200 Project

This section will cover how to edit and build (compile) your project using Eclipse. The following screen shows the OS 2200 Project perspective. This section focuses on using the COBOL editor. Later sections discuss other editors like the Fortran editor and Generic editor.



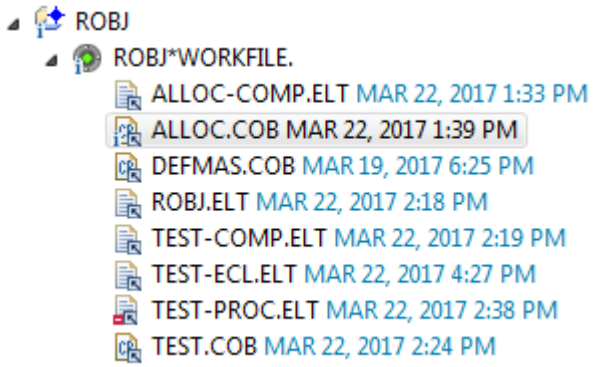
Note that the project name is the root of the explorer tree and the OS 2200 program file is shown but only those elements selected as project files are listed.

The icon before the OS 2200 program file (i.e. the project work file) indicates if the OS 2200 host is connected  or not connected  .

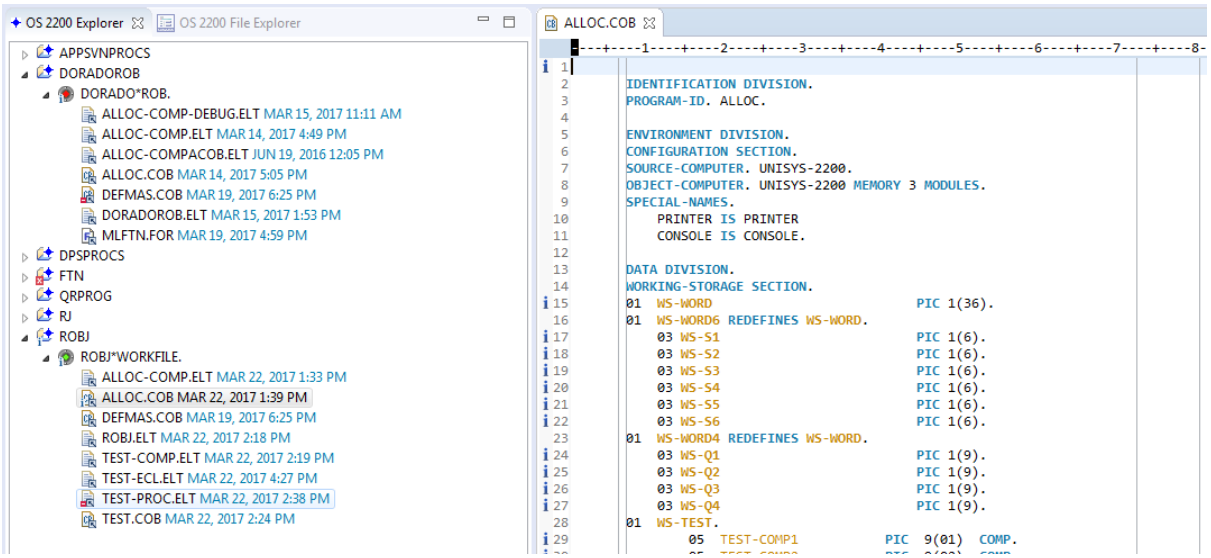
You will not the cached TOC timestamp is displayed.

Editing and Saving

Now double click on an element that represents a COBOL program. In the project navigation tree, the file will have an extension of COB. In this example, ALLOC.COB is selected.

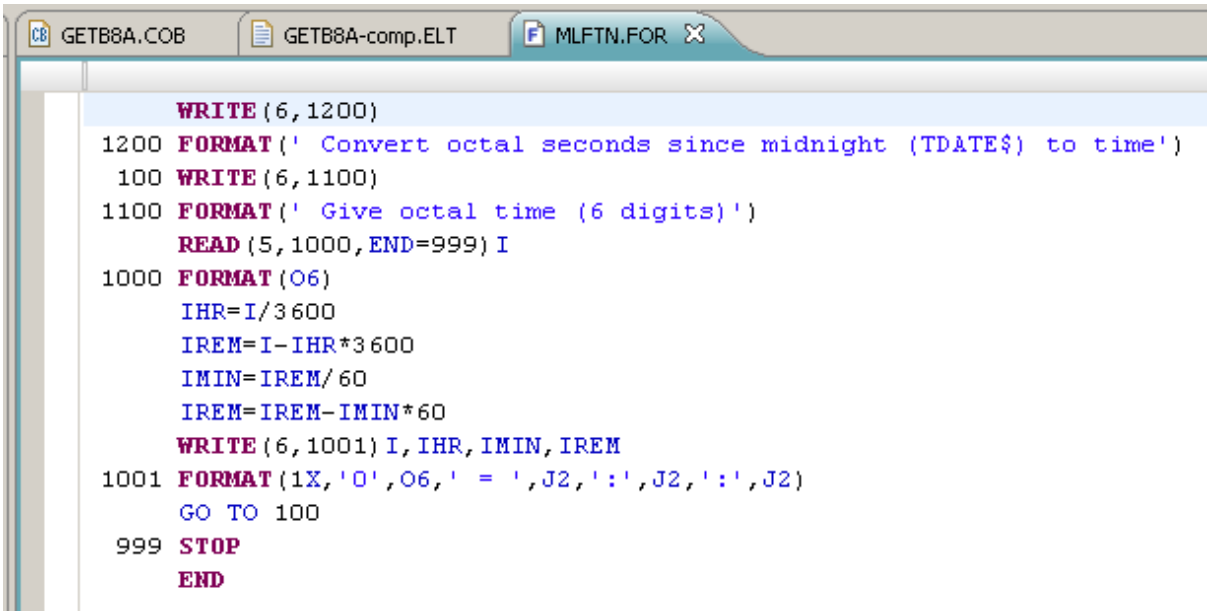


Eclipse will retrieve the source from the OS 2200 work file and open using the COBOL editor.



Eclipse has now displayed the contents of the element in a separate tab in the editor window. Since we had identified this element as a COBOL program, the editor uses the UCS COBOL template to highlight the code in different colours for reserved words, statements, comments and user variables. These were the COBOL preferences that we configured earlier.

One of the advantages of using Eclipse is that multiple files (OS 2200 elements) can be open at any time. These could be from one project or multiple projects. You can double click a file in the navigation tree to open or right click the file name and then select **Open**. Eclipse will open a new pane for each file as it is opened as shown below.



Therefore you could have multiple files representing different source programs open at the same time. It is a simple matter to click on the appropriate tab to change the focus to the required source for that file. Code can be copy/pasted between panes – even if the files are in different projects.

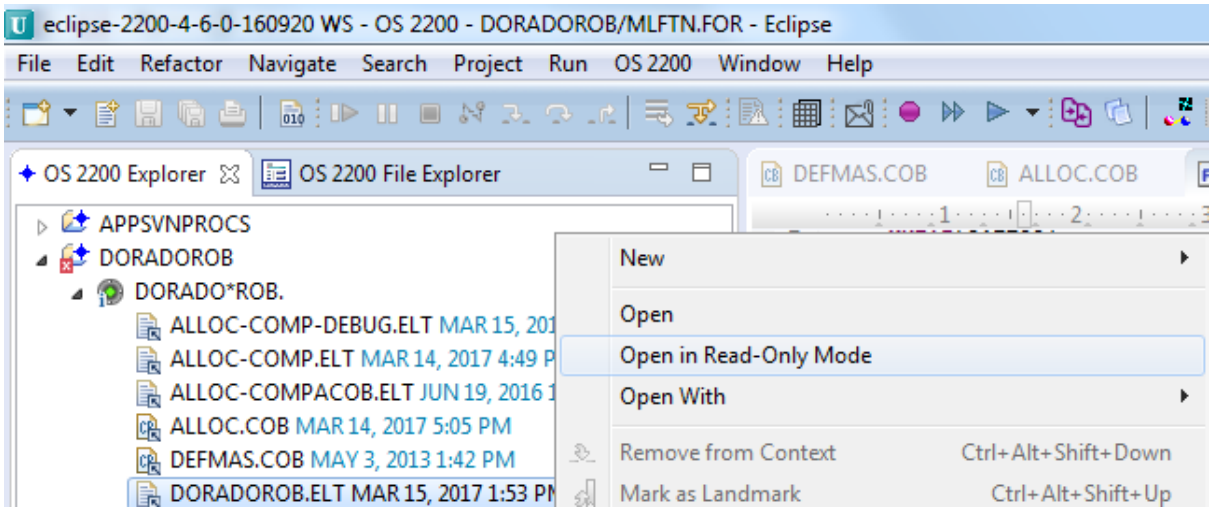
Note that after you update the source code, an '*' appears before the element name in the tab. See below for an example.

These edits have only been made to the version of the file (element) stored on the workstation and not on the OS 2200 host. When you save the element, the updates are applied to the element in the OS 2200 program file. Eclipse will also maintain a local history of saved versions that will be discussed later.

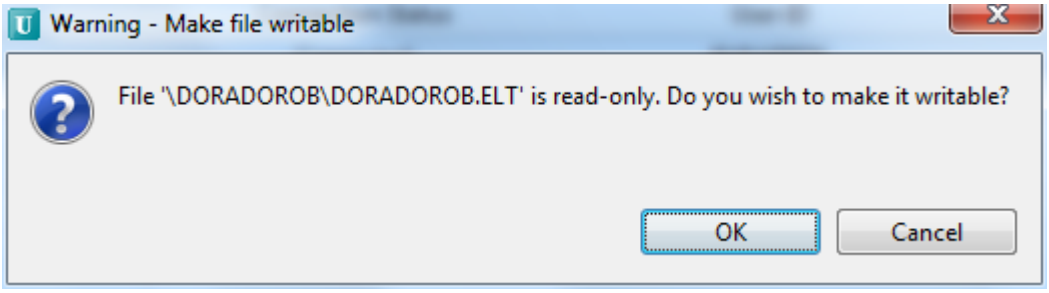
Note that Eclipse does no syntax checking or compiling. The editor template provides assistance to improve your productivity. We will discuss some of the editor features later. Incorrect syntax will be reported after the program is compiled on the OS 2200 host when you build the project.

Opening an Element in Read-Only Mode

By default, Eclipse will open elements in update mode. If you want to open an element in read-only mode, right click on the element in the Explorer View and select **Open in Read-Only Mode**.



If the user tries to update the element, the following prompt is received.



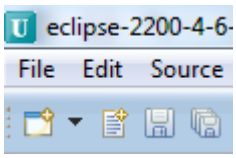
The user can decide whether they want to proceed and change the element so it can be updated.

Using the Save option

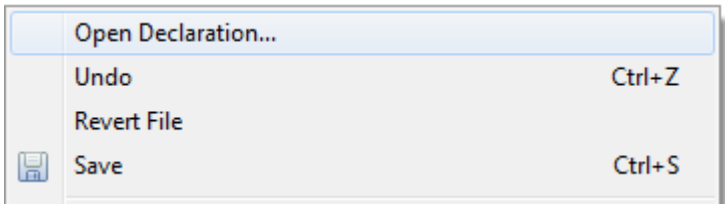
To save an element, you can

a) click the diskette icon in the tool bar,
b) right-click in the editor pane and select 'Save' or
c) use **File → Save**.

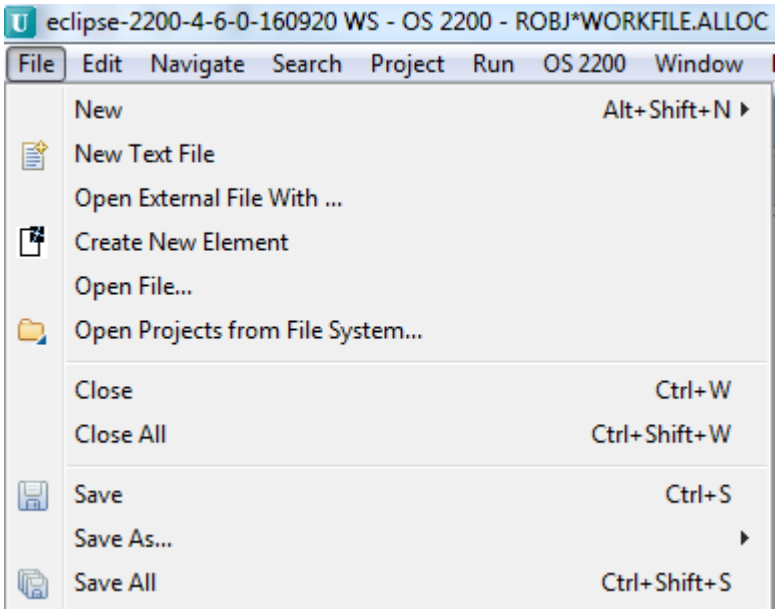
Eclipse uses CIFS to update the OS 2200 program file element. The following example shows using the diskette icon: Clicking the single diskette icon will save the current program. Clicking the multiple diskette icon with save all updated elements.



The next example using right-click in the editor pane appears in the next screen snapshot:



Finally you can use **File → Save**.

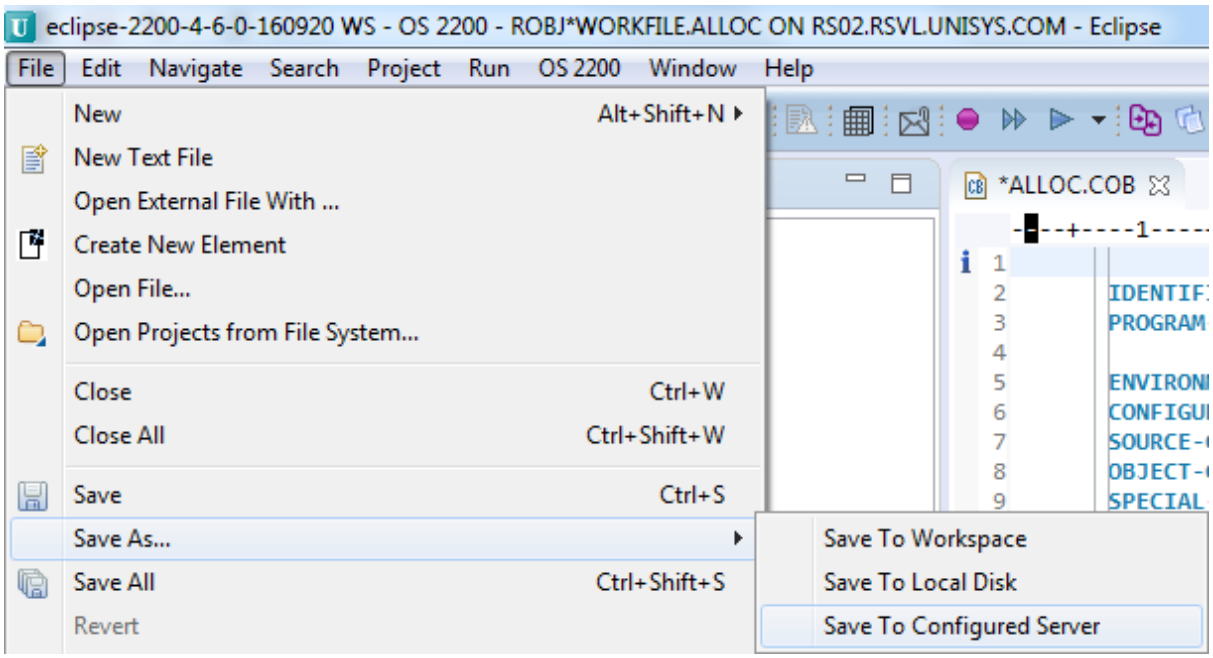


Using the Save-As option

Eclipse provides the ability to use a Save-As function with 3 options:

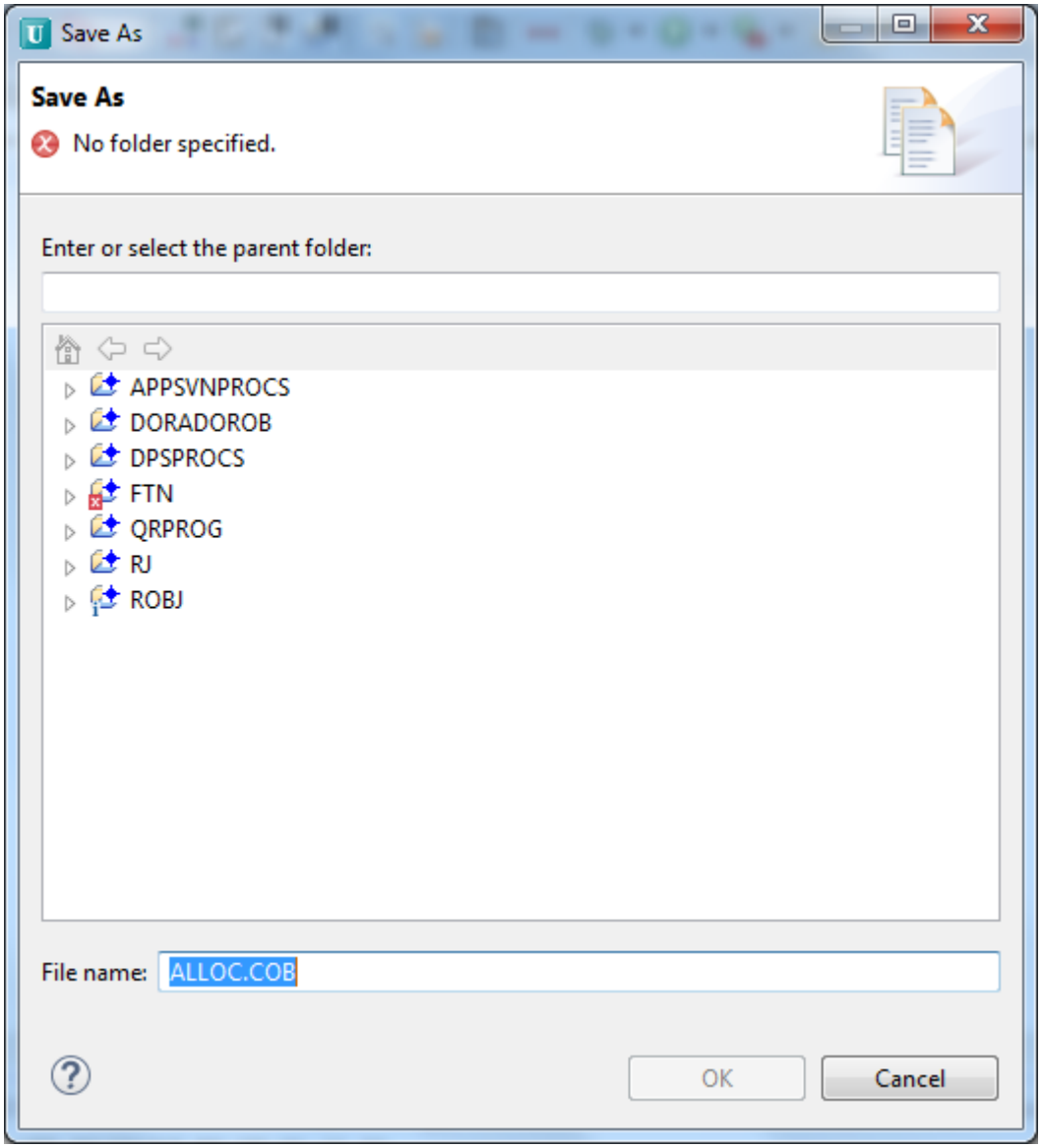
1. Save to the Workspace
2. Save to Local Disk
3. Save to a Configured Server

Go to **File -> Save As…**



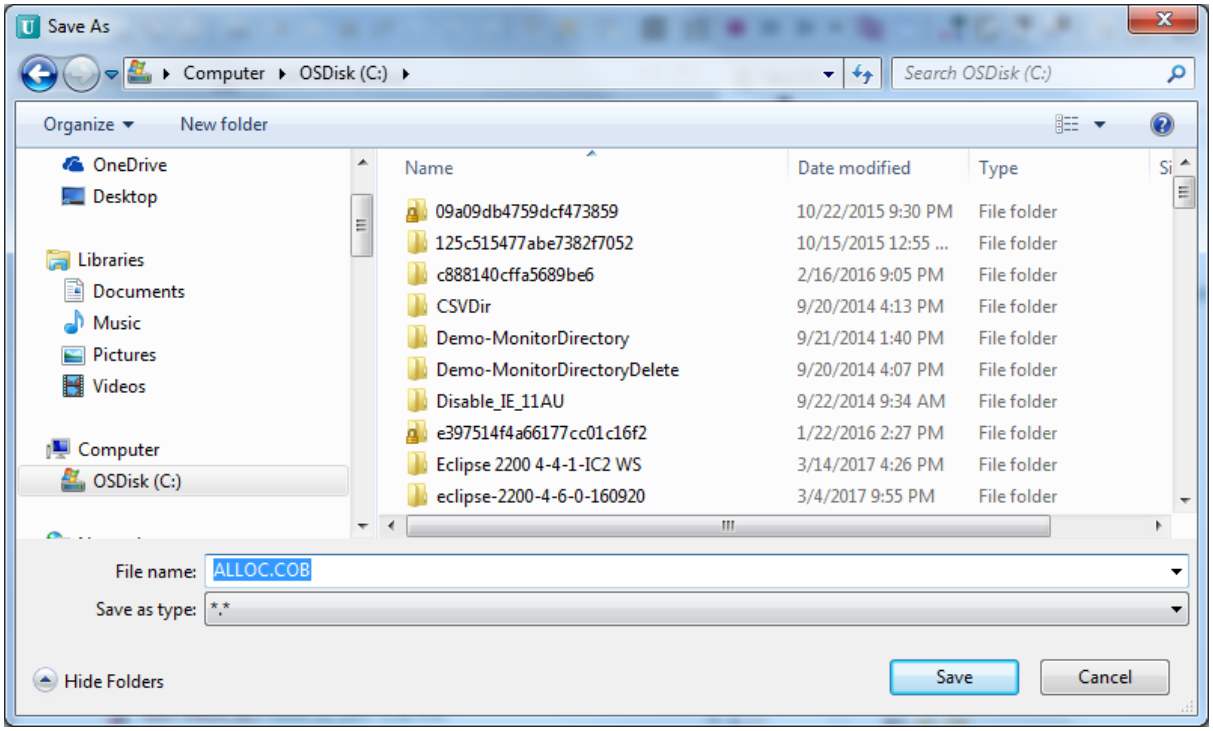
Save To Workspace

This option allows you to save the source file to a project defined in your workspace. For OS 2200 Projects, it does not save the source to the associated 2200 work file. Highlight the destination project, change the file name if required and then click OK.



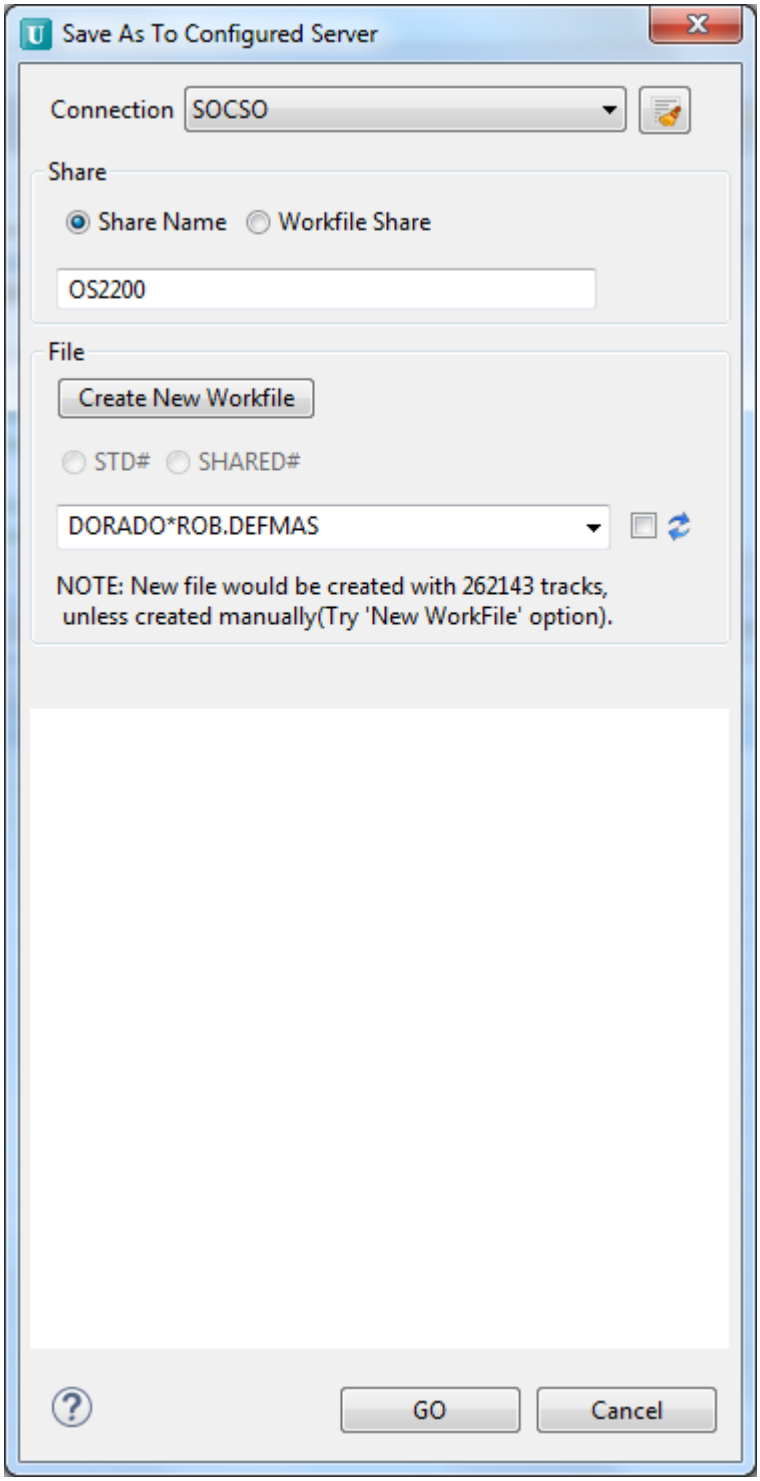
Save To Local Disk

Use this option to save the source file to any folder accessible by your workstation. You can browse to select the drive from the “Save in:” text box. The File name and file type can also be changed if required. Then click OK.



Save To Configured Server

This option will save the file to the selected OS 2200 host.



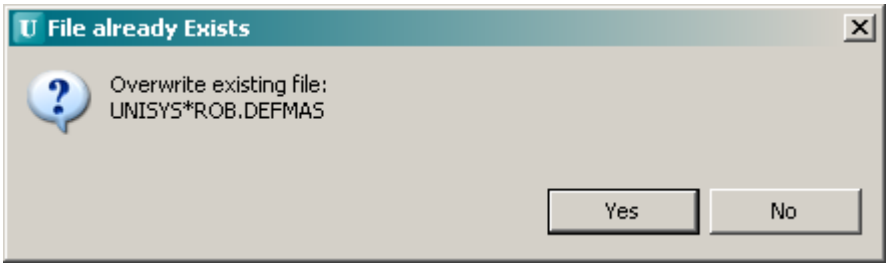
Select the connection if you want to save on a different OS 2200 host.

Select the CIFS share name.

If a new OS 2200 work file is required, click **Create New Work File**.

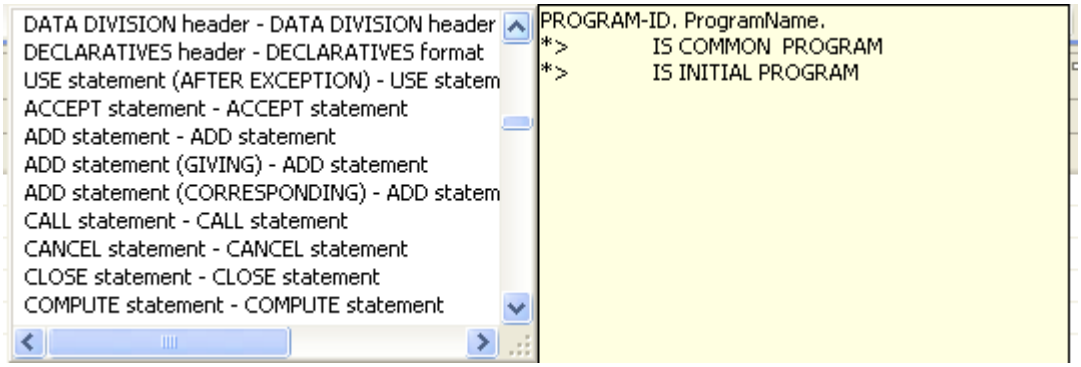
Finally enter the OS 2200 element name (including optional version) and click **GO**.

If the destination element exists, Eclipse will report this:



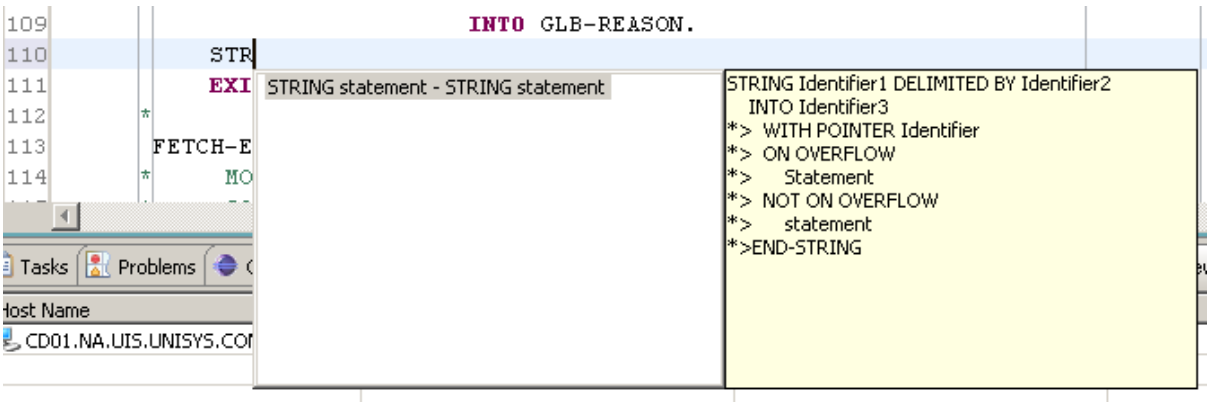
COBOL Content Assistant and Auto Completion

The Editor template also provides for content assistance and auto-completion to assist the programmer. For example, a programmer is developing a new program and cannot remember the format of certain COBOL structures and statements. The programmer can hit 'Ctrl-Space' or select Edit → Content Assistant from the menu bar. Eclipse will display a pop-up with the COBOL statements as shown below. The statements are limited to the COBOL division that you are working in.



The programmer can then scroll thru the list to find the required statement. Hitting 'Enter' will result in Eclipse putting a template of the statement in the program source where the cursor was positioned.

If the programmer knows the first character/s of the verb but not the rest of the statement, then they can use auto-completion via the content assistant to help. For example, if you enter 'STR' as the first characters on a new line and then invoke the content assistant (Ctrl-Space), Eclipse will show a pop-up with only those COBOL statements that begin with 'STR'.



By transmitting 'Enter', the STRING statement template as shown in the right pop-up is inserted in the code.

```
110          STRING Identifier1 DELIMITED BY Identifier2
111              INTO Identifier3
112      *>   WITH POINTER Identifier
113      *>   ON OVERFLOW
114      *>       Statement
115      *>   NOT ON OVERFLOW
116      *>       statement
117      *>END-STRING
118
```

The cursor is moved to the Identifier field where the programmer can type the appropriate variable name. If the statement has more than one variable, Eclipse will display multiple Identifier fields that can be tabbed to.

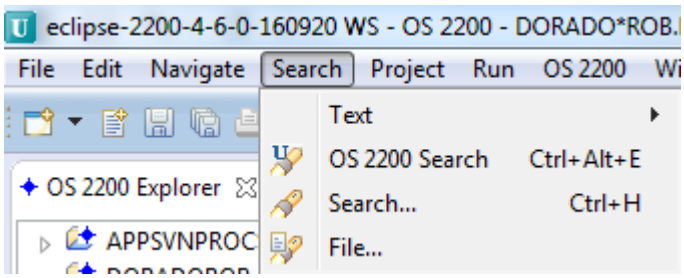
Searching Files, Projects and Workspaces

There are two search features – OS 2200 Search is for generic use while TDATE$ Search is to assist in TDATE$ remediation work.

OS 2200 Search

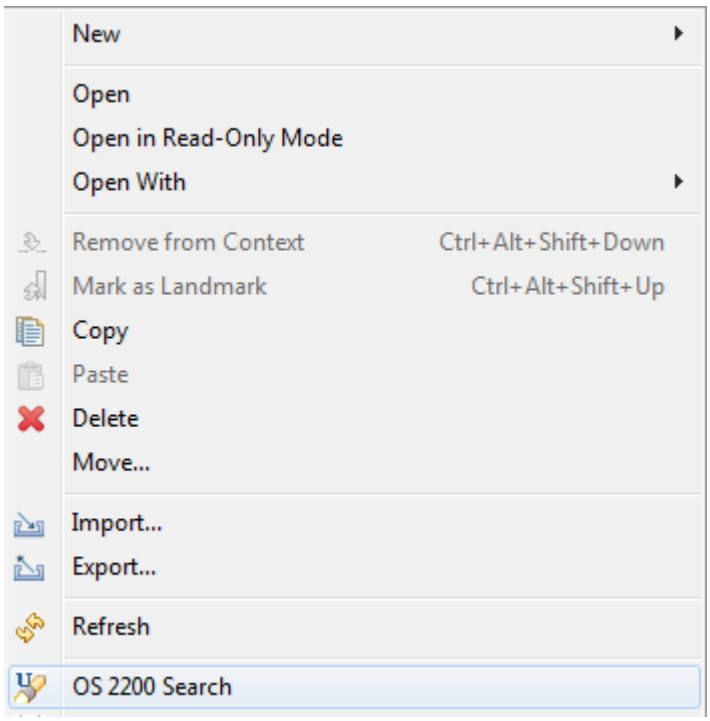
Eclipse provides an inbuilt searching capability that works on files, projects and workspaces. It does not work on data files or OFE opened elements.

Go to the **Menu -> Search**

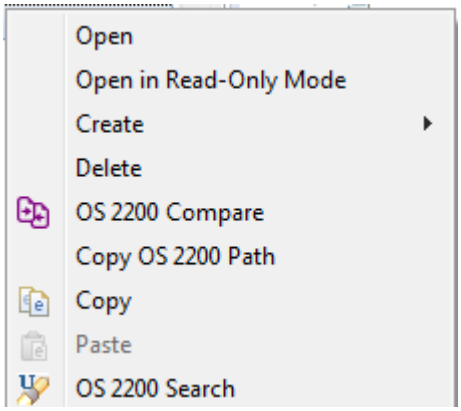


Select **Menu → OS 2200 Search** or use the short cut **Ctl+Alt+E**.

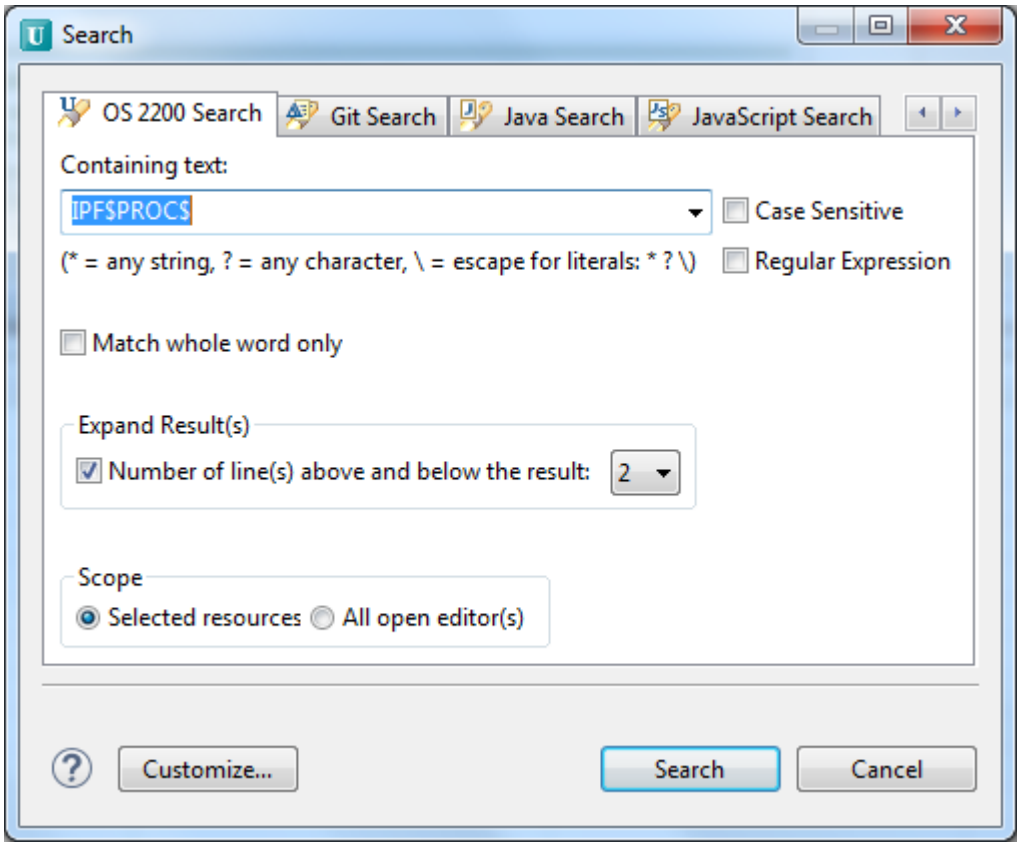
Or use right-click in the OS 2200 Explorer tab:



Another option is to right click in the OS 2200 File Explorer tab:



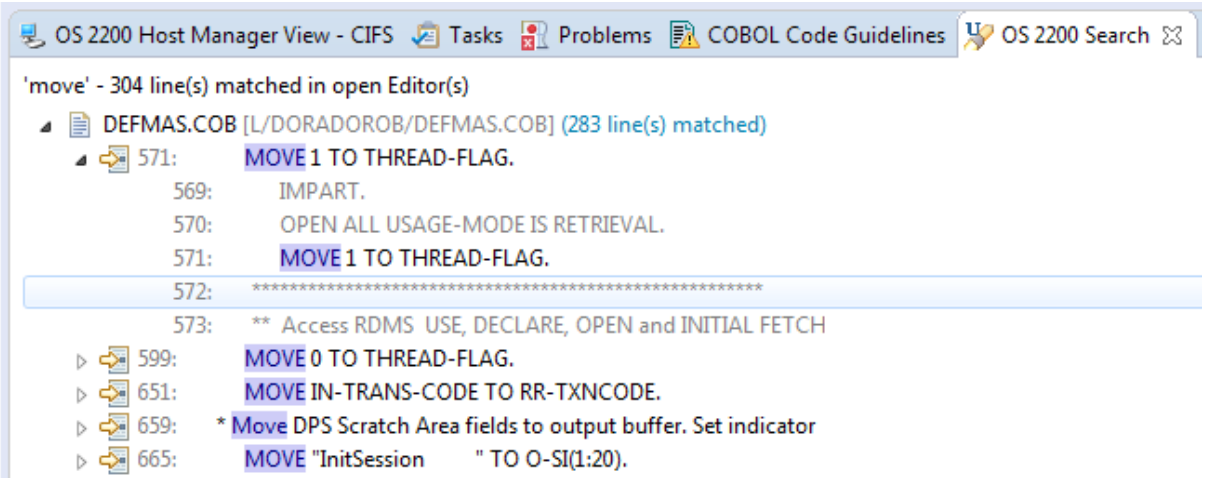
These options will show the following dialog:



The Scope will search through selected resources in the OS 2200 Explorer or OS 2200 File Explorer if checked or thru the open editors. Note that searches using OS 2200 Explorer or open editors only search thru cached files.

The Expand Results (Number of lines) is useful when viewing the matches in the results pane.

A search for ‘move’ returned these results in the example. Notice the two lines before/after the matched line.



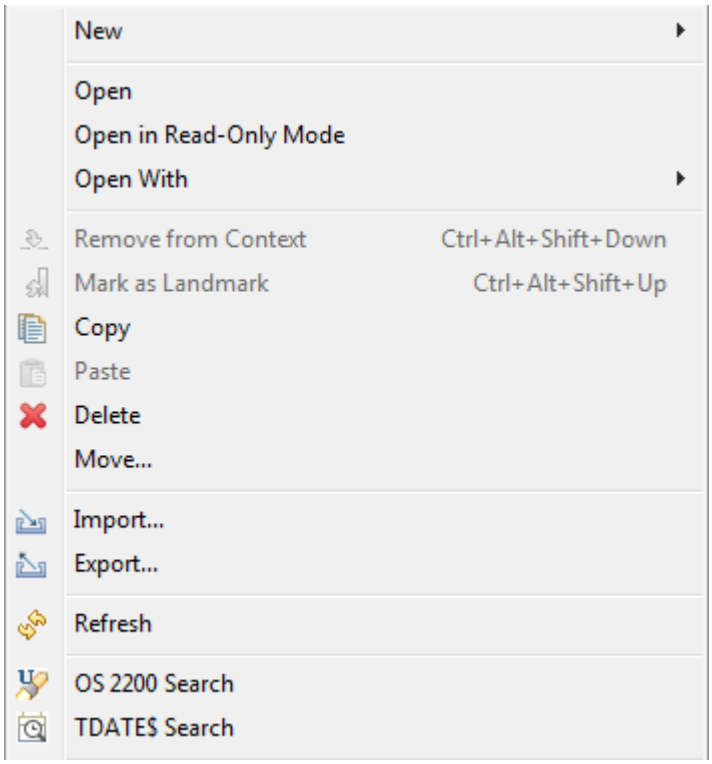
The results can be expanded to show the element and line number. Double click the line number to open the element in the editor and position the cursor on the line.

Notice the Icon  next to all lines that matched the search.

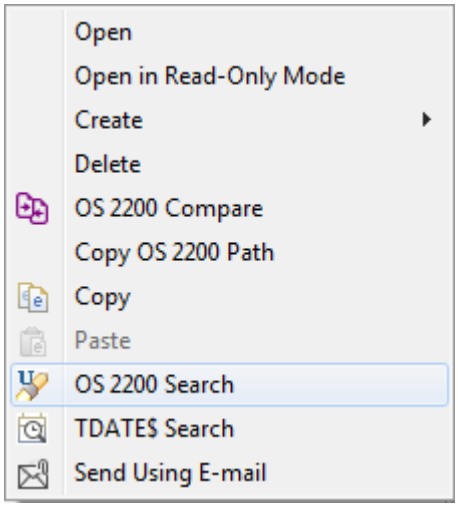
TDATE$ Search

The TDATE$ search will search for predefined patterns that will assist in TDATE$ remediation efforts. Various search criteria can be maintained and used. The search can be performed on selected resources or editors as required.

From OS 2200 Explorer view, right click to get the context menu and select TDATE$ Search.

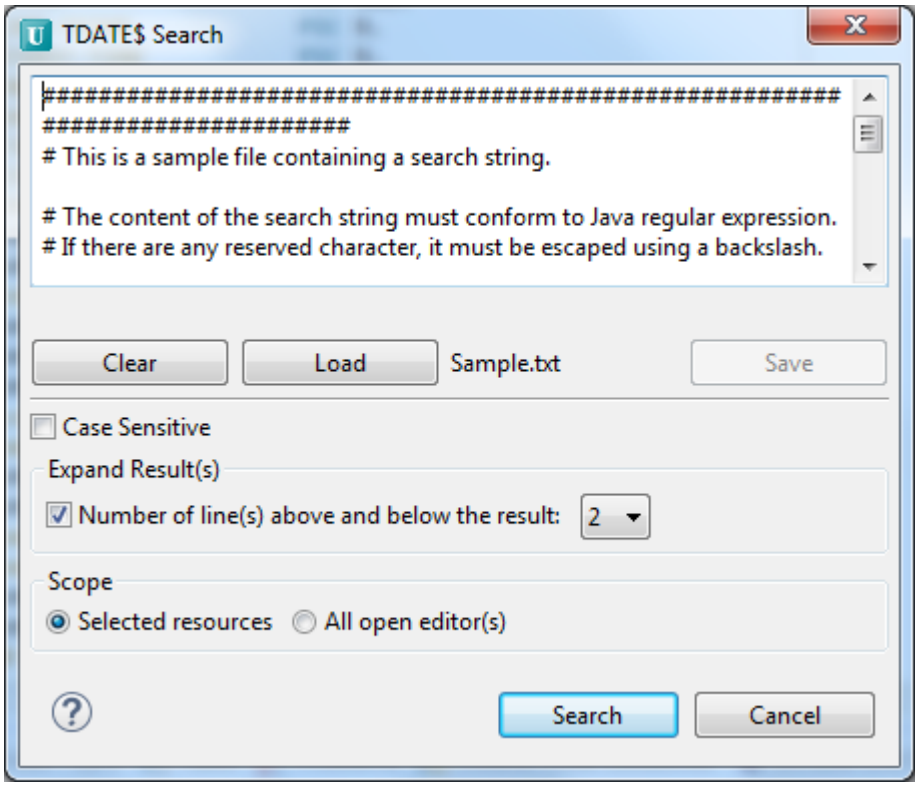


From OS 2200 File Explorer view, right click to get the context menu and select TDATE$ Search.



Or use the  icon from the menu.

The following dialog is displayed:



By default, the Sample.txt search criteria is displayed. This file is located at:

C:\<Eclipse install folder>\plugins\com.unisys.tde.ui_4.6.0.20170220\Sample.txt

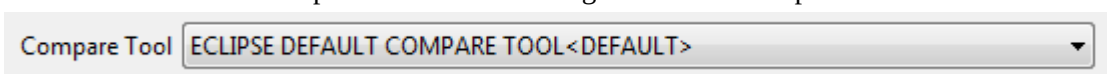
Check the **Selected resources** field if the search is using OS 2200 Explorer or OS 2200 File Explorer files or elements. Check the **All open editor(s)** to only search the source in the editors.

Comparing different source versions

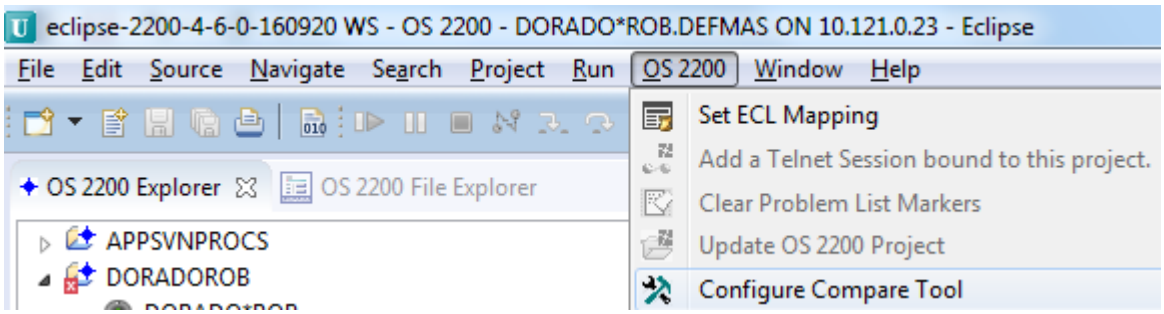
As mentioned earlier, Eclipse maintains different source versions in the workspace on the workstation.

Configuring Compare Tools

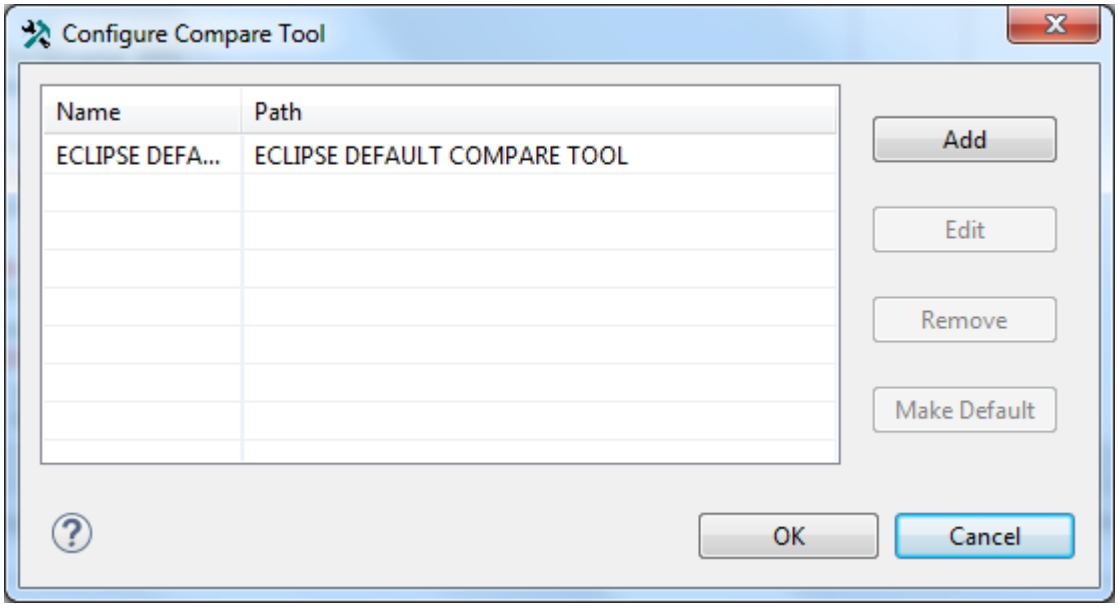
The OS 2200 IDE for Eclipse comes with a configured default compare tool:



Clients can configure other compare tools. Select **Menu -> OS 2200**:



Select **Configure Compare Tool**:

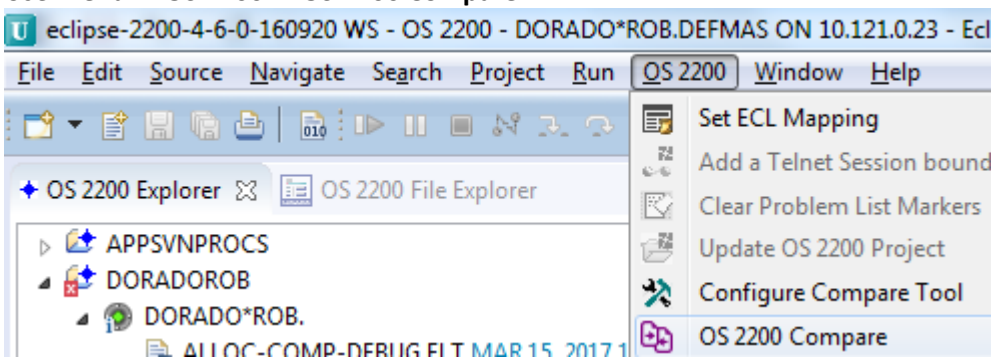


Click **Add** and then browse the necessary executable on the workstation. After this, one of the available tools can be selected as the default.

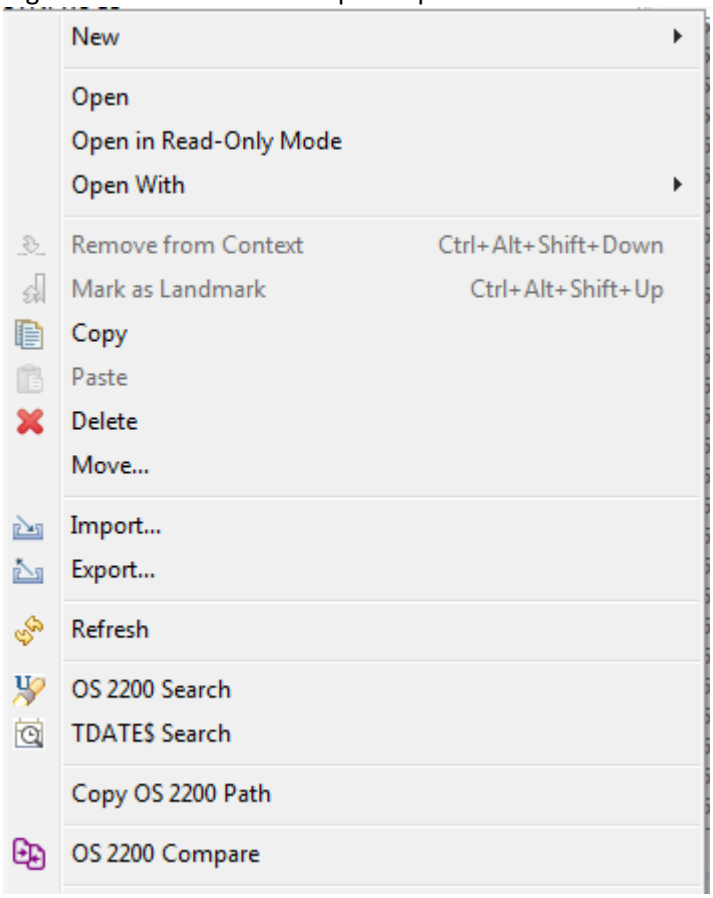
OS 2200 Compare

The OS 2200 Compare utility can be invoked from a variety of methods:

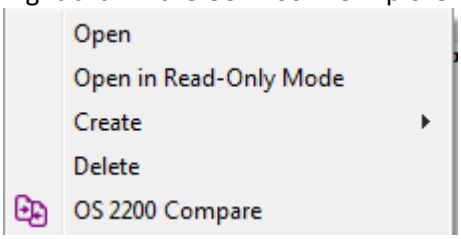
- Click the  icon in the menu
- Use **Menu -> OS 2200 -> OS 2200 Compare**



- Right click in the OS 2200 Explorer pane and select OS 2200 Compare

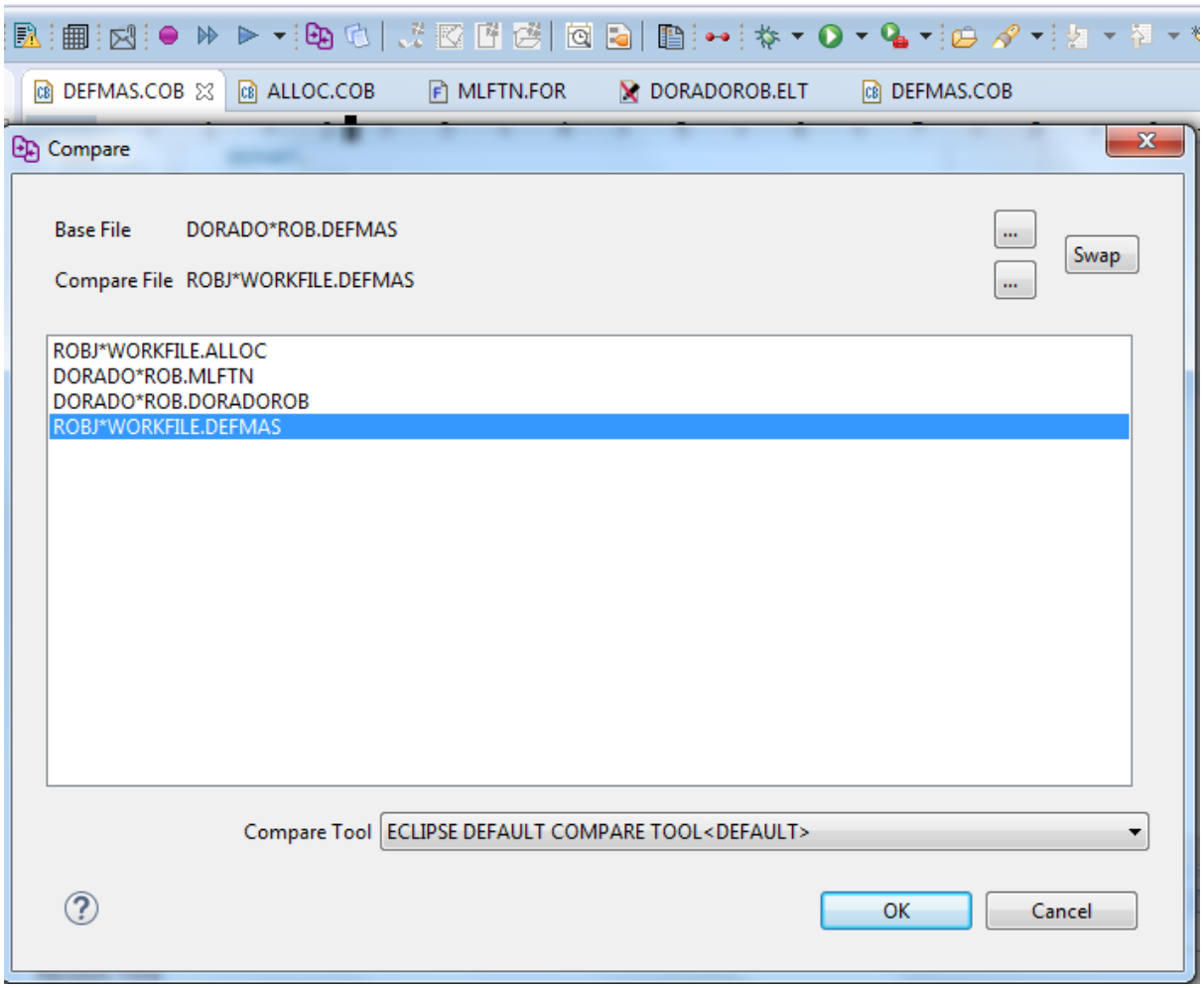


- Right click in the OS 2200 File Explorer pane and select OS 2200 Compare



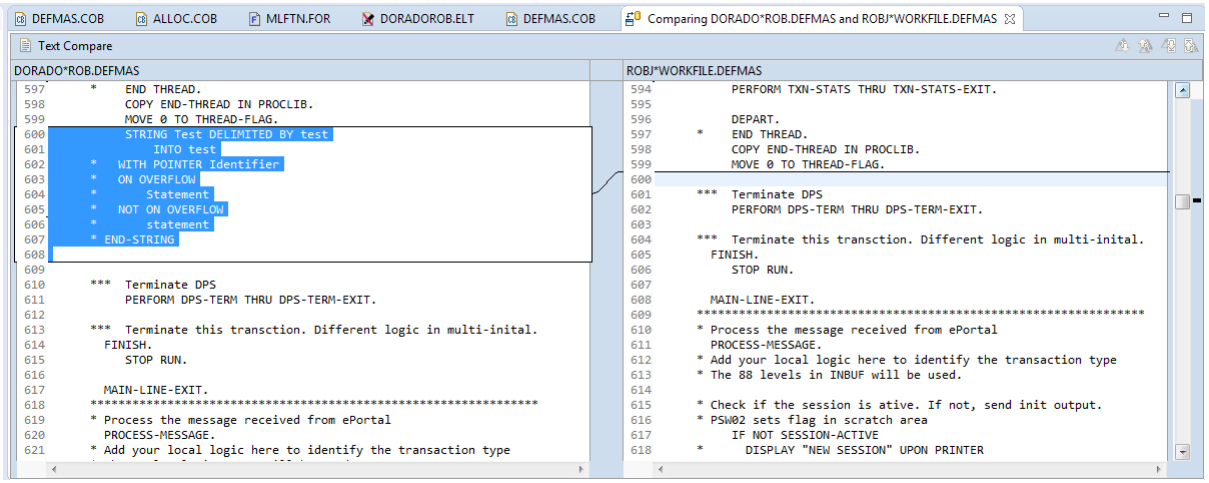
Compare Sources in Different Editors

Set focus on one editor. This becomes the base file. Launch the OS 2200 Compare using the icon as per above.



Then select the other editor to be compared to, select the compare tool and then click OK. (Use the Swap button the exchange the base and compare files.)

The results are shown in an editor pane:



Code changes are identified and the right border indicates the changes.

Compare Sources in OS 2200 Explorer Projects

Select the base and compare files in one or more projects and right click then select OS 2200 Compare.

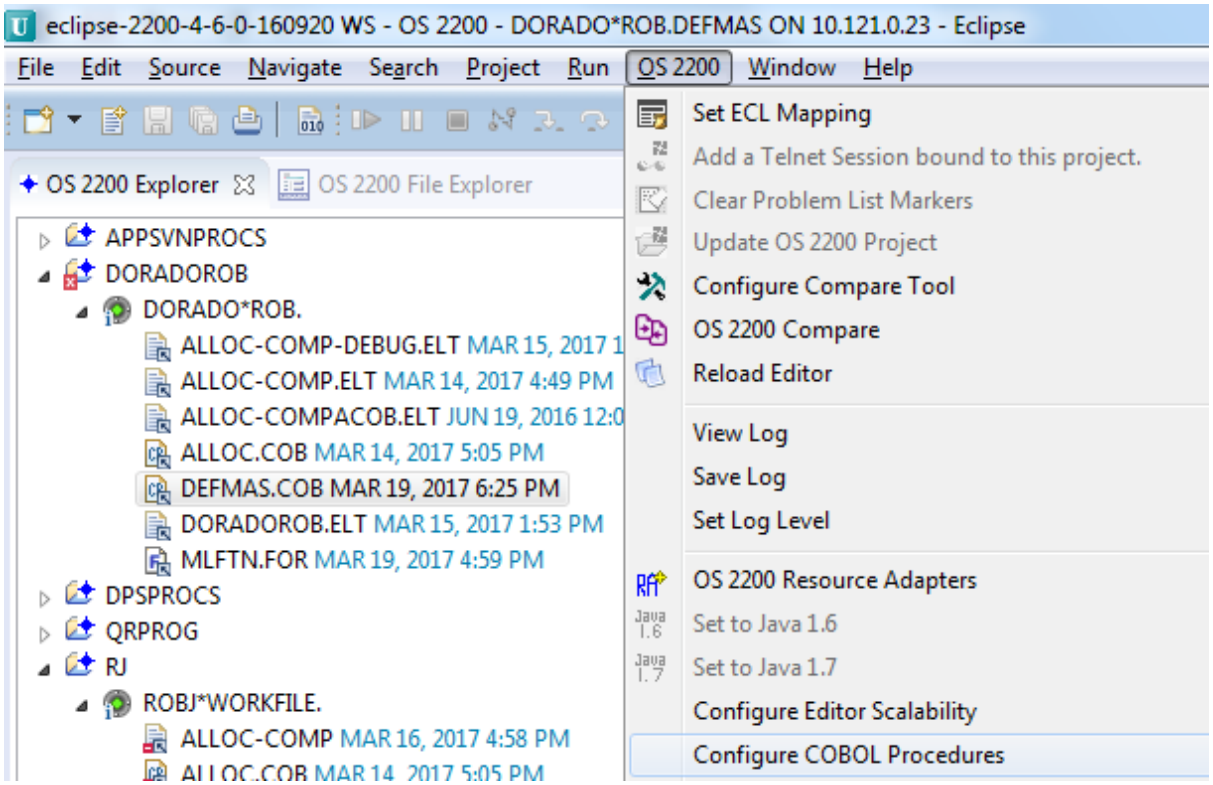
Compare Sources in OS 2200 File Explorer

Select the base and compare files in one or more projects and right click then select OS 2200 Compare.

Referencing COBOL COPY Procedure Source

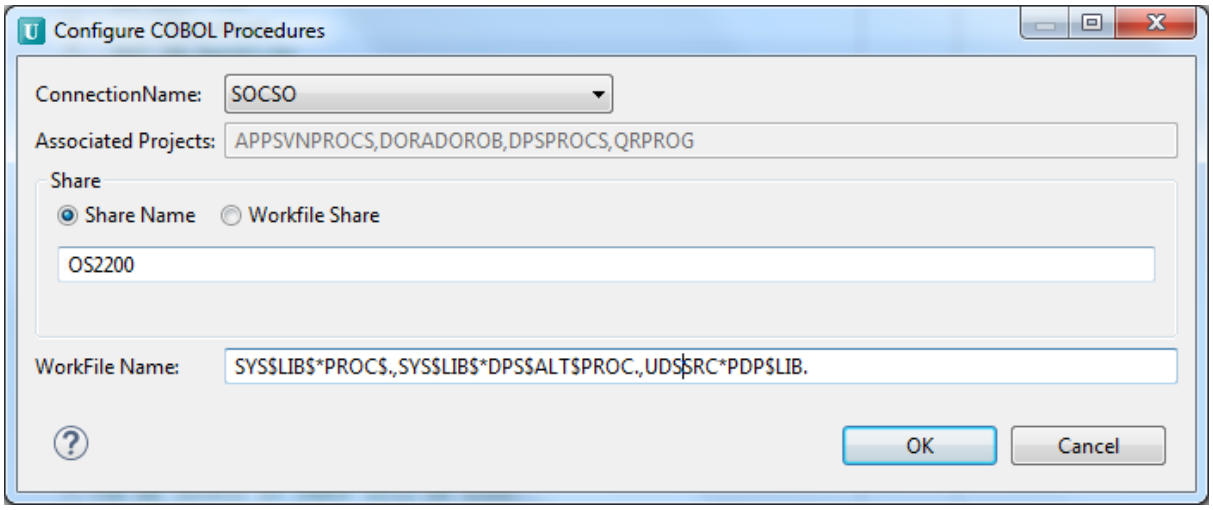
Eclipse provides a method to define the locations of the COBOL copy procedures used by the COPY statements in a program. You can refer to the COBOL compilation stream to determine what files are used. For example, there may be an @USE to COB$PF or an @USE to a use name that appears on the COPY <name> IN/OF <PDP file>.

Go to **Menu -> OS 2200 -> Configure COBOL Procedures**

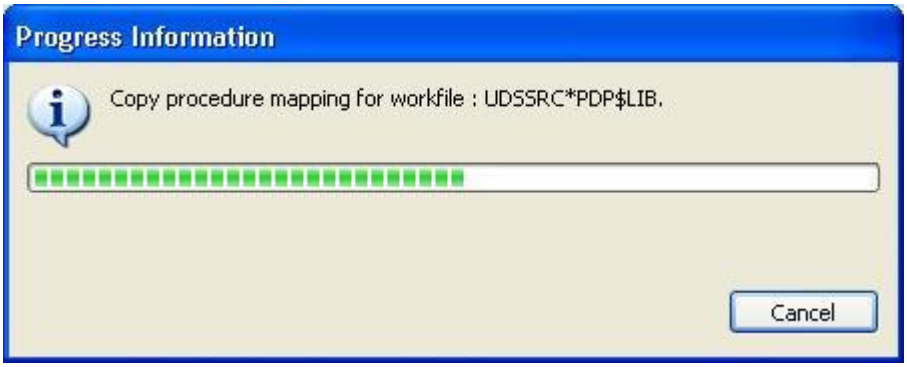


Select the host connection name.

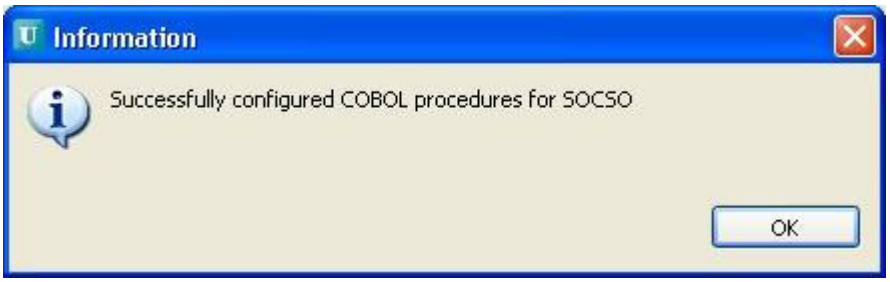
In the WorkFile Paths, enter Q*F.,Q*F., etc. Unlimited number of files can be entered.



When you click OK, Eclipse starts the process and shows a progress dialog:



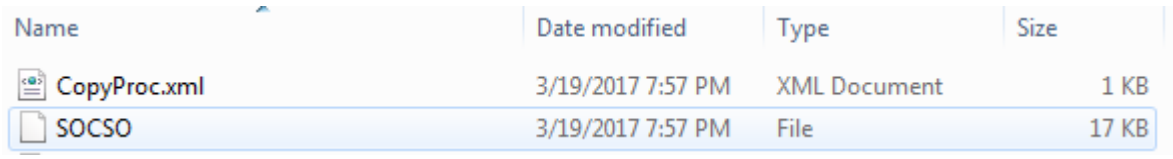
There is a complete message for the host connection:



Eclipse will build information into either of the following folders:

C:\Users\<User-id>\AppData\Local\Unisys\os2200\dd

If you check the DD folder, you will see the following files.



Name	Date modified	Type	Size
CopyProc.xml	3/19/2017 7:57 PM	XML Document	1 KB
SOCSO	3/19/2017 7:57 PM	File	17 KB

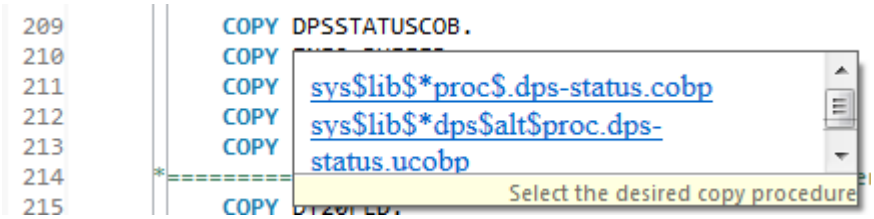
The 'CopyProc.xml' file contains the files from the wizard as shown below:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<ns2:copyProcConnMap xmlns:ns2="Copy Proc">
    <copyProcMap>
        <entry>
            <key>SOCSO</key>
            <value>
                <shareState>1</shareState>
                <shareName>OS2200</shareName>
                <wrk>SYS$LIB$*PROC$.,SYS$LIB$*DPS$ALT$PROC.,UDSSRC*PDP$LIB.</wrk>
            </value>
        </entry>
    </copyProcMap>
</ns2:copyProcConnMap>
```

If you open one of the host connection files, you will each COBOL procedure entry name and the element it is found in including the host IP address, share, qualifier, filename and element name.

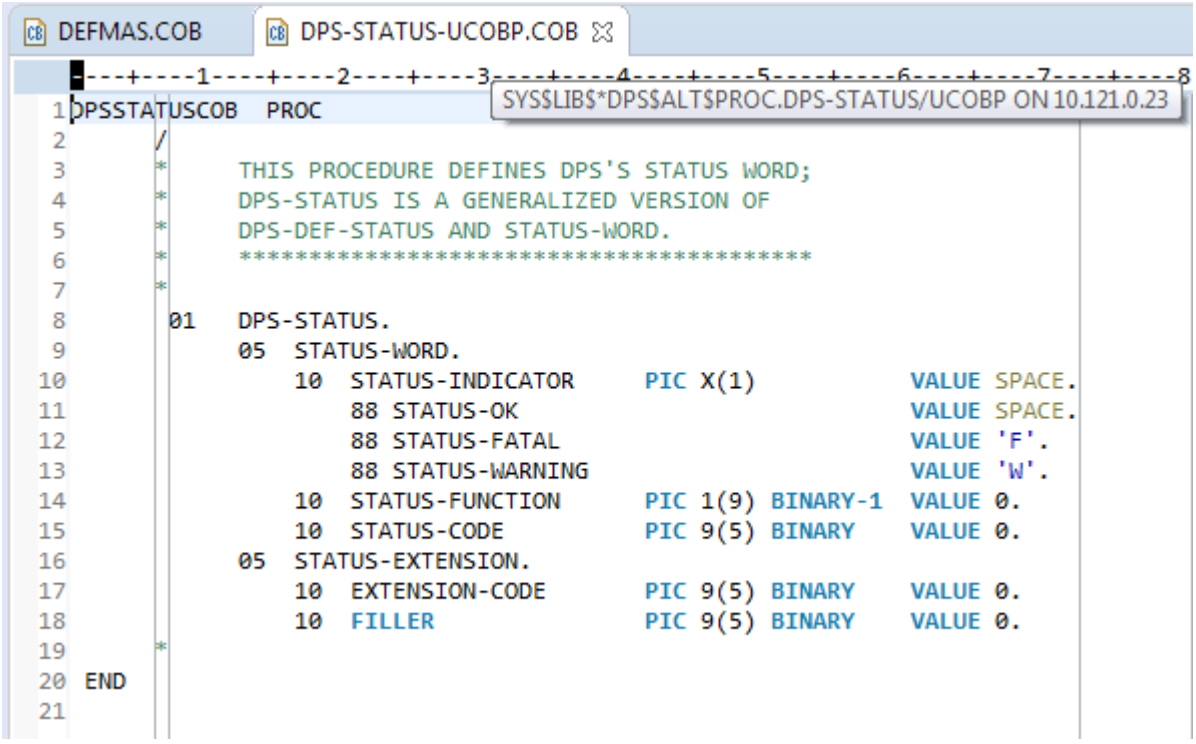
```
FEATURE-KEYFOUND-PKT \\10.121.0.23\os2200\sys$lib$\proc$\fkeyfounddef.ucob
CALL-FP-ACQ-ELT-INFO-LONG \\10.121.0.23\os2200\sys$lib$\proc$\fp$acqeltinf.cob
CALL-FP-ACQ-ELT-INFO-SHORT \\10.121.0.23\os2200\sys$lib$\proc$\fp$acqeltinf.cob
FP-ACQ-ELT-INFO \\10.121.0.23\os2200\sys$lib$\proc$\fp$acqeltinf.cob
CALL-FP-ACQ-FILE-INFO-LONG \\10.121.0.23\os2200\sys$lib$\proc$\fp$acqfilinf.cob
CALL-FP-ACQ-FILE-INFO-SHORT \\10.121.0.23\os2200\sys$lib$\proc$\fp$acqfilinf.cob
FP-ACQ-FILE-INFO \\10.121.0.23\os2200\sys$lib$\proc$\fp$acqfilinf.cob
CALL-FP-ACQ-FILE-LIST-LONG \\10.121.0.23\os2200\sys$lib$\proc$\fp$acqfillst.cob
CALL-FP-ACQ-FILE-LIST-SHORT \\10.121.0.23\os2200\sys$lib$\proc$\fp$acqfillst.cob
FP-ACQ-FILE-LIST \\10.121.0.23\os2200\sys$lib$\proc$\fp$acqfillst.cob
CALL-FP-ACQ-OM-EP-LONG \\10.121.0.23\os2200\sys$lib$\proc$\fp$acqomep.cob
CALL-FP-ACQ-OM-EP-SHORT \\10.121.0.23\os2200\sys$lib$\proc$\fp$acqomep.cob
FP-ACQ-OM-EP-INFO \\10.121.0.23\os2200\sys$lib$\proc$\fp$acqomep.cob
CALL-FP-ACQ-BASIC-PF-INFO \\10.121.0.23\os2200\sys$lib$\proc$\fp$acqpfinf.cob
FP-ACQ-BASIC-PF-INFO \\10.121.0.23\os2200\sys$lib$\proc$\fp$acqpfinf.cob
CALL-FP-ACQ-COB-PROC-INFO-LONG \\10.121.0.23\os2200\sys$lib$\proc$\fp$acqproc.cob
CALL-FP-ACQ-COB-PROC-INFO-SHRT \\10.121.0.23\os2200\sys$lib$\proc$\fp$acqproc.cob
CALL-FP-ACQ-PROC-INFO-LONG \\10.121.0.23\os2200\sys$lib$\proc$\fp$acqproc.cob
CALL-FP-ACQ-PROC-INFO-SHORT \\10.121.0.23\os2200\sys$lib$\proc$\fp$acqproc.cob
```

With the COBOL source open in the editor, hover the cursor over the COPY Procedure name . In the following example, this is INFO-BUFFER. A dialog with options to select the COPY procedure source element appears. Note an element could contain many COBOL procedures.



If no COPY Procedure has been associated with the name, then an error is displayed in the status line:

By selecting an entry in the list, Eclipse will open the element in the COBOL editor and position the cursor at the PROC statement. Note this element is not part of a project.



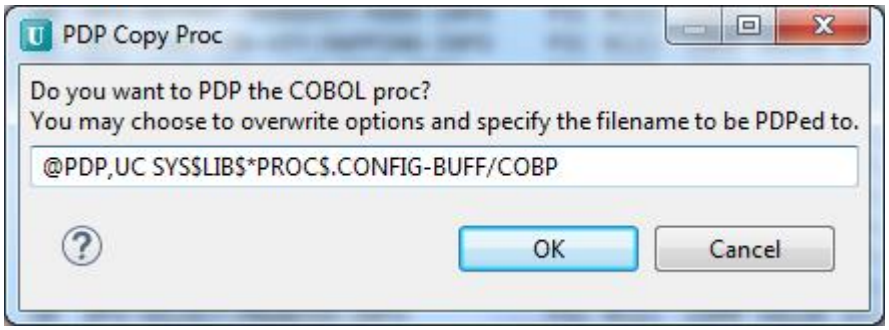
Note that if a COBOL source has been opened with OFE, this feature is unable and the following error is shown on the status bar:

Processing COPY Procedures When Saving

When saving an active UDT editor (typically elements of type ELT), you can process the element for COPY Procedures using @PDP. This is useful if you have updated the element and modified/created/deleted any Procedure.

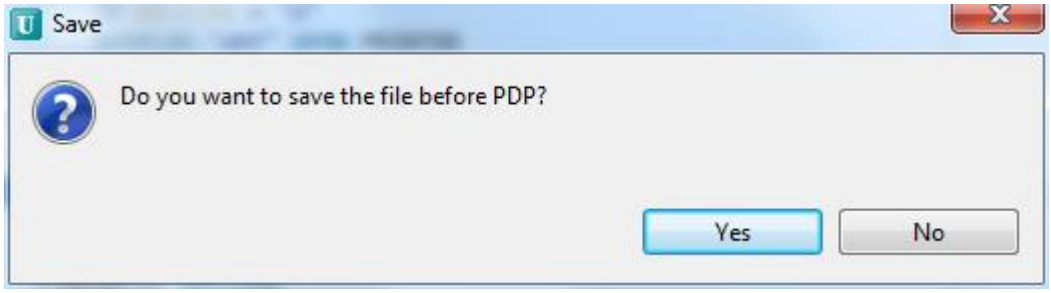
You can process an active editor in the following ways:

- Automatic: Go to **Window -> Preferences -> General -> Editors -> Text Editors -> UDT Preference Page** and select the **Check for PDP Copy Proc after save** check box. This enables you to process the Unisys Common Editor every time it is saved. With every save on the Unisys Common Editor which is a COBOL copy procedure, the PDP Copy Proc dialog box appears.
- Manual: Click **OS 2200 -> PDP Copy Proc**. Alternatively, you can click from the tool bar menu icon  . A PDP Copy Proc dialog box appears.

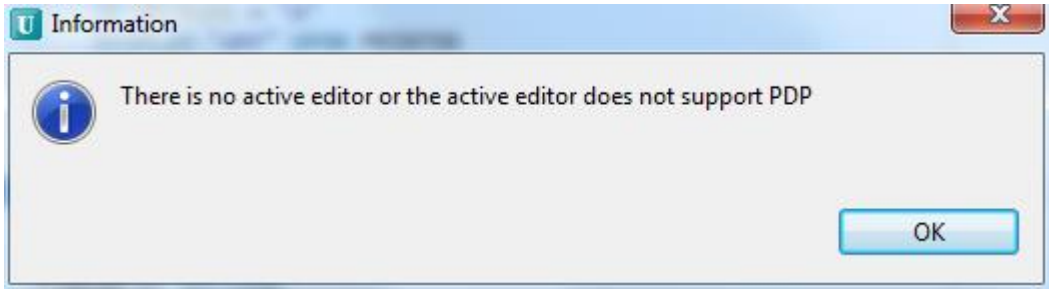


The @PDP statement can modified e.g. change the command options and/or specify the file name where the copy procedure will be processed. Note: By default, the text box in the PDP Copy Proc dialog box is prefilled with the command @PDP,UC and the OS 2200 file path of the active editor.

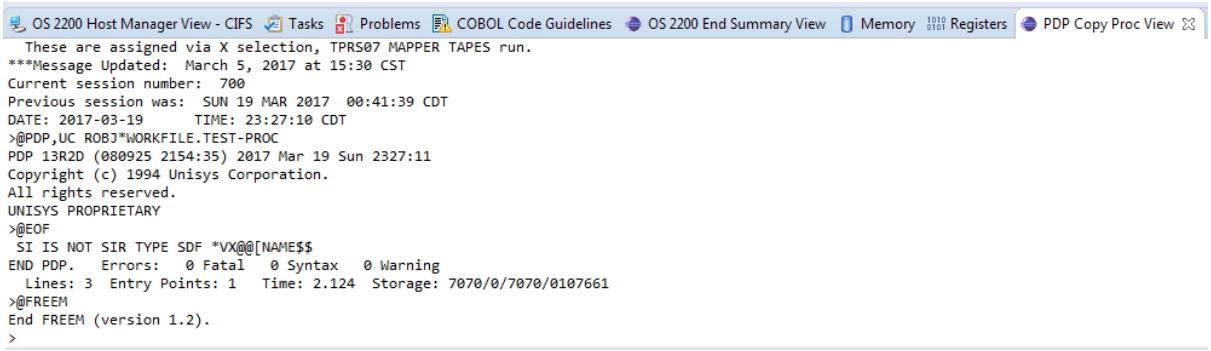
If the element has not been saved, Eclipse will prompt if you want to save before doing the @PDP. If you do not save, then the last saved version on the OS 2200 system is processed.



If the editor is not a COBOL procedure, Eclipse prompts if you still want to continue. Click **Yes** to continue to process the active editor. Only files that contain '~~PROC' and '~END' (where ~ is a space) are considered as COBOL procedures. For files without these words, PDP can be done by the manual method.



In the background, the command is sent to the host of the active editor and executed. When the output is generated, it is displayed in the PDP Copy Proc view. This view is refreshed with each element that is processed. The data of the previously processed copy-procs is not maintained.

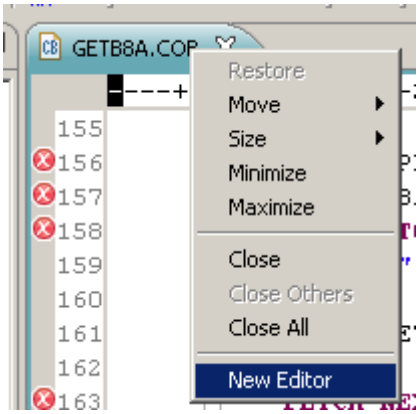


Miscellaneous OS 2200 Perspective Features

Splitting the Editor Pane

Sometimes a developer is coding the business rules in the Procedure Division but needs to reference some other code in the program e.g. the Working Storage section. Eclipse provides the functionality to split the editor pane into two panes. Modifications made to one pane are reflected in the other pane. If you save one pane, it saves the common course displayed in both panes.

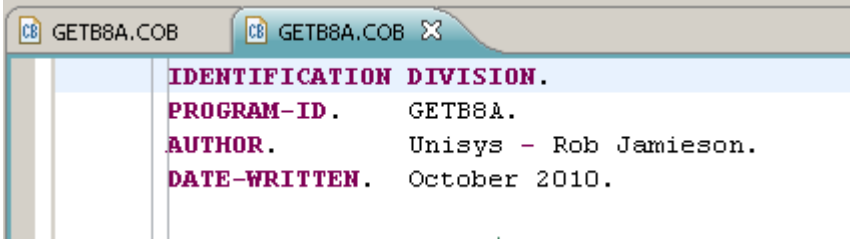
To perform this, right click on the editor pane tab e.g. GETB8A.COB in the picture below.



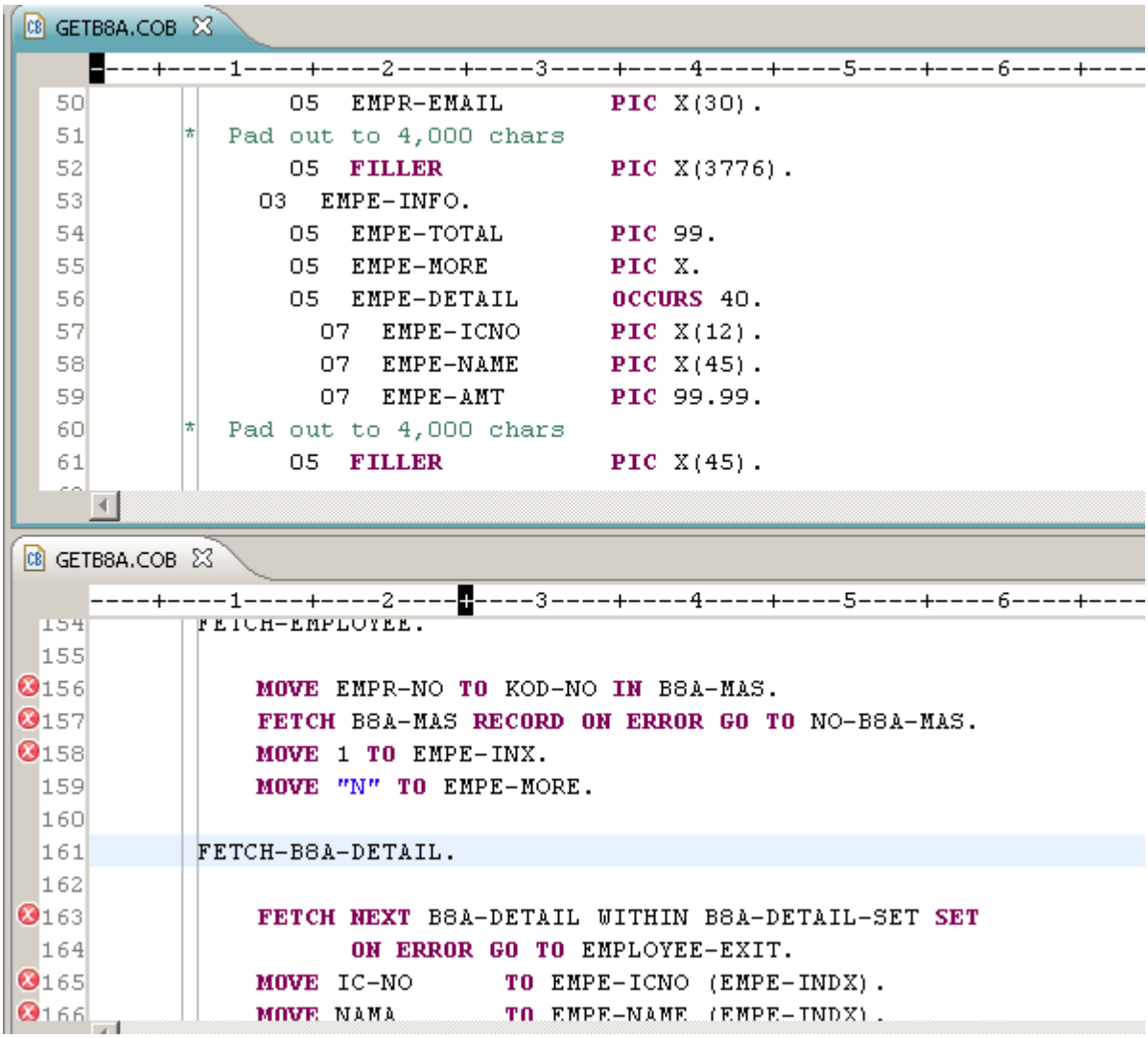
Then click **New Editor**.

Or go to the menu **Window → New Editor.**

Eclipse will open a new COBOL editor pane as shown below. Both panes are displaying the same source. Updating the source in one pane will also update the source in the other pane. In fact there is only one source being edited but two panes used for editing.



Now with the cursor on the tab, hold down the left mouse key and drag the editor pane down the screen. When the cursor is close to the bottom of the edit window, you will see a dotted line across the middle of the edit window and a bold black down arrow on the screen. Release the left mouse key and you will have two editor panes for the same source.



Each pane can be manipulated independently but both panes are working on the same source element. In this way, one pane could show part of Working-Storage and the other pane might show part of the Procedure Division. This is useful if you can't remember data names when coding the program.

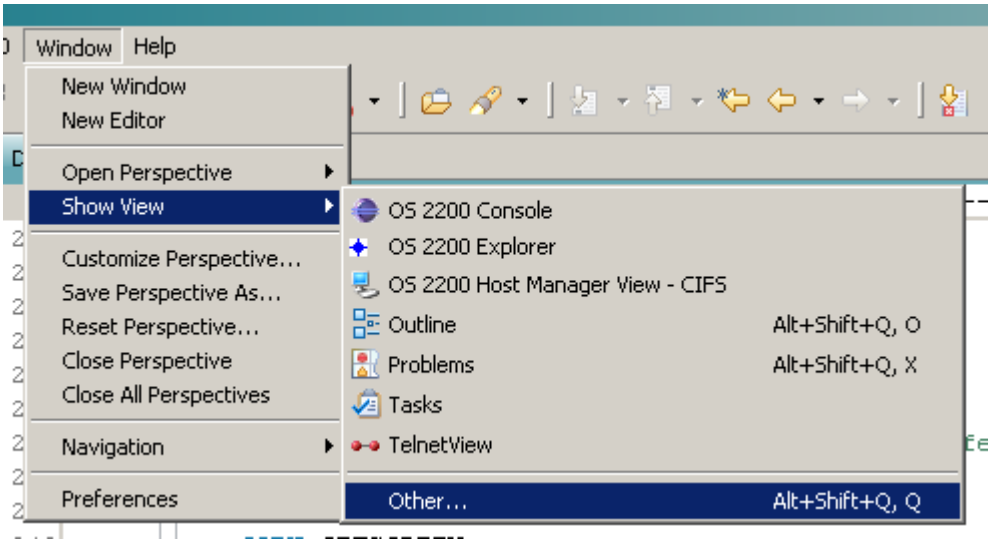
Navigating your COBOL Program Source

Eclipse provides a couple of methods to simplify the navigation of your COBOL program source:

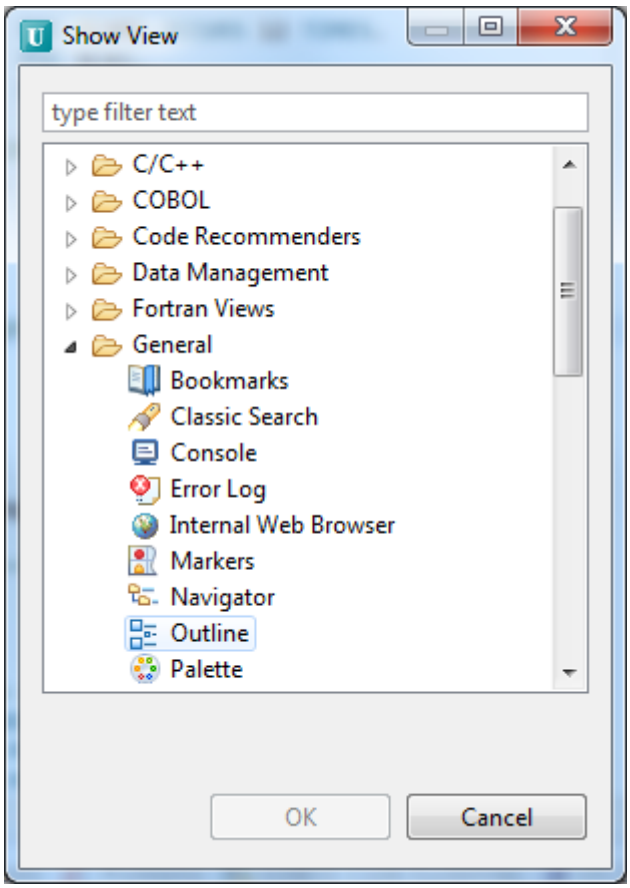
1. Using the Outline View
2. Using Sections and Paragraphs

Outline View

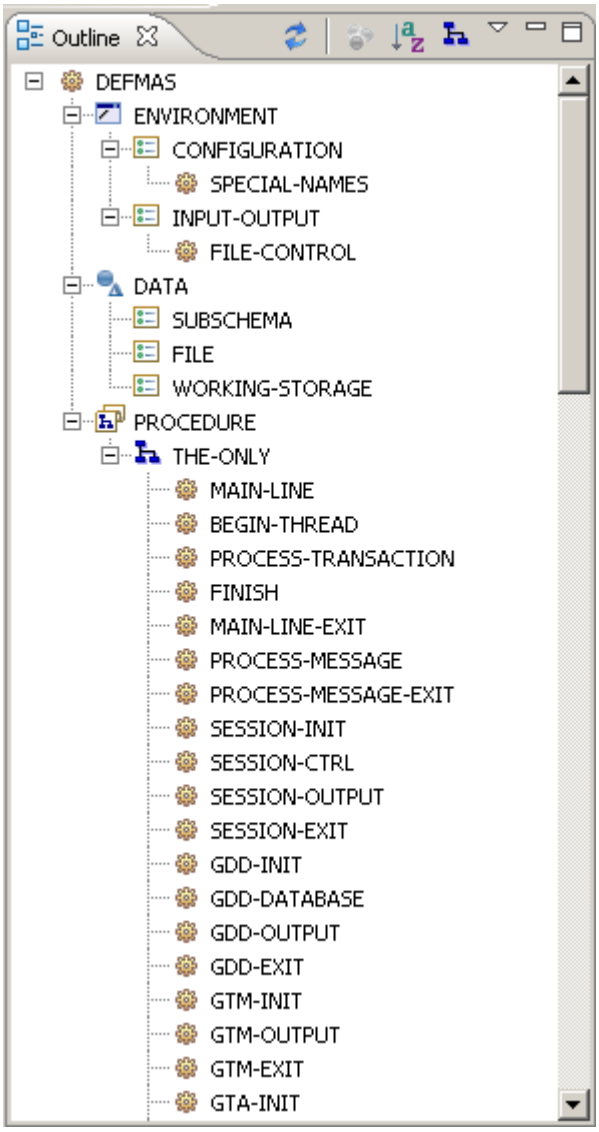
In the COBOL perspective, you select the Outline view to see the program structure. Go to **Window → Show View → Other.**



Then select **General** and expand the node. Then click on **Outline**.



The perspective will show the program outline with the different COBOL divisions and paragraph names.



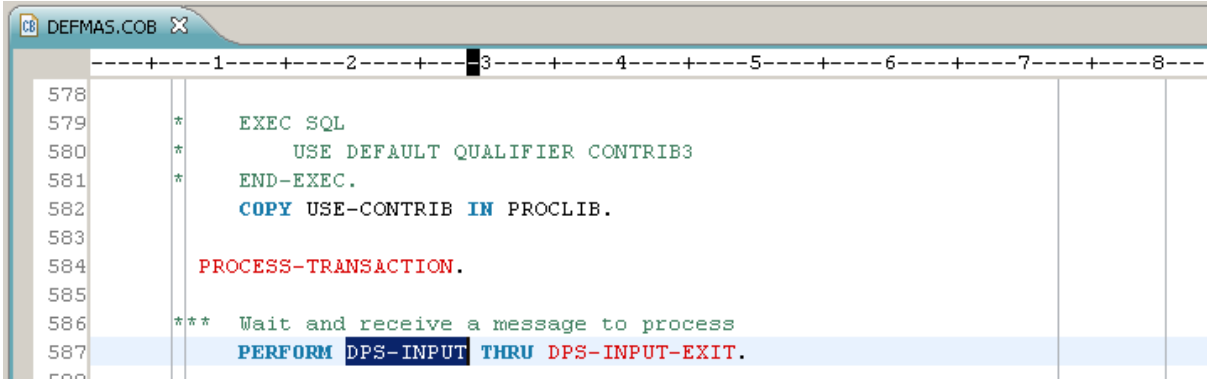
Drag this view to a suitable location on your workbench. My preference is to have this open on the right side of the editor view.

Note the refresh icon,  , can be used to refresh the outline as program editing is performed.

Clicking on an entry in the Outline will position the Editor pane at that location in the program. This provides a quick navigation method to areas of the code.

Using Sections and Paragraphs

Highlight the section or paragraph name in a PERFORM or GO TO statement.

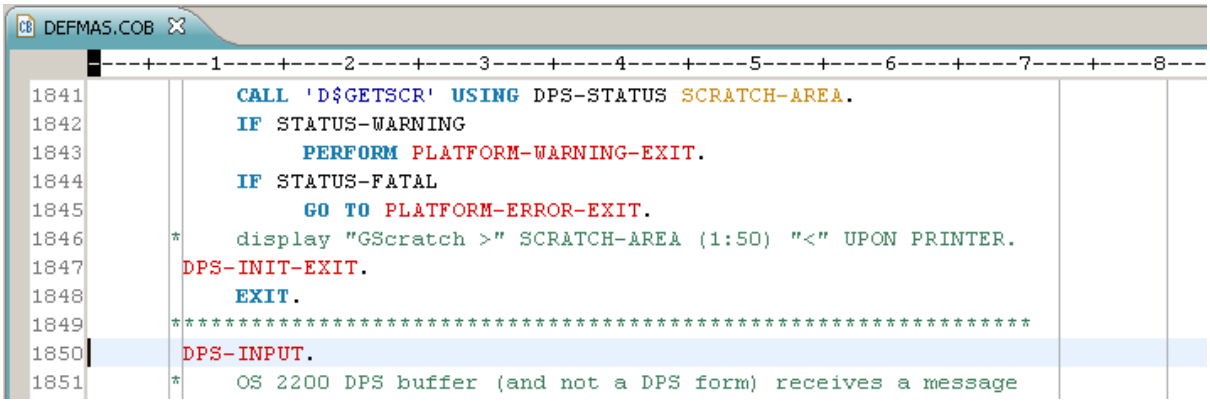


To navigate to the section or paragraph, press F3.

Or right-click and select Open Declaration:

Another method is to <Ctrl>+Click and then hover over the section/paragraph name and select the hyperlink.

The cursor is positioned to the section or paragraph name.

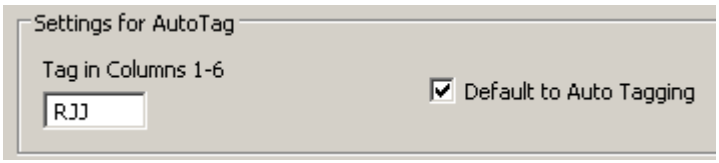


Use the Go Backwards icon  (or press <Ctrl>-Q) to return to the PERFORM or GO TO statement.

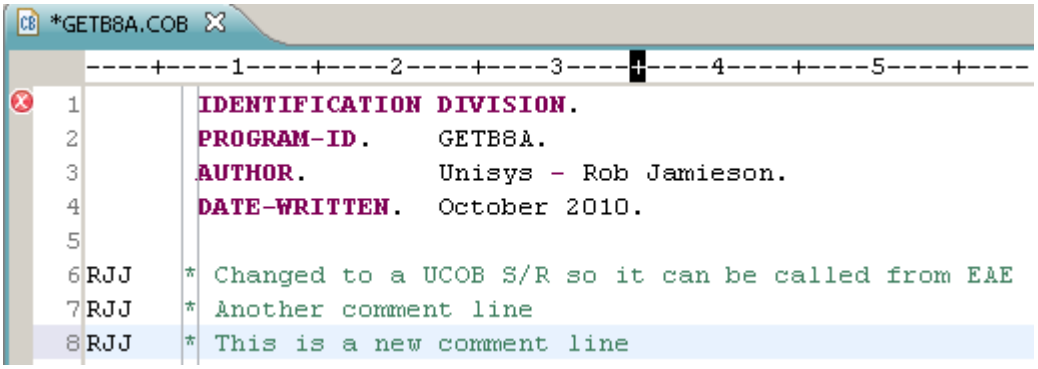
Auto Tag in Columns 1-6

The Auto Tag feature allows for up to 6 characters of data to be placed in columns 1-6 of each updated line of code in the COBOL source. Often these columns are used for version information.

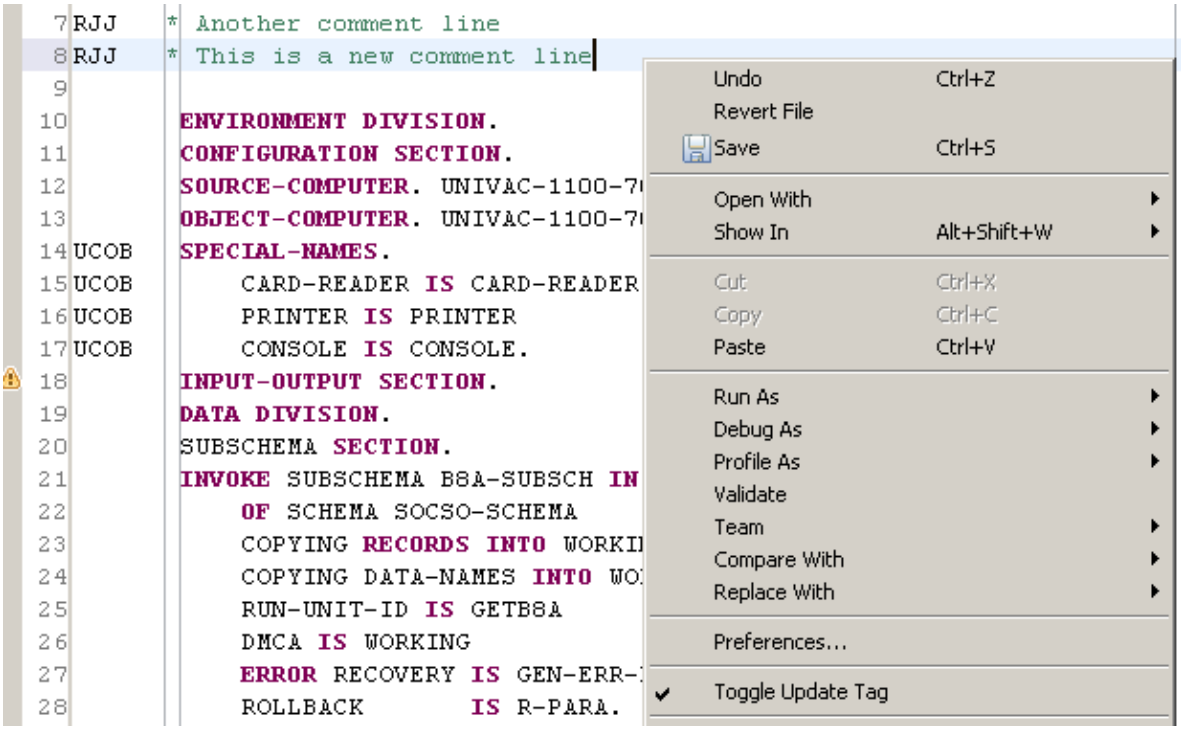
The value to be used is defined in the **Properties → Preferences → COBOL** options. Go to the **Reference Format** tab. Key you value in the field and check the "Default to Auto Tabbing" box. In the example below, RJJ is the value entered.



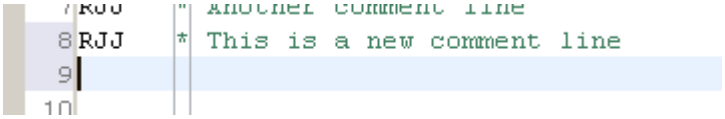
Then as you update the source (modify or insert), the tag value is automatically inserted in columns 1-6.



If you need to toggle whether the tag value appears, right click in the edit pane and select Toggle Update Tag. Lines can be highlighted as well.

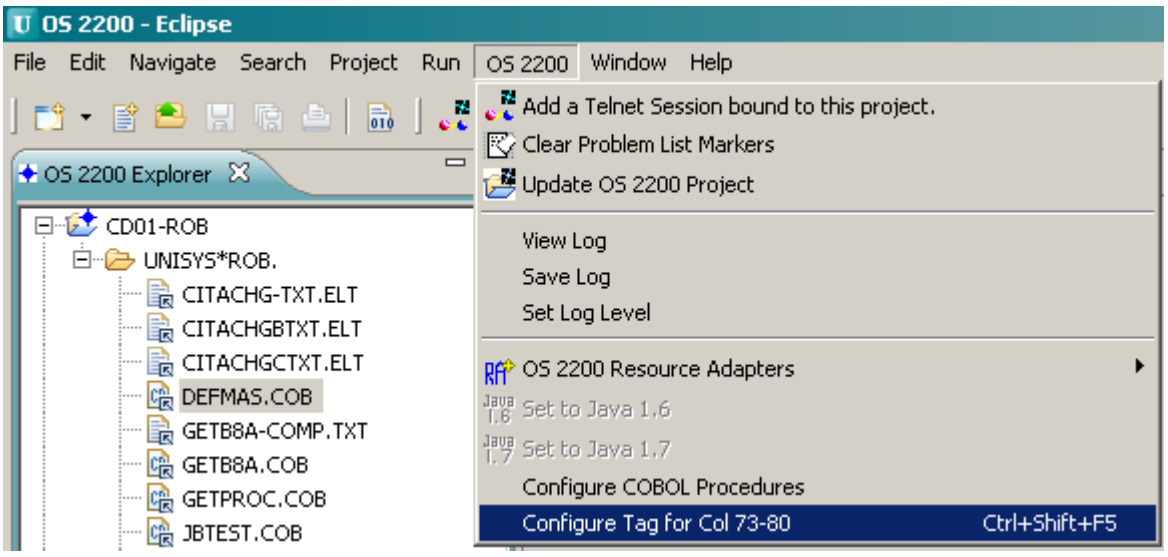


Notice that when a new line was created, the tag was not entered as shown below.

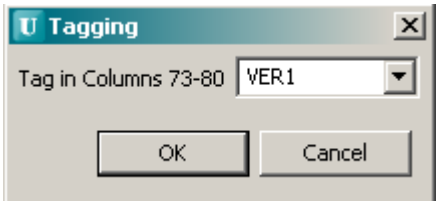


Auto Tag in Columns 73-80

Some sites want to use columns 73-80 instead of columns 1-8 to store some data like a version number.



The following prompt appears:



Data can be entered which is converted to Upper Case. The last 10 values are stored and can be selected.

When you highlight text in the Cobol editor, using <Ctrl>-T will place the selected value in columns 73-80.

```
42      INPUT-OUTPUT SECTION.
43      FILE-CONTROL.                                                    VER1
44          SELECT PRT-FILE ASSIGN TO DISC TPRINT.                       VER1
45          SELECT SRT-FILE ASSIGN TO DISC SRT-DEFAULT.                  VER1
46      DATA DIVISION.
```

Block Comment and Uncomment of Code

One or more lines of code can be marked as a comment (* in column 7) by highlight the lines of code and then doing Ctrl + /. Commented lines can be uncommented by the same process.

Literal Length

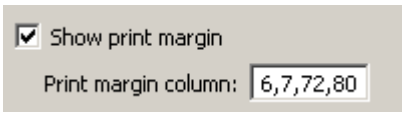
Often in COBOL, the length of a literal is needed e.g. to make sure the destination field is sized correctly. This is achieved by highlighting the code:

```
668             MOVE "InitSession" TO IN-TRANS-CODE.
```

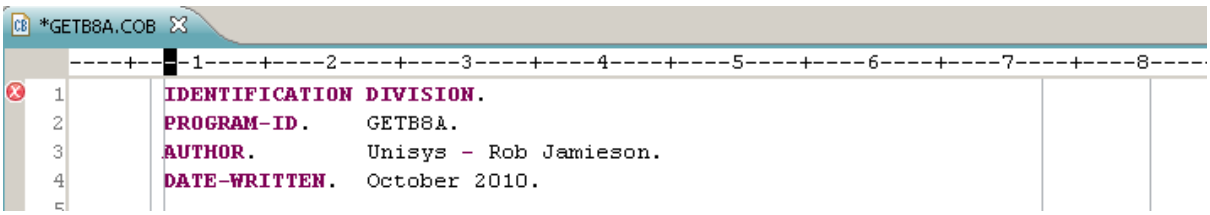
In the status line, the length of the highlighted field is displayed:

Viewing the COBOL Areas

The different COBOL areas can be clearly indicated in the COBOL Editor by setting the Show Margins options. Go to **Windows → Preferences → COBOL → General** and you will see the settings for the Print margin column.



Note how the "Print margin columns" field contains 6, 7, 72 and 80. The editor will show a vertical line after these columns to indicate where the different COBOL areas are. You could modify these values for your own use.

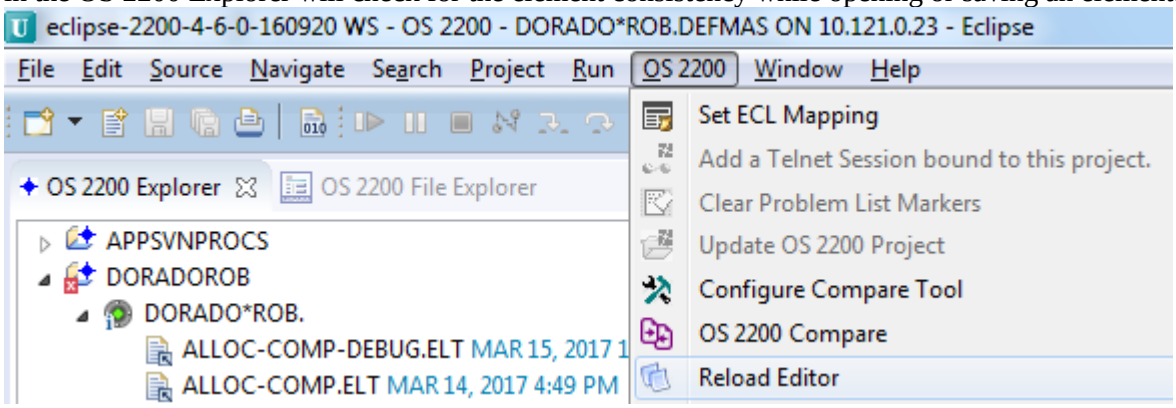


Reloading the Editor Content

Note: This feature only applies to files/elements opened with OS 2200 File Explorer.

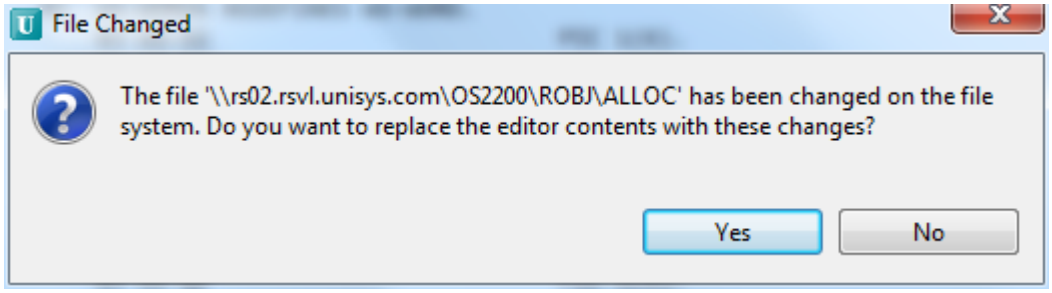
At times the developer might want to refresh their editor contents with the version of the data file or element from the OS 2200 host. This can be achieved by **Menu -> OS 2200 -> Reload Editor** or by clicking **F5** from the OS 2200 File Explorer. The elements in the project are locally cached for performance reasons hence reloading the editor will reload the cached contents. The sync mechanism

in the OS 2200 Explorer will check for the element consistency while opening or saving an element.



Automatic Refresh when Host Contents Changed

Eclipse will be notified when the data file or element contents on the OS 2200 host are changed. In this case, a prompt is shown to allow the developer to take the necessary action.

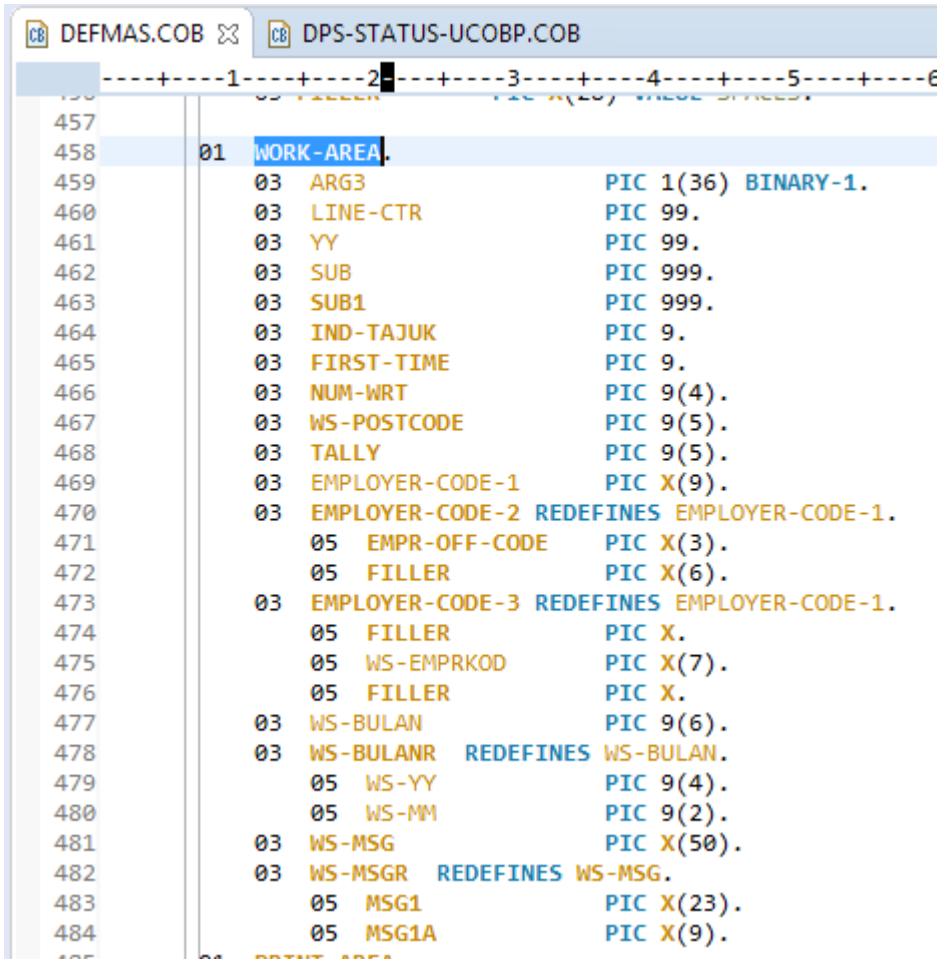


Select **Yes** to refresh your editor with the latest host contents. This will result in any unsaved changes being lost.

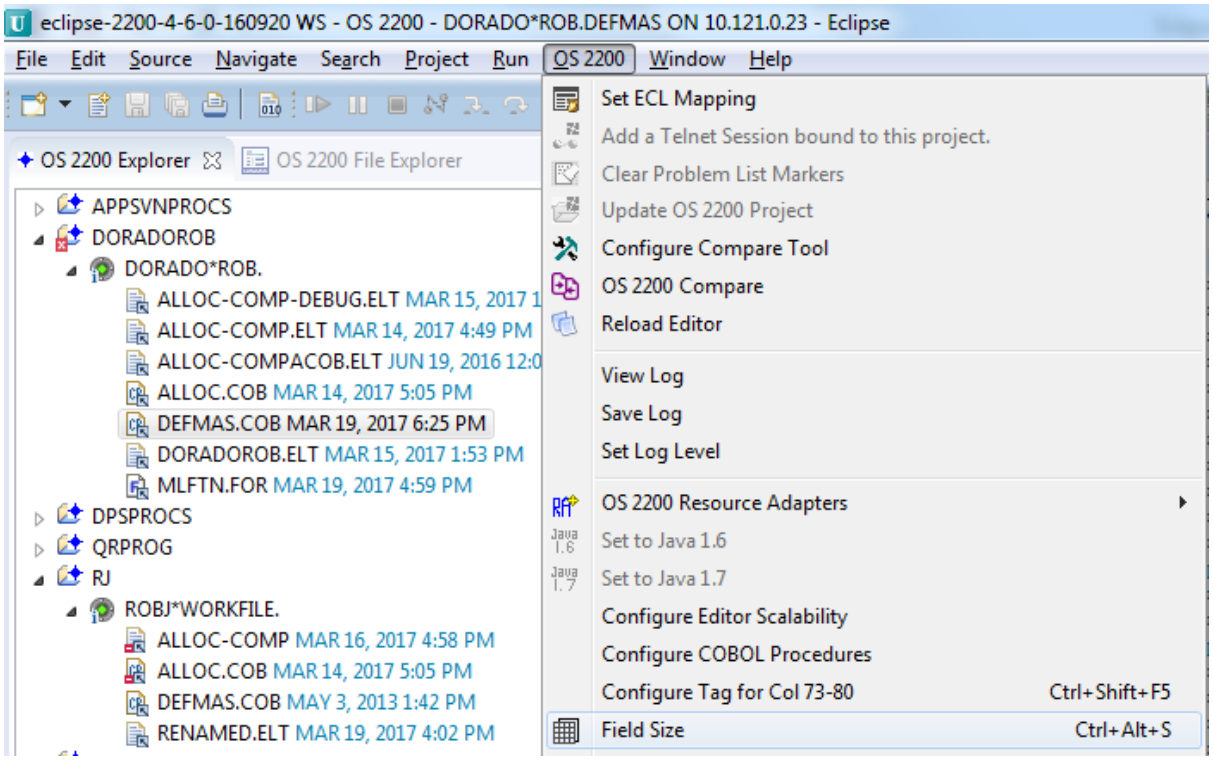
Select **No** to keep working on your editor contents.

COBOL Field Size

Often COBOL programmers want to know the field size (or data allocation) of the variables that are defined in the Data Division. This can be achieved by highlight the variables required or the entire variable name.



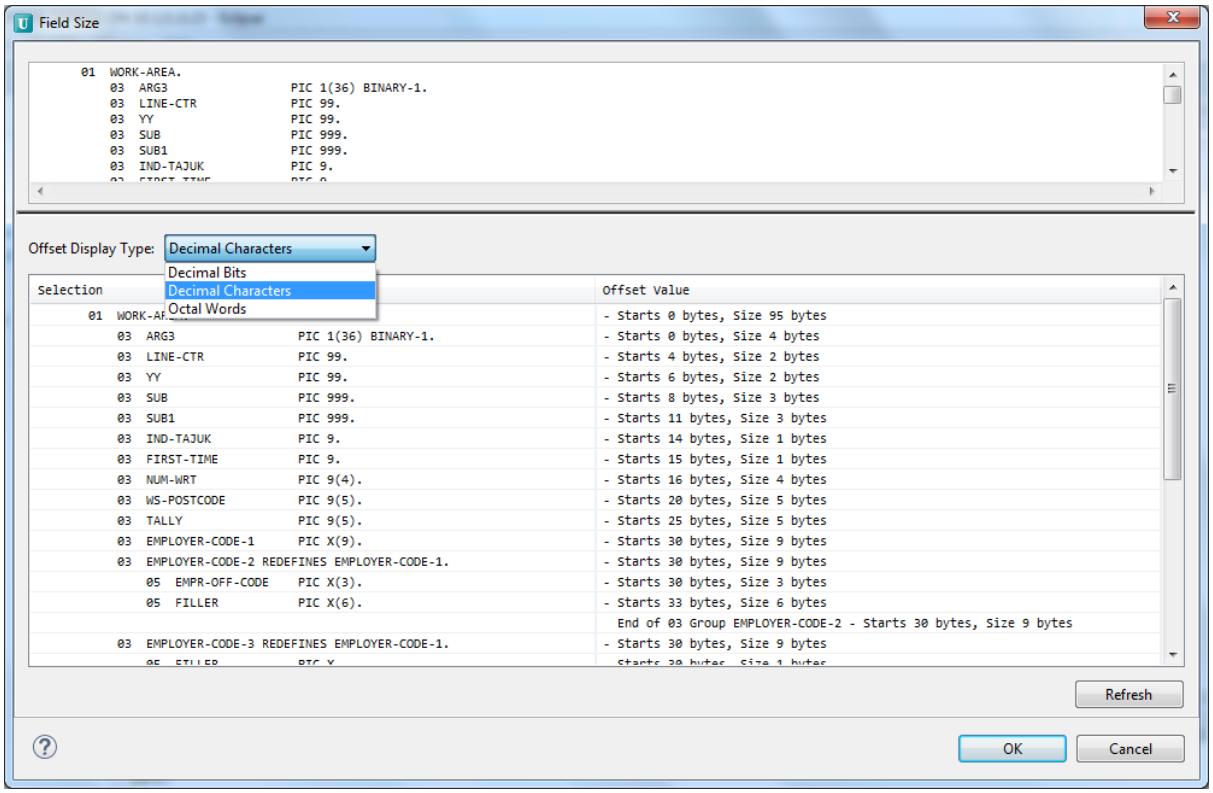
Then use **Menu -> OS 2200 -> Field Size**.



Or use the icon 

Or use **Ctrl+Alt+S**

Eclipse presents the variable and field size. The offset can be changed to one of 3 options with Decimal Characters as the default.

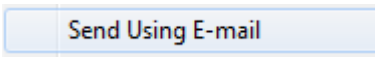


Sending Elements/Files as Emails

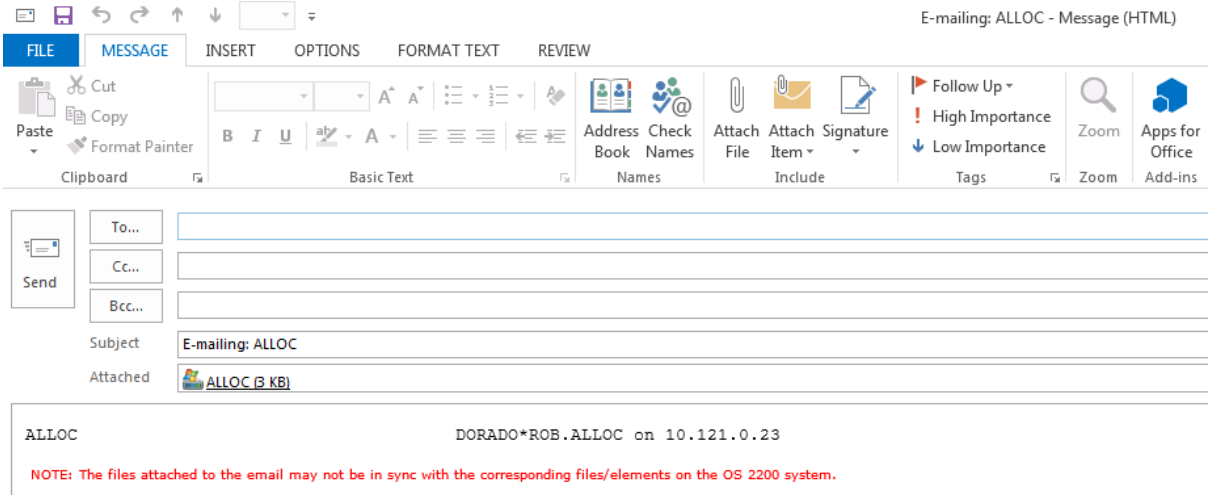
Often source code needs to be emailed as an attachment to others.

Use the menu icon  .

Or right click on a file/element in either OS 2200 Explorer or OS 2200 File Explorer and select the following from the context menu:



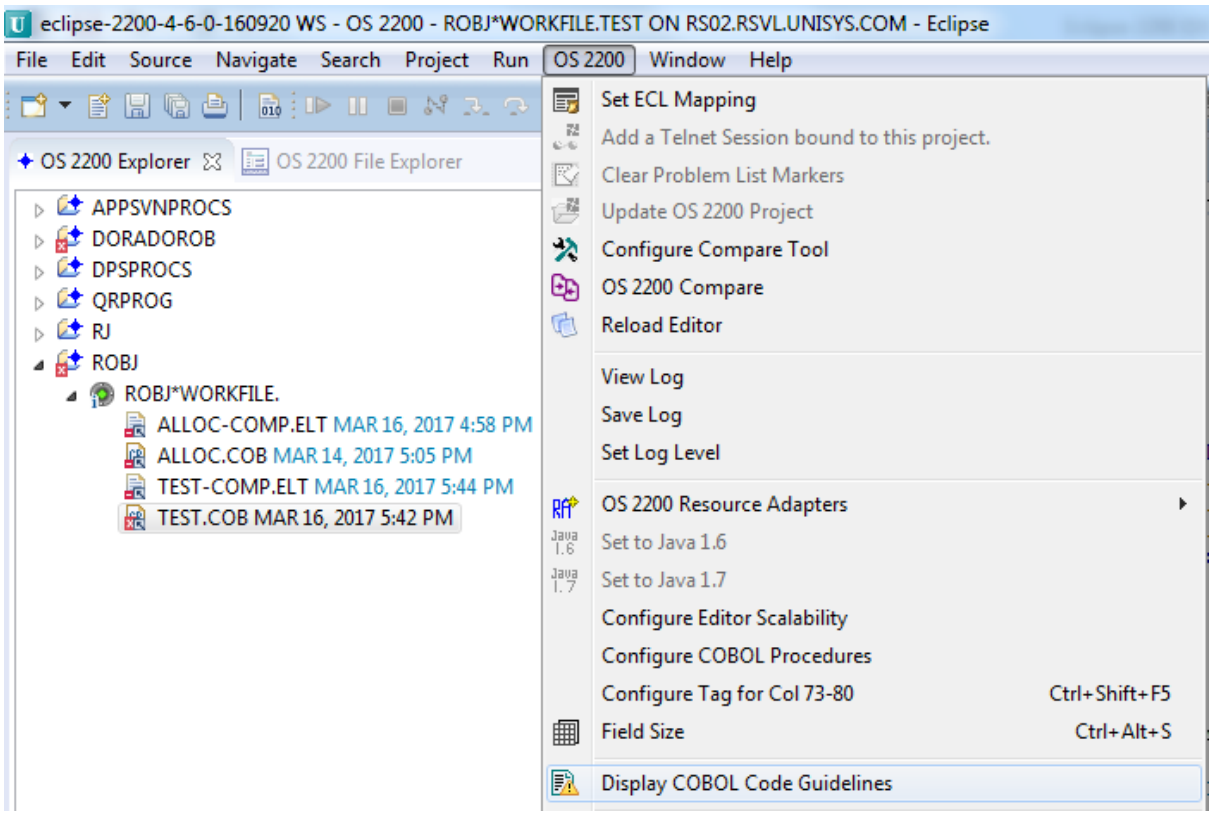
The following draft email is created:



COBOL Code Guidelines

When defining the OS 2200 Preferences, various priorities were set for COBOL Code Guidelines.

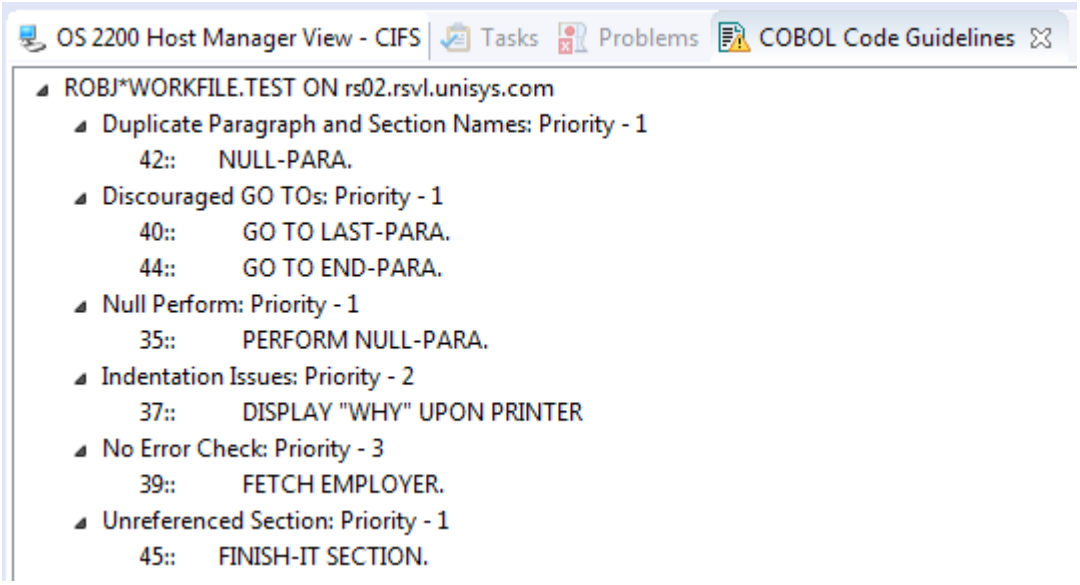
These guidelines are be used when editing a COBOL source by clicking the menu icon  or by using **Menu -> OS 2200** and then selecting **Display COBOL Guidelines**:



As an example, let us consider the following COBOL code:

```
21        PROCEDURE DIVISION.
22
23        A000-CONTROL.
24            display "start alloc" upon printer.
25            MOVE "A" TO WS-FLD1.
26            MOVE "A" TO WS-FLD2.
27            MOVE "A" TO WS-FLD3.
28            display "WS-FLD1: " WS-FLD1 upon printer.
29
30        END-PARA.
31                  STOP RUN.
32
33        NULL-PARA.
34        TEST-PARA.
35            PERFORM NULL-PARA.
36            IF WS-FLD1 = "A"
37            DISPLAY "WHY" UPON PRINTER
38            END-IF
39            FETCH EMPLOYER.
40            GO TO LAST-PARA.
41
42        NULL-PARA.
43        LAST-PARA.
44            GO TO END-PARA.
45        FINISH-IT SECTION.
```

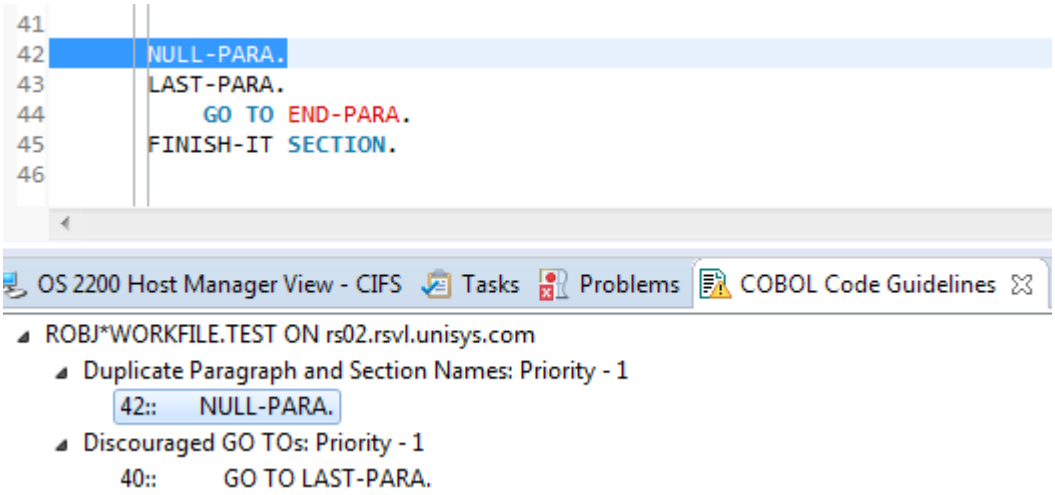
Now select the Display COBOL Guidelines as described above. The results are:



The tool only reports the suspect code but takes no action. The programmer can use these guidelines to review the code.

Note the COBOL Code Guidelines pane has icons at the right to expand/contract the results, remove matches and save the results:

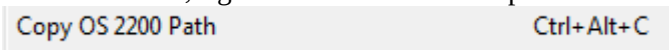
The user can double click on a line entry and Eclipse will position the editor to the same line of code:



Copying Full OS 2200 Path Name

This feature allows you to copy the full OS 2200 file name in case it is needed to other use.

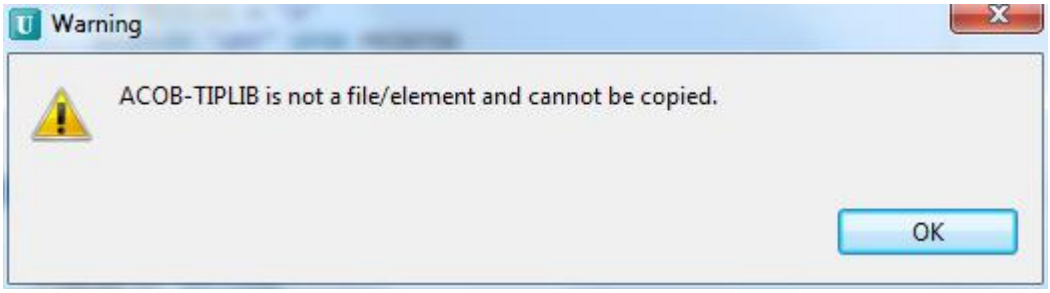
From the editor, right click and select the option in the context menu



As per above, there is a shortcut key for the editor in Ctrl+Alt+C.

From OS 2200 Explorer or OS 2200 File Explorer, right click on a file/element and select the **Copy OS 2200** Path entry.

If the selected file is a program file, Eclipse will issue an error:



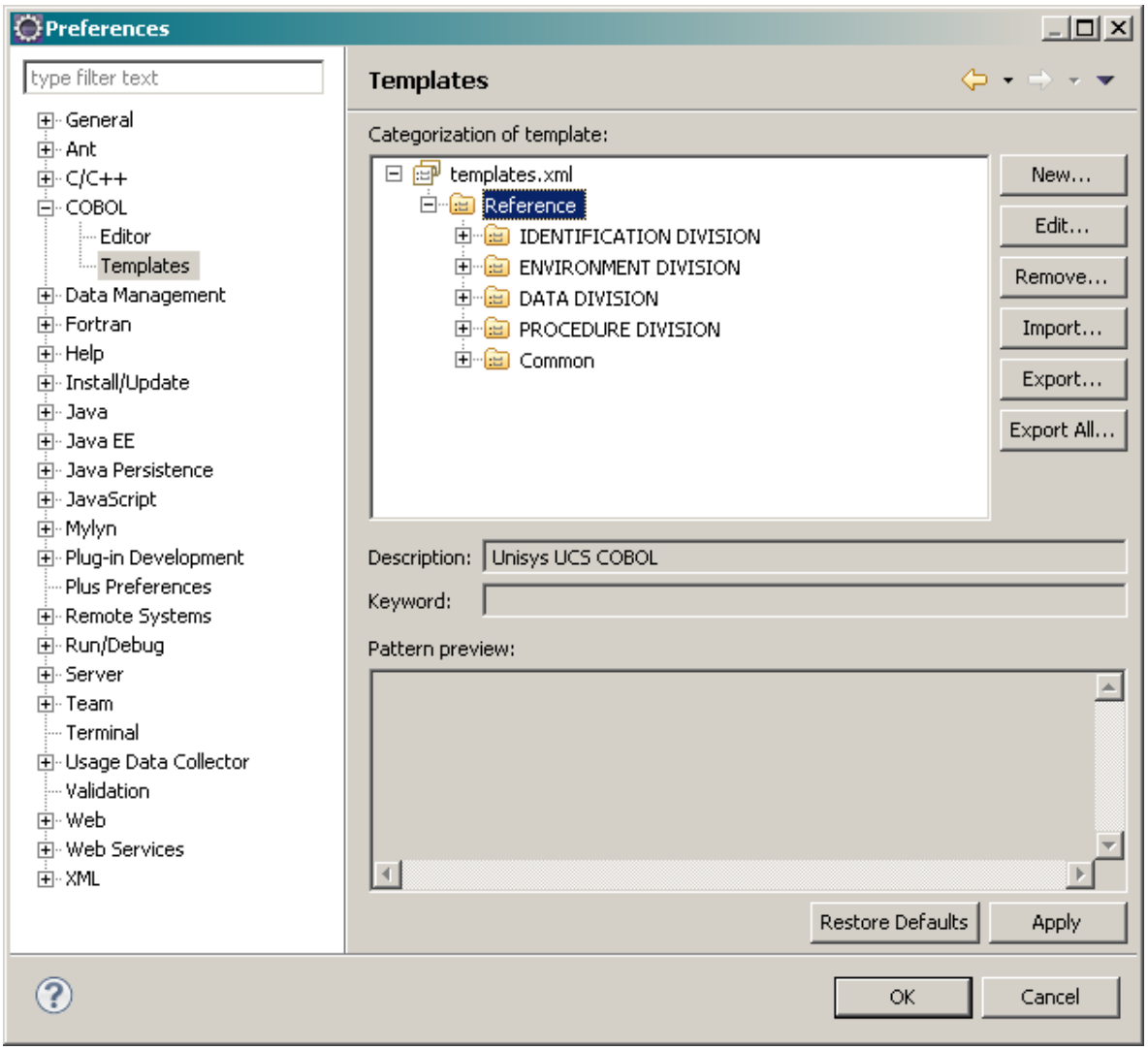
Using Templates

Eclipse can support the use of Templates to save coding. We have already seen how auto-completion can allow us to select the desired COBOL statement or command and then insert the code into our program source. Unisys has developed templates for UCOB but a client can define their own templates. For example, you might require a complete program template or you might want to define site standard code for database error handling etc.

If the following section, the creation, maintenance and sharing of templates is discussed. Note that this section only applies to using templates with the COBOL editor.

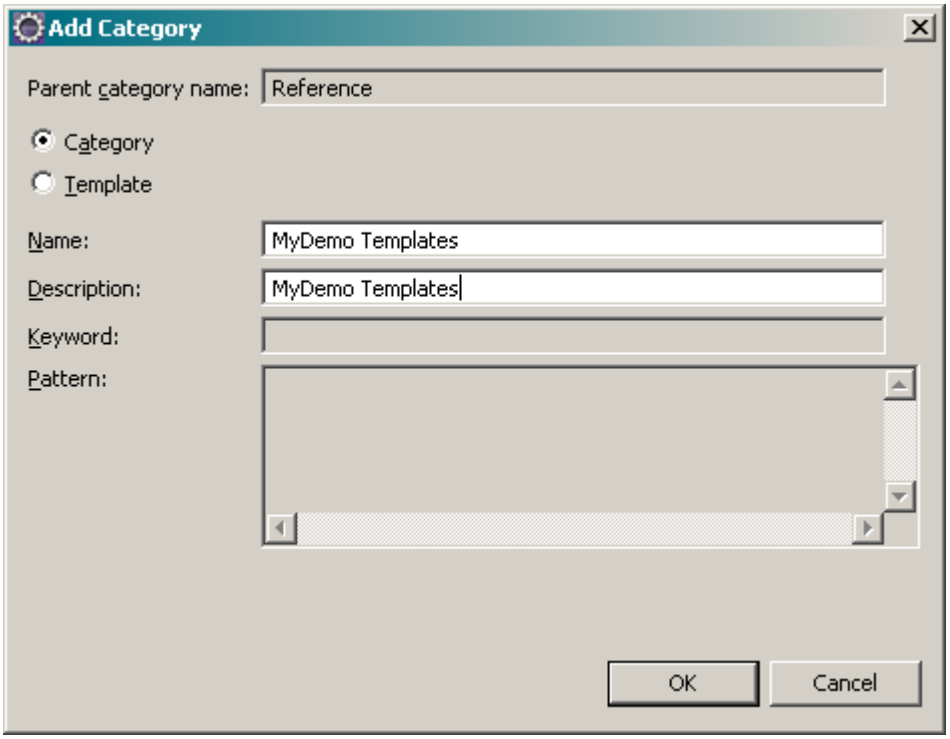
Creating Templates

To create your own templates, you need to go to **Window → Preferences** in the menu bar. Then example the COBOL entry and click on the Template entry.

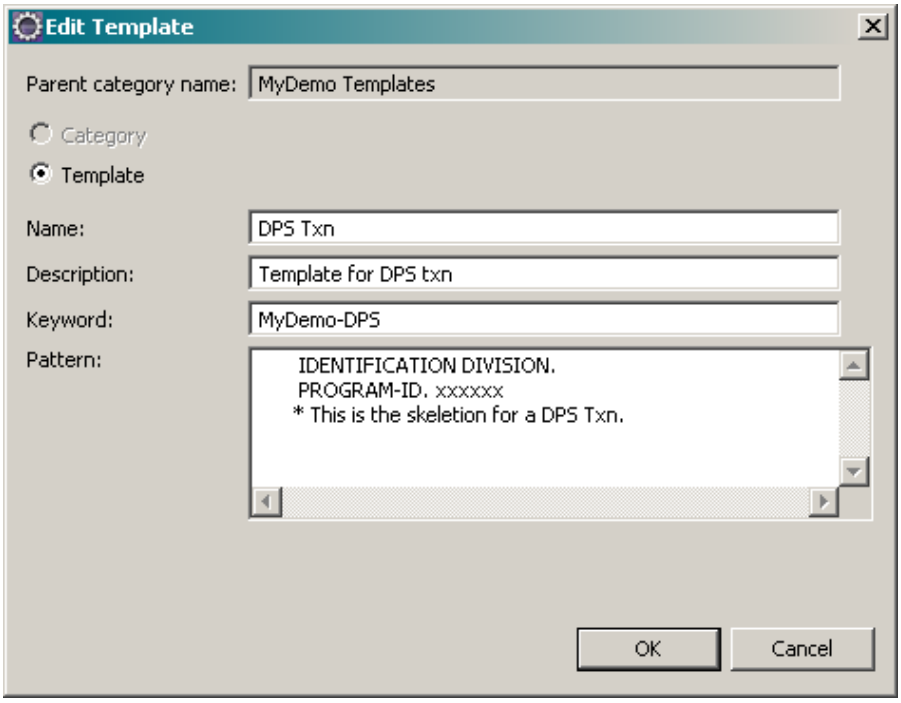


The template structure consists of categories and then templates. Categories can be nested. So for our case, let's create a new category under the Reference category. Highlight the Reference folder and then click "New".

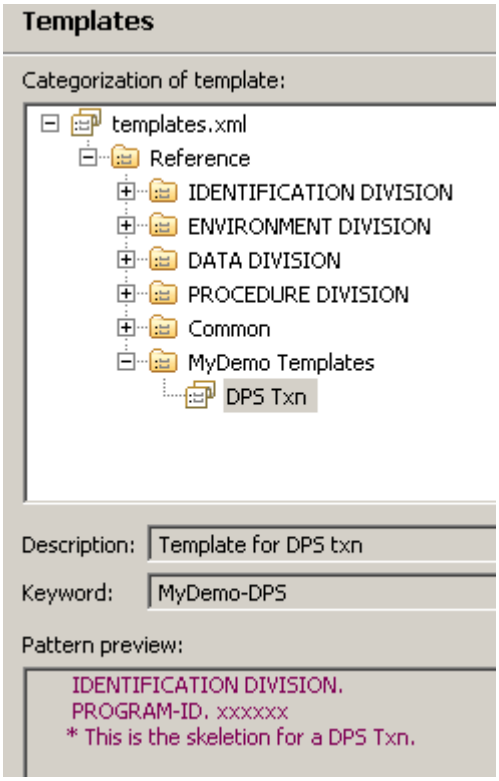
Select the Category radio button and then enter meaningful name and description. Click "OK".



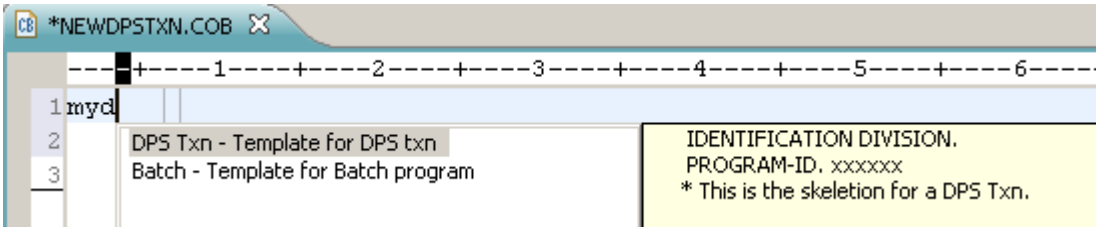
Now we need to create our template. With our category highlighted, click the New button. Enter a meaningful name and description. The most important field for the template is the Keyword. The Keyword is used by Auto-Completion (Ctrl + Space) to present entries matching the keyword (or the leading characters that have been entered.) So it is recommended to use a prefix on the keyword that easily identifies your local templates. In the following example, MyDemo- was used as the prefix. So if the user types "MyDemo" and then clicks Ctrl+Space for auto-completion, they will see all templates with a keyword beginning with MyDemo.



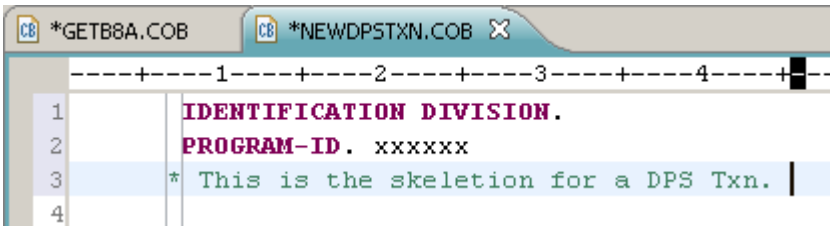
Click OK to save.



It is recommended to use a prefix on the keyword that easily identifies your local templates. In the following example, MyDemo- was used as the prefix. So if the user types "MyDemo" and then presses Ctrl+Space for auto-completion, they will see all templates with a keyword beginning with MyDemo as shown below. (We only need enough characters to match the category hence the demo shows "myd".)



So if we double-click on the DPS TXN entry, the template will be copied to our editor working pane as shown below.



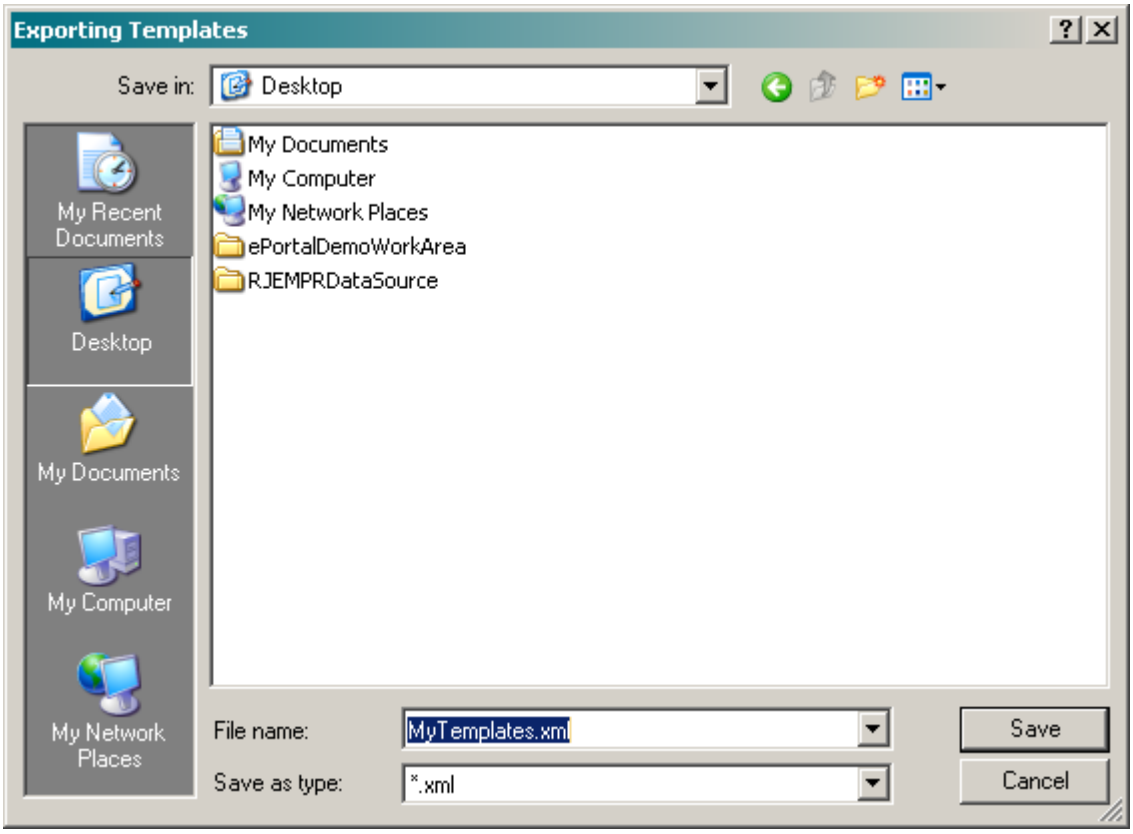
TIP: Turn off Auto Tag when using templates.

For this example, we also created a Batch template called Batch. The result shows how we have our 2 templates under our category of MyDemo Templates.

Maintaining and Sharing Templates

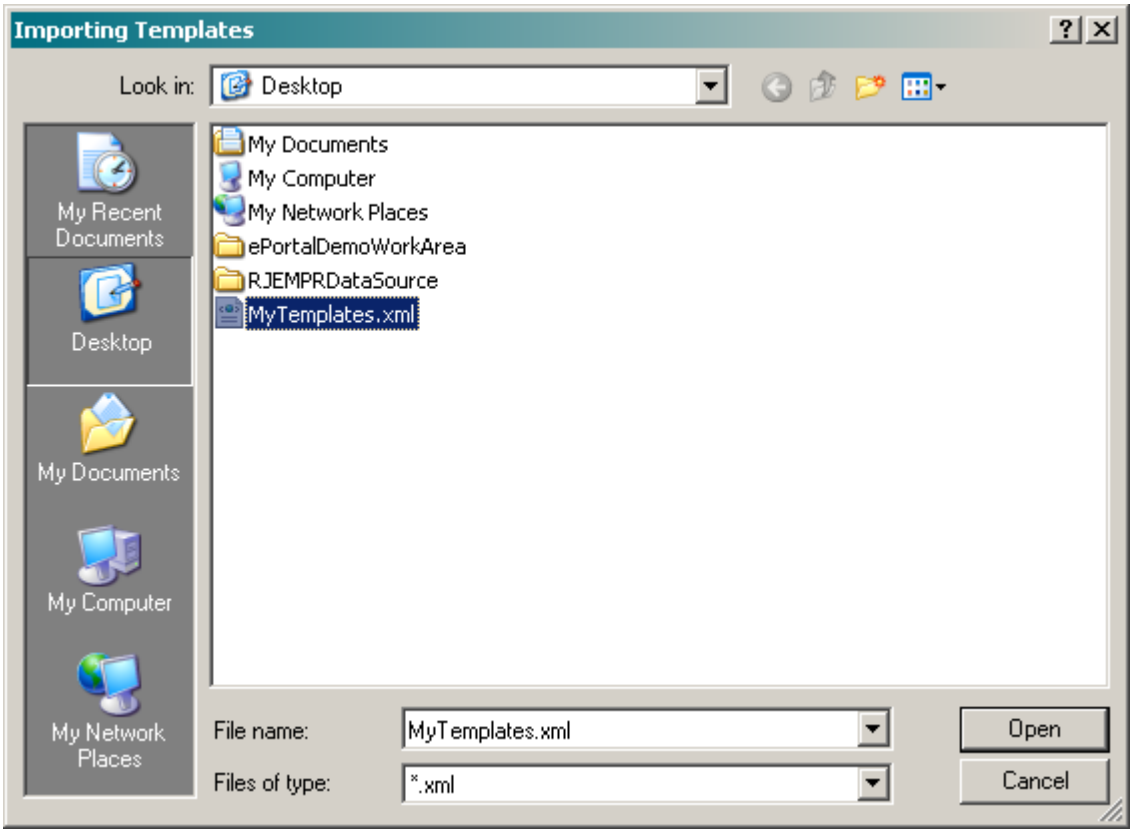
Now that we have defined our templates, we may need to share them with other users. Currently the templates only exist on the local workstation. Eclipse provides Export and Import functions to assist in maintaining your templates. (Refer to the previous screen and you will see the Export/Import

buttons on the right side of the window.) The Export function will create a XML file in a directory that you select by specifying the location in the Save In field. You can export categories or templates.



To share with other users, this export file needs to be provided to the other users so they can import it. If you maintain an OS 2200 file that contains your Eclipse information (All-In-One file, manuals, JDK installation file etc) then this might be a good vehicle to make the file easily accessible to other users.

So the other users need to do an Import as shown below.



Templates and New Eclipse Releases

If you do use local templates, remember to export them from the current Eclipse environment when upgrading to a new Eclipse release. These local templates will not be in the Unisys Eclipse release files.

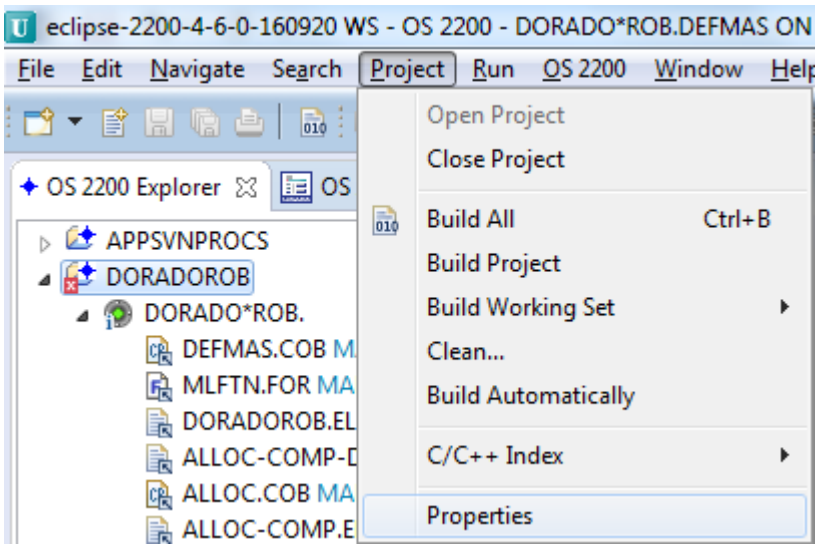
Building an OS 2200 Project

At this stage we have coded our program and now we need to build the project. When you build a project in Eclipse, a predefined set of ECL commands is sent to the OS 2200 host via a Telnet session. These commands could compile and link (MAP) one or more programs plus do other OS 2200 tasks like using SUPUR to update a TIP transaction library file.

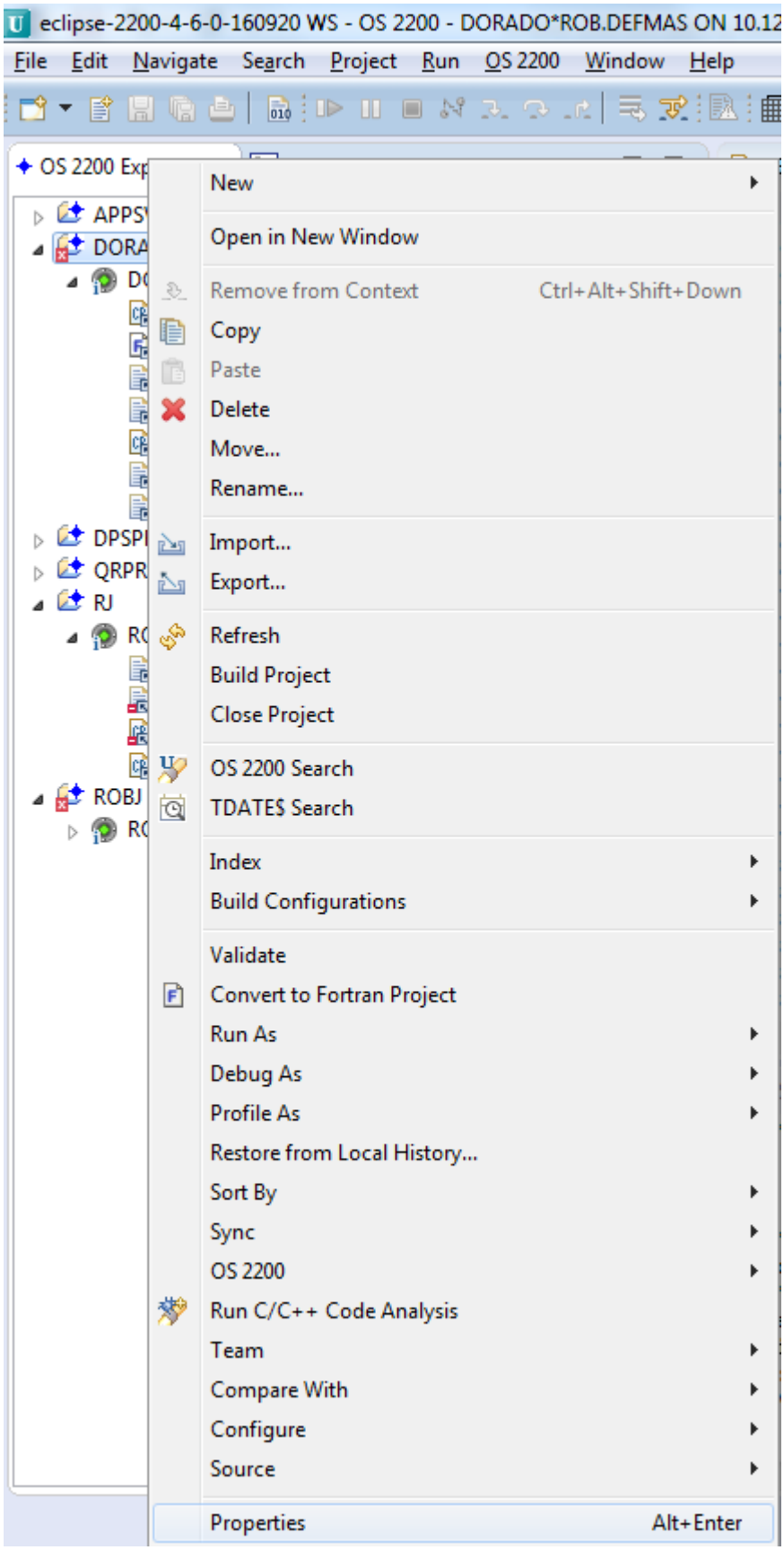
Configuring the Build and Brkpt properties

Earlier when we used the wizard to define a new project, we skipped the screen that requested Build and Breakpoint information. We will now update these properties of the project as it is the Build commands defined in these properties that are submitted to the OS 2200 host.

From the menu bar, go to **Project → Properties** and click.

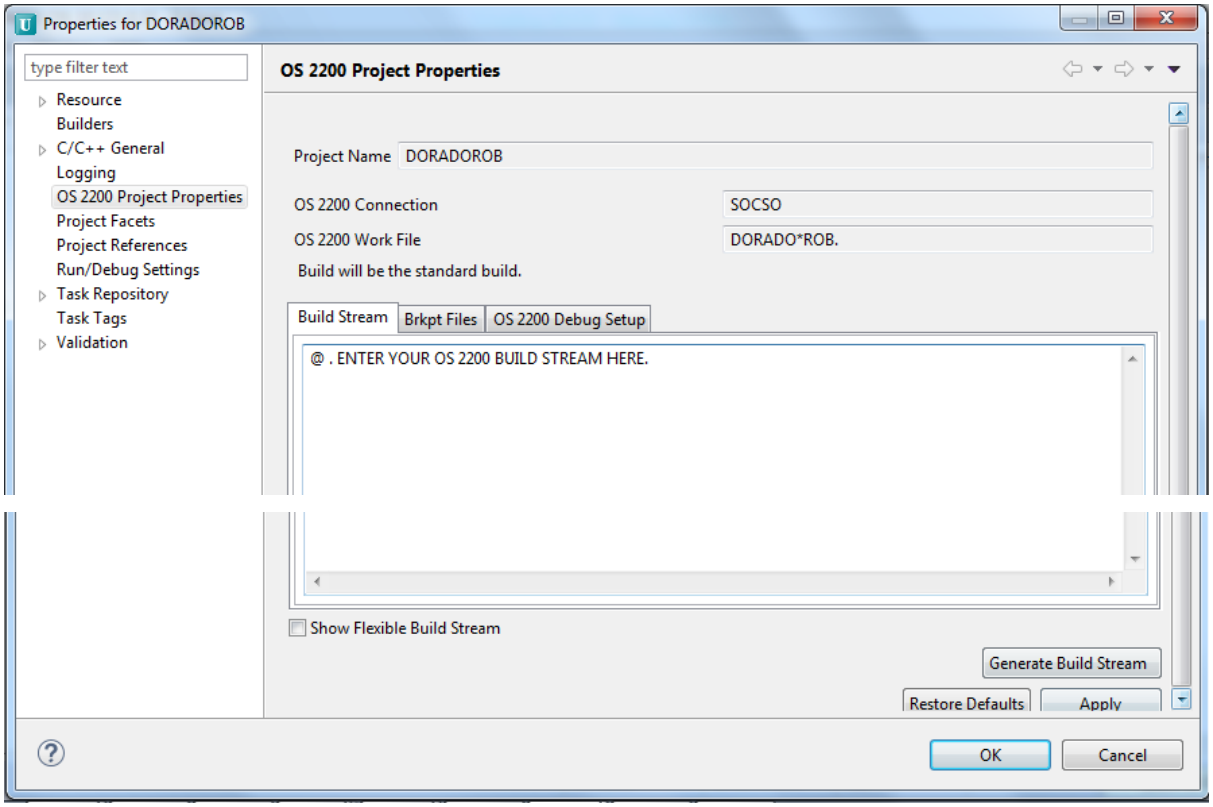


Or right click on the project in the OS 2200 Explorer view and select **Properties** from the displayed windows:



Or use **Alt+Enter**.

This results in the following screen being displayed for an OS 2200 project.

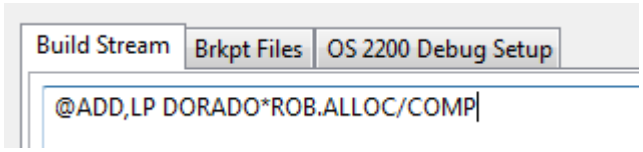


Configuring the Build Stream

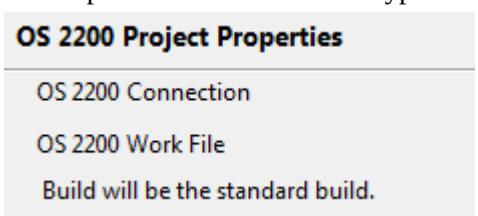
Note that the Project Name, OS 2200 Connection and OS 2200 Work File are fields that are not updateable.

User Defined Build Stream

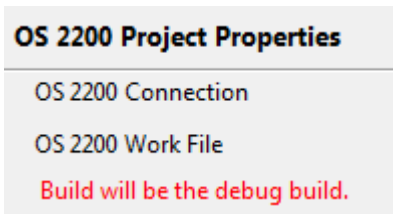
At the Build tab, we can enter various ECL statements that will be used to build our project based on what the programmer wants to do. In the above screen, there is the default entry. Below I have updated the Build Stream to @add an element. However you could have an @SSG call here, or compiler commands etc. Any valid ECL is allowed – just like you would do in a demand session.



It is important to note the build type. If it is a standard build, the screen shows:



Later we discuss a debug build which changes the screen to:

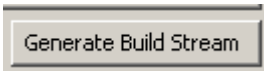


The above screen shows this is a standard build as opposed to a debug build.

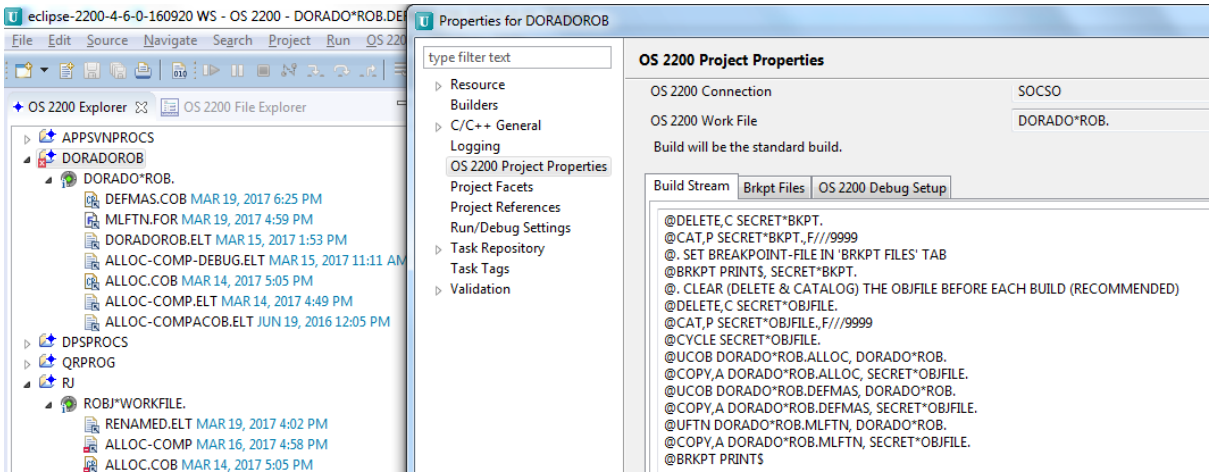
Note: If you want Eclipse to report Error, Warning and Information messages as described later, you have to set the L option on an @ADD or other processor options that generate listings.

Creating a Default Build Stream

Eclipse can generate a default Build Stream based on your project details. Click on the Generate Build Stream button at the bottom of the wizard:



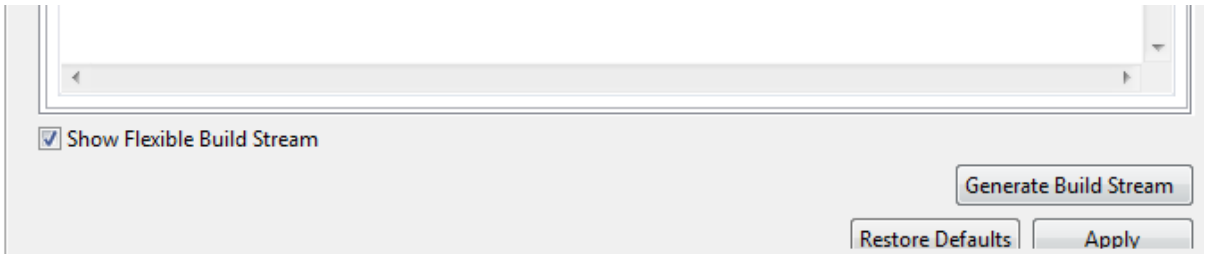
The result in my example is:



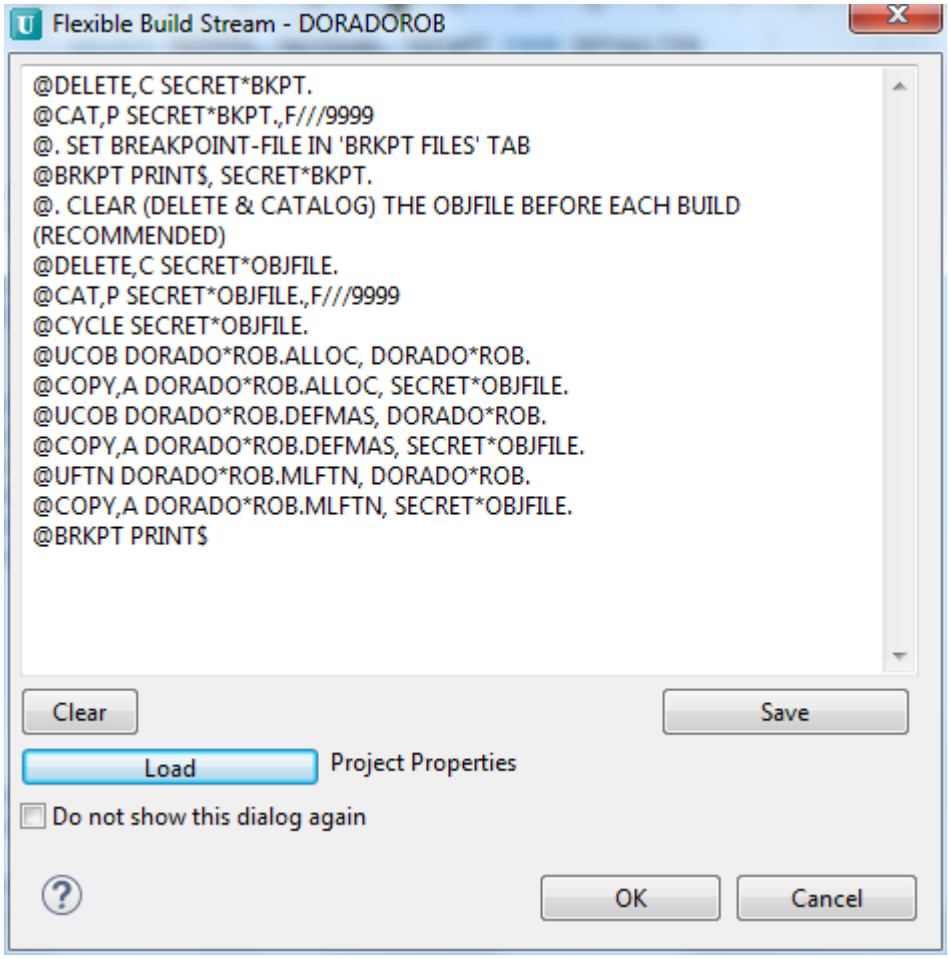
The default Build Stream creates UCOB and UFTN compiler statements for each COBOL and Fortran element in the project. This might not meet your site standards but maybe a starting point that can be edited for your requirements. For example, you might want to assign PDP COPY Proc files, use specific compiler options, obtain compiler output or do a static LINK.

Flexible Build Stream

This feature allows the programmer to review/modify/save/load the require build stream. Check the box at the bottom of the build stream:



When a project build is performed, Eclipse will send this dialog:



The user can use the displayed build stream and just click **OK**.

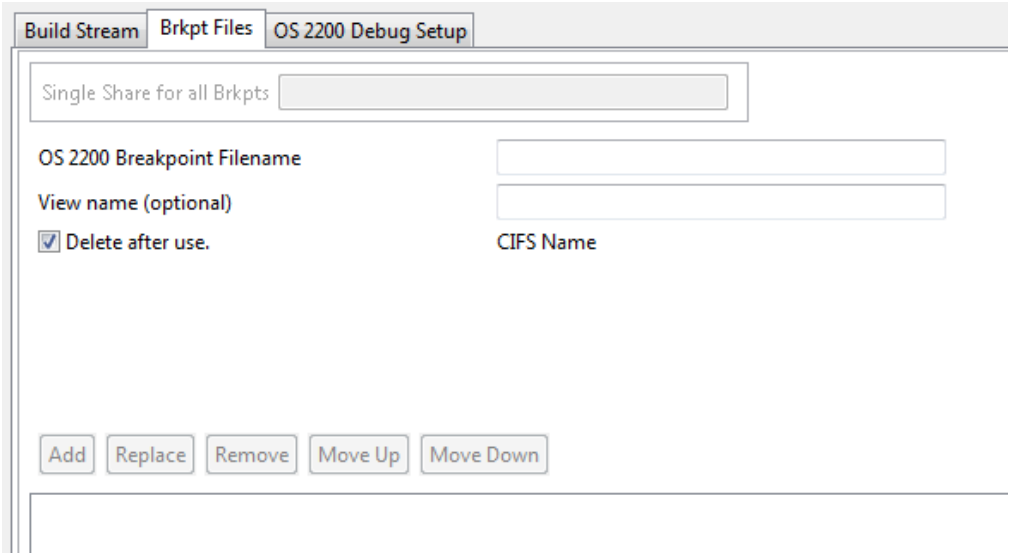
Or they can update the build stream and click **OK** to use it. Optionally the modified build stream can be saved by clicking **Save**. This saved build stream is displayed on the next build.

By clicking **Load**, a saved build stream will be restored and used for the Build. The user can browse to the location of the saved build stream:

The flexible build stream could be useful where the project contains many source programs and only a subset of these need to be compiled. Or the site has developed SSG routines where the programs to be compiled are entered as parameters.

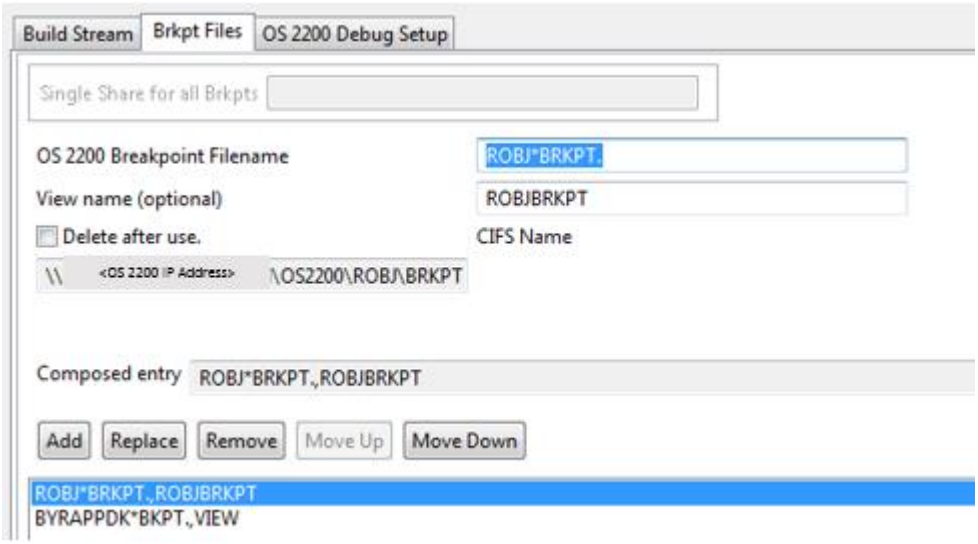
Configuring the Brkpt Files

Now go to the Brkpt Files tab that looks like the following screen:



If your Build Stream commands (or the elements they use) create a brkpt file, then you can enter the OS 2200 Breakpoint Filename here. (Actually it could be any valid OS 2200 data file.) Note that if you enter a View name, then Eclipse will open a pane in the diagnostic window with the contents of the Brkpt file at the end of the project build process. Be careful with the 'Delete after use.' check as the Brkpt file will be deleted if this is checked. Note that multiple Brkpt files can be defined.

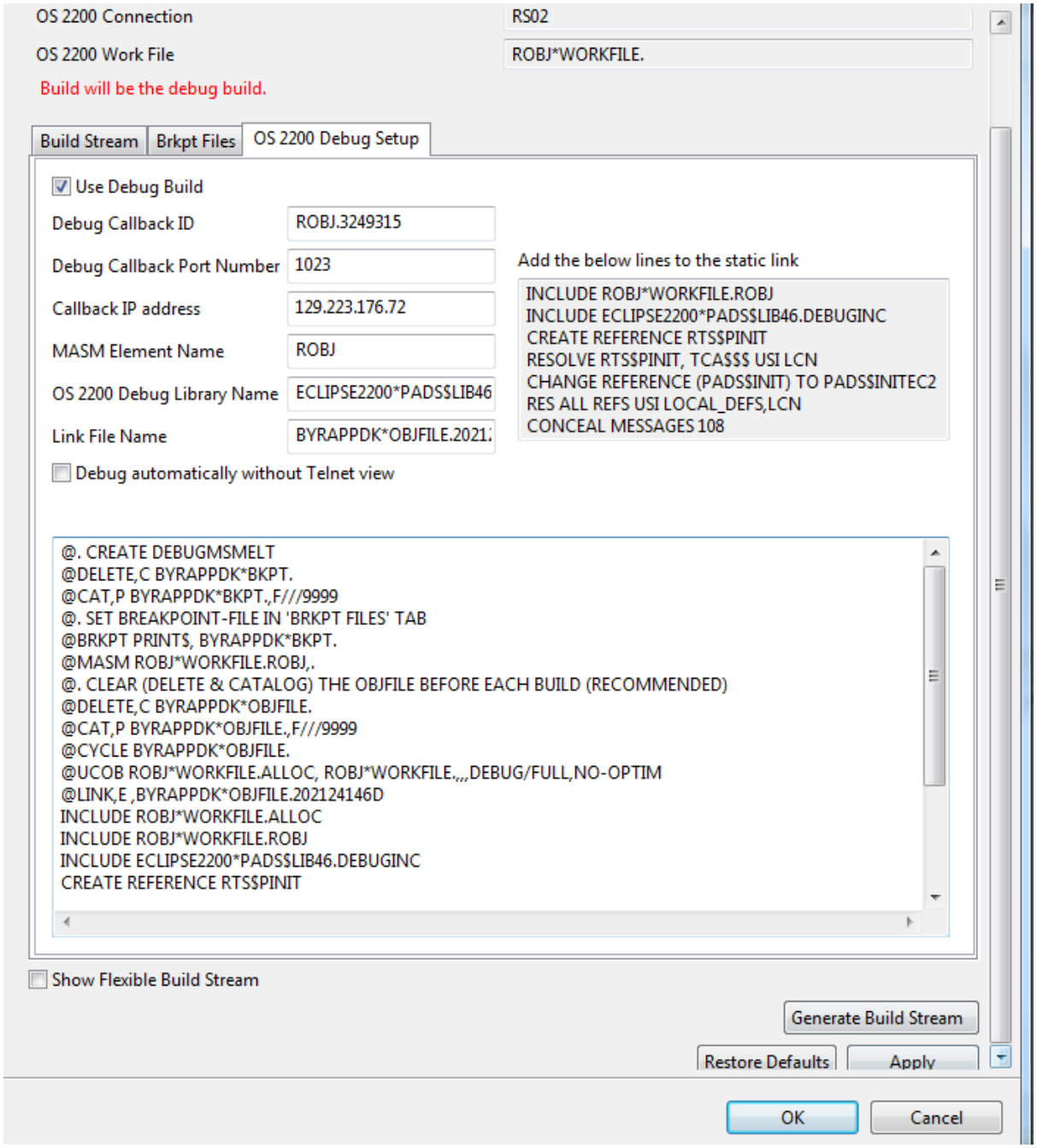
Note that Eclipse does a timestamp check on the Brkpt files and will only process and display the file if the last reference timestamp is after when the build was started.



By highlighting a Brkpt file, you can modify the settings.

Configuring the OS 2200 Debug Setup

Click on the OS 2200 Debug Setup tab. Eclipse shows the setup information for a debug build. Debug builds are used with the Eclipse debugger module to provide an interactive debug session. Programs must be complied with a UCS compiler like UCOB and using the appropriate compiler options. DEBUG/FULL and NO-OPTIM are mandatory. The Eclipse PADS library compatible with the Eclipse IDE release must be installed on the OS 2200 host. Check with your system administration for the name of the installed Eclipse PADS library file – it is needed for debug builds.



Note that when the **Use Debug Build** checkbox is selected, the build type is changed to indicate this will be a debug build.

The **Debug Callback Id** is used when creating your debug session. Use a unique value but a good practice is to choose a value that matches your program to be debugged.

The **Debug Callback Port Number** is the port number used by PADS to send data to the Eclipse debug session running on a workstation. Generally use the default value.

The **Callback IP address** is the IP address of the workstation where the Eclipse debug session will be run. (PADS will send information to this port.) Generally it is your local workstation IP address.

The **MASM Element Name** is the name of the element in your Project file (OS 2200 work file) where Eclipse writes the MASM element required for PADS to interface with the Eclipse debugger. Different elements can be created but the default is the Project Name. If you are debugging multiple programs in the same OS 2200 work file, then use a value to identify each program e.g. ABC/DEBUG for program ABC.

The **OS2200 Debug Library Name** is the name of the Eclipse PADS library file on the 2200.

The Link File Name is the target output object module from the @LINK in the debug build stream. This can be copied to make it easier to use in a debug runtime session.

Eclipse creates a set of LINK statements that must be used in the @LINK of the program. You can copy/paste these statements as required.

In the edit window, Eclipse creates a default compilation build stream that is required for a debug build. You can edit this as required. (Note that this build stream is used for a debug build and not the build stream under the Build Stream tab but only if the Use Debug Build box is checked.) It is necessary to call the MASM processor to generate an object module from the appropriate MASM element. The LINK statements are also essential.

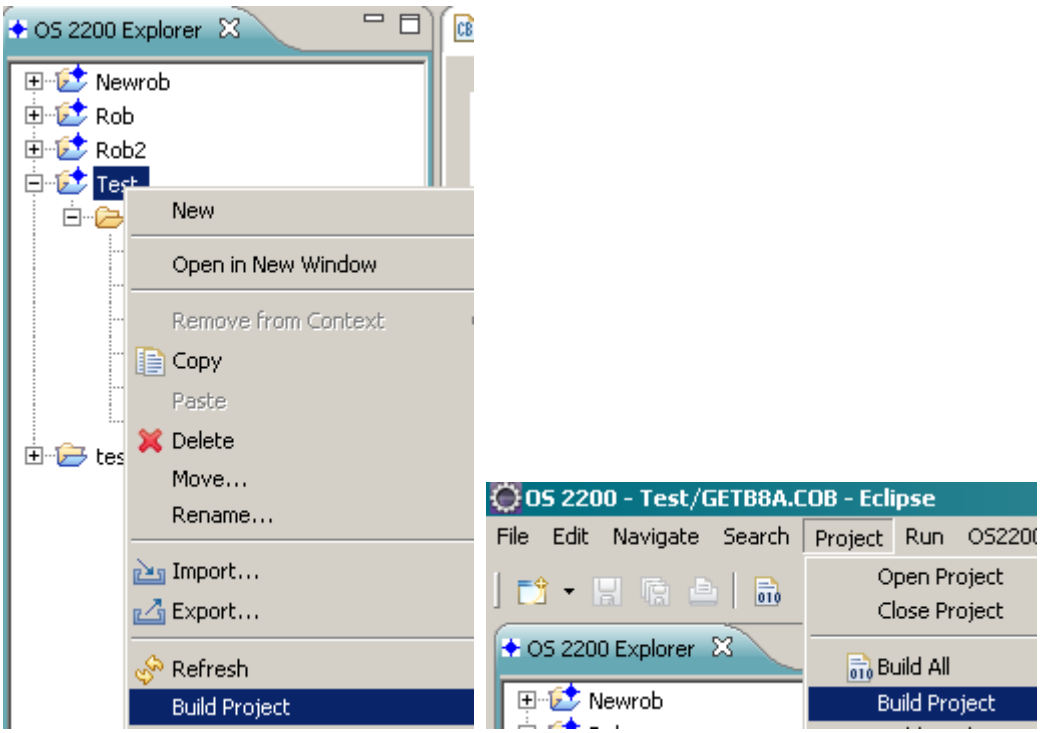
Before a UCS executable can be debugged:

- A special debug element must be created. This element contains information the PADS subsystem will use to call back to the PC at startup.
- The executable needs to be static linked to:
  - Include the special debug element;
  - Include a certain debug library OM;
  - Cause a special PADS entry point to be called at start time.

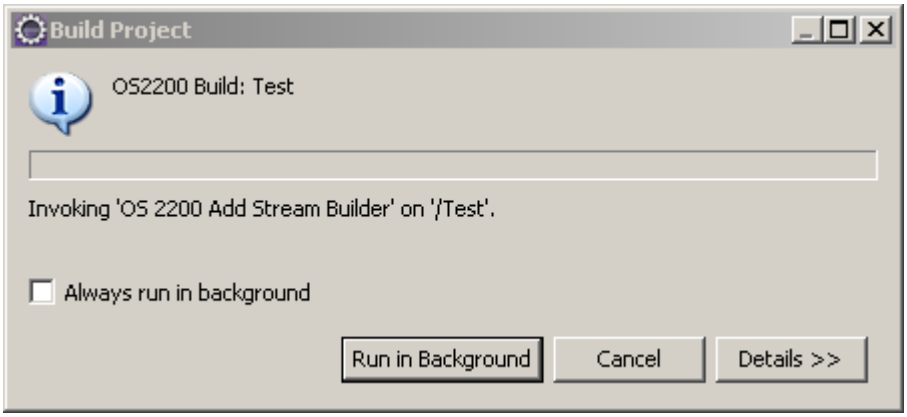
Refer to the section on UCOB Debugging for more details. For now, leave the Use Debug Build unchecked.

Doing the Project Build

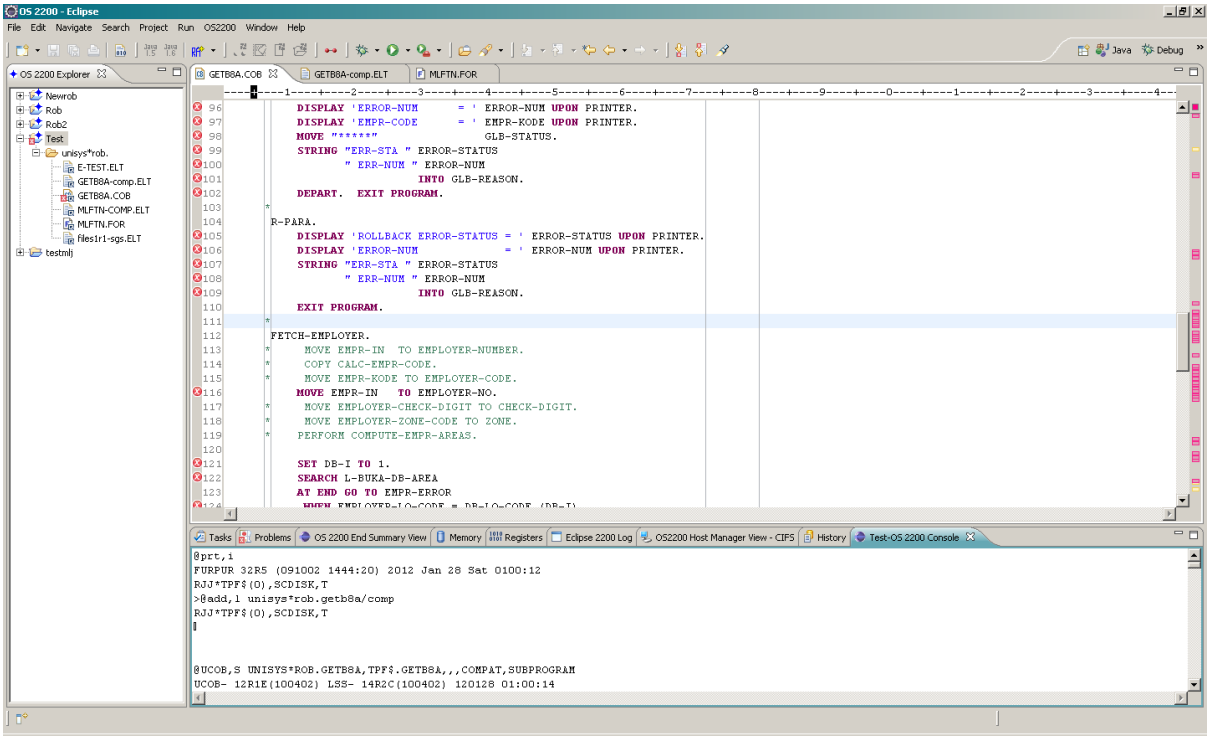
Now that we have defined the build commands, we can perform the project build. Go to the Explorer pane and right-click on the project name. Or go to the menu **Project → Build Project.**



Click the **Build Project** entry. Eclipse will pop-up a dialog with the build status.

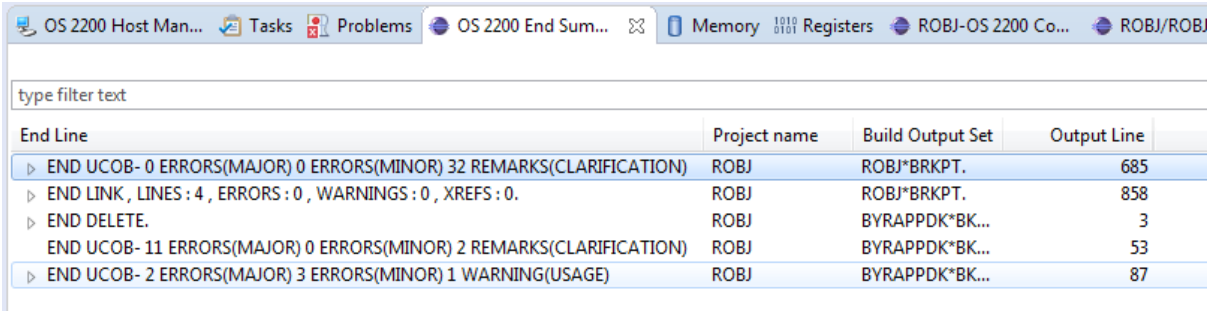


You will notice that Eclipse has opened a new pane called the OS 2200 Console. After the Build Project process has finished, this window appears at the bottom of the workbench as a tab in the diagnostic window.



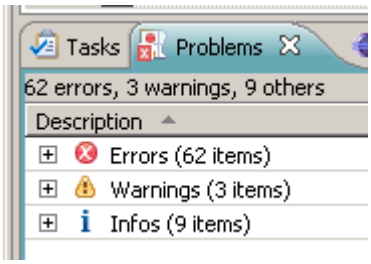
As you can see, this OS 2200 Console pane shows the results of the build process. Firstly Eclipse has performed a @PRT,I and then submits the Build Stream ECL that we defined earlier. Note that if a Brkpt file was defined and it had a View name, it would appear as a pane next to the OS 2200 Console. You can enlarge this pane or use the scroll bars to look at the output. However Eclipse does check the OS 2200 Console and any Brkpt files for you looking for Errors, Warnings and Informational messages.

There is a pane titled “OS 2200 End Summary View” that contains the output for all lines beginning with END. (In a demand session using @ED, you may have issued FC END to get this info.) You can quickly check if any errors were reported.

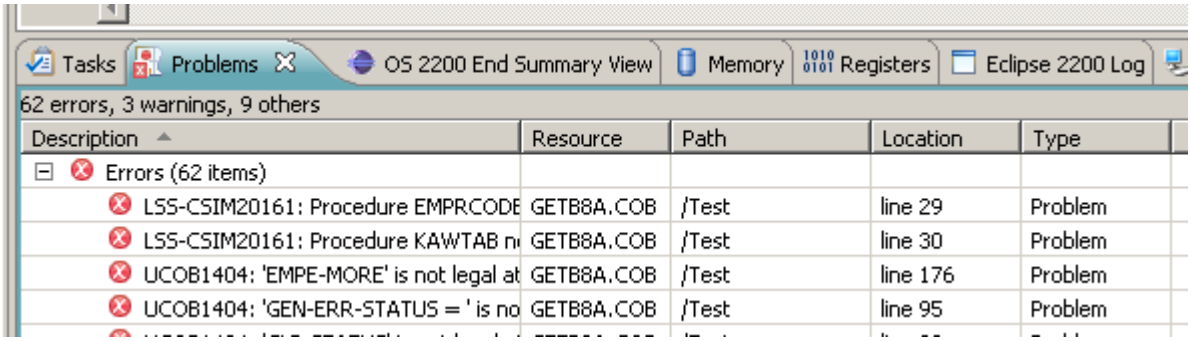


Note that OS 2200 End Summary View contains the output from many project builds. This can lead to confusion so you can clear this view by clicking the following icon on the right side of the pane title:

By clicking on the Problems tab, you will see a summary of the results of these checks.

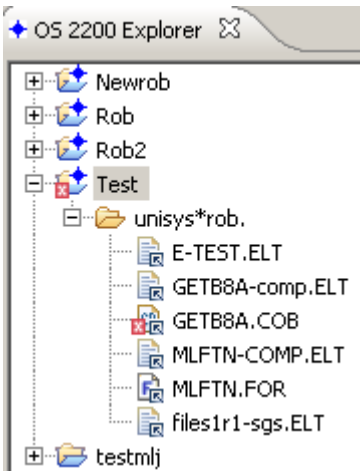


You can expand each type of error by clicking on the '+' sign.

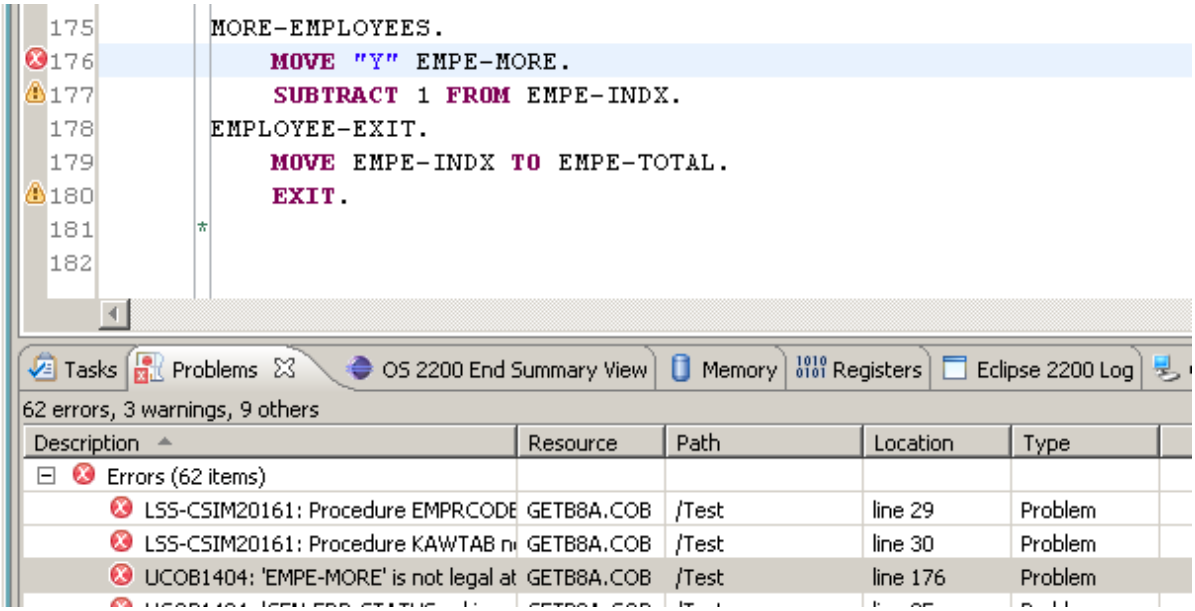


Eclipse prints the error/warning message, the path indicates the project with the problem and the source line number.

The navigation pane will also indicate the project files with errors by placing the same error icon on the name. A programmer can easily see which files have errors.



As a programmer, you would want to go to that line to correct the problem. By doubling-clicking on the problem line, Eclipse will open the element in question and position the cursor on the line in error.



In the above case, the problem entry for line 176 was double clicked and the COBOL editor opened the GETB8A file and positioned the editor at line 176. Notice the editor also indicates lines with problems – different icons are used for errors, warning and informational.

Interactive Debug for UCOB

Follow the procedures described earlier for performing a debug build for the project.

Perform the Debug Build

The UCS interactive debugger operates by causing the OM or ZOOM to call back to the PC doing the debugging during the normal run of the OM or ZOOM. To accomplish this action the executable must be static linked to include certain OMs and cause PADS to be invoked through a special entry point. This is accomplished by the debug build. The OM or ZOOM is acting as a TCP/IP client and the PC as the listener. It is necessary then that the 2200 be configured to allow calling out and that firewalls do not prevent a PC from receiving connection requests from the 2200.

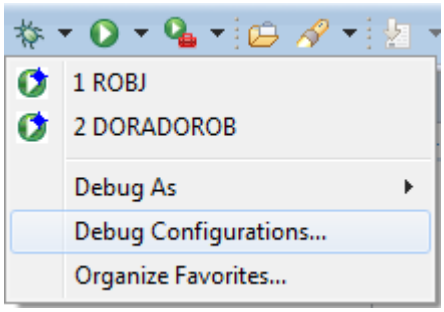
Debug Build Best Practice

The OM or ZOOM output with the debug settings should be placed in a different file to where the UCOB source program is located. If the source and OM/ZOOM are in the same file when the debug session is run, problems can occur.

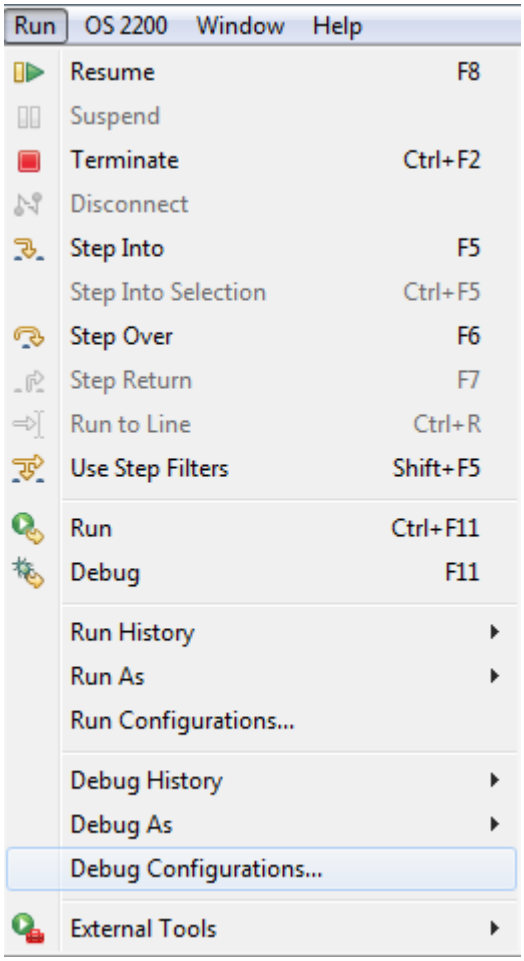
Defining a Debug Configuration

There are a number of ways to initiate the debug session but first we need to define a debug configuration. One the main icon, click on the debug 'bug'.

Then select Debug Configurations.

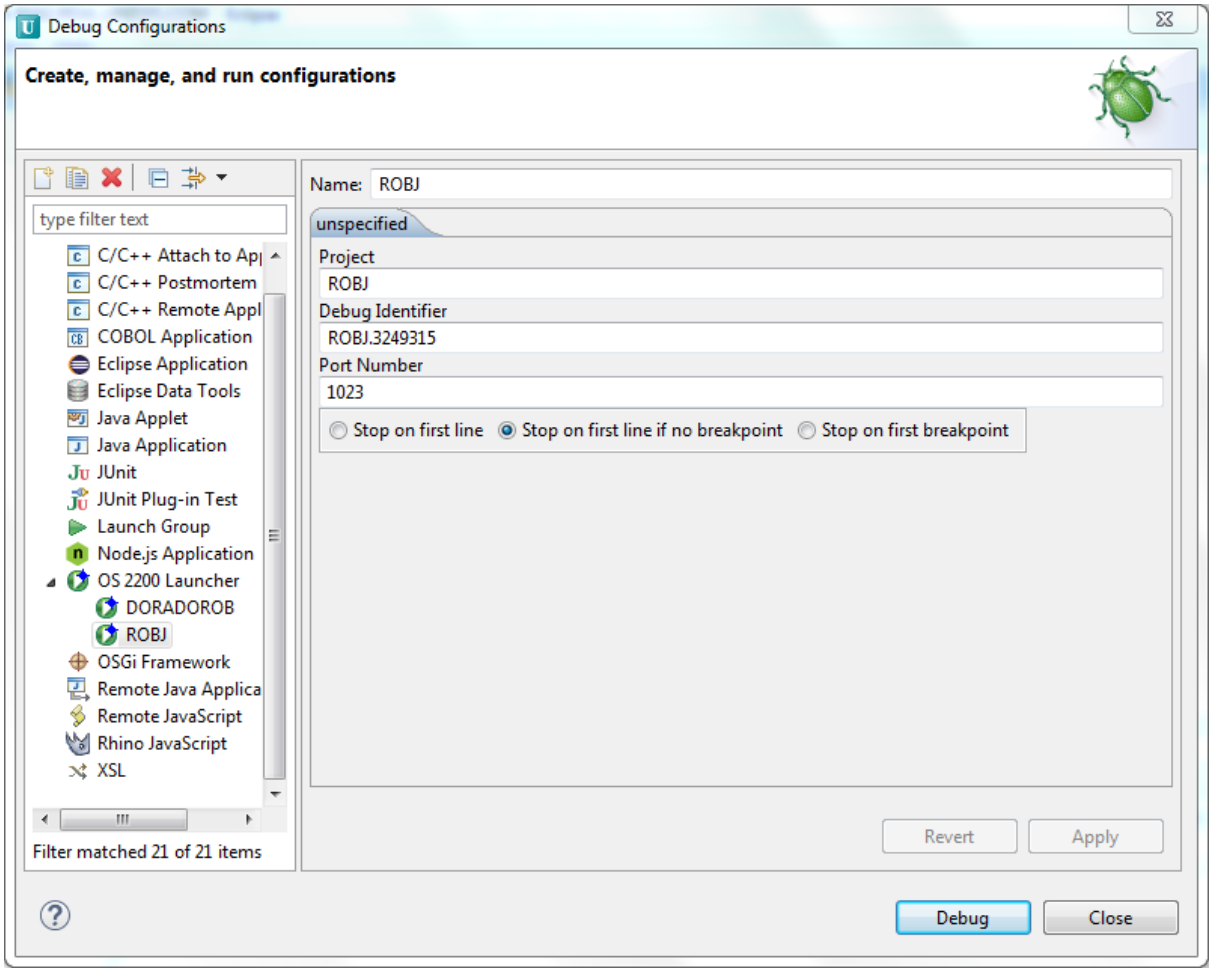


Or go to the menu **Run → Debug Configurations.**



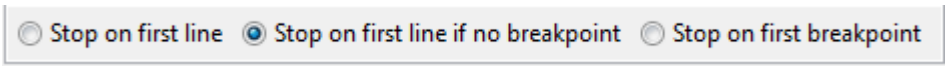
The wizard displays a dialog to be filled in with information for this debug configuration. Multiple configurations can be defined. Eclipse will define a definition from a debug build.

Click the required debug configuration under the OS2200 Launcher if the wrong debug configuration is selected.



If a new debug configuration, define a meaningful name. The Project, Debug Identifier and Port Number should match the information used in the project debug build stream.

Note that the first place where the debug stops is controlled by the following selection:

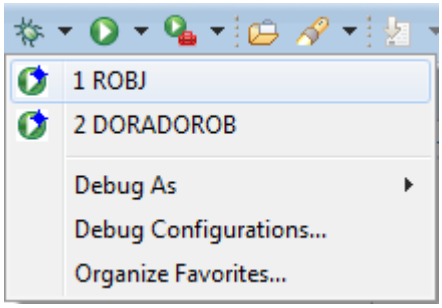


You may need to change this setting depending on what your debug intentions are.

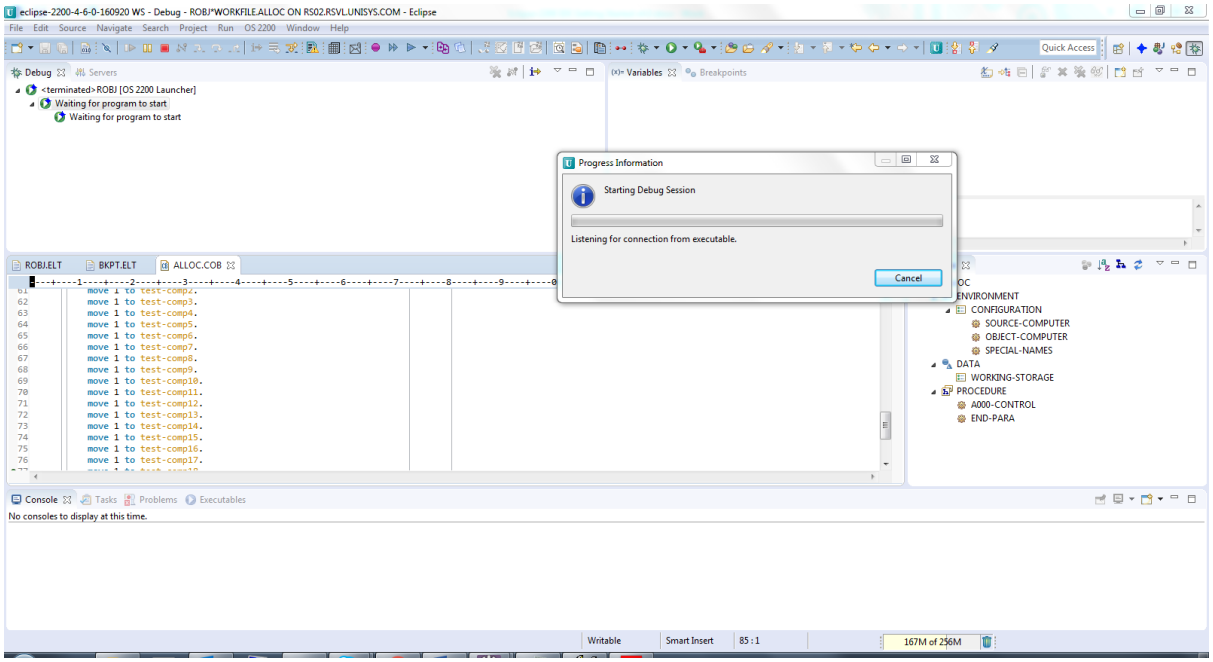
Running a Debug Session

Starting a Debug Session

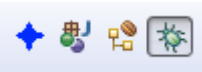
Click on the 'bug' and select the debug configuration to be used.



Eclipse will open the Debug Perspective and use the selected debug configuration.

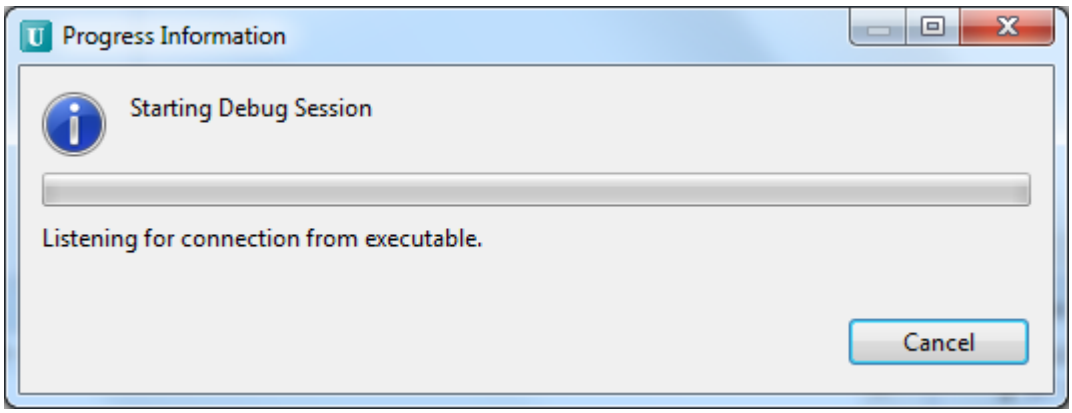


Note the perspective icons in the upper right.

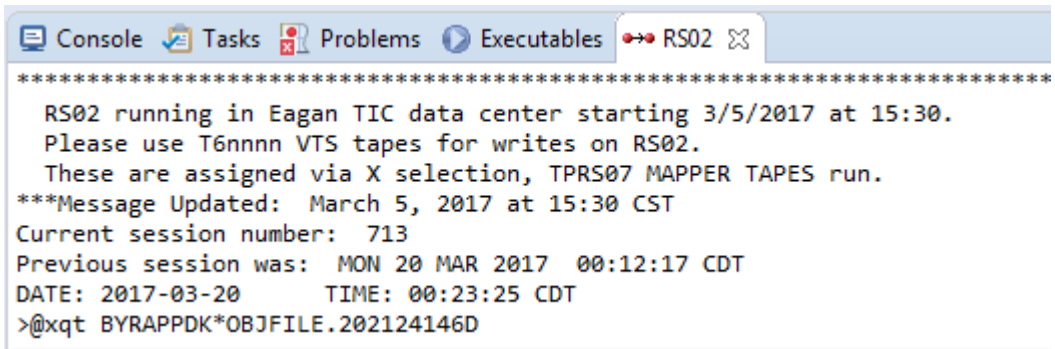


You can easily navigate to the OS 2200 Perspective and then back to the Debug Perspective using these icons.

Then following dialog is displayed.

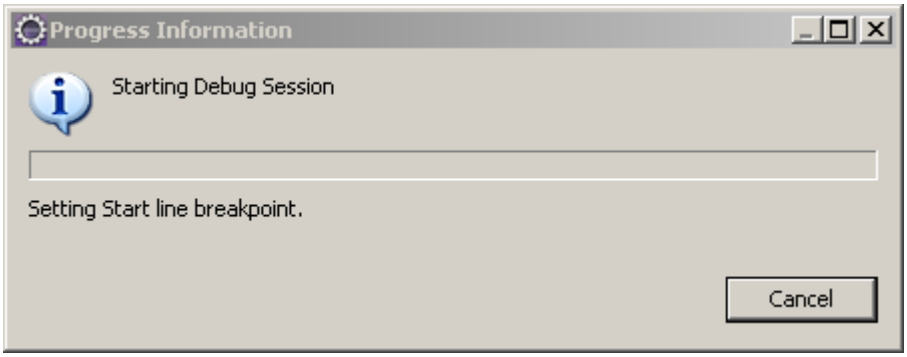


At this stage you need to execute the debug OM/ZOOM on the 2200. For demand or batch jobs this can be done from the Eclipse Telnet client. For full-screen programs or transactions it must be done from an emulator. Launch a Telnet session (use icon  from the Debug menu icons) and select the host for this debug session. Then enter the program to be executed. (Note this is where the Link File Name saved in the debug build stream creation is useful.)



Submit the command or run the transaction.

The OS 2200 program will communicate with Eclipse. Various messages are displayed in the dialog indicating that information is being downloaded from the 2200 to the Debug session.



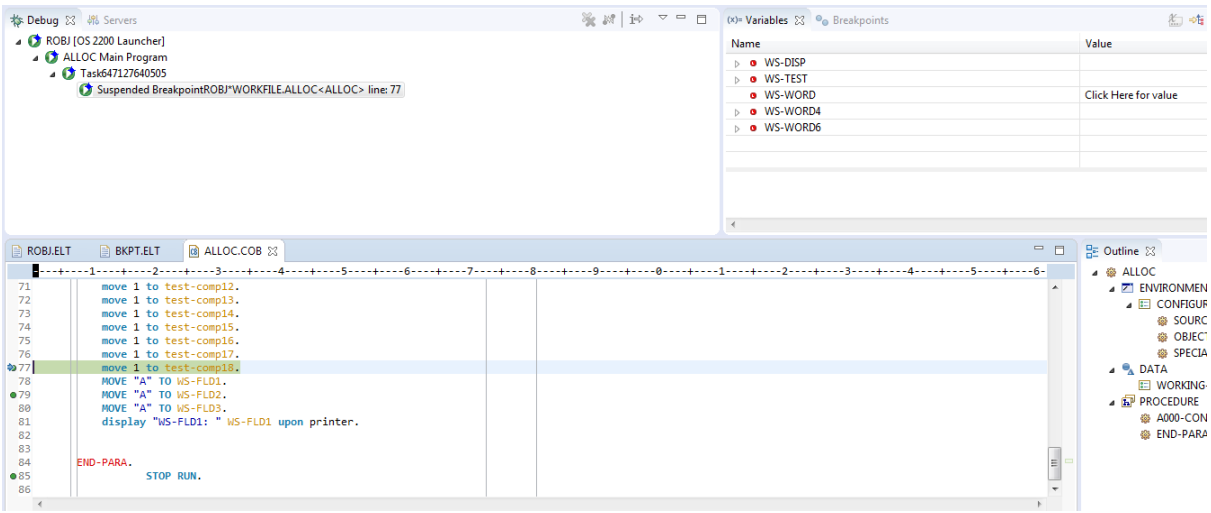
The Debug Views

The following views of the debugging session are provided on tabs in the upper right pane:

- Variables view:
  Shows the variables that are currently in scope. That is, it shows global variables and variables that are local to the current stack frame. If a variable contains other variables (that is, if it is the root of a structure), it is displayed as an expandable node.
- Registers view:
  Shows the A, X, and R registers of top stack frame of the program. The registers are global; that is, registers do not change from frame to frame.
- Breakpoints view:
  Shows the breakpoints that are set currently. If you have multiple projects in your workspace, the breakpoints for all projects are displayed, not just the breakpoints for the projects being debugged.
- Expressions view:
  Contains a list of variables that should be watched independently. You can add them to the watch list from the variables view.

Using the Debug Perspective

Eventually the Debug session will pause with the source code in a pane and some variables listed in the Variables view.

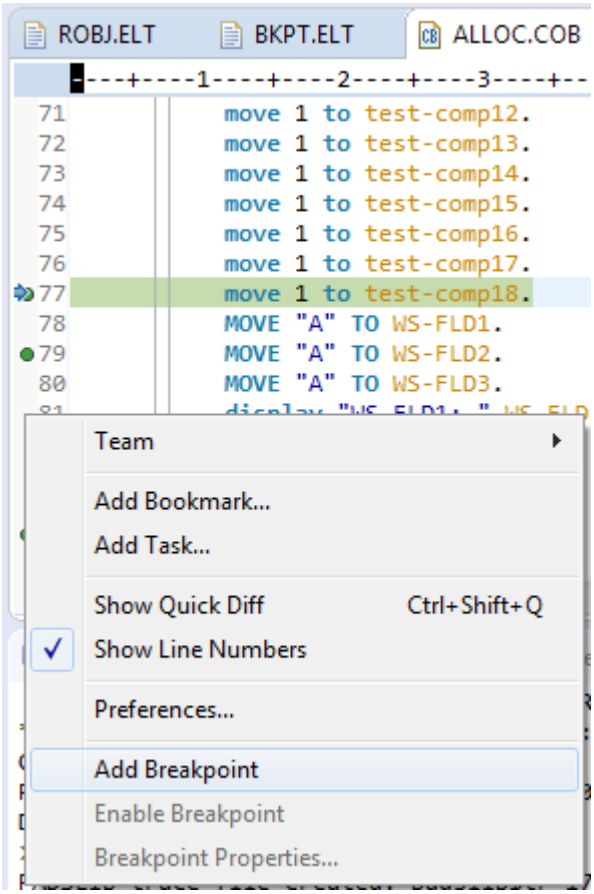


NOTE: The time it takes to call back can vary. A demand program over a fast connection generally calls back almost immediately. A transaction can take over two minutes. The speed of the connection to the 2200 effects the callback time.

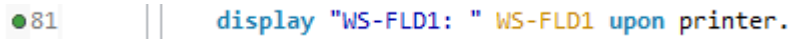
The upper left of the debug perspective shows the stack. These is a pane showing the editor for the debug program. In the upper right is a pane which holds the variables, breakpoints, registers, and watch views. The variables view displays all local and global variables in the selected stack frame. The registers are global, that is, registers do not change from frame to frame.

Adding Breakpoints

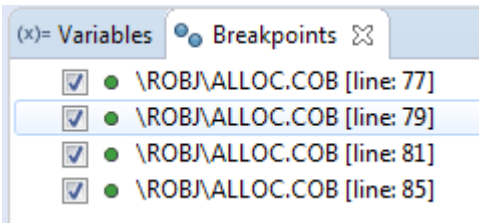
Breakpoints can be added to source by going to the required line in the editor and doing a right click. Note that you right click just inside the start of the line – in the example, this is the top left corner of the pop-up.



Selecting Add Breakpoint marks the line with an indicator.

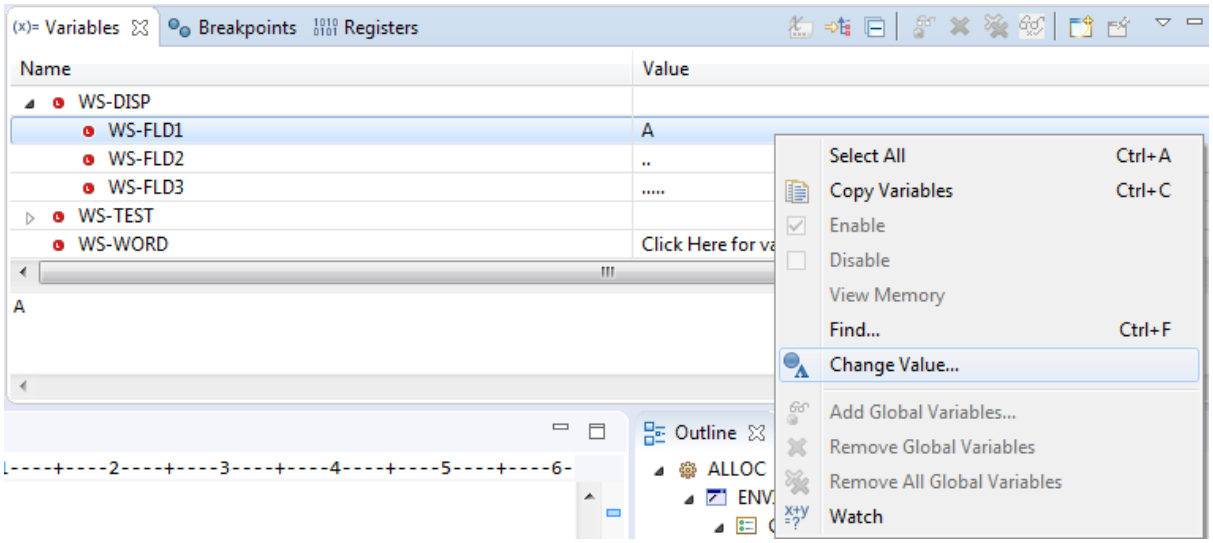


An entry is also written to the Breakpoints view.

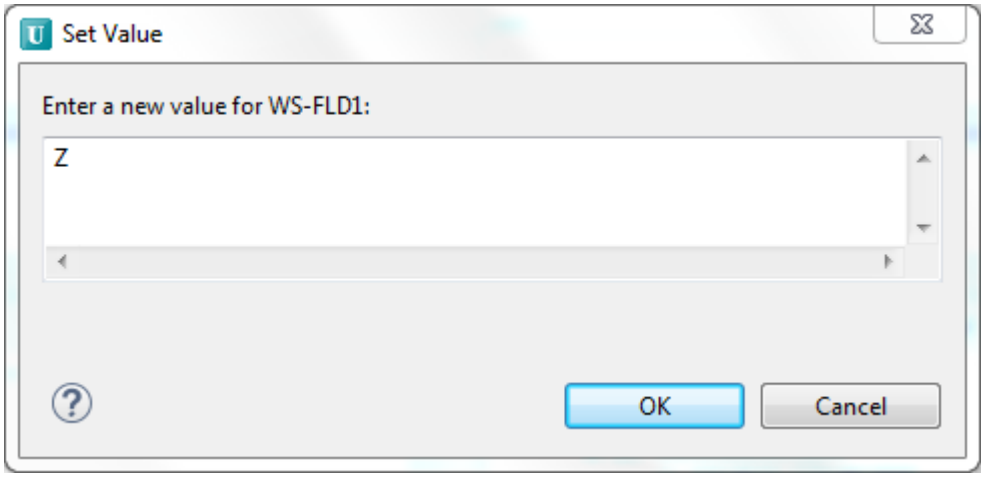


Viewing and Updating Variables

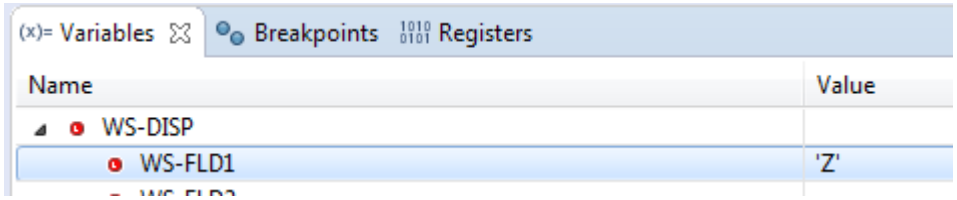
The Variables view lists the variables defined in your source. You can change the value of a variable by highlighting the variable and doing a right click.



After clicking Change Value, the following dialog is displayed. The current value is displayed. Enter the new value then click OK.

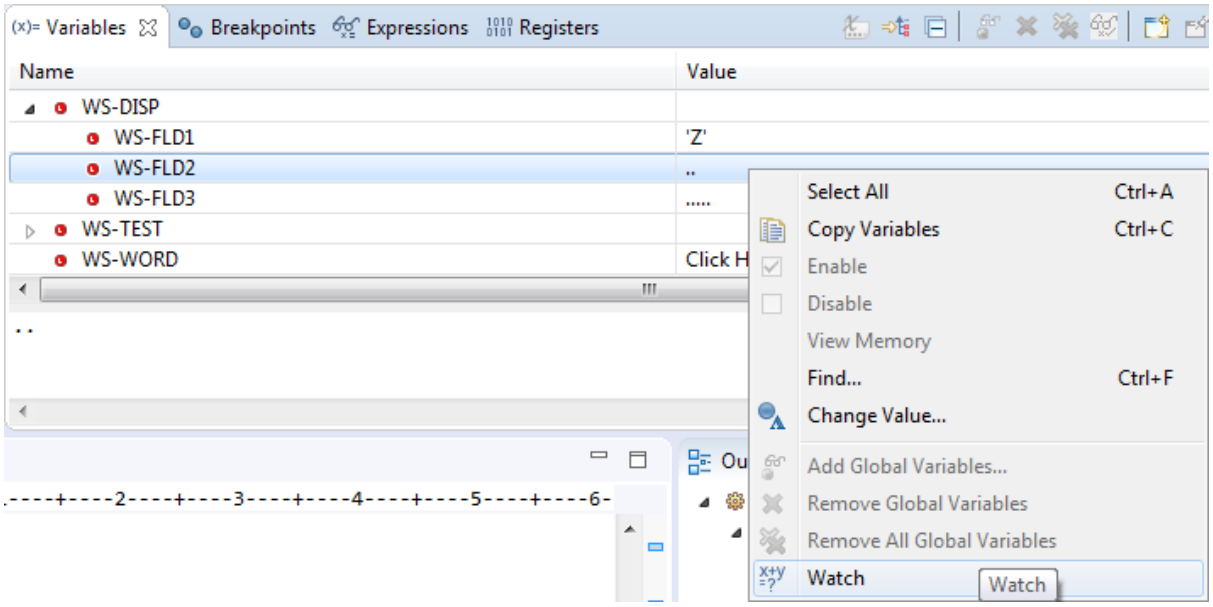


The Variables view is updated:

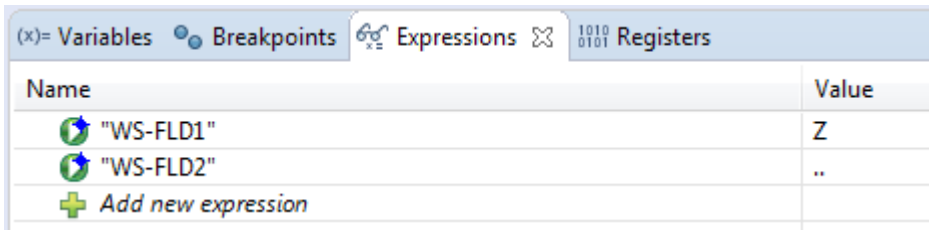


Watching Variables

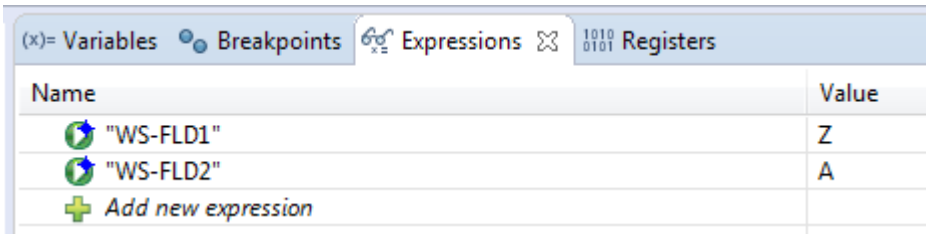
It is also possible to ‘watch’ the value of selected variables. Right click on the variable name and then select Watch:



The Watch list is updated in the Expressions view:



As the program is debugged, the value of the "Watch" variables may change depending on the logic.



Controlling the Debug Session

There are a number of ways of stepping thru the logic. From the debug view one can "resume", 'step into', 'step over', 'step out' or 'terminate'.

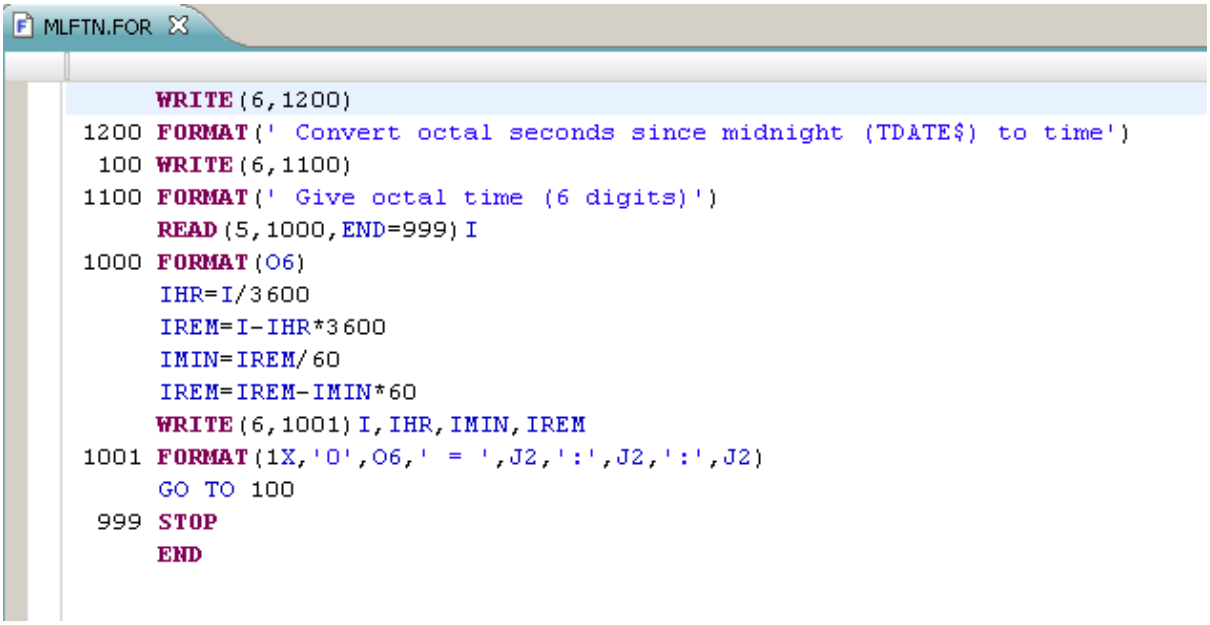
- 'Resume' proceeds until a breakpoint is hit or the program exits.
- 'Step into' goes to the next executable statement whether it is in the same subroutine or a different subroutine.
- 'Step over' goes to the new executable statement in the current subroutine or the calling routine. If the next statement is in a subroutine be called by this routine, it will perform the subroutine and return, unless there is a breakpoint in the called routine.
- 'Step out' will finish executing the current subroutine and stop in the next line in the caller unless a breakpoint is hit along the way.
- 'Terminate' will cause the program to exit and the debugging session to end

Other 3GL Editors

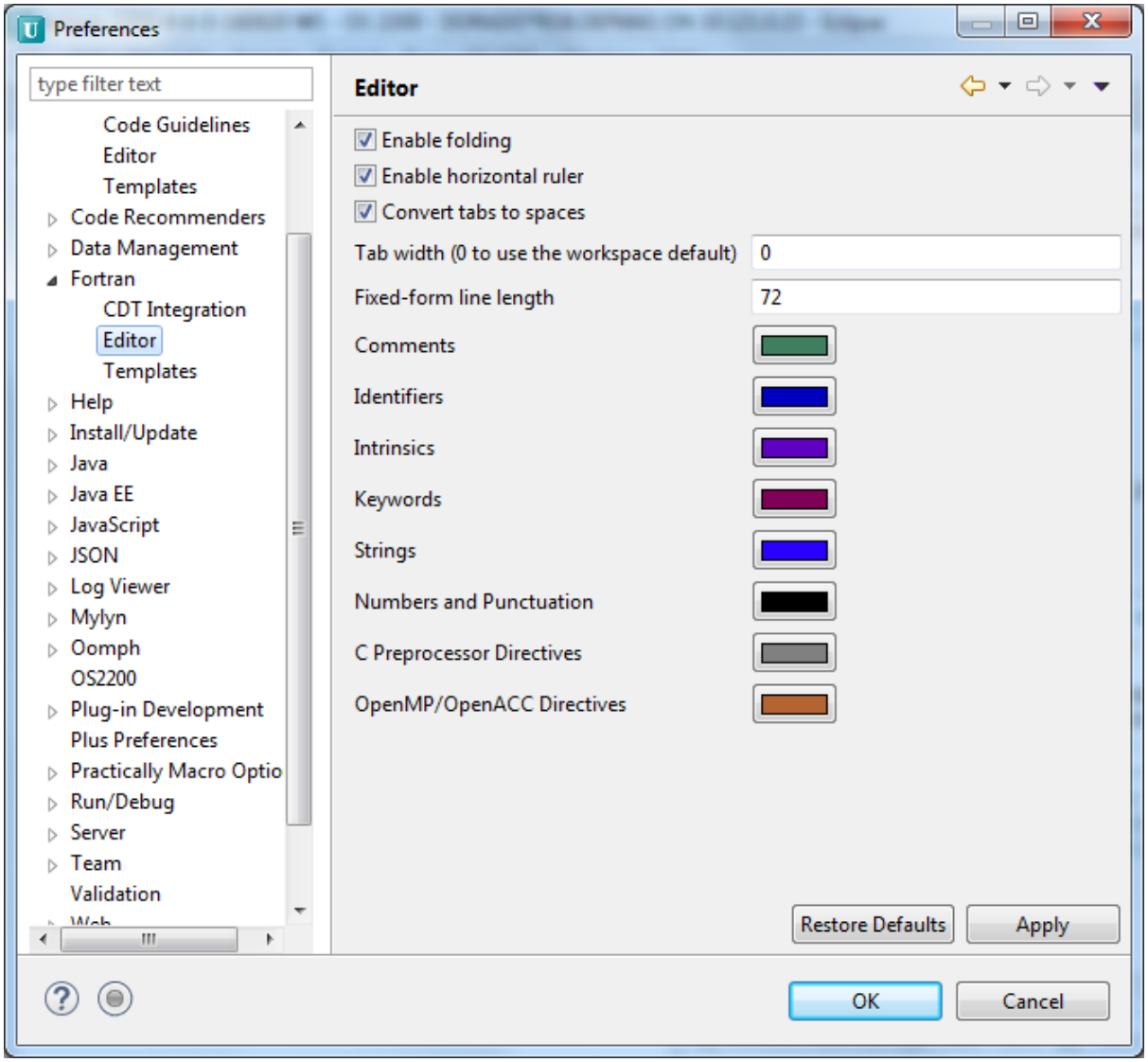
Eclipse can support many types of editors that maybe used for OS 2200 and other development. This section describes some of the other editors.

Fortran Editor

The Fortran editor is invoked if an OS 2200 element is given an editor type of FOR. Unisys does not provide a Fortran Editor plug-in like we do for COBOL but instead uses the Photran editor available from the Eclipse community.



When you open the element, similar features as the COBOL editor in terms of colour coding are available. The editor preferences can be found from the menu **Window → Preferences → Fortran**.



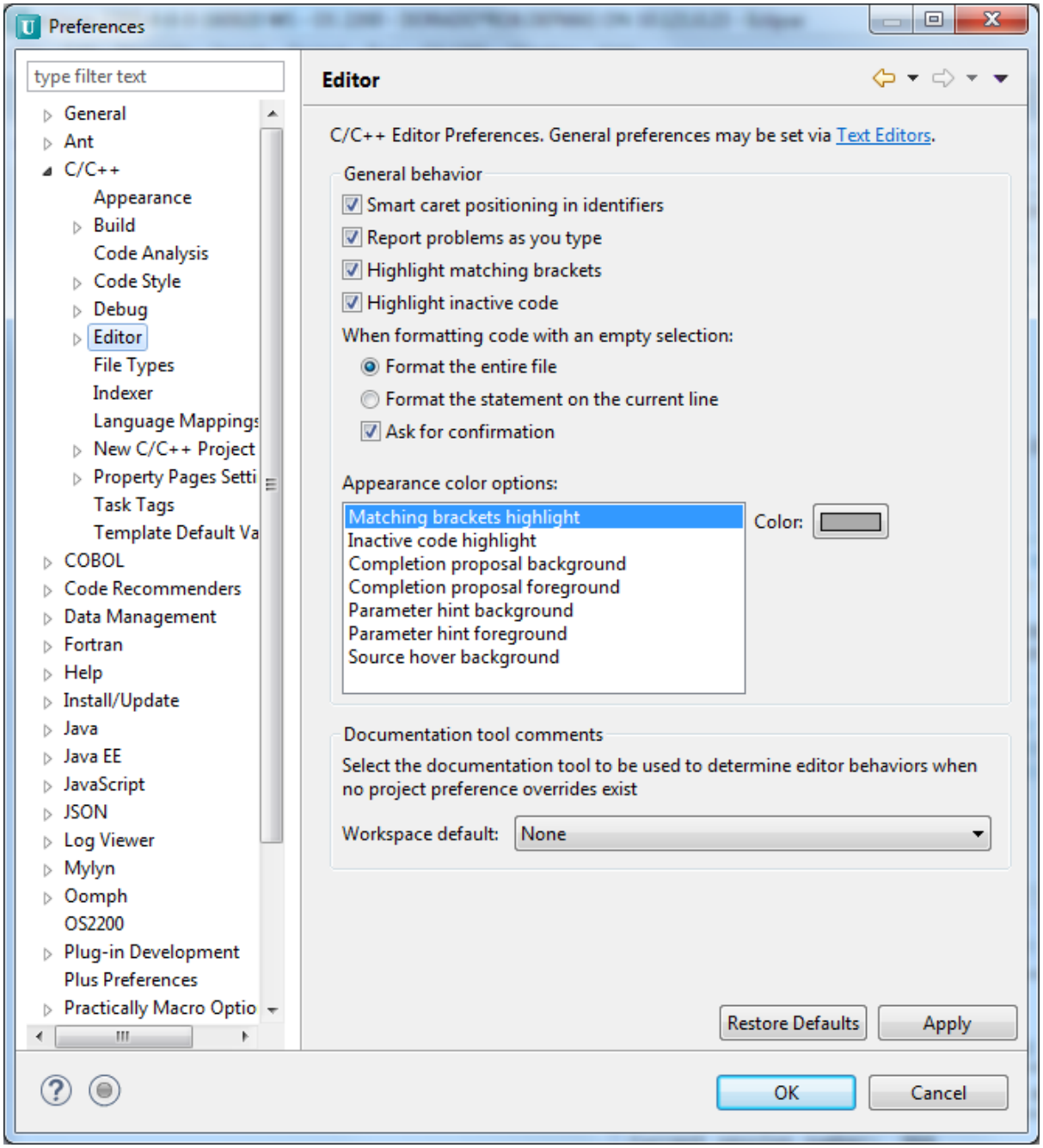
C Editor

The C editor is invoked if an OS 2200 element is given an editor type of C. Unisys does not provide a C Editor plug-in like we do for COBOL but instead uses the C editor available from the Eclipse community.

lmon.C

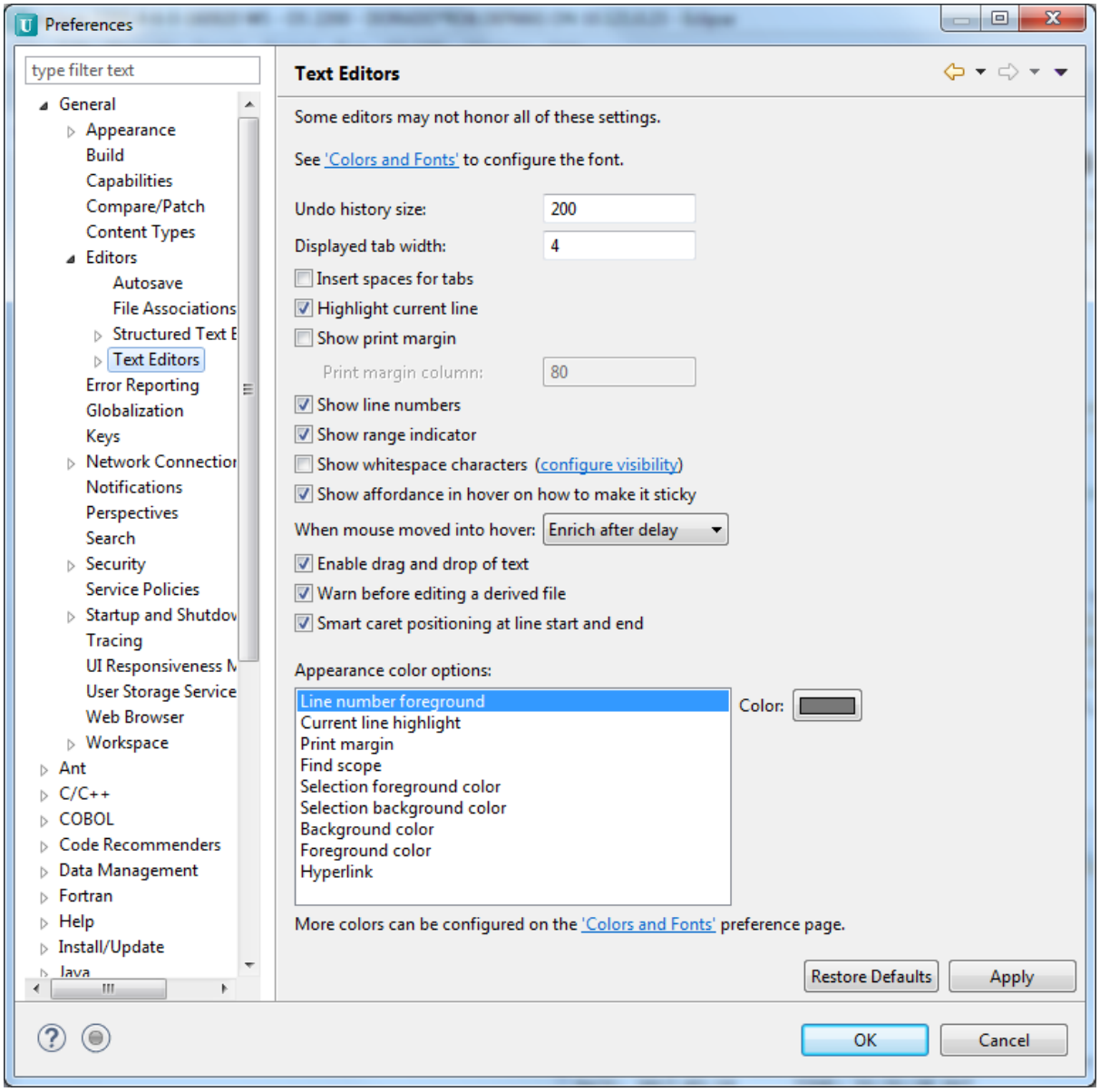
```
#include <fp$acqfilinf.h>
#include <fp$rtn$file.h>
/* HEADER for TIP calls */
#include <config.h>
#include <tip.h>


#define TRUE 1
#define FALSE 0
#define DEBUG TRUE

/* PROTOTYPE Definitions of all function */
void trim(char *trim_str,char *trim_char);
void begin_thread(char *application);
void end_thread();
void check_rsa_error(rsa_error_code_type value_returned);
void report_schema(char *schemaname);
void sa_report(char *schemaname,char *sa,char *file_type);
char *get_value(char *atype,char *ename,char *schemaname);
void do_exec(char *task);
void get_info_ssector(char *usename,int *buffer,int *word_count,
                      int *ssector);
void get_RDMS_intern(char *filename,char *qualifier,int tip_num,
                     int *file_size,
                     int *page_size,int *index_level,int *pages_free);
```

When you open the element, similar features as the COBOL editor in terms of colour coding are available. The editor preferences can be found from the menu **Window → Preferences → C/C++**.



General Text Editor

This editor is used for files with the ELT subtype etc. This is just a basic text editor with no special features. The preferences can be updated by **Window → Preferences → General → Editors → Text Editors.**

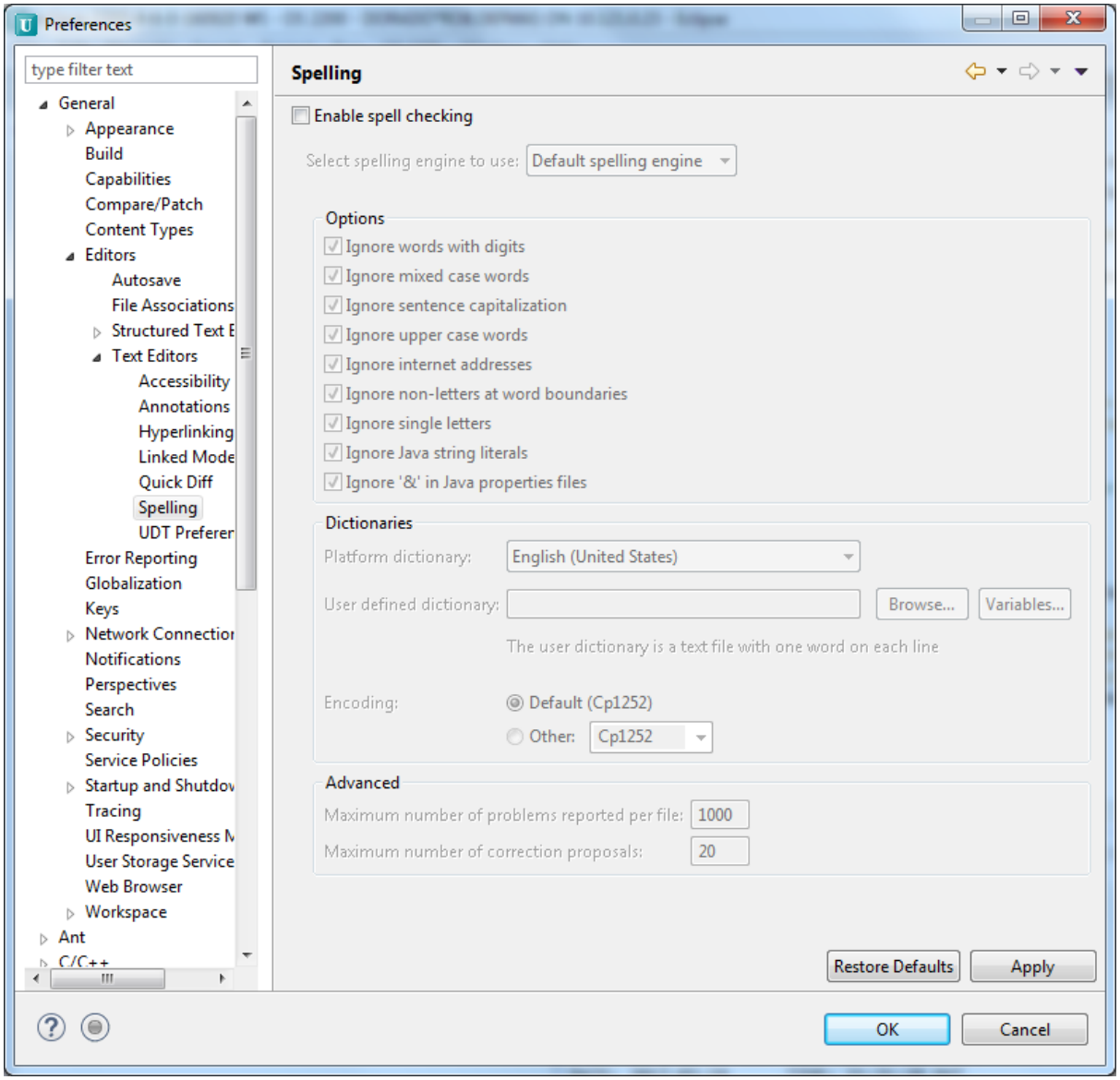


Turning Off the Spell Checker

By default, Eclipse turns on spell checking. When editing an ECL, SSG or similar element, many words are underlined in red as they are not matched by the spell checker. For OS 2200 elements, this often applies so readability is affected. Also when you copy the contents and paste to Microsoft Word, the highlighted words are inserted with underlines!

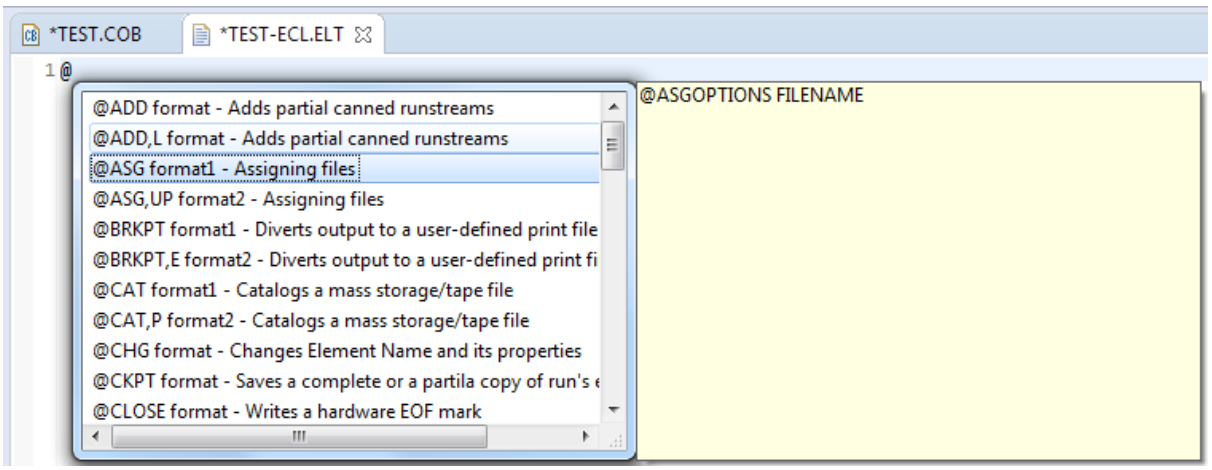
It is easy to turn off the spell checking function.

Go to **Window → Preferences → Editors → Text-Editors → Spelling** and uncheck ‘’Enable Spelling Check’.

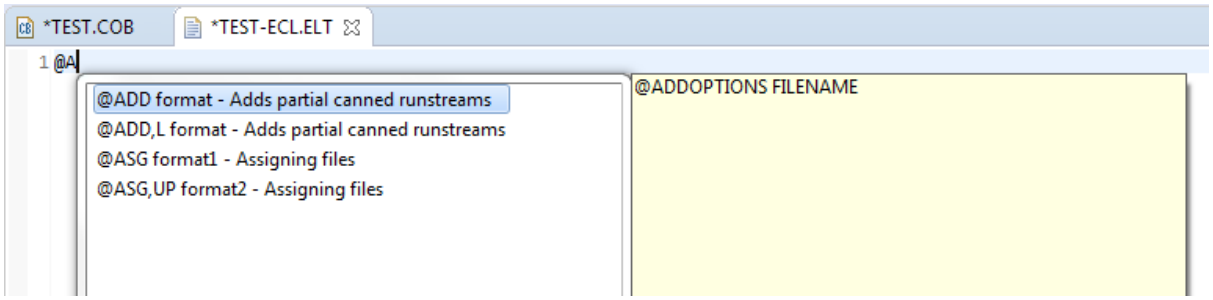


ECL Content Assistant

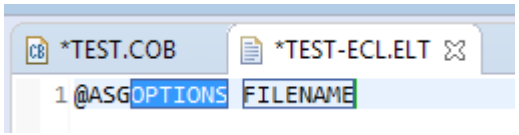
There is auto-completion available when editing an element for ECL commands. After typing "@", then do **Ctrl+Space** and the content assistant dialog is displayed showing the available ECL commands:



The list of possible commands can be filtered by specify the starting characters after the "@". For example, entering "@A" and then **Ctrl+Space** results in:



Double clicking on an option results in the command being written to the editor. You can tab to a parameter and replace with the required value.

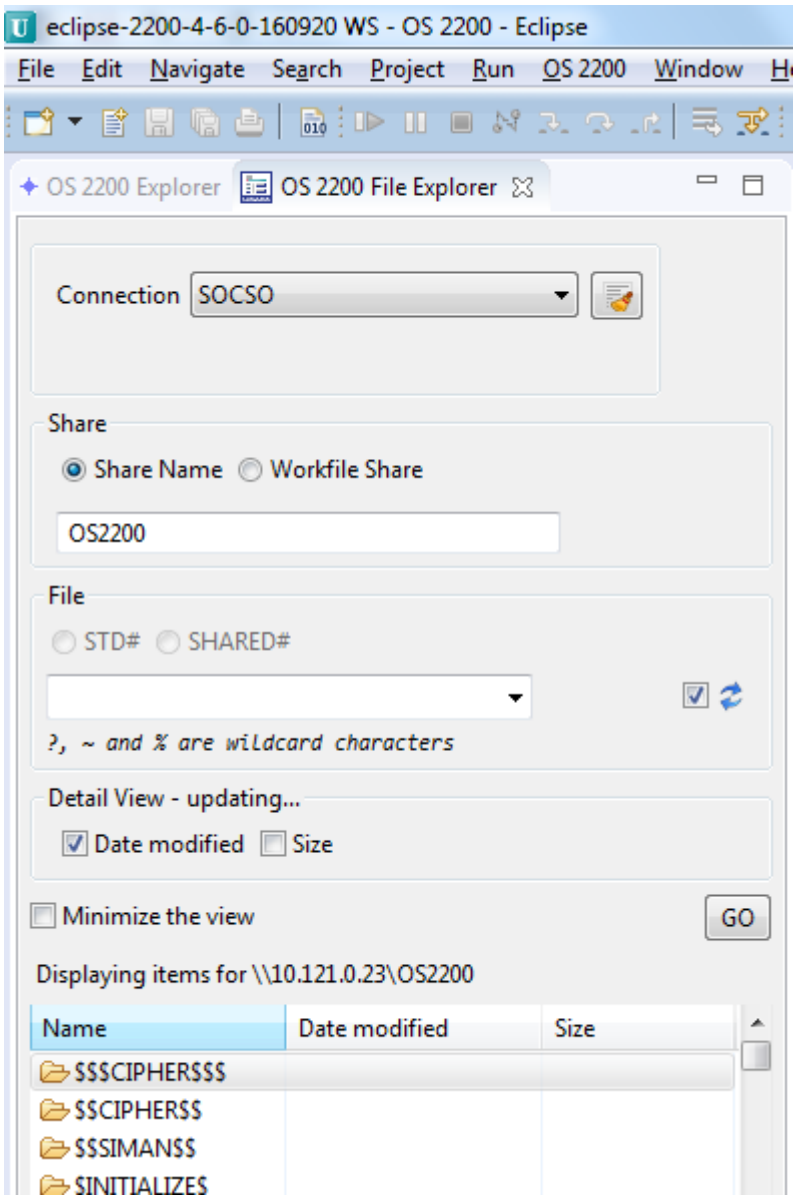


Note you will have to enable the "," after the ECL command where OPTIONS are required. Further changes can still be made to the editor.

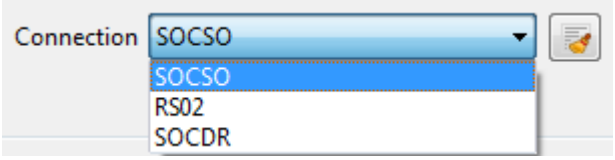
OS 2200 File Explorer

Often an OS 2200 developer will need to review the contents of a data file or perhaps need to review source elements quickly without the use of a project. Unisys has added the OS 2200 File Explorer (OFE) feature to handle these types of activities. As this feature is outside of the planned use of Eclipse as an IDE using projects, some other features may not be available.

OFE is part of the OS 2200 Perspective and is a separate tab to the OS 2200 Explorer in the Explorer pane:



The Connection has all of the configured OS 2200 hosts in a list box. Select the host to be accessed:



The  icon is used to clear the information used by OFE about this host and files/elements. The date and time when the cache was last cleared is displayed.

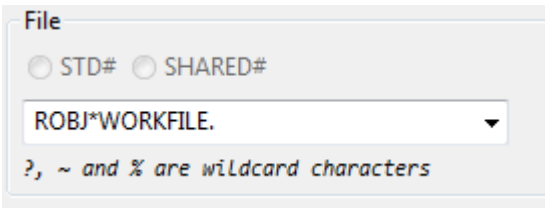
The Share parameter allows the user to select the CIFS share name to be used.

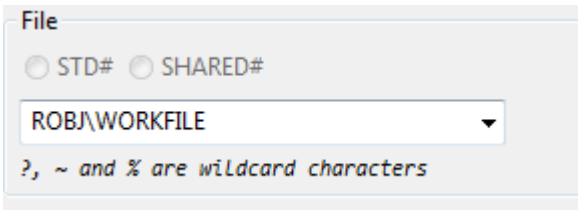
For the File parameter, if the system is configured for MHFS then the directory option is enabled.

In the text box under File, provide your input, as follows:

- If you provide the input as a qualifier, then the list of files with the qualifier are listed.
- If you provide the input as a fully qualified element name or data file, then the file opens in the relevant editor.
- If you provide the input as a program file, then the list of elements appears. (If in Windows -> Preferences -> OS 2200, the Show Absolute Elements is checked, then the absolute names are also listed.)

The File search criteria can be entered in either OS 2200 format or Posix format as shown below:

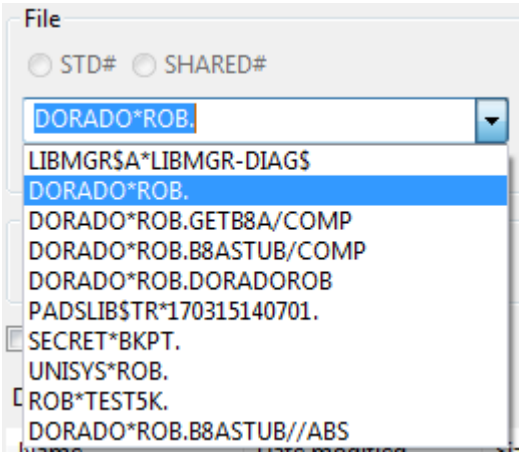




You can use wildcard characters such as ?, ~, and % to reduce the scope of the available options, as follows:

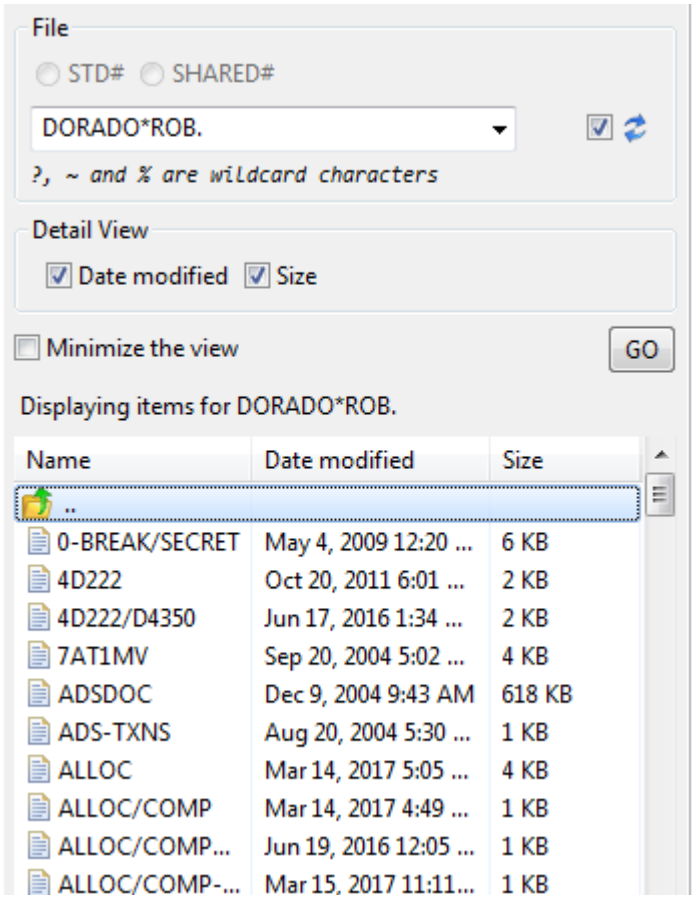
- '?' Represents a single character. For example, if the searched string is A?C, the result can be ABC but not ABDC.
- '~' Represents any number of characters. For example, if the searched string is A~C, the result can be ABC and ABDC.
- '%' Represents the presence of a key string anywhere within the name of the entity. For example, if the searched string is AB%, the result can be ABC, CAB, and CBABD.

Note the last 10 searches are stored in the File list box:



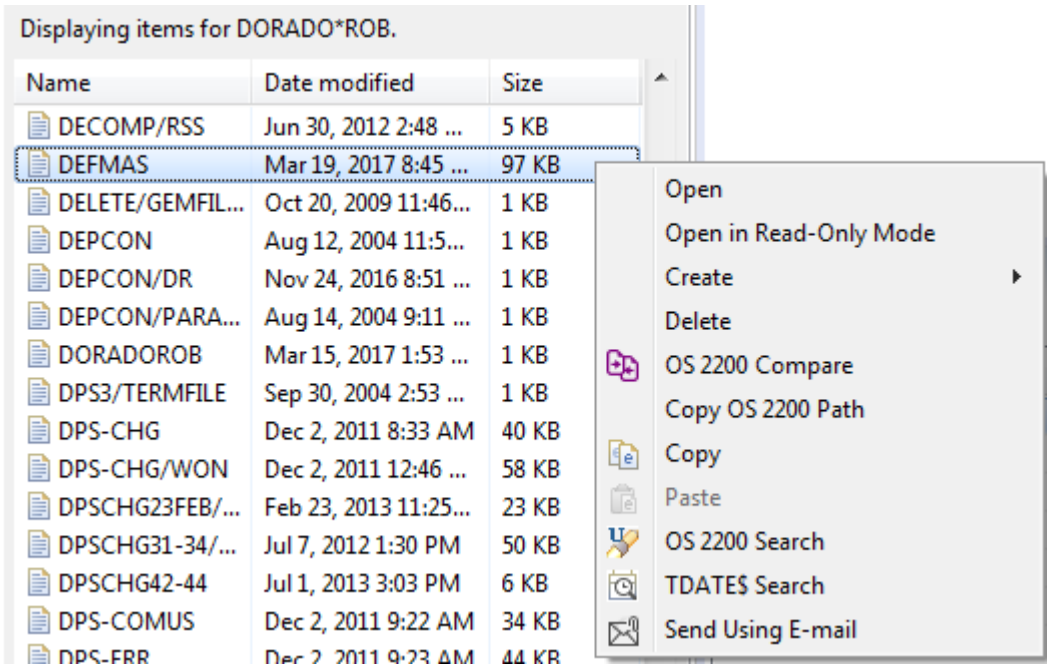
Use the Detailed View to display Date Modified and file Size information.

The following example shows the source elements for program file DORADO*ROB with the options for date modified and size checked:

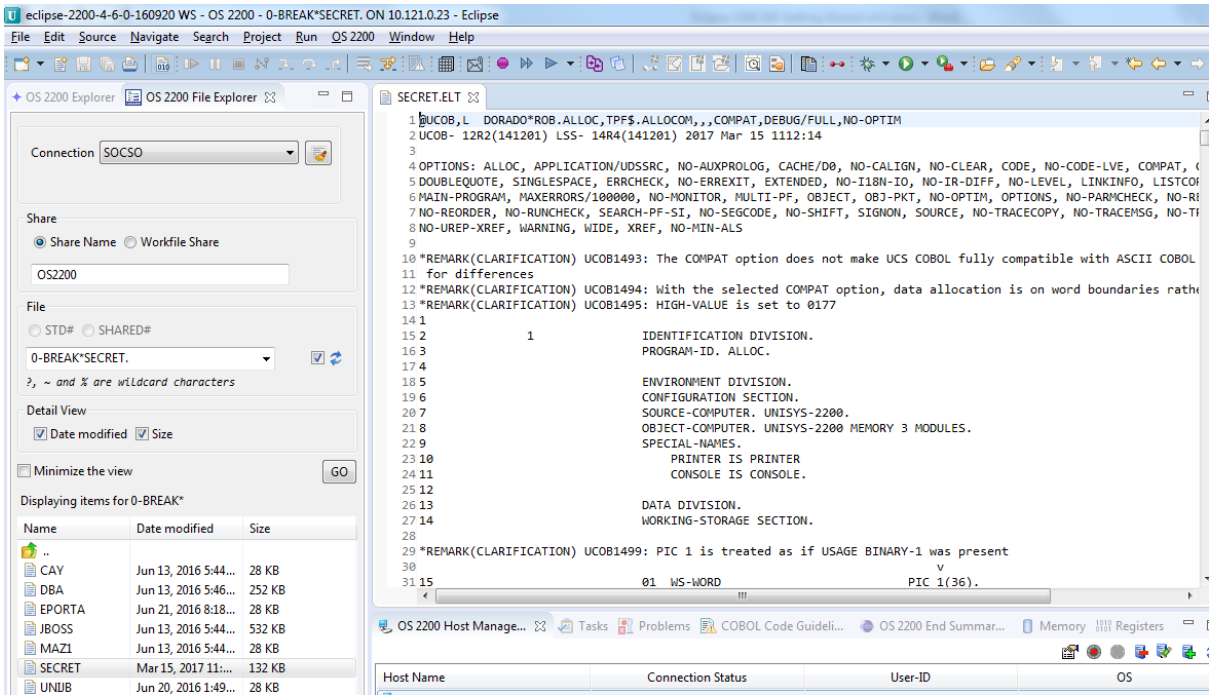


Note be default the list is sorted in Name order but can be sorted by Date modified or Size by clicking the sort column heading. The date modified timestamp for each file/element is displayed in the local workstation time.

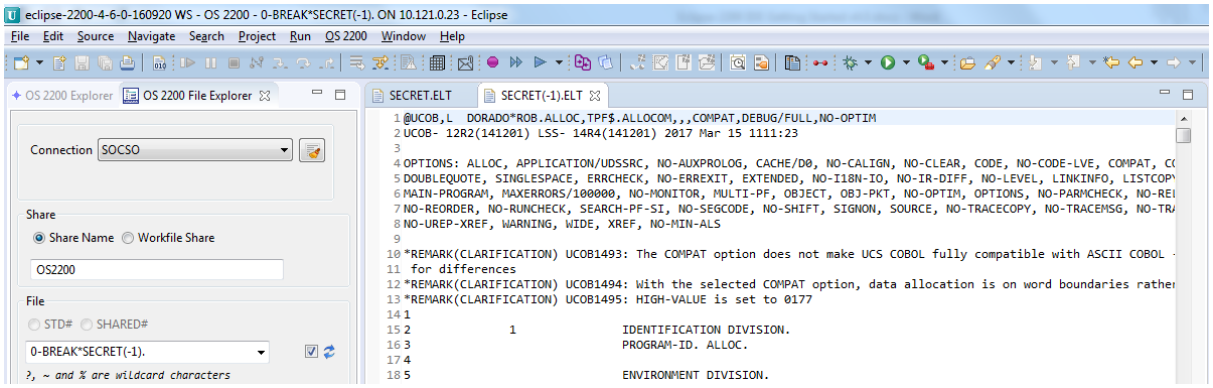
By double clicking on an entry, the file is opened in the editor. But by right clicking on an entry, the context menu of actions is presented. Many of these are the same as the OS 2200 Explorer tasks.



OFE also supports the ability to display SDF files. In the following example, the qualifier 0-BREAK was used as the search criteria and the matching files displayed. Then 0-BREAK*SECRET was double clicked and Eclipse opened it in an editor.

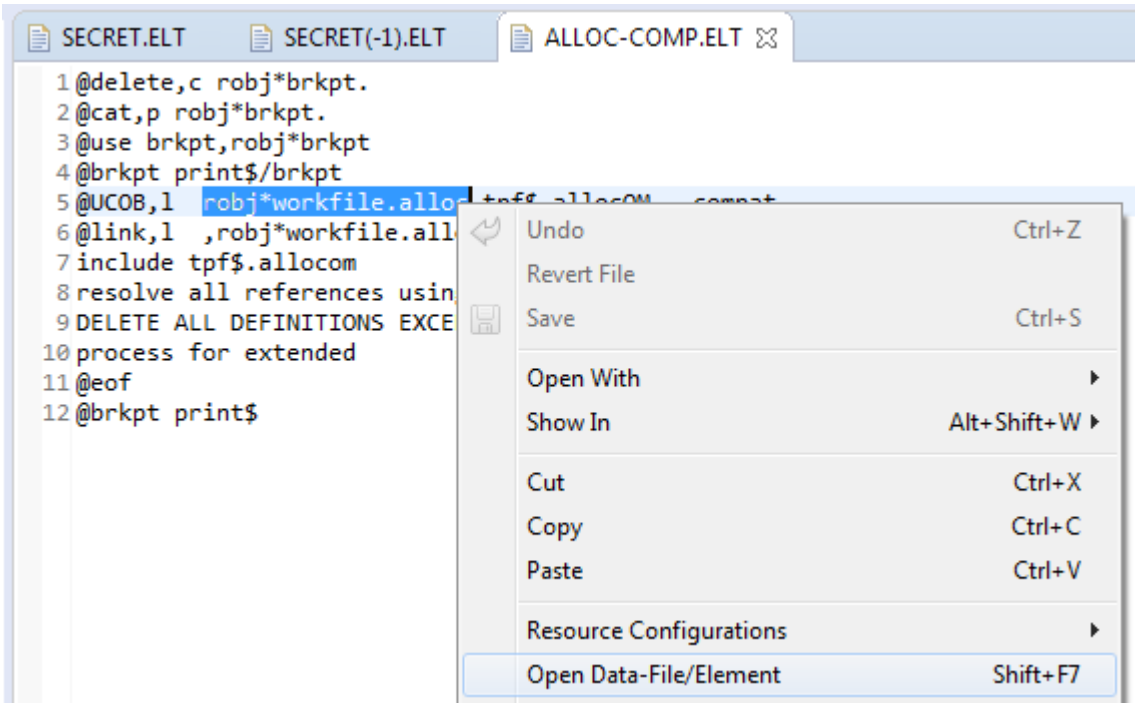


Note that OFE also allows file cycles to be specified as part of the search criteria. In the following example, 0-BREAK*SECRET(-1) was specified:

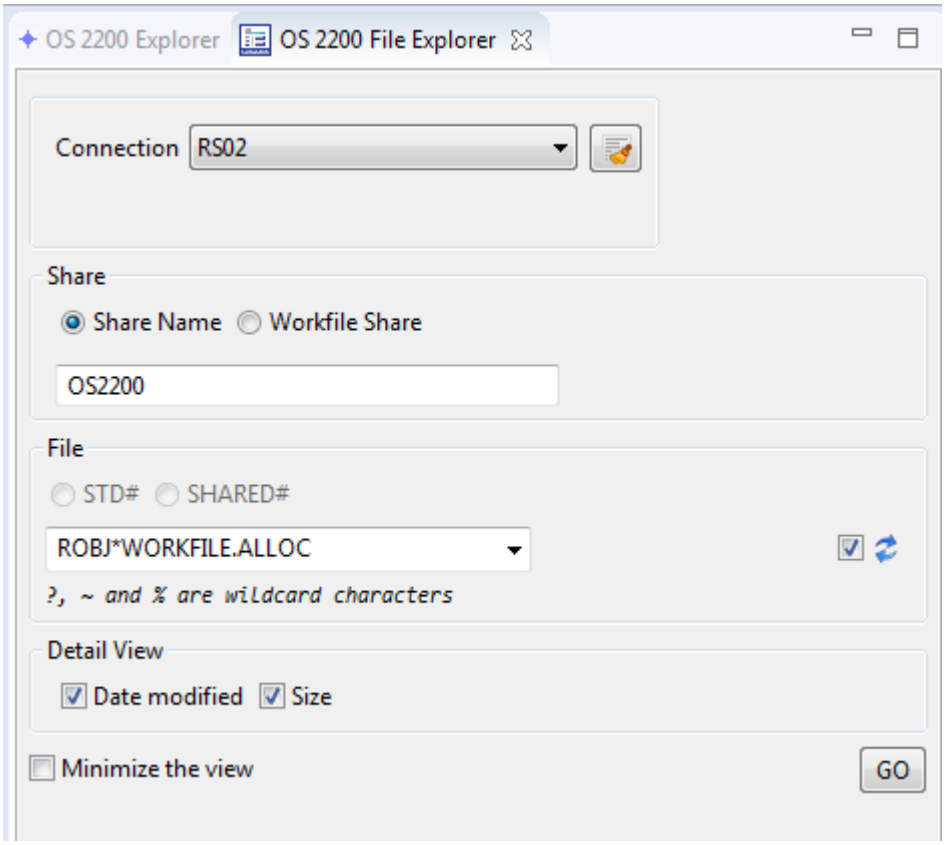


Opening a File/Element from an Editor

OS 2200 File Explorer can be launched with parameters to open a file/element selected in an editor. For example, a runstream might be open in a text editor. A file/element name can be highlighted. Then right click in the editor and select **Open Data-File/Element** or enter **Shift+F7**.



OFE is populated with the selected file/element and the correct host connection. The user just needs to submit the request.



Eclipse and Rolled-Out Files

If an OS 2200 file (program or data) is stored on Fixed disk, it may be subject to be rolled-out when mass storage reaches a threshold. When using Eclipse project or OFCS methods to access a file, the handling of a rolled-out file can be impacted by the system security level and a CIFS parameter. The information below is a summary of how Eclipse handles rolled-out files in these cases. If you are using the Eclipse Telnet session, then the same handling as per any Demand run is performed.

Fundamental Security

- CIFS does not initiate a ROLBAK since the CIFS subsystem runs in privileged mode
- Error status returned to Eclipse and user gets error dialog saying file is not accessible and maybe rolled-out
- User must manually initiate the ROLBAK using a demand session e.g. @ASG,A
- Recommend CIFS$WAITROLBAK be set to 1 so Eclipse responds immediately
- Note CIFS 8R4C will initiate a separate job to initiate a ROLBAK..

SECOPTn Security

- CIFS will initiate a ROLBAK. (If not, CIFS not installed correctly. In this case, it is likely the privileges for the userid that owns and runs the CIFS subsystem are incorrect.)
- CIFS waits until the earlier of 2 events. Note Eclipse will show no activity during this time.
    1. File is restored to text and CIFS then continues with Eclipse request e.g. to open the file.
    2. CIFS$WAITROLBAK timer expires. Error status is returned to Eclipse and user gets error dialog.
- Recommend CIFS$WAITROLBAK in CIFS-BACK runstream be set to 1. This would avoid the Eclipse user thinking Eclipse is ‘hung’. The default value is 600 seconds.
  System profile should set CIFS$WAITROLBAK to default 600. This is for OS 2200 batch and demand connections to CIFS.
- If other CIFS network connections require a longer CIFS$WAITROLBAK period, a userid profile should be created with the appropriate value.

Contact your system administrator to modify the CIFS-BACK runstream to set the CIFS$WAITROLBAK to 1 second. The following example shows the suggested change to the SYSLIB*RUN$.CIFS-BACK runstream:

```
@cifsut
set
set         CIFS$WAITROLBAK=1
@free       SYS$LIB$*CIFS$LIB
@xqt        modps-z
```

Using the RDMS JDBC Client

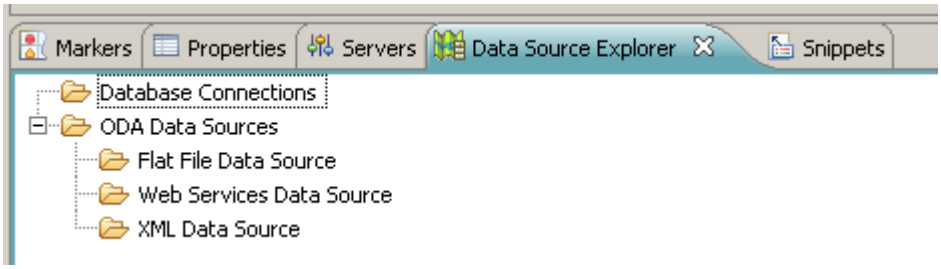
This section provides some guidance in using the JDBC interface located in the Data Source Explorer view of the J2EE perspective in Eclipse. This can be useful for RDMS programs where the developer wants to test a SQL command before including it in a program. However this section will also prove useful to Java developers.

It is assumed that the JDBC-RDMS software has been installed and configured on the OS 2200 host plus the relevant background service jobs are running. Review to the Relational JDBC Driver for ClearPath OS 2200 User Guide for information on the installation and configuration of the OS 2200 software. Consult your system administrator if unsure.

Configuring the JDBC Client

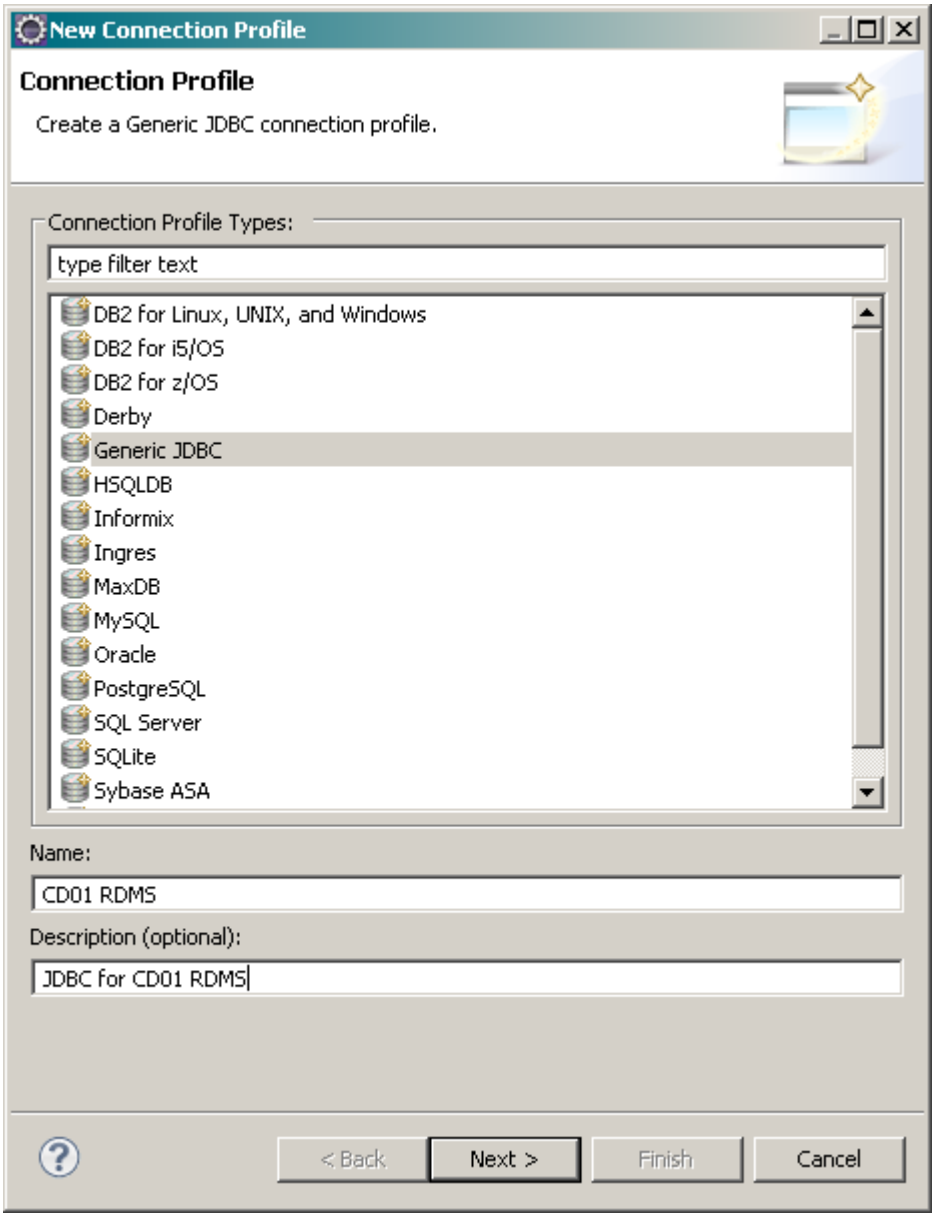
Refer to the section 4 of the ClearPath OS 2200 IDE for Eclipse Application Development Guide for Java EE. It is assumed a folder "C:\Database Drivers" has been created and the appropriate jar files copied into this folder from the <appl group>*JDBC$CLIENT installed file.

Open the Java EE perspective and click on the Data Source Explorer tab.



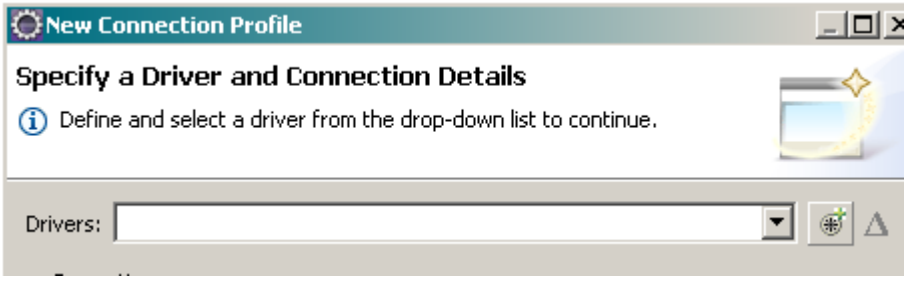
Right click on **Database Connections** and select **New.**

The following dialog appears.

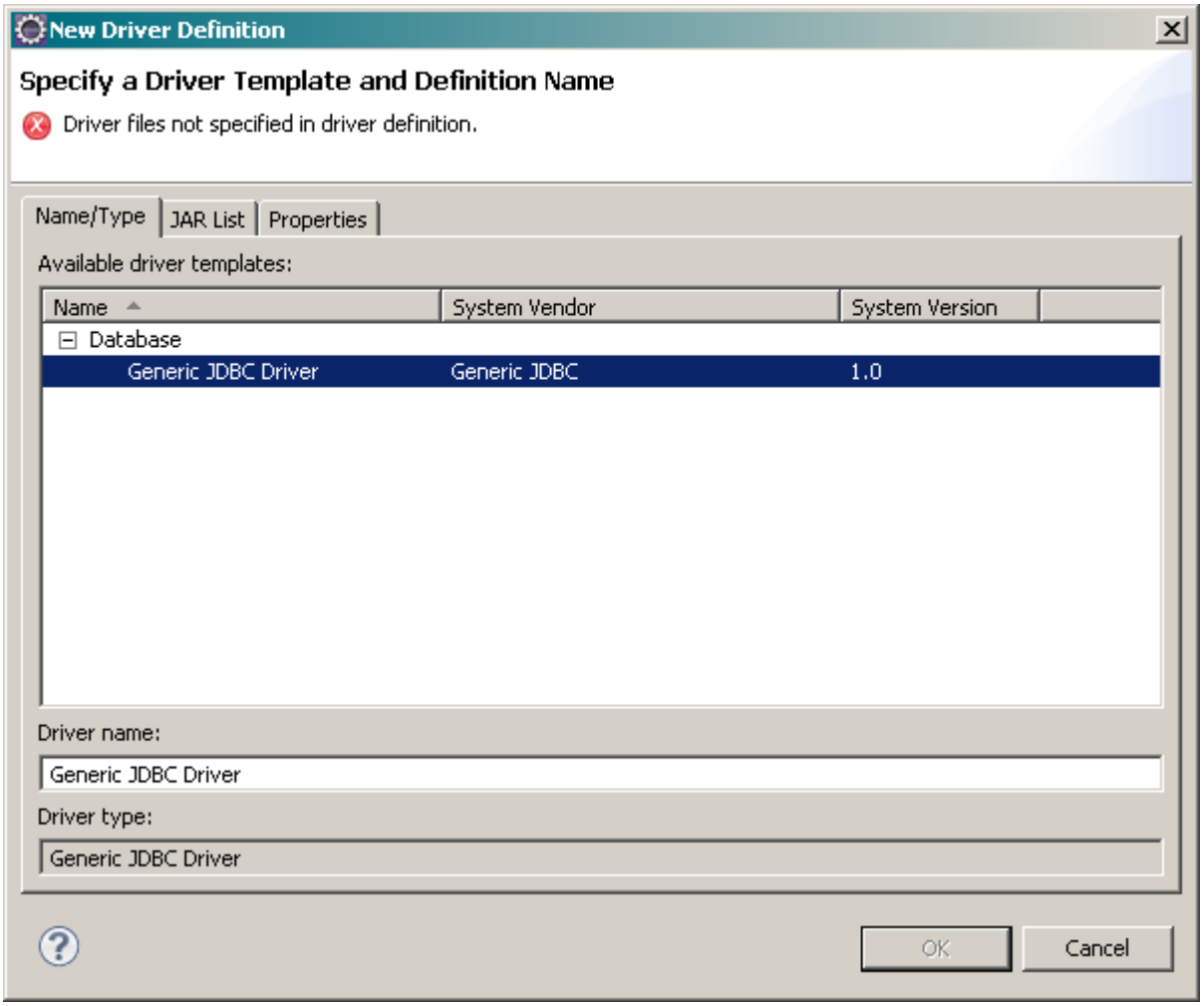


Select the **Generic JDBC** connection profile type.

Enter a value in the Name field to identify this connection. Optionally enter a description. Then click **Next.**



Click the  icon to the right of the Drivers field. A dialog showing available drivers is displayed.



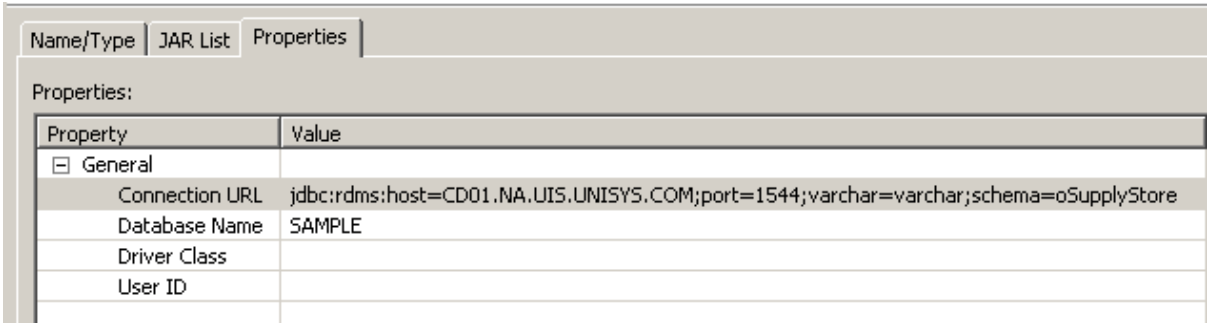
Select the Generic JDBC Driver.

Click on the **JAR List** tab so the JAR files copied into the C:\Database Drivers folder can be added.

Click on the **Add JAR/Zip** button and browse to the C:\Database Drivers folder. Select the rdmsdriver.jar file.

Repeat for the unsiys-jca.jar file. The result should look like below.

Click the **Properties** tab.



In the Connection URL, type **jdbc:rdms:host=name; port=1544; varchar=varchar; schema=OSupplyStore**

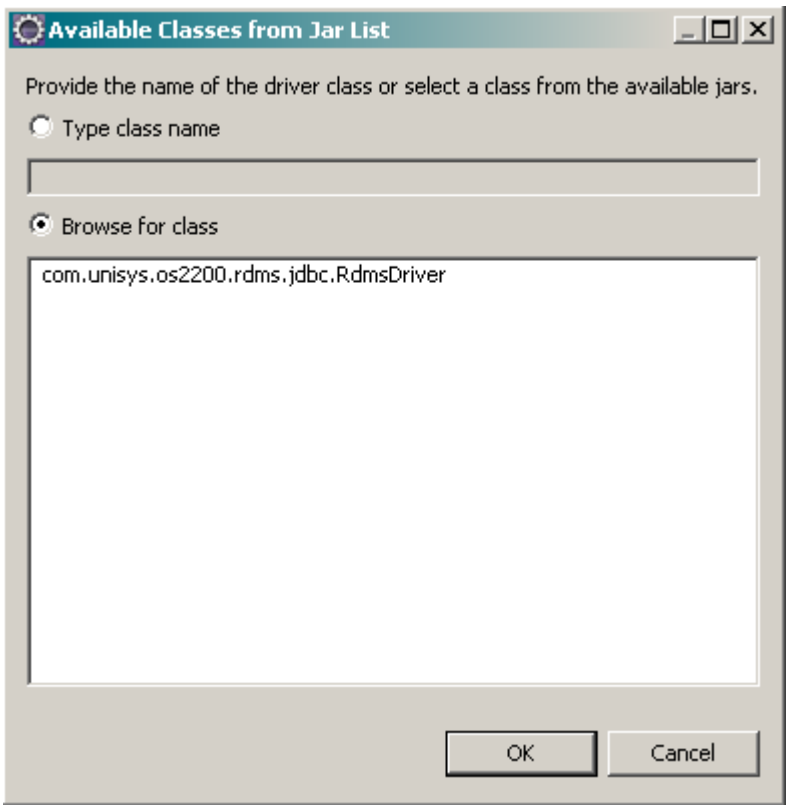
where

name is the name of your OS 2200 host.

1544 is the default port number for application group 3; your port number can differ if you are using an application group other than 3 or are not using the default port.

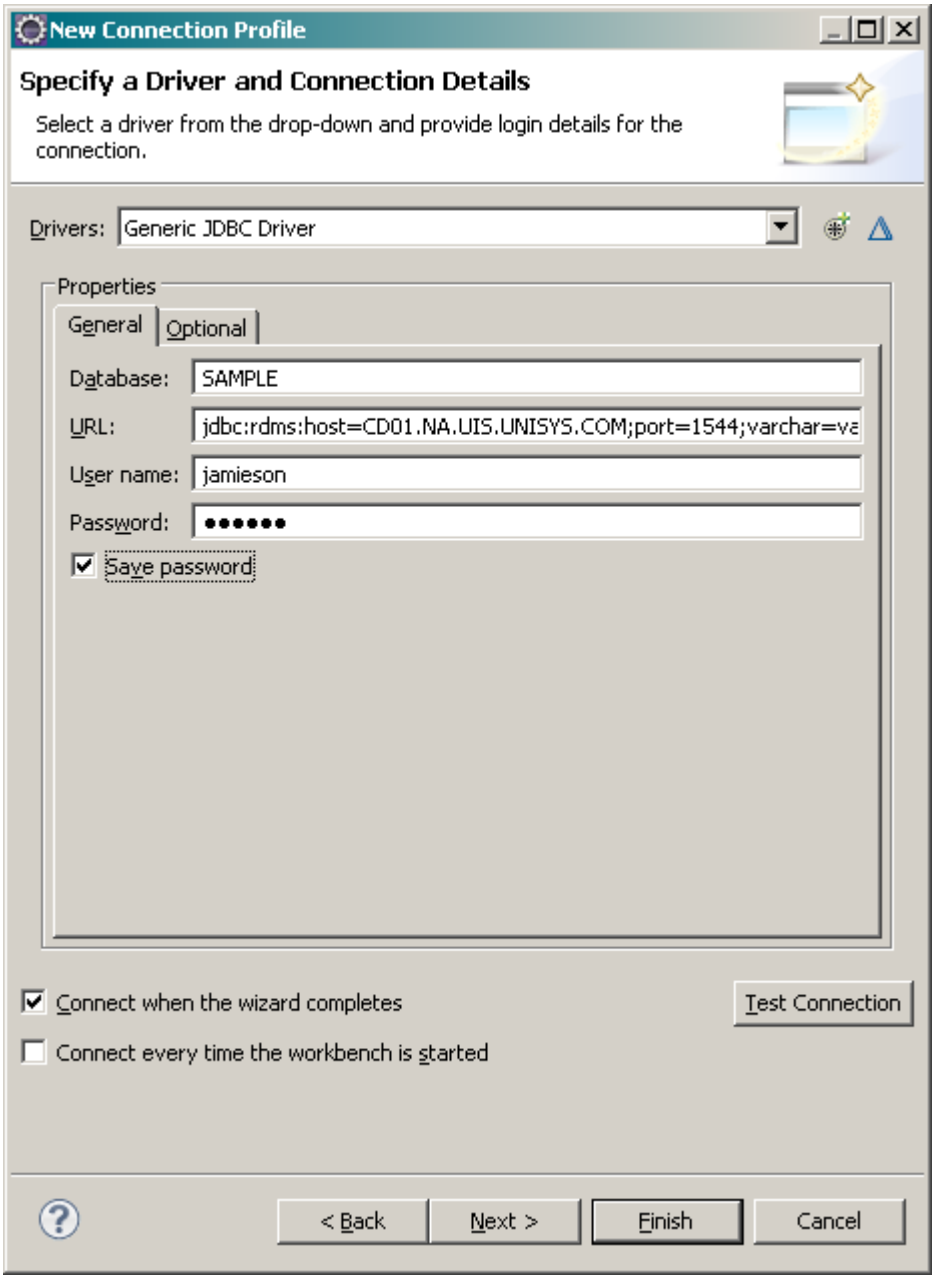
The schema name should match the RDMS schema you want to access.

Highlight the Driver Class field and click the icon in the right edge of the field.



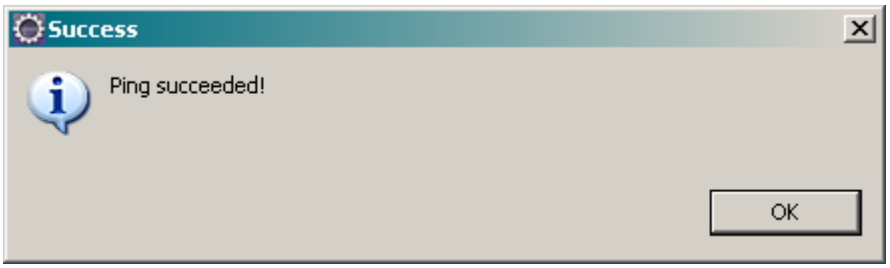
Click on Browse for class and highlight com.unisys.os2200.rdms.jdbs.RdmsDriver.

Click **OK.**



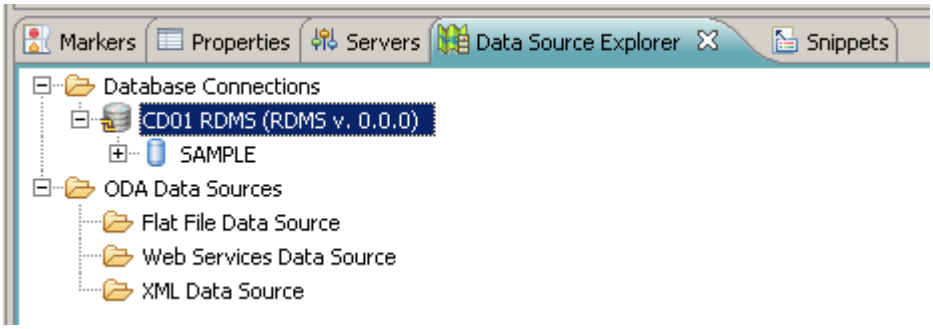
Enter your OS 2200 credentials.

At this stage, we can test the connection. Click **Test Connection**. If OK, the following pop-up appears.



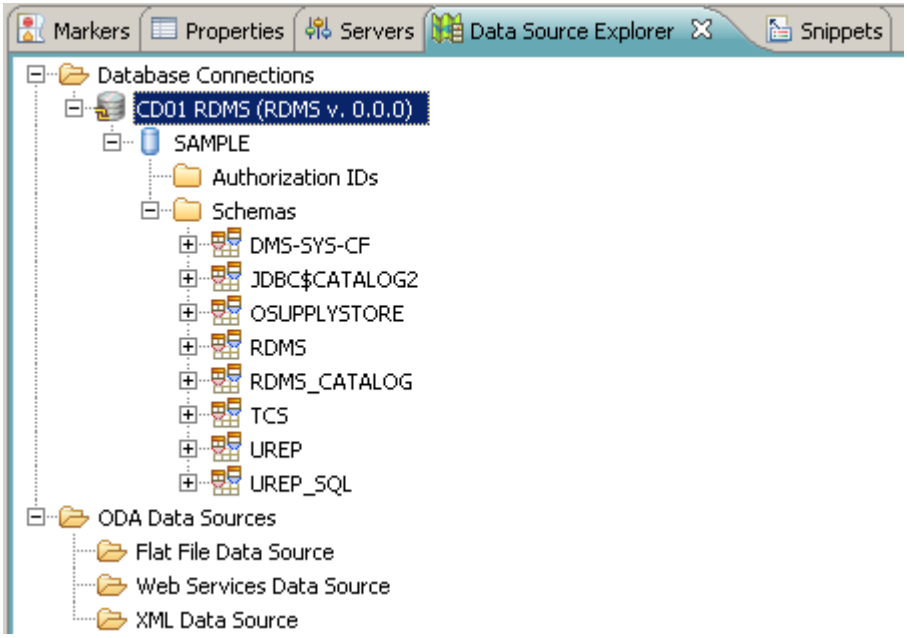
Click **OK** and then click **Finish**.

The Data Source Explorer pane will now show the connection details that we have just defined as shown below.



Retrieving RDMS Schema Information

Expand the database name entry. In this example, it is SAMPLE. This make take a little time as the JDBC driver is used to read key information from the RDMS catalog on the 2200.

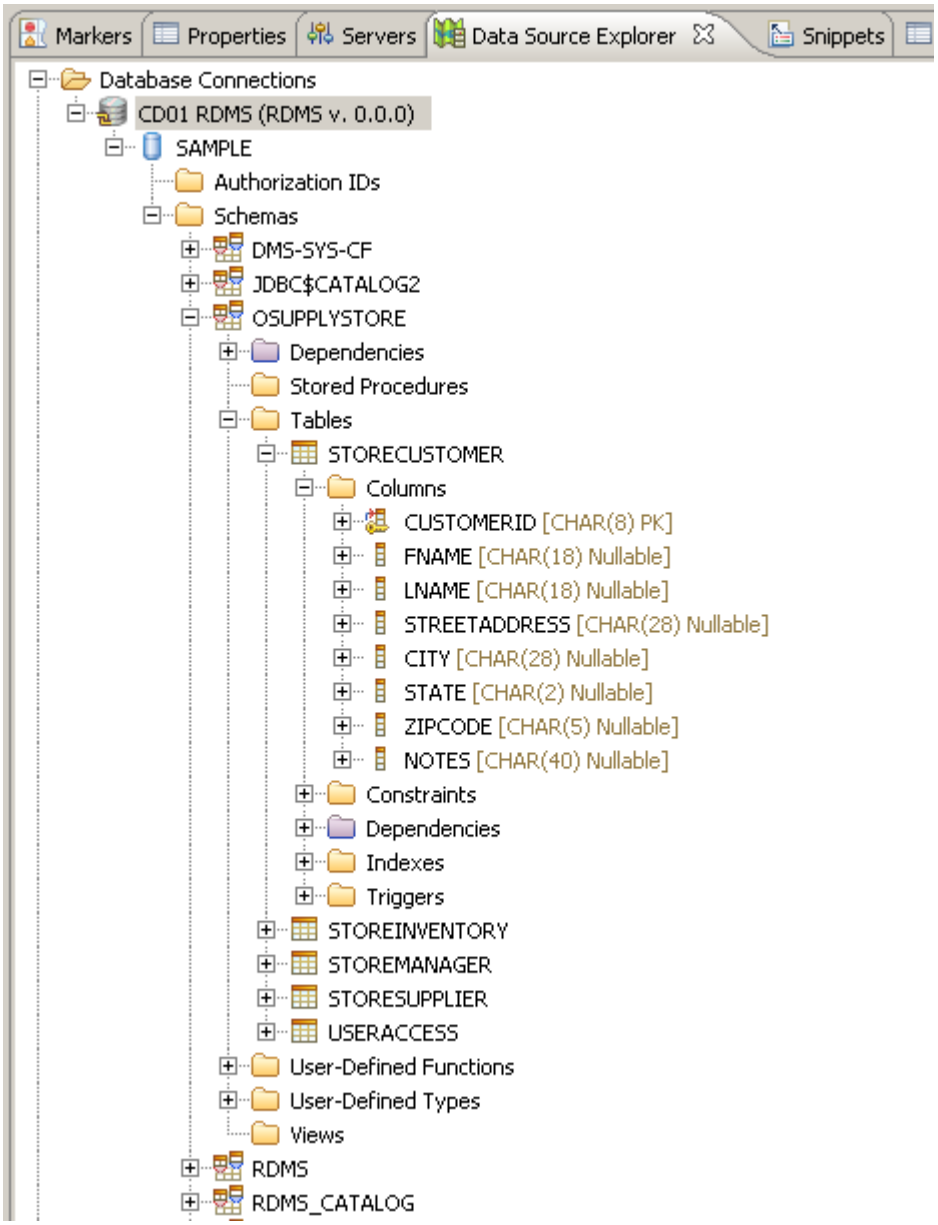


Expanding the Schemas entry shows the available schemas.

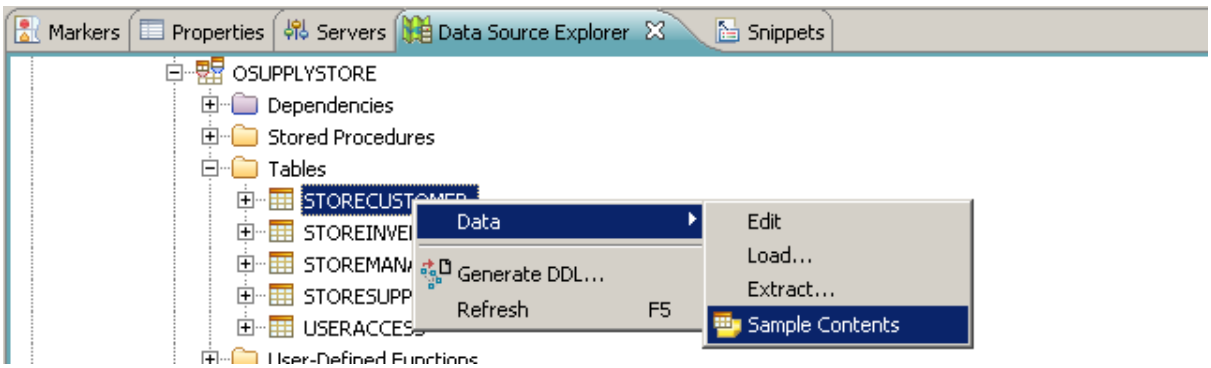
Only RDMS schemas are displayed including internal RDMS schemas that describe DMS schema information.

Expand a RDMS schema entry and then a table entry for this schema.

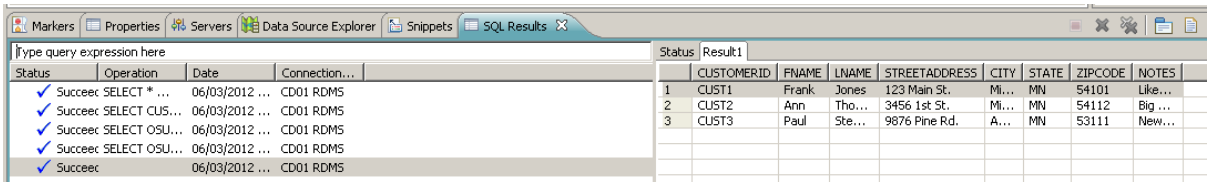
You will see the columns defined for the table and their data definition.



Highlight a table entry, right click, select **Data** and then **Sample Contents**.

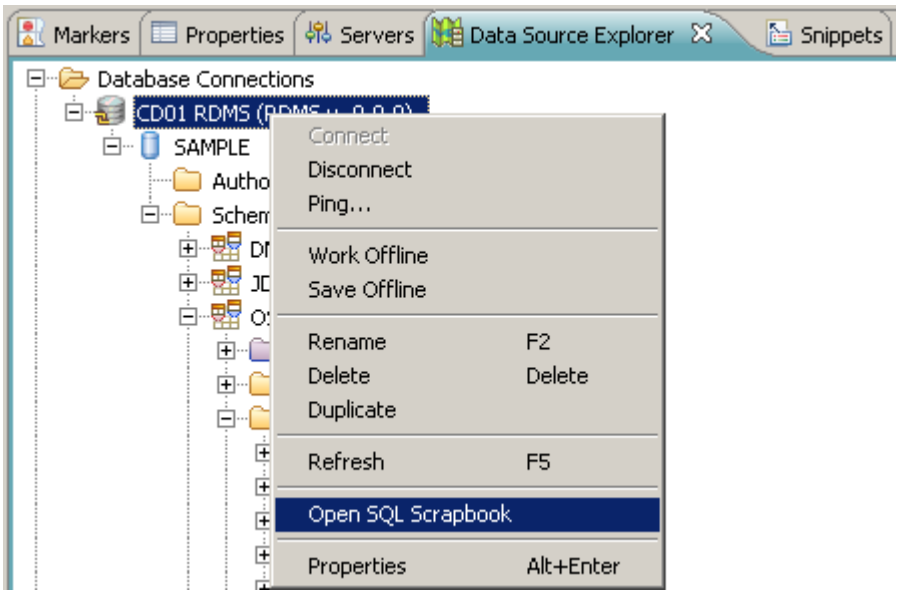


A new view called SQL results is opened and the data in the table is displayed.

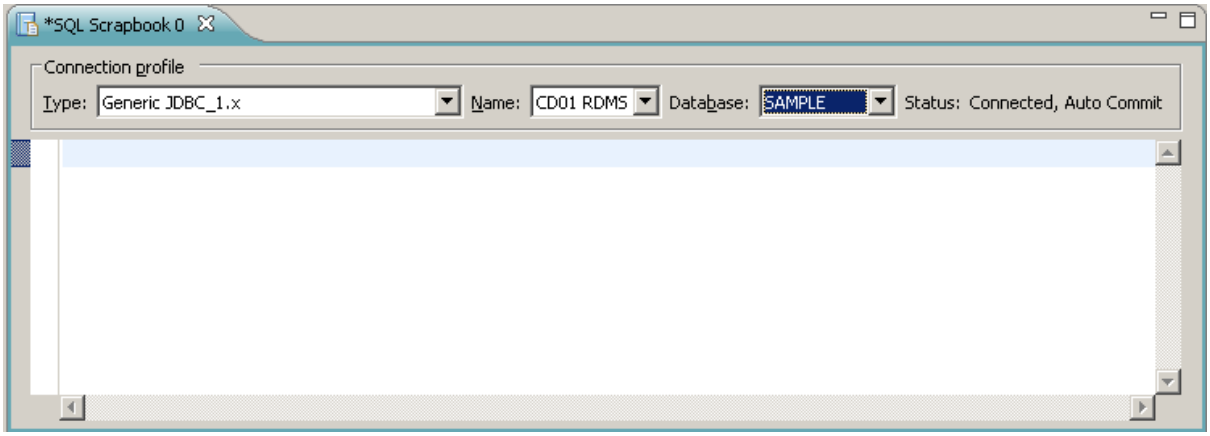


Developing and Testing SQL Commands

Right click on the Database Connection entry.

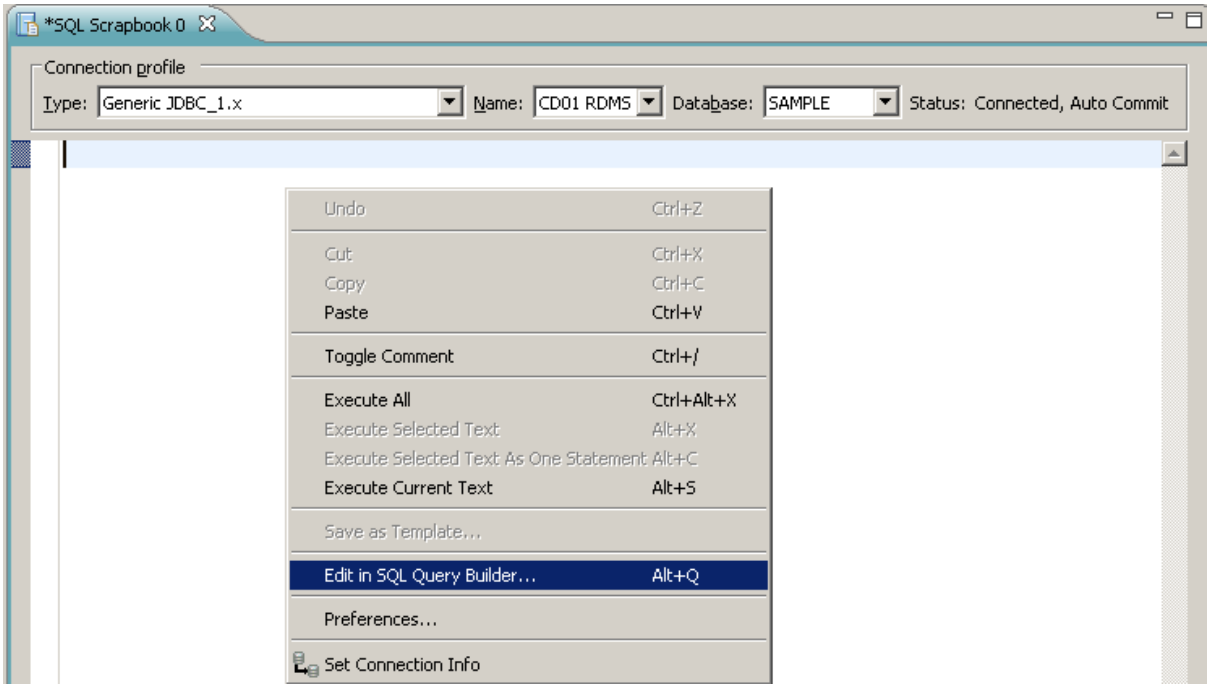


Select **Open SQL Scrapbook**. A new Window appears as shown below.



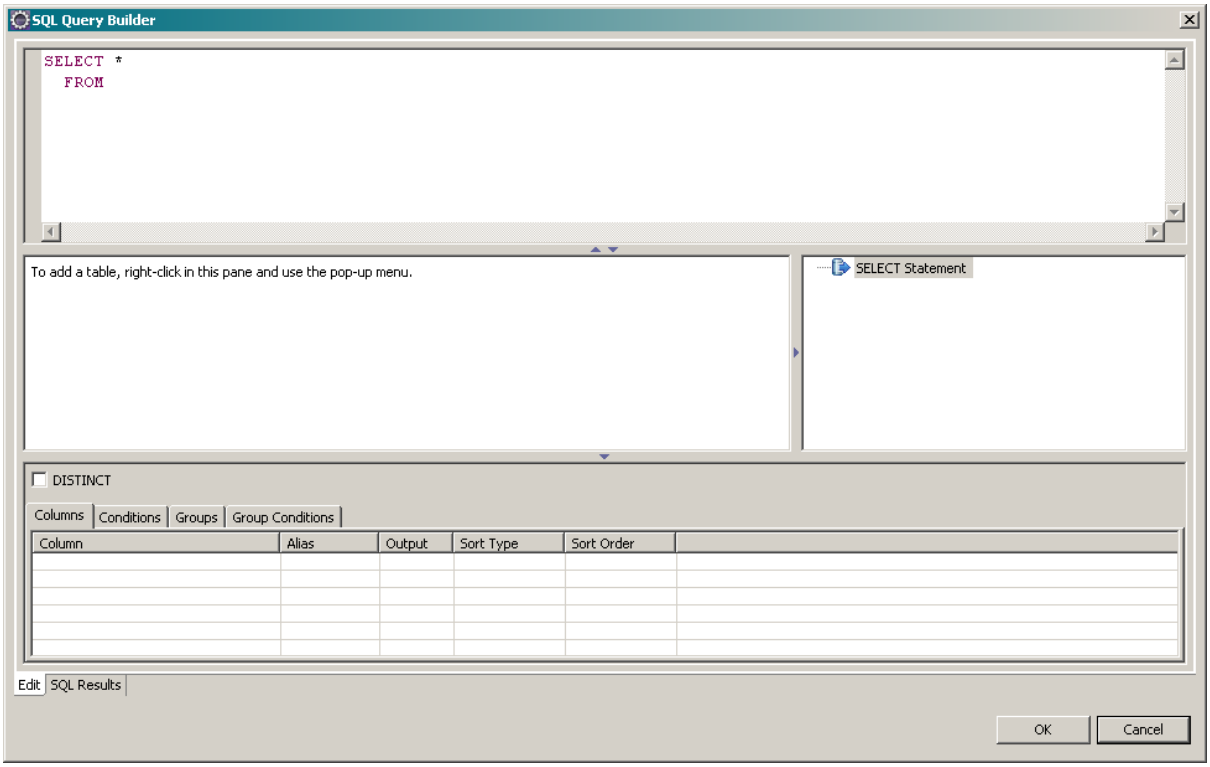
Use the list box to select the Type, the Name and the Database. These are the values we defined earlier.

Right click in this window.

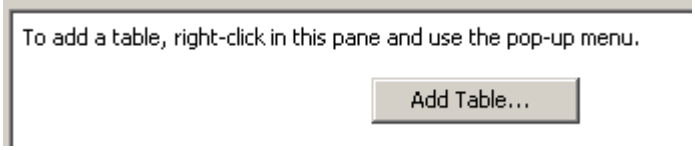


Click the **Edit in SQL Query Builder** entry.

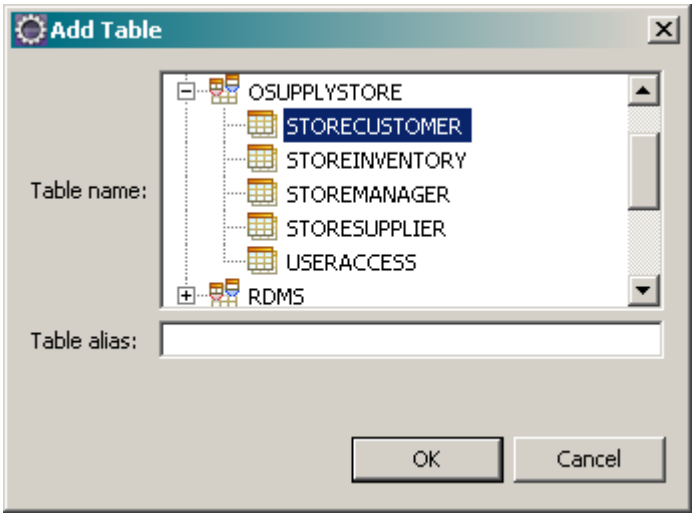
The window for the SQL Query Builder opens. This allows you to manually type in the SQL command in the upper pane or use the advanced features described below to help automate this process.



In the middle left pane (with the "To add a table…" text), right click and then click on Add Table.



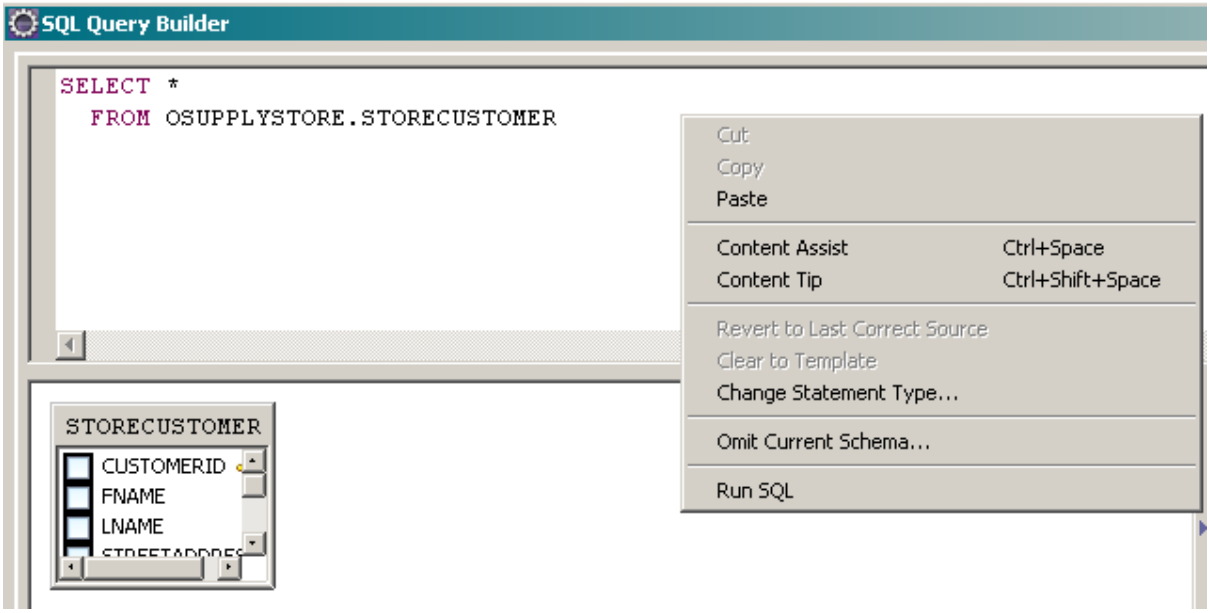
Scroll to the correct database and expand the entry to show the tables.



Highlight the required table and click **OK.**

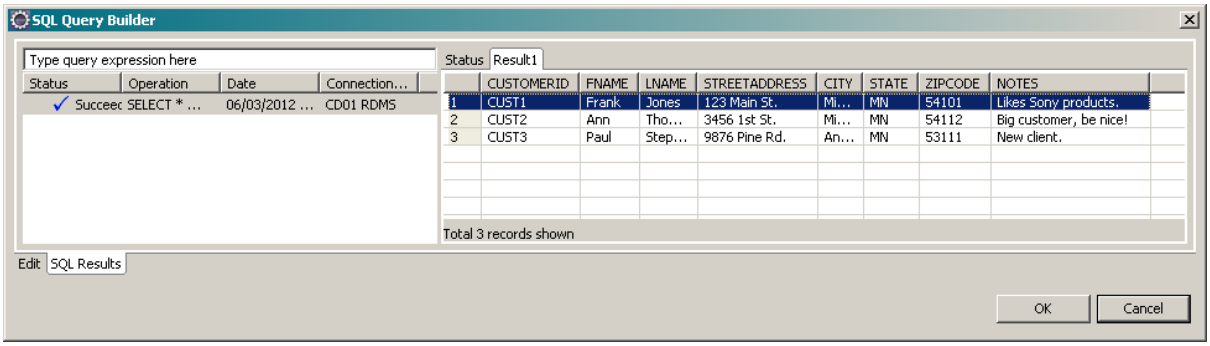
A small box appears with the table name as the title and all columns listed. A check box appears next to each column.

Notice how the SELECT command in the upper pane now has this table added to the FROM clause.

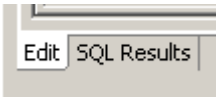


Right click in the upper pane and select **Run SQL.**

The JDBC driver will pass the command to the 2200 for processing and return the results. If the command is in error, this is reported.

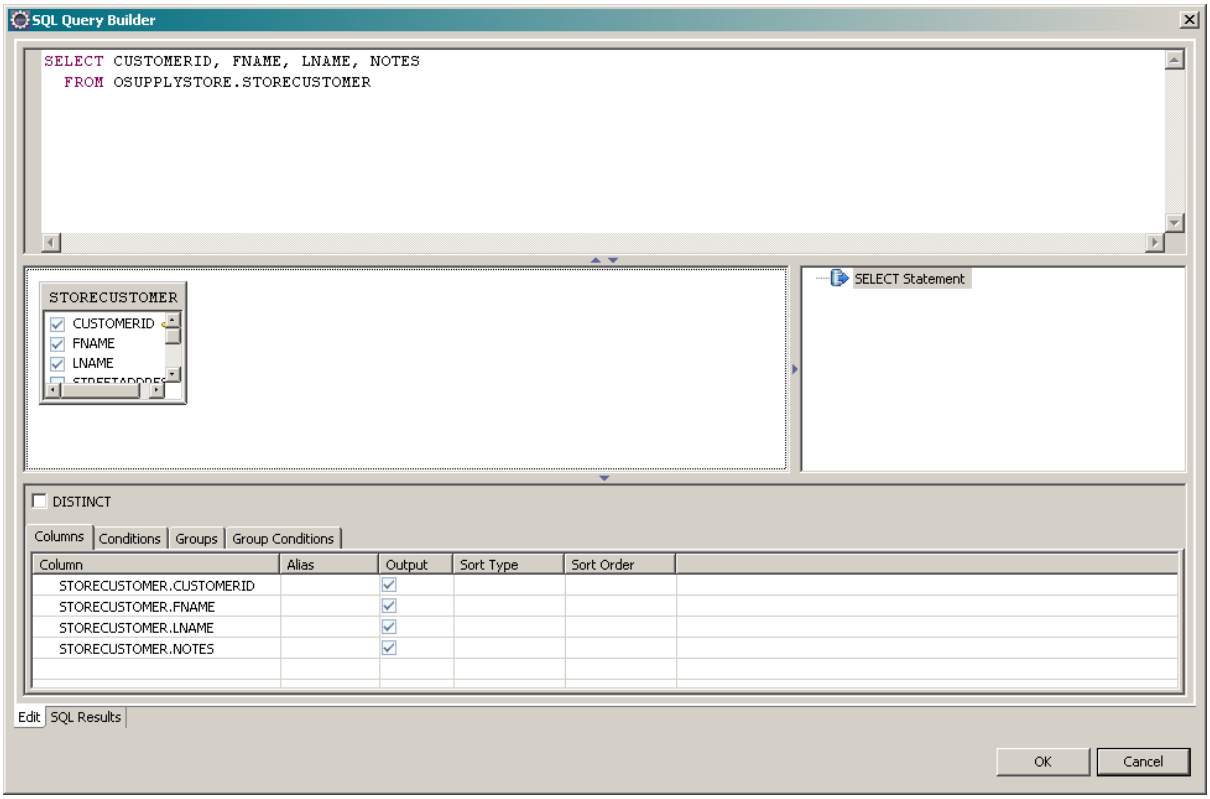


Note that the bottom left of the SQL Query Builder window now has the option to select **Edit** or **SQL Results.** If you click on SQL Results, the data returned from the 2200 based on the submitted SQL command is shown.

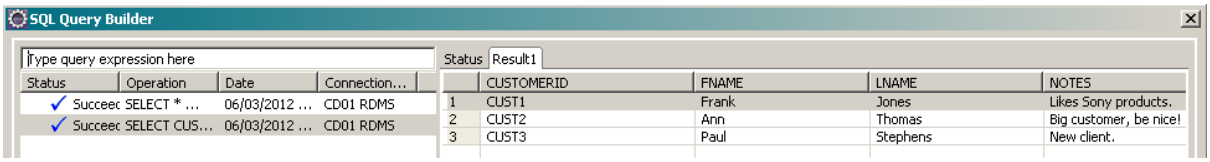


Click **Edit** to return the query builder editor.

In the bottom pane, we can set different options for the SQL command. In the middle left pane, check the columns that you want to display. Now look at column tab in the bottom pane. We see the columns we selected are listed as Output is checked.



Run the SQL command and confirm that the output only contains the selected columns.

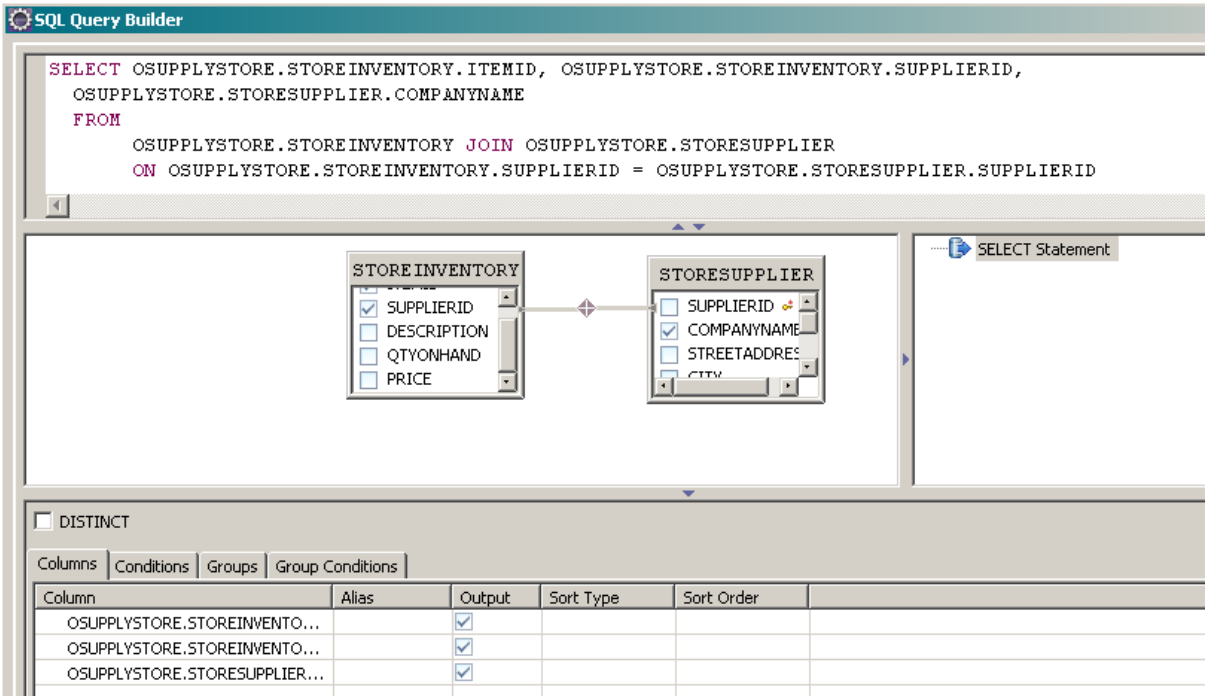


In the middle left pane, add another table.

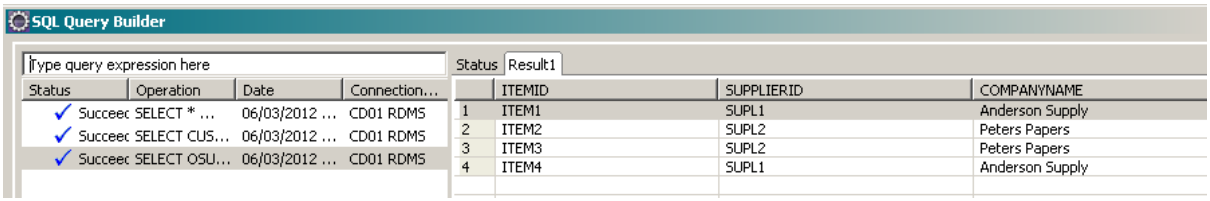
Note the SQL command is updated with the new table in the FROM clause.

Select some fields in the new table.

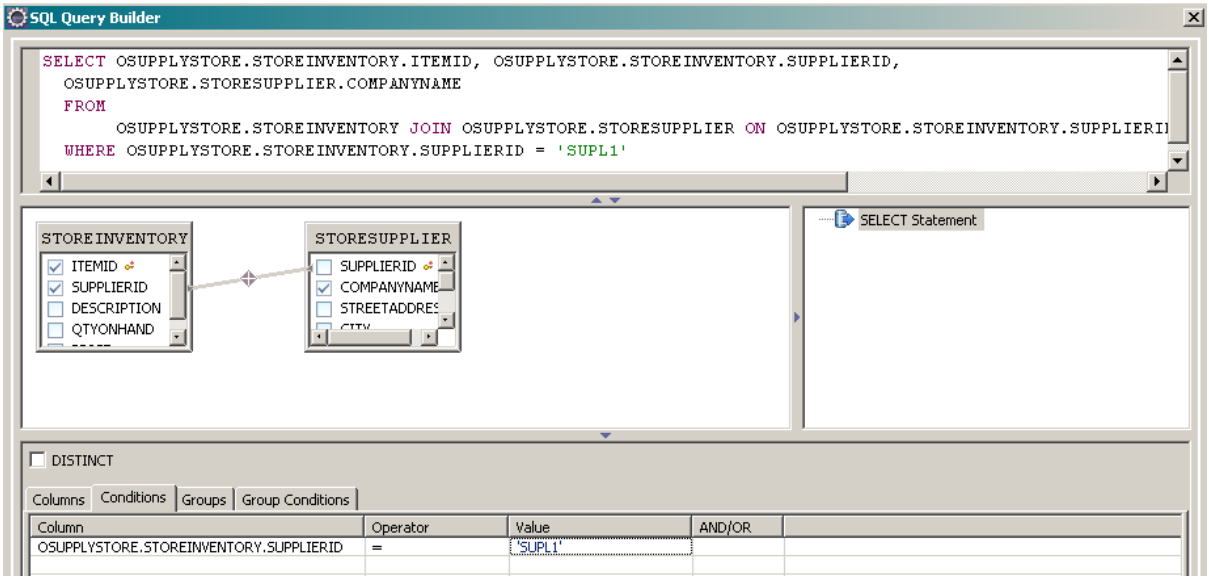
We can also select the fields to be used to join the tables. In the example below, SUPPLIERID is highlighted in the STOREINVENTORY table. The mouse is held down and the cursor dragged to the SUPPLIERID in the STORESUPPLIER table. Note that the system shows a line linking these fields. Also note that the SQL command now has a JOIN and ON clauses added.



Run the SQL command and check the results. As shown below, we get the required information. ITEMID and SUPPLIERID come from the STOREINVENTORY table while COMPANYNAME comes from the STORESUPPLIER table.

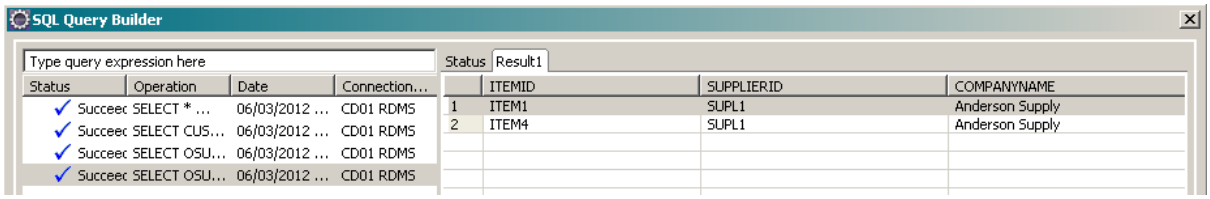


In the bottom pane, click on the **Conditions** tab. This is how we can easily define the WHERE clause to apply to our SQL command. Click on the column field and only valid columns are shown. Select a value. Then select the Operator and finally select the Value. Note the value could be a literal or a column entry from a table.

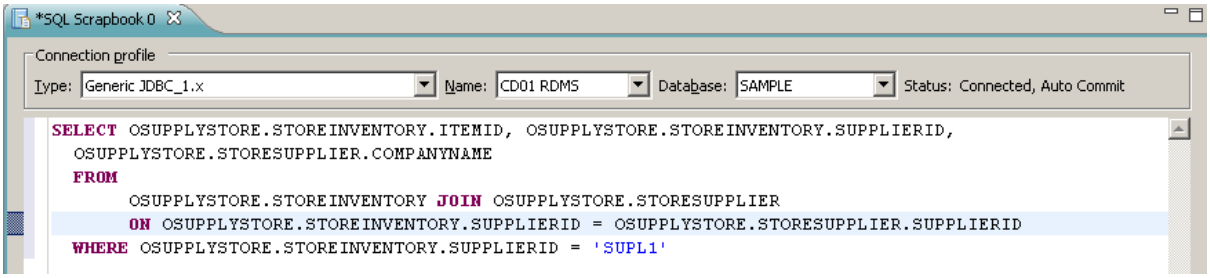


Note the WHERE clause is now added to our SQL command. We only wanted to see SUPPLIERIDs equal to ‘SUPL1’.

Run the command and check the results.



We can still edit the command in the upper pane. This might be necessary if you want to format in a certain way. For example, you might want to copy the command into a COBOL program and therefore the columns restrictions of 12 through 80 apply. After editing the command, you can run it again to make sure no editing mistakes were made.

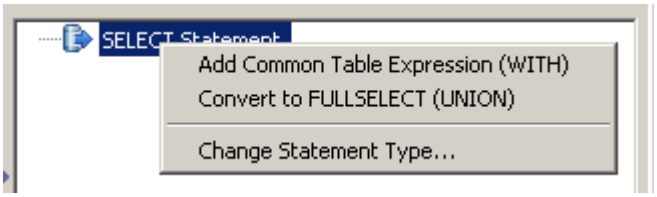


When satisfied, you can save this command or copy the command to paste into a program source. If pasting into a 2200 program source, remember to open the OS 2200 perspective first. Then you can open the appropriate source program if not already open.

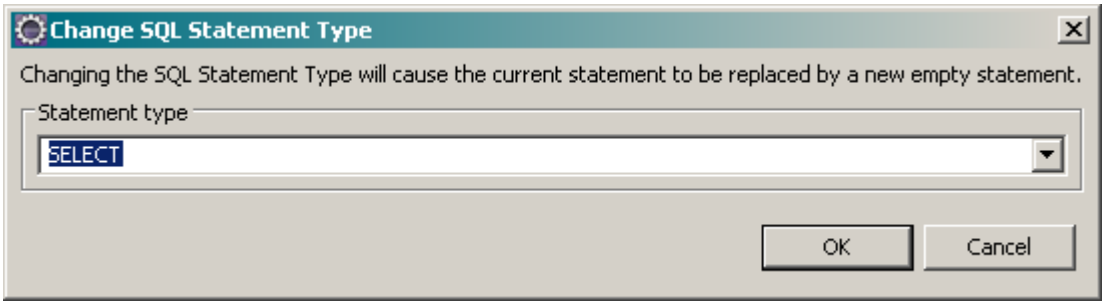
Changing SQL Commands

The above example referred to the SELECT command which is used by default.

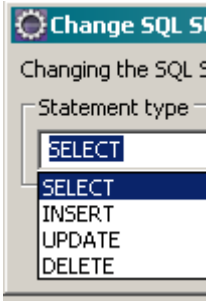
In the SQL Query Builder window, go to the middle right pane and right click on **SELECT Statement**:



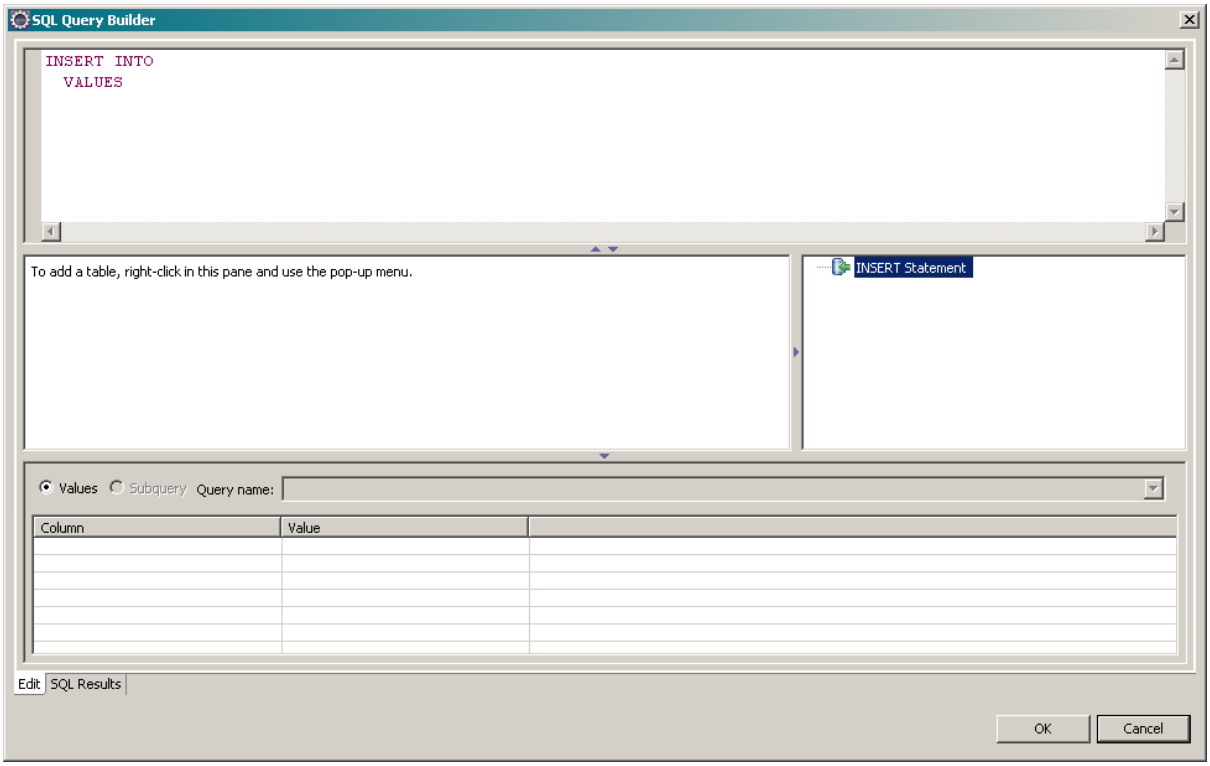
Click on **Change Statement Type.**



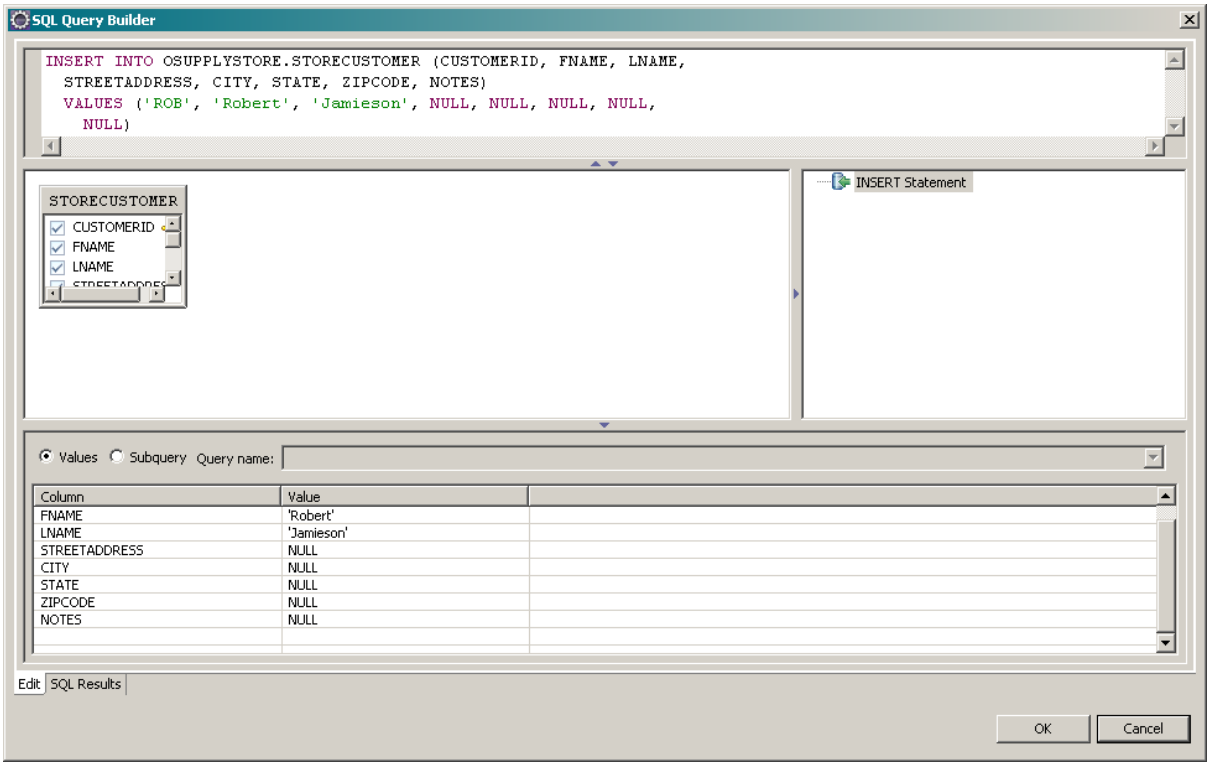
Expand the list box to view the available SQL commands.



Select the required command and then click **OK.** The SQL Query Builder changes for the selected command. In the following example, INSERT was selected.



Note the difference in the lower pane. You can also only have 1 table shown in the middle left pane since we are doing an INSERT.



If the column is defined to allow NULLs, then NULL is used as the default value but can be overwritten.

Avoiding the Schema Qualification

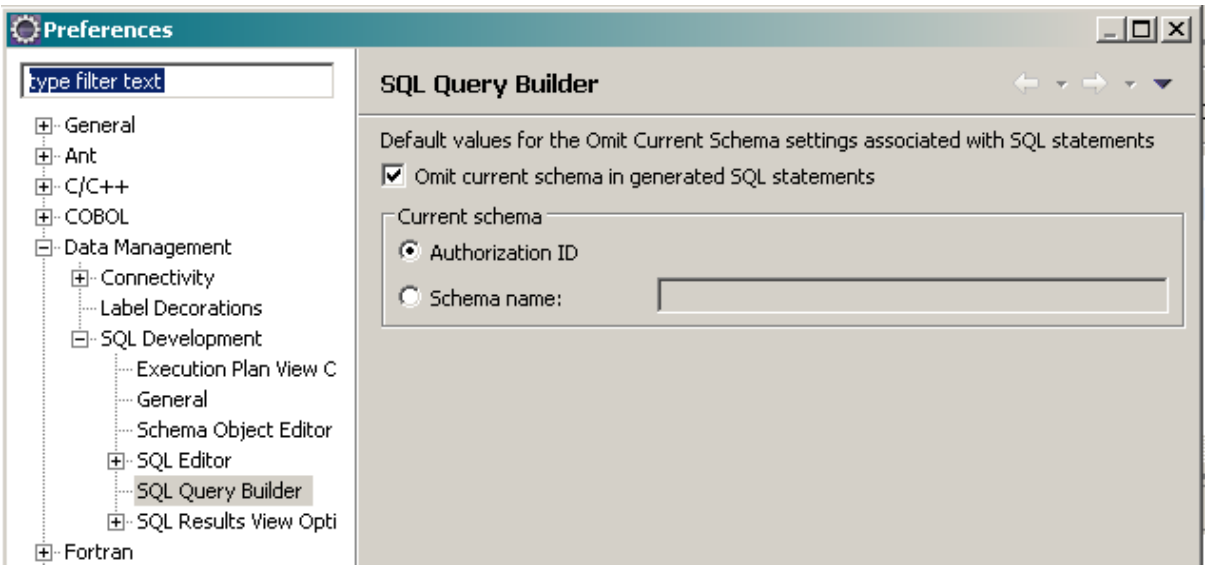
In the above examples, each field is qualified by schema, table and column e.g.

```
OSUPPLYSTORE.STORESUPPLIER.SUPPLIERID
```

Generally in 3GL development on the OS 2200, a developer would issue a USE DEFAULT QUALIFIER or USE DEFAULT SCHEMA statement to define the schema name. Both options are valid but experienced OS 2200 developers maybe more familiar with the former while new OS 2200 developers may know the latter. If the field is not qualified with a schema name, it uses this default qualifier value.

In many database systems, the default schema name is the user ID (or Authorization ID). However, in RDMS the default schema name is always "rdms". If you want to avoid using the schema name to qualify all table names, you must set the default schema (also called the QUALIFIER) for the connection. This is done by adding a connection property when you define the connection (e.g., schema=OSUPPLYSTORE). You can also tell the Eclipse SQL Builder to not add schema names. Check the "Omit current schema" box, then select the "Schema name" option and enter your schema name that you added to the connection properties (e.g., OSUPPLYSTORE).

Eclipse by default will include the schema in the field definition but it can be configured to omit the schema name. Go to **Preferences → Data Management → SQL Development → SQL Query Builder**.



Check the "Omit current schema" box.

The result is:

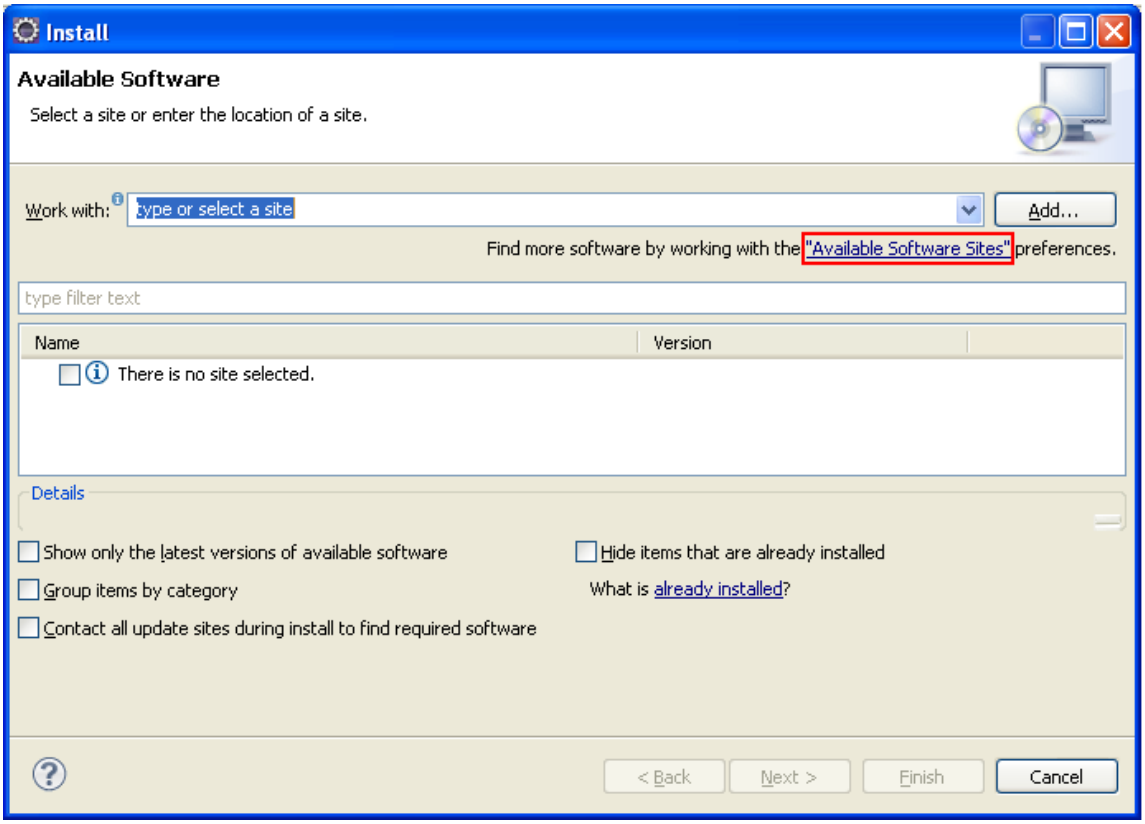
```
SELECT SUPPLIERID, COMPANYNAME
  FROM OSUPPLYSTORE.STORESUPPLIER
```

Obtaining Eclipse Updates

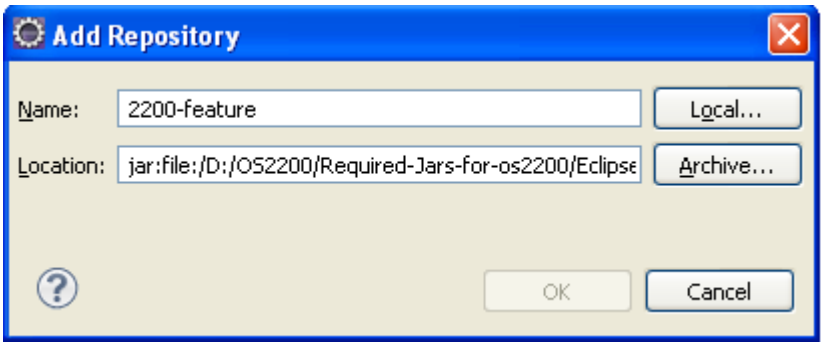
Unisys provides an Eclipse update site to provide updates to a released version. The update site is available as a link the email that you receive after registration.

Once the update site is downloaded, the following instructions provide the steps to process the update site. Please follow the below process to update.

1. In the Eclipse window, Go to "*Help*" menu and choose "Install new Software". In the Install window, click on the "Available Software Sites" as shown below.



2. Now click the "Add" button to specify the location for the Eclipse 2200 All-in-One update site. This should bring up the "Add Site" window. Enter the URL specified above in the Location field.



3. We shall choose the OS2200-feature label from the drop-down box with the label "*Work with*" at the top of the dialog. (Note : We shall make sure that the "*Contact all update sites during install to find required software*" option is UNCHECKED)

4. Now the two feature should be listed in the "Name" box, namely;
   - com.unisys.ca.feature

- org.eclipse.cobol.feature

We shall choose both these features and click on “Next” and in the following window accept the licenses and finish the update process.

If you are using C or C++ editors, you have to update Eclipse with mandatory plug-ins (CDT and JST) from the eclipse community (www.eclipse.org). Unisys also maintains these plug-ins on our product site. Please be advised that this is the old version of CDT and JST. In case any customer needs the latest plug-ins, they have to download it from www.elipse.org .

Clients can check for updates if there are any PLE's released. The client will know from product site if there are any PLE raised and what were the issue reported and the fix provided in the update. Unisys recommends for receiving alerts when new releases or updates are available.

Appendix A – Eclipse Shortcut Keys

Eclipse Shortcut Keys

Use Ctrl+Shift+L to display a list of shortcut keys:

Activate Editor	F12
Activate Task	Ctrl+F9
Add Artifact to Target Platform	Ctrl+Alt+Shift+A
Add Javadoc Comment	Alt+Shift+J
All Instances	Ctrl+Shift+N
Backward History	Alt+Left
Browse VPG	Ctrl+Alt+Shift+B
Build All	Ctrl+B
Change Method Signature	Alt+Shift+C
Close	Ctrl+F4
Close All	Ctrl+Shift+F4
Collapse	Ctrl+Numpad_Subtract
Collapse All	Ctrl+Shift+Numpad_Divide
Commit...	Ctrl+#
ConfigTagCmd	Ctrl+Shift+F5
Content Assist	Ctrl+Space
Context Information	Ctrl+Shift+Space
Copy	Ctrl+Insert
Copy Lines	Ctrl+Alt+Down
Copy OS 2200 Path	Ctrl+Alt+C
Cut	Shift+Delete
Deactivate Task	Ctrl+Shift+F9

The following is a list of some shortcuts.

CTRL+SHIFT+L		Show all shortcuts	
Editor Shortcuts		**Search**	
CTRL+D	Delete line	CTRL+H	Search
ALT+Up	Move line up (or down)	CTRL+J	Incremental
ALT+Left	Previous/next editor/file	CTRL+K	Find next
CTRL+SHIFT+O	Organize Imports	CTRL+SHIFT+K	Find previous
CTRL+1	Quick Fix		

CTRL+M	Maximize tab	**Debugging**	
CTRL+I	Correct Indentation	F5	Step Into
CTRL+SHIFT+F	Format Code	F6	Step Over
CTRL+L	Goto Line Number	F7	Step Return
CTRL+Q	Last Edit Location	F8	Resume
CTRL+T	Display type hierarchy	F11	Debug Last Launched
F4	Show type hierarchy	CTRL+SHIFT+B	Toggle Breakpoint
F3	Type declaration		
F2	Show info	**Opening**	
CTRL+O	Quick outline	CTRL+SHIFT+T	Open type
		CTRL+SHIFT+R	Open resource
CTRL+.	Next Error	CTRL+E	Show open editors
CTRL+,	Previous Error	CTRL+F6	Open editors
		CTRL+W	Close editor
CTRL+Space	Content Assist	CTRL+SHIFT+S	Save all
CTRL+SHIFT+Sp	Parameter Assist	CTRL+SHIFT+W	Close all
CTRL+/	Comment	CTRL+N	New project
ALT+/	Word Completion		

		Moving	
Refactoring		CTRL+F7	Move between views
ALT+SHIFT+R	Rename	CTRL+F8	Move between perspectives
ALT+SHIFT+L	Extract to local variable		
ALT+SHIFT+M	Extract to method	**Running**	
ALT+SHIFT+Y	Change method signature	CTRL+F11	Run application
ALT+SHIFT+Z	Undo refactoring	CTRL+ALT+P	Publish apps
		CTRL+ALT+R	Run In Appserver
		CTRL+ALT+D	Debug In Appserver
		ALT+SHIFT+X+T	

Quick Key	**Function**
Ctrl + /	Toggle Comment (*) indicator in col 7
Ctrl+Space	Auto completion mode is invoked

Appendix B – Japanese Usage

Japanese users should be aware of the Internationalization manual available using this link:

http://public.support.unisys.com/common/ShowWebPage.aspx?id=8405&pla=ps&nav=ps&elqTrackId=0c8a162e81b948fdbb7e99d14ebab0c3&elq=40173231f6d74e7792e9740b7af8b751&elqaid=3209&elqat=1&elqCampaignId=

The site shows a link to the manual:

Internationalization of OS 2200 Eclipse IDE	8205 7043-000	30-Sep-16	1.1 MB

After the Eclipse installation, Japanese users need to enable the Babel package for Japanese which is available from the Eclipse market place. Refer to the procedures in the above manual.