



COBOL-IT® Developer Studio
Getting Started
The Basics
Version 2.0



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Acknowledgment

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COBOL-IT Developer Studio Topics

Introduction and License terms

This document describes how to install and how to use the **COBOL-IT Developer Studio**, which is COBOL-IT's eclipse-based development environment, designed to support users of the **COBOL-IT Compiler Suite**.

COBOL-IT Developer Studio License terms

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Dependencies

Dependencies and Comments

Dependency	Comment
“C” compiler	The COBOL-IT Compiler requires a “C” compiler. While most Linux>Unix installations will include a “C” compiler, many Windows installations will not. Windows users can download the Visual Studio from www.microsoft.com .
COBOL-IT Compiler Suite	The COBOL-IT Compiler Suite, Standard Edition can be downloaded at the COBOL-IT Online Portal. For access to the COBOL-IT Online Portal, please contact your sales representative at sales@cobol-it.com .
Java Runtime Environment (JRE)	The COBOL-IT Developer Studio Kepler build can be run with the Java Runtime Environment (JRE) Version 1.6 or greater. The COBOL-IT Developer Studio Neon build can be run with the JRE Version 1.8 or greater.
Eclipse	Eclipse is included with the download of Developer Studio.

The COBOL-IT Developer Studio requires that the COBOL-IT Compiler Suite already be installed on the host platform, and that a “C” compiler be installed on the host platform.

The COBOL-IT Developer Studio is an Eclipse plug-in, and as such, requires that Eclipse be installed on the host platform. Eclipse, in turn, requires that a Java Runtime Environment (JRE) be installed on the host platform.

The COBOL-IT Developer Studio Distribution

For Windows-based installations, the COBOL-IT Developer Studio, Enterprise Edition can be downloaded from the COBOL-IT online portal with a login and password provided by your sales representative.

The COBOL-IT Developer Studio, Enterprise Edition is available with Subscription. The COBOL-IT Developer Studio, Enterprise Edition provides functionality with the installation of several Perspectives:

- Developer Studio Perspective in which users set up and build COBOL projects, using a locally installed version of the COBOL-IT Compiler Suite Enterprise Edition. The Developer Studio Perspective additionally provides access to Code Coverage and Profiling Tools.
- Debugger Perspective providing access to a feature-rich COBOL debugger both locally, and on Remote Systems
- Remote Systems Perspective, allowing use of Compiler, Runtime, and Debugger functionalities installed on remote servers.

- Git and RSEGit Perspectives, providing users with full access to the Git/Github Source Code Control System.
- Data Displayer Perspective, providing access to a tool for browsing and modifying data in indexed, sequential and relative files.
- Planning Perspective, providing access to the Mylyn Task Manager.
- For more information about the usage of Git/RSEGit, Data Displayer, Mylyn Task Manager, and Code Coverage, see the Getting Started with the Developer Studio- The Utilities Manual.
- Using the COBOL-IT Developer Studio requires a license for both the COBOL-IT Compiler Suite Enterprise Edition, and COBOL-IT Developer Suite.

Using the COBOL-IT Developer Studio

This document describes how to install and how to use the **COBOL-IT Developer Studio**. **COBOL-IT Developer Studio** is a COBOL development workshop based on the Eclipse environment.

This IDE includes a project manager and a full screen editor dedicated to COBOL language with colorized syntax and an interface to the COBOL debugger. It may be customized according to the specific needs of each company. The Eclipse environment offers great flexibility through its wide range of plug-ins.

The Developer Studio is the Eclipse-based COBOL-IT Development Environment , providing a framework for using the Compiler, Runtime and Debugger in a Development environment with a feature-rich COBOL Code Editor.

COBOL-IT Developer Studio enables COBOL developers to more easily maintain and enhance their applications by offering them the entire range of possibilities and power of Eclipse.

This chapter guides the user through a practical exercise that includes installing the Developer Studio, and launching a workspace.

Installing Developer Studio (Windows)

COBOL-IT Developer Studio Windows distributions are provided in a zipped folder file format. Distributions are provided for the Kepler Version of Eclipse (Java 6, 7) , as well as for the Neon version of Eclipse (Java 8).

Downloadable distributions for the Developer Studio version 2.0.0 are available in both 32- and 64-bit formats for Windows and Linux operating environments, with builds done with both the Kepler and Neon versions of Eclipse. Linux distributions are provided in gzipped tar formats. Windows distributions are provided in zipped formats.

The COBOL-IT Developer Studio is downloadable from COBOL-IT Online, with access provided by your Sales Representative. Your login and password will give you access to the Downloads Screen on COBOL-IT Online.

In the Active Authorizations Window of the Downloads screen, select "Cobol IT Developer Studio". Active Authorizations are the Products you are currently authorized to Download. Selecting "COBOL-IT Developer Studio" displays a list of the Products you may download.

From the list, select IDE Windows with jre.

After selecting "IDE Windows with jre", you will advance to the COBOL-IT Developer Studio Download Screen.

For Windows Distributions:

Right-click on the COBOL-IT Developer Studio zipped archive and select "Unzip to...". Then browse to the folder in which you wish to install your Developer Studio.

The COBOL-IT Developer Studio is an application called "CDS.exe". Double-click on "CDS" to launch the Developer Studio.

For Linux Distributions:

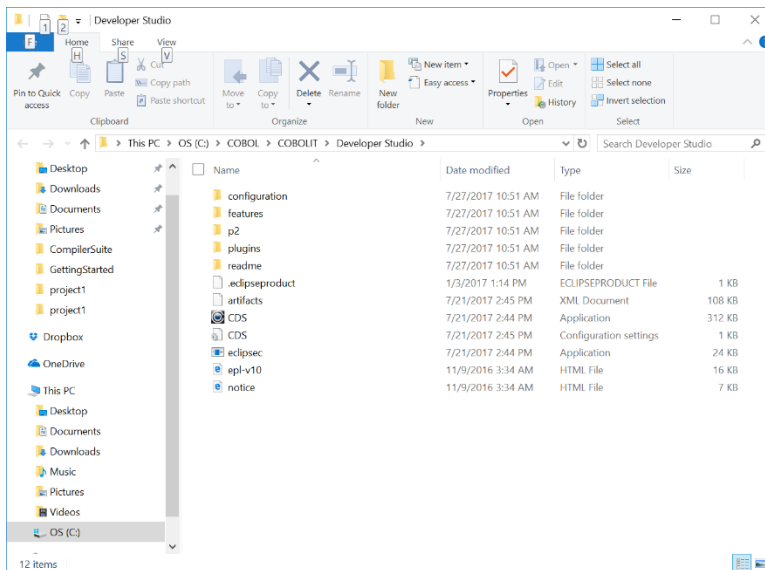
From the command line, unzip/untar the distribution archive, and install it in a directory on your Linux Server.

```
>tar xzpf devstudio-neon-2.0.0-linux.gtk.x86_64.tar.gz -C /home/cobolit/devstudio
```

The Linux-based COBOL-IT Developer Studio is an application called "CDS". Run "CDS" to launch the Developer Studio.

The Developer Studio is licensed with the COBOL-IT Developer Studio license file which is located by default in your COBOL-IT installation directory. Licenses are product- and platform specific. In addition to the Developer Studio license, usage of the Developer Studio requires a license for the COBOL-IT Compiler Suite for all platforms on which you wish to compile and run COBOL programs.

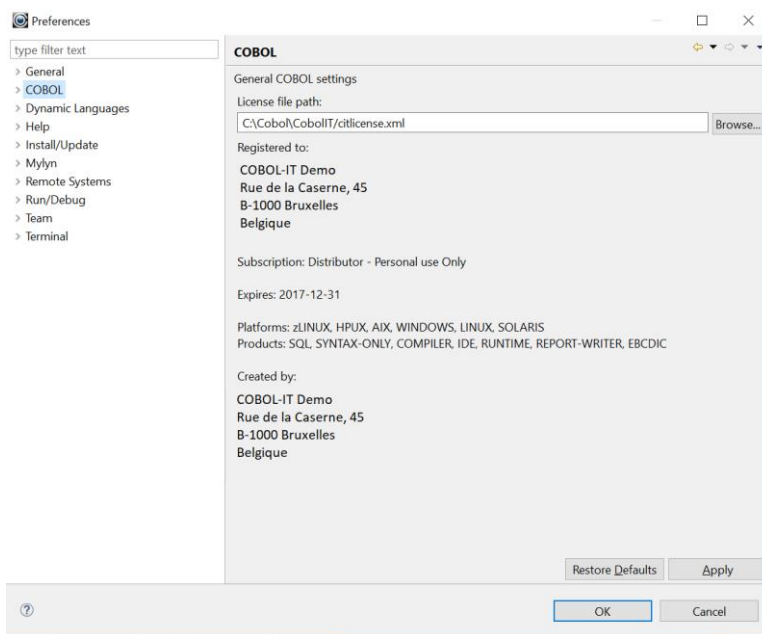
The Developer Studio Distribution



Validate the Installation, by checking the license.

To validate the install, select Window, from the Main Menubar, and then select “Preferences” from the dropdown menu. In the Preferences dialog screen, select “COBOL” from the panel on the left. You will now need to browse to locate your COBOL-IT license file. The Developer Studio will attempt to validate licenses located in the installation directory with a name of citlicense.xml, or a name beginning with “citlicense-“ and with the “.xml” suffix.

As an examples, click on the Browse button, navigate to the installation directory, and select “citlicense.xml”. The expiration date of your license, and the products and platforms supported will be displayed. Verify that the Compiler Suite and Developer Studio are licensed on your platform.



Click OK to return to the Developer Studio.

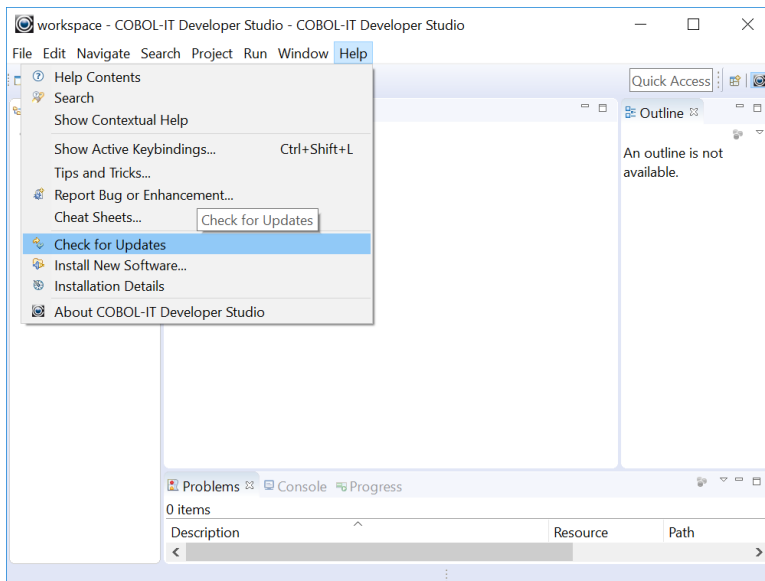
Installing Updates to the Developer Studio

Administrator privileges required in some situations

In Windows, if the Developer Studio is installed under either the C:\Program Files or C:\Program Files (x86) folders on your Windows system, then you must have Administrator privileges in order to perform Developer Studio updates. This is because Windows considers the C:\Program Files and C:\Program Files (x86) folders to be restricted directories.

To install an update to the Developer Studio

Select Help/Check for Updates from the Main Menubar.



Eclipse is programmed to check the plug-ins you have installed for updates.

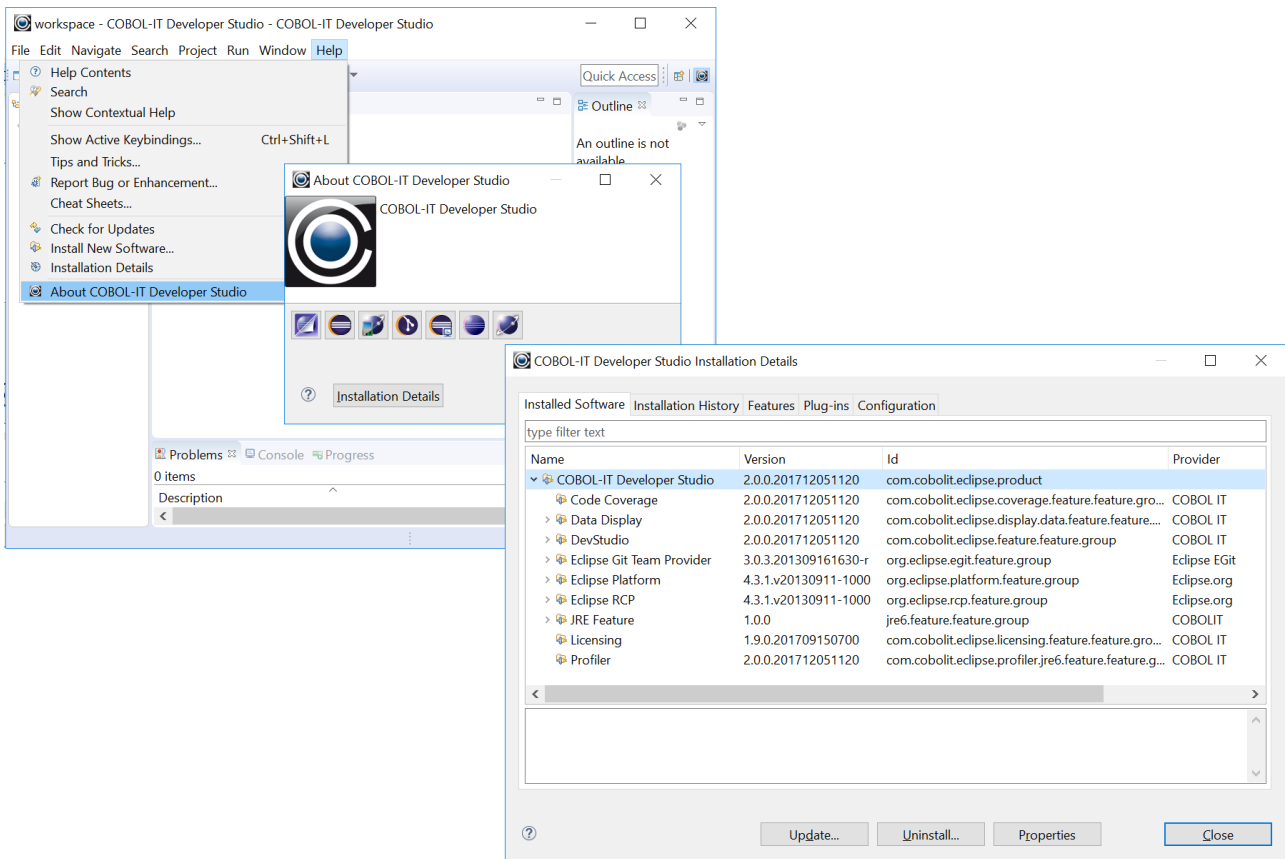
On the Available Updates dialog screen, click “Select All”, and then click on the “Next>” button to continue.

Review and confirm the updates.

If any updates are downloaded, you will be required to review and accept the terms of the Eclipse license agreement.

Select the radio button titled “I accept the terms of the license agreement.”.
Click on the Finish button to begin the download and install of the updates.

Wait, while your software updates. You may receive a Security Warning that the software contains unsigned content. Click “OK”. When you are prompted to restart Eclipse, click “Restart Now”.
To verify that your update has been installed, click on Help, then click on Installation Details in the dropdown menu.



The COBOL-IT Developer Studio Installation Details window contains Version Information about COBOL-IT Developer Studio, and its dependencies in the Eclipse environment.

The Eclipse Platform

Key Concepts

The Eclipse Platform stores your projects in a folder called a workspace.

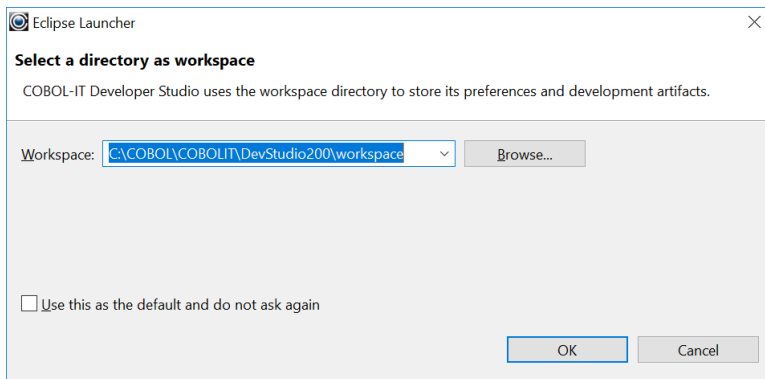
When opened, Eclipse prompts the user to indicate where they wish to launch their workspace.

Eclipse guides the user from the “Workspace Launcher” screen through the “Welcome” screen, to the Developer Studio IDE.

Users of the Developer Studio IDE should begin by de-selecting “Build Automatically” on the dropdown menu under the Project button on the main mainubar.

The Workspace Launcher

Enter a path for the Workspace, and click “OK”.



The COBOL-IT Developer Studio

Key Concepts

This chapter guides the user through the installation of the COBOL-IT Developer Studio and includes remarks about the Eclipse IDE. Then, there is a review of best practices for using the COBOL-IT Developer Studio.

Best practices for using the COBOL-IT Developer Studio are:

- 1- Enter the Window>Preferences interface and configure the Development Studio. Minimal configurations can be made in Window>Preferences>General>Editors>Text Editor, Window>Preferences>General>Workspace and Window>Preferences>Run/Debug>Perspectives.
- 2- Use the File>New>Project>COBOL Project Wizard to create a new project.
- 3- Use the File>New>COBOL Program Wizard to create a new COBOL program in the project folder.
- 4- Enter the Project>Properties>Compiler Options interface to set the compiler flags in your project.
- 5- Create a runtime configuration for your COBOL program.
- 6- Clean, and Build the Project.
- 7- Review the output from the Build in the Compiler Console Window, and possibly the Problems window. The Problems window will display compiler errors detected in a clickable interface that returns control to the line on which the compiler error was detected.
- 8- Run the program.
- 9- Run the program in the debugger.

We have also included reference chapters for :

Additional development scenarios, including:

- a. Using existing source code in its current location
- b. Importing existing source code into a New Project structure
- c. Dragging and dropping files and folders from the Windows explorer into the Project

For reference material on using the COBOL-IT Debugger, see the related document :

- Getting Started with the Developer_Studio
Debugger Perspective

For reference material on using the Remote System Perspective, see the related document:

- Getting Started with the Developer Studio
Remote System Perspective

With these guidelines, we hope that your experience of Getting Started with the COBOL-IT Developer Studio will be rewarding. The COBOL-IT Technical Services team welcomes your feedback. Please submit comments and suggestions to techsvcs@cobol-it.com.

Configuration Settings

Configuring your development environment using the Window>Preferences interfaces causes the settings to be applied at the Workspace level. Settings applied at the Workspace level are applied automatically to all Projects in a Workspace.

Window>Preferences>General>Editors>Text Editors

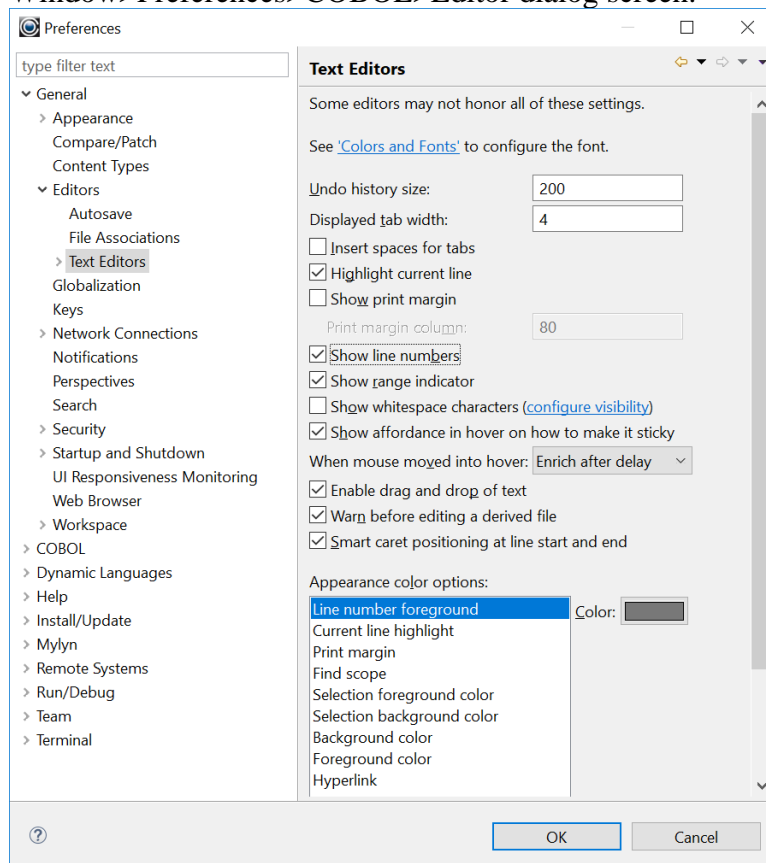
Configure behaviors of the Text Editor.

Select checkbox to enable the use of :

Show line numbers

Causes line numbers to print in columns 1-6

Note- The COBOL Code Editor derives its Tab behaviors from the Window>Preferences>COBOL>Editor dialog screen.



Window>Preferences>General>Workspace

Configure behaviors associated with the Workspace.

De-select checkbox to disable the use of :

Build automatically De-select Build automatically

Select checkboxes to enable the use of:

Refresh using native hooks or polling

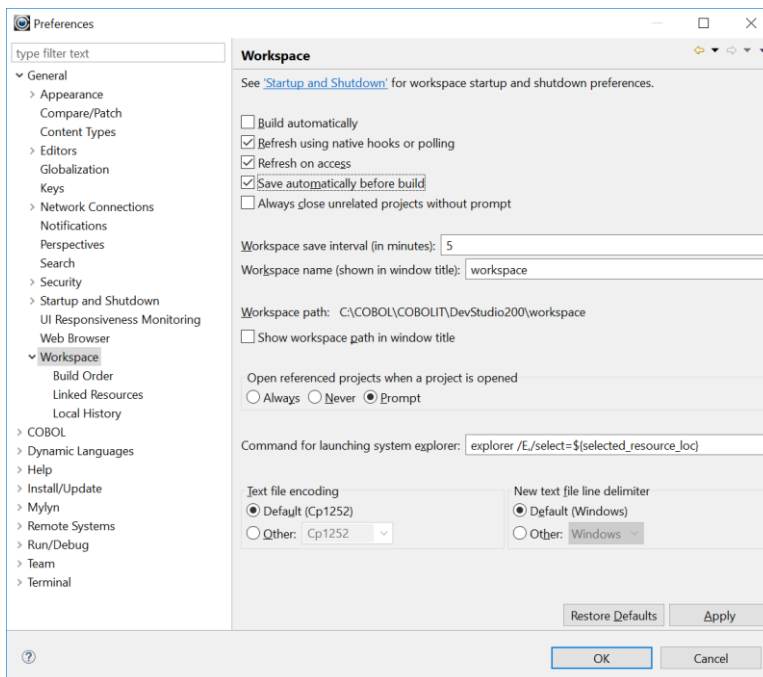
Refresh on access

Save automatically before build

Refresh view of project files using native hooks

Refresh view of project files on access

Causes unsaved changes to be saved before Build



Window>Preferences>COBOL>License file path

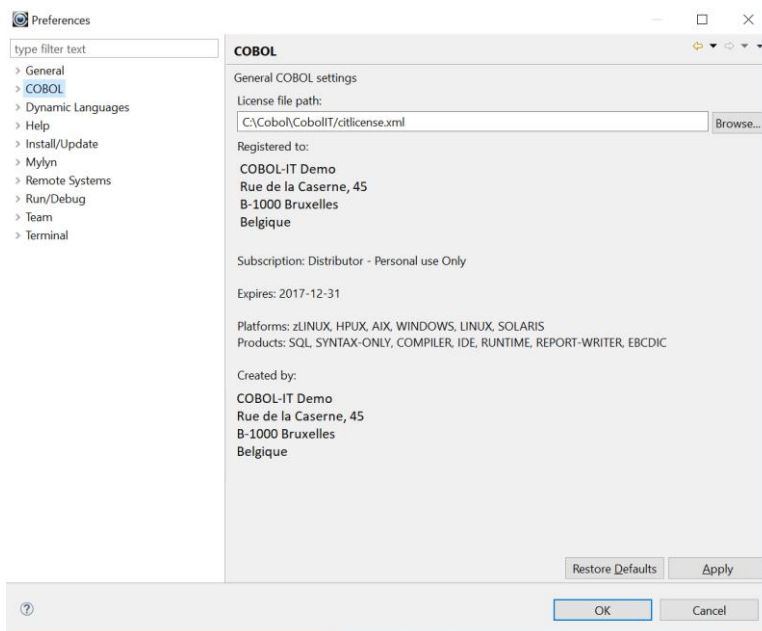
The Enterprise Edition License file is required in order to use the Developer Studio with the Enterprise Edition of the Compiler, and Runtime.

The Enterprise Edition license file can be named citlicense.xml, or a variant, as long as the license name begins with “citlicense-“ and has the .xml suffix. Alternatively, if you provide a non-standard name for your license, or if you choose to locate your license file in a non-default location, you should use the COBOLIT_LICENSE environment variable to locate your license. For these cases, the COBOLIT_LICENSE environment variable must be set in the shell in which you start the Developer Studio when you launch the Developer Studio. **For details, see the Compiler and Runtime Reference Manual.**

The Enterprise Edition license file is provided to Customers with Subscriptions. The default

behavior of the COBOL-IT Compiler Suite Enterprise Edition is to check for the file `citlicense.xml` in the default installation directory, or the directory described by the environment variable `COBOLITDIR`.

Use the Browse interface in `Window>Preferences>COBOL` to locate the license file, select it, and click on “Apply”. Click “OK” to close the `Window>Preferences>COBOL` dialog window. If the license file is in a non-default location, or has a non-default name, you must make sure that `COBOLIT_LICENSE` is set when you launch the Developer Studio, and that `COBOLIT_LICENSE` includes the full path and full name of the license file.



Renaming or placing the license file in a non-default location

For cases where different naming conventions are used, or where license files are not stored in the default installation directory, the user should use the `COBOLIT_LICENSE` environment variable to indicate the full path(es) and name(s) of their license file(s).

Note that when indicating multiple license files, the semicolon “;” separator is used. In Linux, the list of license files is started and finished with single-quote marks “‘”. The single-quote is located on the same key as the double-quote on most keyboards.

As examples (Linux) :

```
>export COBOLIT_LICENSE=/opt/cobol-it4-64/compilerlic.xml
```

```
>export COBOLIT_LICENSE='opt/cobol-it4-64/compilerlic.xml;opt/cobol-it4-64/citsqllic.xml'
```

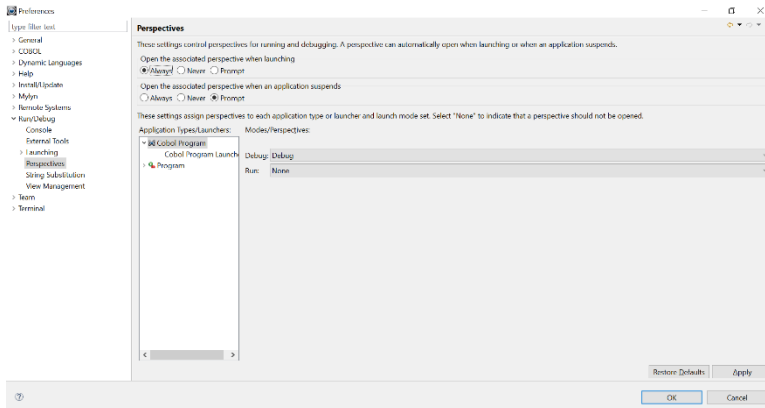
In Windows:

```
>SET COBOLIT_LICENSE=C:\COBOL\CobolIT\license\mycitlicense.xml
```

Select this license file from the `Window>Preferences>COBOL` dialog screen.

Window>Preferences>Run/Debug>Perspectives>...

In the Panel on the left, Select Perspectives. In the option labeled “Open the associated perspective when launching”, select the radio-button titled “Always”. This will cause the Developer Studio to switch to the Debugger Perspective, when any Debug function is activated.



Window>Preferences>COBOL>Compiler (Compiler flags & Scripts)

Compiler flags can be set within the Window>Preferences>COBOL>Compiler interface. Compiler flags & scripts that are set in this interface are automatically inherited by all of the projects in the Workspace.

Compiler flags & scripts can be set at the Project level within the Project>Properties>COBOL Properties wizard.

The File>New Wizards

Key Concepts

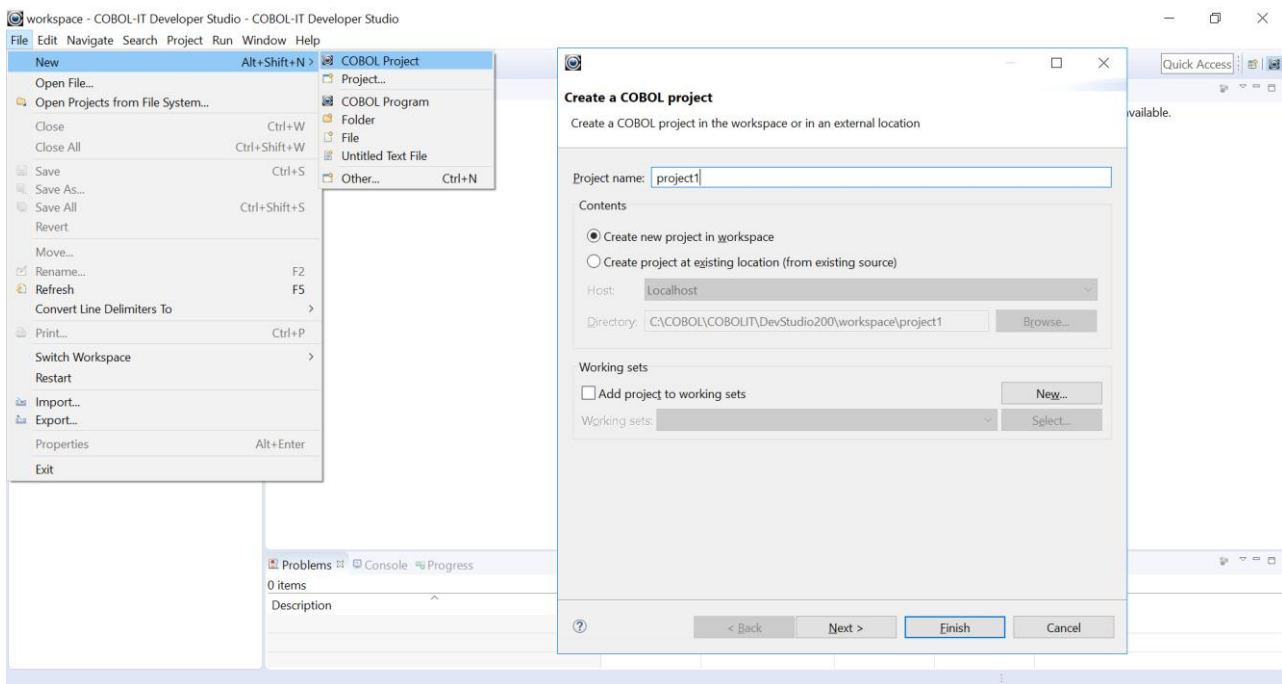
The “New COBOL Project” wizard creates a sub-folder under the Workspace folder with the name of the project.

The “New Folder” wizard adds sub-folders under the Project folder. These folders can be used to organize other project elements such as copy files, list files, object files, and data files.

The “New COBOL Program” wizard opens a blank COBOL program in the COBOL-IT Code Editor, and Saves it in the selected folder.

File>New>COBOL Project

Select File>New>COBOL Project... to open the COBOL Project Wizard.
Create a new project in the Workspace.



Enter a project name. In this example, we create a project called project1.

In this case, entering project1 as a Project name causes a subfolder called project1 to be created under the workspace folder.

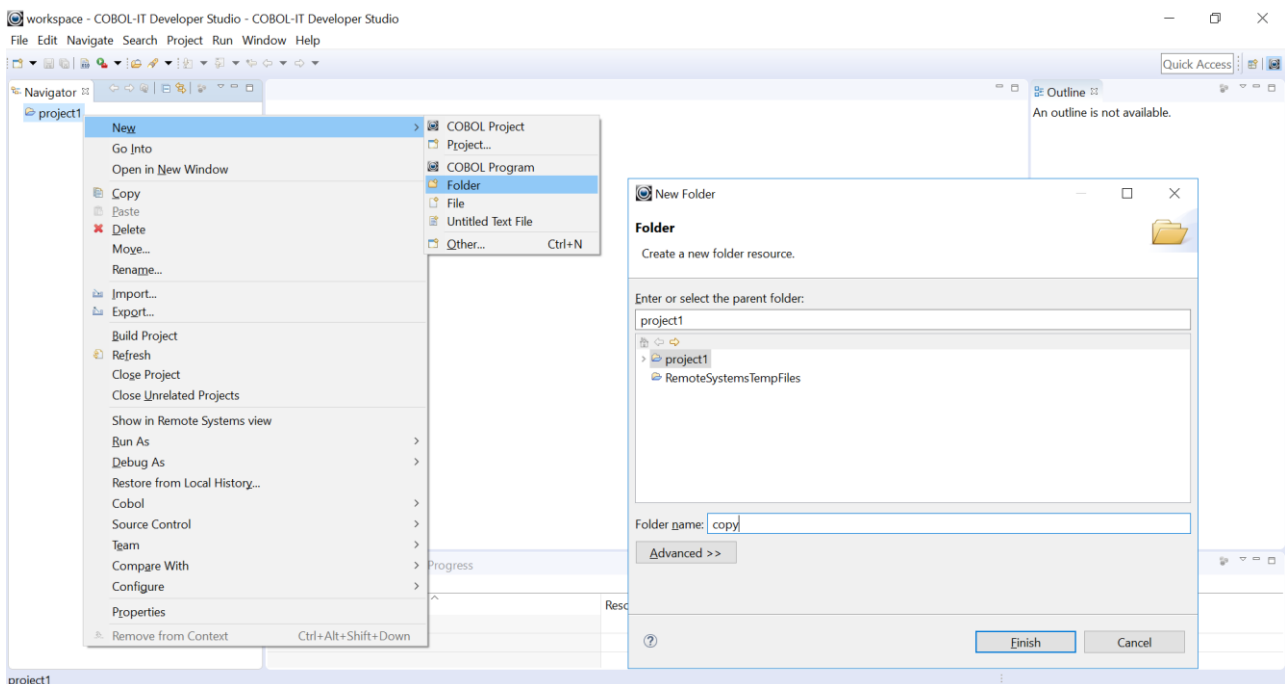
Here we are creating a new project in the workspace. Eclipse artifacts, such as the .project file, will be created in this project directory. Click [Finish].

Project>New>Folder

Now that we have created a COBOL project folder, we can create subfolders for the various components in our project, such as copy files, list files, object files, and data files. To do this, we will use the New Folder Wizard.

Select project1 in the Navigator Window. Right-click on the project, and select New>Folder to enter the new folder wizard. In the new folder wizard, enter a folder name “copy” and press the [Finish] button. [Finish] closes the new folder wizard.

Repeat multiple times to create the subfolder “lst” for list files, the subfolder “object” for object files, and the subfolder “data” for data files.



We now have a base project directory, and 4 subfolders, in which to do our Getting Started development exercises.

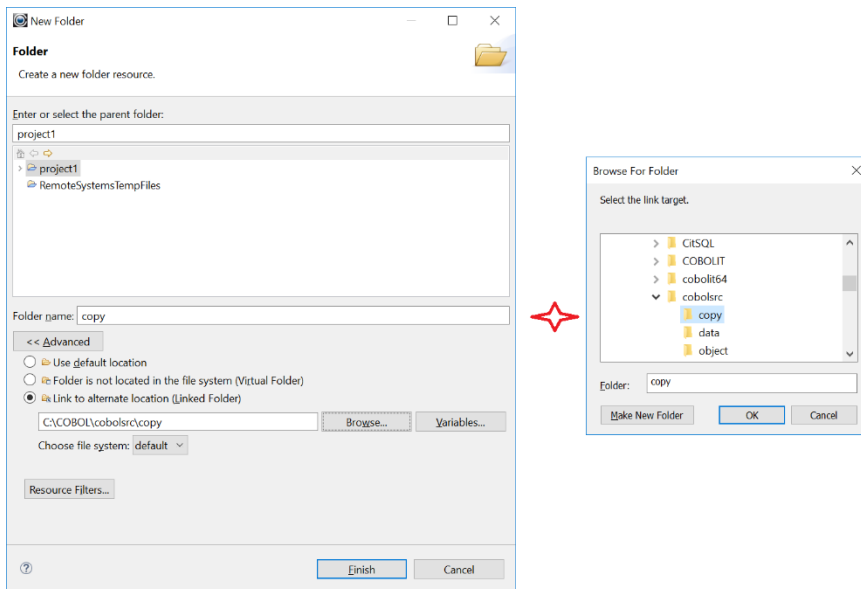
New Folder Advanced Functions

New Folder Advanced Functions allow you to add folders to your Project which are not located as subfolders of the Project folder on the disk.

It is common that in a corporate work environment, copyfiles will be stored in a folder that all users share. This folder can be referenced by the -I [copypath] compiler flag without adding the folder to the project, so it is not strictly a requirement that it be part of the project.

However, the copyfile folder does have to be in the Project in order for the the Project to execute certain functions like, "Open Declaration", for example. Or, if your copy file contains Procedure Division code, then the copyfile folder has to be in the Project in order for the Debugger to step through the Procedure Division code statements.

So, if your copyfiles are not in a subdirectory located underneath the Project, how do you get them into the Project? That is done at the point where you create a New Folder. In File>New>Folder, (the New Folder dialog Screen), click on the <<Advanced button.



This expands the New Folder dialog screen to include 3 radio buttons, which are:

- () Use default location
- () Folder is not located in the File System (Virtual Folder)
- () Link to alternate location (Linked Folder)

The default is the first one. When you are using the default setting, and you create a folder, it is created as a subdirectory of the Project. You can then create folders under this folder, and so forth...

The Virtual Folder selection allows you to add a folder on a remote machine to your project. When using the Virtual Folder, you should also select the Remote System on which the virtual folder resides from the "Choose File System" dropdown box.

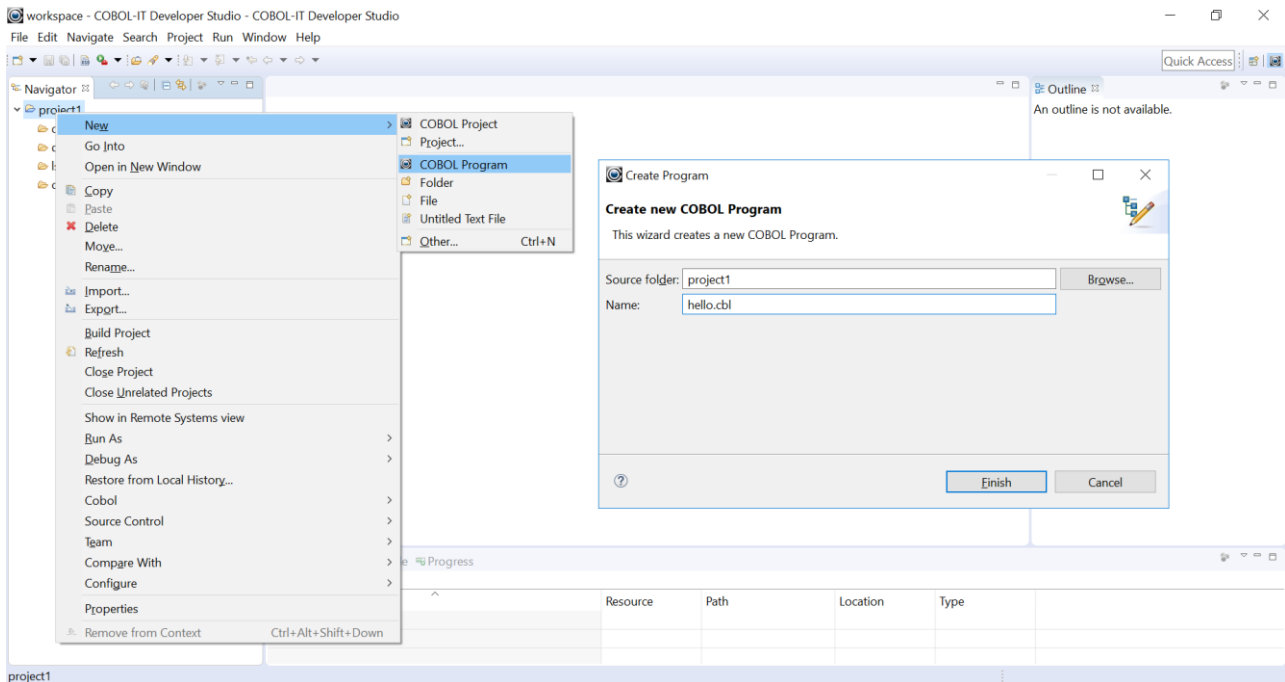
The Linked Folder allows you to link to an existing folder on your system that is not located under your Project folder. For this case, you name the folder in the Folder Name entry field, but link this folder name to another location, which you browse and select. When you do this, you will find that this folder is added to your Project, and the Developer Studio and Debugger will execute functions like "Open Declaration", and "Step Into" code located in a copyfile with no problems.

Project>New>COBOL program

We can now create a new COBOL program in the base project directory.
We will create our sample program, hello.cbl, in the project directory.

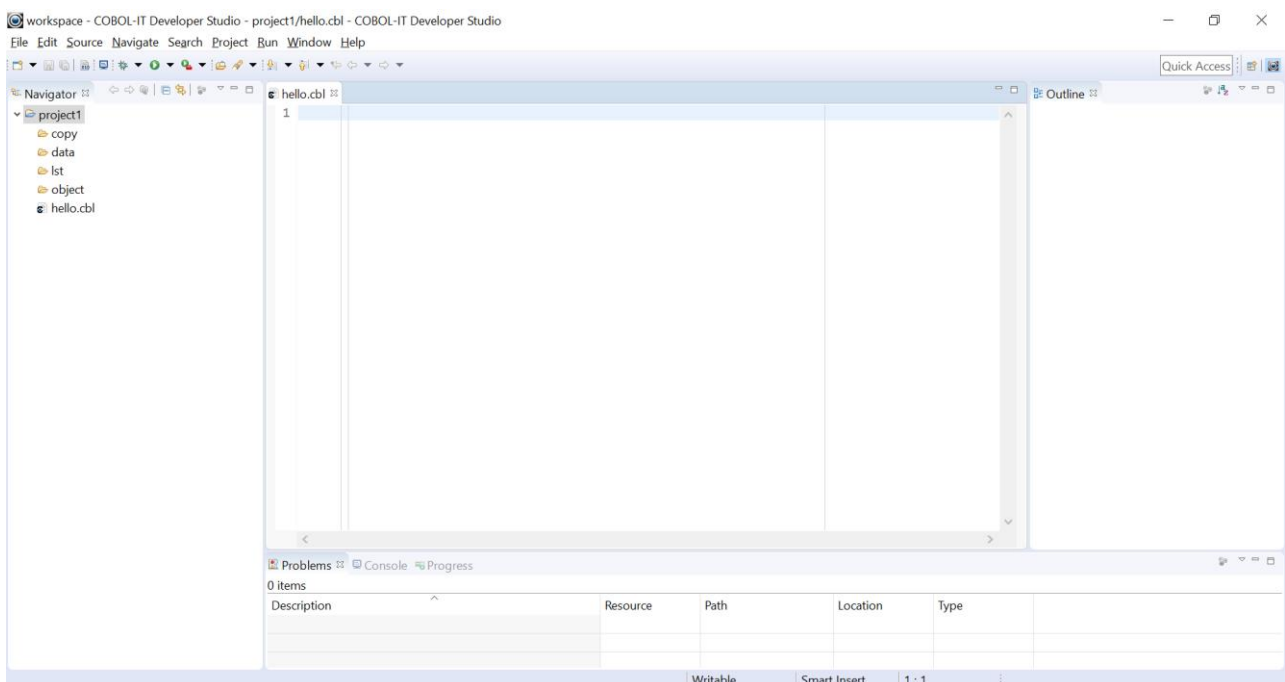
In the Navigator Window, select the project by clicking on it. This selection will ensure that the Wizard will store the project folder as the default location for the new COBOL program, which is what we want.

Select **File>New>COBOL Program** to open the New COBOL Program Wizard.
Enter the name of your new COBOL program, and press the [Finish] button.
Pressing [Finish] closes the New COBOL Program Wizard.

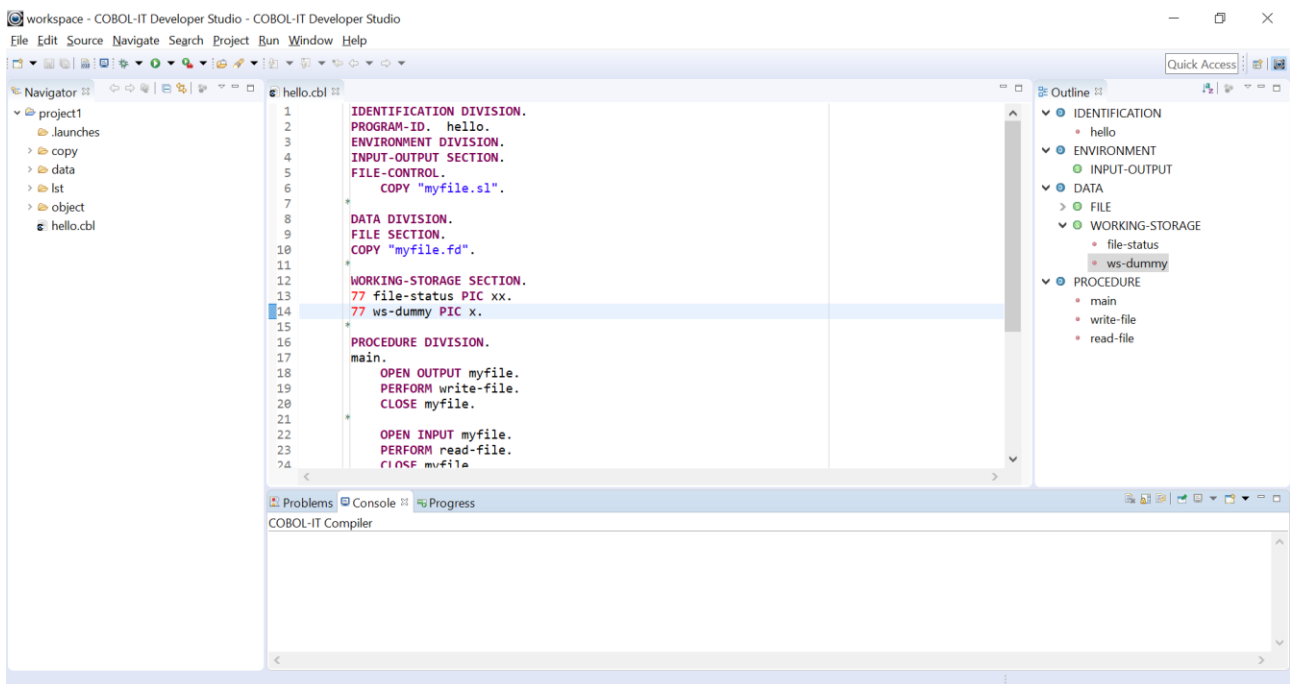


The Code Editor

You will see that you now have an empty COBOL program called `hello.cbl` in your Developer Studio Code Editor. The Outline Window becomes populated as you create `hello.cbl`.



Enter the code for hello.cbl.



The Outline Window auto-updates as you type your COBOL program.

The Divisions (Procedure Division, Environment Division, etc...) in your program are marked with a blue D, the Sections (Working-Storage, etc...) are marked with a Green S.

The Outline Window provides a useful navigation tool. Click on a title, and navigate directly to that line of source in the COBOL program.

Save your COBOL program

You can SAVE your COBOL program by clicking on the Save button on the Developer Studio toolbar.

Additionally, the Window>Preferences>General>Workspace dialog screen contains interfaces for setting:

Save Automatically before build

Workspace save interval (in minutes)

Workspace save interval ensures that your work will be automatically saved at specified intervals. Save automatically before build ensures that even if you forget to save your work before starting a Build, the Developer Studio will automatically save the code changes before beginning the build.

Project>Properties>COBOL Properties (Compiler flags & Scripts)

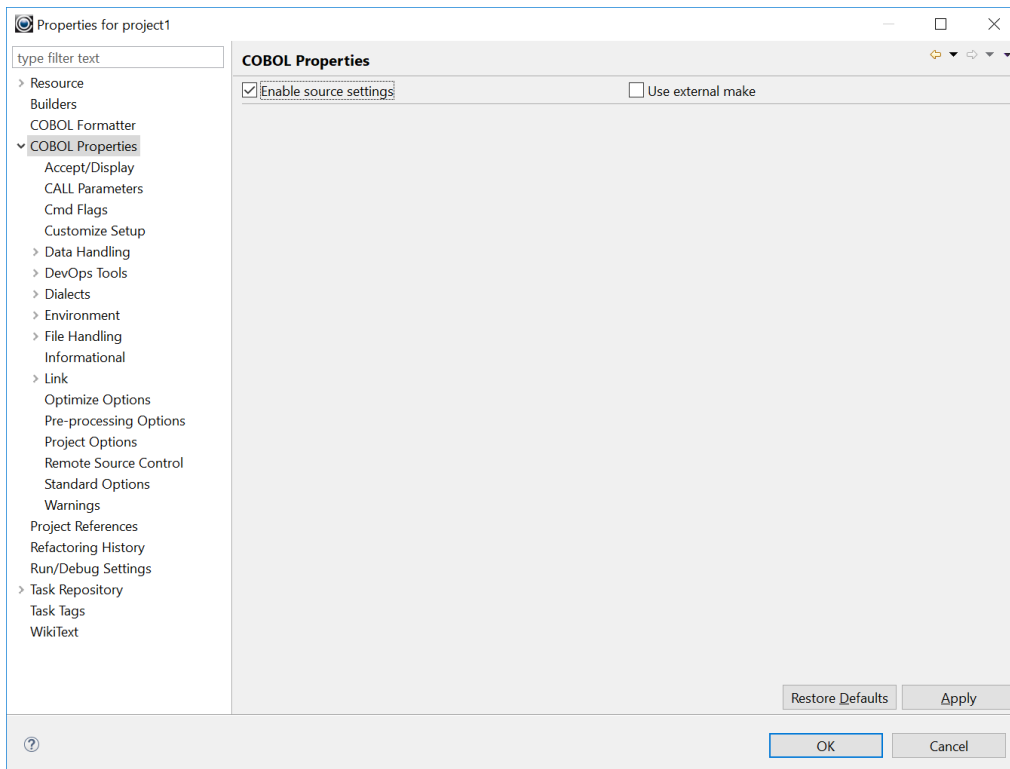
Compiler flags and scripts can be set at the Workspace level in the Window>Preferences>COBOL>Compiler dialog screens.

Compiler flags and scripts can be set at the Project level in the



Project>Properties>COBOL Properties dialog screens.

COBOL-IT Compiler flags are grouped by classifications that can be seen in the panel on the left.



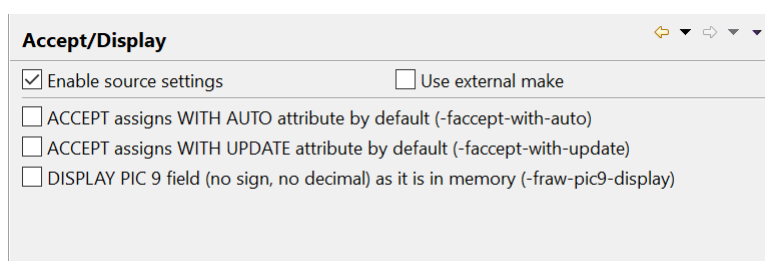
Select the Enable source settings checkbox to enable compiler flag and script settings.

When you have selected the Enable source settings checkbox, it will be enabled at the top of all of the compiler flag screens.

The compiler flag screens are listed in the Navigator Window.

Accept/Display

Affect the behavior of the ACCEPT and DISPLAY statements.



-facept-with-auto

Causes the WITH AUTO clause to be assumed by default on a field-level ACCEPT statement.

-facept-with-update

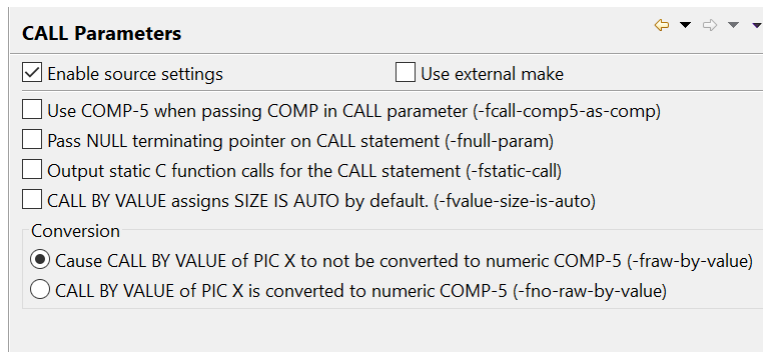
Causes field-level ACCEPT statements to assume the “WITH UPDATE” clause.

-fraw-pic9-display (Internal use only)

DISPLAY PIC 9(X) (no sign, no decimal) as it is in memory.

CALL Parameters

Affect the behavior of the CALL statement.



The screenshot shows the 'CALL Parameters' dialog box. It has a title bar with a yellow arrow icon and a dropdown menu. Inside, there are two sections. The first section contains four checkboxes: 'Enable source settings' (checked), 'Use external make' (unchecked), 'Use COMP-5 when passing COMP in CALL parameter (-fcall-comp5-as-comp)' (unchecked), 'Pass NULL terminating pointer on CALL statement (-fnnull-param)' (unchecked), 'Output static C function calls for the CALL statement (-fstatic-call)' (unchecked), and 'CALL BY VALUE assigns SIZE IS AUTO by default. (-fvalue-size-is-auto)' (unchecked). The second section is titled 'Conversion' and contains two radio buttons: 'Cause CALL BY VALUE of PIC X to not be converted to numeric COMP-5 (-fraw-by-value)' (selected) and 'CALL BY VALUE of PIC X is converted to numeric COMP-5 (-fno-raw-by-value)' (unchecked).

-fcall-comp5-as-comp

On little-endian platform (intel Linux, Windows) when a call USING clause contains a literal , causes the literal to be copied as a COMPUTATIONAL value, rather than as a COMP-5 value.

-fnnull-param

Causes an extra NULL pointers to be passed as the last argument on CALL statements.

-fstatic-call

Causes static C function calls to be generated for the CALL statement.

-fvalue-size-is-auto

Causes the SIZE IS clause in a CALL USING BY VALUE statement to be set to AUTO.

-fraw-by-value

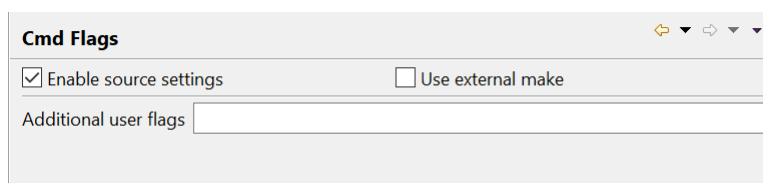
Causes PIC X to not be converted to numeric COMP-5 in a CALL USING BY VALUE statement. This is the default.

-fno-raw-by-value

Causes PIC X to be converted to numeric COMP-5 in a CALL USING BY VALUE statement.

Cmd Flags

Allows for the setting of additional user flags. Enter additional compiler flags in the entry field and they will be added to your compile string.



The screenshot shows the 'Cmd Flags' dialog box. It has a title bar with a yellow arrow icon and a dropdown menu. Inside, there are two checkboxes: 'Enable source settings' (checked) and 'Use external make' (unchecked). Below these is a text input field labeled 'Additional user flags'.

Customize Setup

Allows for the scheduling of scripts to be run before/after clean and build operations.

Customize Setup

☒ Enable source settings
 ☐ Use external make

☒ Customize Setup

Build/Clean Setup

Build command	<input type="text" value="citmake"/>	<input data-bbox="778 421 858 448" type="button" value="Browse..."/>
Pre-build script	<input type="text" value="%COBOLITDIR%\setenv_cobolit.bat"/>	<input data-bbox="778 465 858 492" type="button" value="Browse..."/>
Post-build script	<input type="text"/>	<input data-bbox="778 510 858 537" type="button" value="Browse..."/>
Pre-clean script	<input type="text" value="%COBOLITDIR%\setenv_cobolit.bat"/>	<input data-bbox="778 555 858 582" type="button" value="Browse..."/>
Post-clean script	<input type="text" value="%COBOLITDIR%\setenv_cobolit.bat"/>	<input data-bbox="778 600 858 627" type="button" value="Browse..."/>
Compiler command	<input type="text" value="cobc %f"/>	<input data-bbox="778 645 858 672" type="button" value="Browse..."/>
Compiler execution directory See "Compiler command" for code detail	<input type="text" value="%p"/>	<input data-bbox="778 689 858 716" type="button" value="Browse..."/>

Run/Debug Setup

Pre-run script	<input type="text" value="%COBOLITDIR%\setenv_cobolit.bat"/>	<input data-bbox="778 779 858 806" type="button" value="Browse..."/>
Post-run script	<input type="text"/>	<input data-bbox="778 824 858 851" type="button" value="Browse..."/>
Pre-debug script	<input type="text" value="%COBOLITDIR%\setenv_cobolit.bat"/>	<input data-bbox="778 869 858 896" type="button" value="Browse..."/>
Post-debug script	<input type="text"/>	<input data-bbox="778 913 858 940" type="button" value="Browse..."/>
Remote SSH port	Remote SSH port range	
<input type="text" value="8484"/>	<input type="text" value="50"/>	

%p Module absolute path %r Module relative path
 %P Project Absolute path %f Module file name (no path)
 %m Module name (no path no extension)

Browse and select scripts which are automatically executed in certain conditions :

Pre-build script	Prior to a project build.
Post-build script	After the completion of a project build
Pre-clean script	Prior to the execution of the clean operation
Post-clean script	After the completion of the clean operation
Compiler command	cobc %f %f = Module file name (no path)
Compiler execution directory	%p %p = Module absolute path
Pre-run script	Prior to launch of a run of the application
Post-run script	After the completion of the run of the application
Pre-debug script	Prior to launch of the application in the debugger
Post-debug script	After the completion of the run of the application in the debugger
Remote SSH Port	8484
Remote SSH port range	50

Data Handling>Data Operations

Affects the behavior of data operations.

Data operations

☒ Enable source settings ☐ Use external make

☐ Align 01/77 data items on 8-byte boundary (-falign-8)

☐ Make compare of numeric with PIC X using numeric value of PIC X (-fnumeric-compare)

☐ Slide location of fields in memory after OCCURS DEPENDING ON table (-fodo-slide)

Typedef global scope

☒ Cause TYPEDEF to have a GLOBAL scope (-fglobal-typedef)

☐ Does not cause TYPEDEF to have a GLOBAL scope (-fno-global-typedef)

Numeric display sign

☒ Numeric display sign ASCII (-fsign-ascii)

☐ Numeric display sign EBCDIC (-fsign-ebcdic)

Signed numerics assume

☒ By default signed numerics assume SIGN IS TRAILING

☐ Signed numerics assume SIGN IS LEADING by default (-fsign-leading)

☐ Signed numerics assume SIGN IS SEPARATE by default (-fsign-separate)

☐ Round COMP-1/COMP-2 on MOVE to non COMP-1/COMP-2 (-fround-fp)

☐ UNSTRING uses MOVE PIC X to the INTO field instead of a raw copy (-funstring-use-move)

Recording Mode

☒ RECORDING MODE not assigned if unspecified

☐ RECORDING MODE assigns V if unspecified as default (-frecmode-v)

☐ RECORDING MODE assigns F as default always (-frecmode-f)

☐ RECORD DEPENDING clause is compatible with ISO (-frecord-depending-iso)

☐ Initialize FD at program entry (-finitialize-fd)

-falign-8

Aligns 01-level and 77-level data on 8 byte boundaries.

-fnumeric-compare

Causes the comparison of a numeric field with a PIC X field to interpret the value of the PIC X field using its numeric value.

-fodo-slide

Causes data items that appear after a variable-length table (with OCCURS DEPENDING clause) to always immediately follow the table, whatever the current size of the table. The internal addresses of these data items change as the table's size changes.

-fround-fp

Affects behaviors when COMP-1 or COMP-2 are “moved” into non-COMP-1 or COMP-2 target fields when the target field has fewer decimal places than the source field. Causes the value to be rounded to the number of decimal of the target field.

-funstring-use-move

When an UNSTRING INTO operation is described as PIC 9, causes the operation UNSTRING operation to be performed using a MOVE operation instead of raw copy operation. Rules defined by the move-picx-to-pic9 compiler configuration flag are used for conversion.

-fglobal-typedef



Causes TYPEDEFS to be GLOBAL for all nested programs.

-fno-global-typedef

Causes TYPEDEFS to be local to the current program.

-fsign-ascii

Causes numeric DISPLAY items that include signs to be interpreted according to the ASCII sign convention. (default on ASCII machines)

-fsign-ebcdic

Causes numeric DISPLAY items that include signs to be interpreted according to the EBCDIC sign convention. (default on EBCDIC machines)

-fsign-leading

Makes SIGN IS LEADING the default.

-fsign-separate

Makes SIGN IS SEPARATE the default.

-frecmode-v

Causes all unspecified RECORDING MODE clauses to be interpreted as RECORDING MODE V.

-frecmode-f

Causes all unspecified RECORDING MODE clauses to be interpreted as RECORDING MODE F.

-frecord-depending-iso

For ISO-compatibility, causes files declared with a RECORD DEPENDING ON <FIELD> clause, without any FROM or TO value, to assume a FROM and TO value of the maximum record size.

-finitialize-fd

Causes records declared in the File Section to be initialized when program is loaded in memory.

Data Handling>Linkage Section

Affects the handling of data in the Linkage Section.

Linkage Section	
<input checked="" type="checkbox"/> Enable source settings	<input type="checkbox"/> Use external make
<input type="checkbox"/> Allocate unused LINKAGE item (-falloc-unused-linkage)	
<input type="checkbox"/> Avoid SIGVEC if NULL is given as parameters (-fprotect-linkage)	
<input type="checkbox"/> Avoid SIGVEC in debugger when parameters are not provided (-fsafe-linkage)	

-falloc-unused-linkage

Causes the compiler to allocate static memory for level 01 fields in the Linkage Section that are not used in either a USING clause or an ENTRY clause.

-fprotect-linkage

Generates code at the entry point of a program containing a USING xxx clause.

-fsafe-linkage

Generates code at the entry point of a program containing a USING xxx clause. This allows for the omission of parameters. Doing this will avoid a SIGVEC being returned by the debugger when all linkage parameters are not provided.

DevOps Tools>Checkpoint/Restore

Allows for use of the Checkpoint/Restore functionality.

Checkpoint/Restore	
<input checked="" type="checkbox"/> Enable source settings	<input type="checkbox"/> Use external make
<input type="checkbox"/> Enable checkpoint by saving context for save/reload (-fcheckpoint)	

-fcheckpoint

Enables setting of checkpoints. Program state is saved at checkpoints, and can be reloaded.

DevOps Tools>Code Coverage

Allows for the configuration of Code Coverage functionality.

Code Coverage	
<input checked="" type="checkbox"/> Enable source settings	<input type="checkbox"/> Use external make
<input checked="" type="checkbox"/> Open coverage view automatically	
<input type="checkbox"/> Apply Code Coverage to runtime session (-code-cover)	
Store code coverage information (-debugdb) <input type="text" value="debugdb.dbd"/>	
See Label Decorators for coverage decorators.	
See Annotations for editor highlighting style.	

Open coverage view automatically

Causes the Coverage View to open automatically when compiling with -code-cover

-code-cover -debugdb=debugdb.dbd



Causes code coverage information to be stored in the debugdb.dbd file. For more information on Code Coverage see Getting Started using the Developer Studio- The Utilities.

DevOps Tools>Data Displayer

Allows for the configuration of Data Displayer functionality

Data Displayer

☒ Enable source settings ☐ Use external make

☐ Load data partially

Page size:

☐ Use settings from a XDD file

☐ Use variable size record format

☐ Use MF Line Sequential Escape format

☐ Generate c-TreeACE .xdd file (-fgen-xdd)

Load data partially

For use with table-mode display. Sets a page size which is number of records that will be written to the table. In large files, tables can be browsed by page, with the table re-loading by page, instead of loading all of the records at once.

Use settings from a XDD file

Data Displayer reads information from the XDD file.

Use variable-size record format

Data Displayer evaluates variable-size relative file headers.

Use MF Sequential Escape format

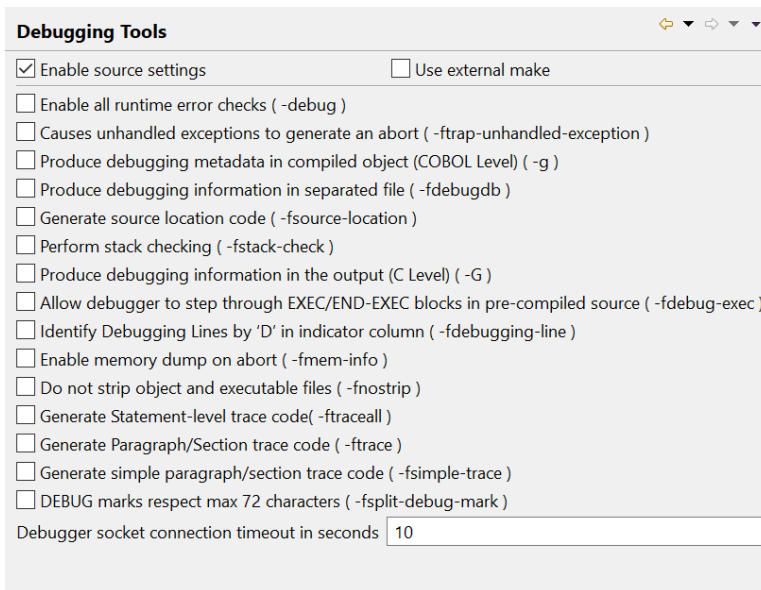
Corresponds to compiler configuration file setting lin-seq-mf: yes. Supports line sequential files that preface bytes with values less than 0x20 with 0x00.

-fgen-xdd

Causes the compiler to parse FDs in the program and generate .xdd files.

DevOps Tools>Debugging Tools

Enables a range of debugging functionalities.



Debugging Tools

☒ Enable source settings ☐ Use external make

- ☐ Enable all runtime error checks (-debug)
- ☐ Causes unhandled exceptions to generate an abort (-ftrap-unhandled-exception)
- ☐ Produce debugging metadata in compiled object (COBOL Level) (-g)
- ☐ Produce debugging information in separated file (-fdebugdb)
- ☐ Generate source location code (-fsource-location)
- ☐ Perform stack checking (-fstack-check)
- ☐ Produce debugging information in the output (C Level) (-G)
- ☐ Allow debugger to step through EXEC/END-EXEC blocks in pre-compiled source (-fdebug-exec)
- ☐ Identify Debugging Lines by 'D' in indicator column (-fdebugging-line)
- ☐ Enable memory dump on abort (-fmem-info)
- ☐ Do not strip object and executable files (-fnostrip)
- ☐ Generate Statement-level trace code(-ftraceall)
- ☐ Generate Paragraph/Section trace code (-ftrace)
- ☐ Generate simple paragraph/section trace code (-fsimple-trace)
- ☐ DEBUG marks respect max 72 characters (-fsplit-debug-mark)

Debugger socket connection timeout in seconds

-debug

Enables all run-time error checking.

-ftrap-unhandled-exception

Enhances information dump when program aborts and ON EXCEPTION/ON OVERFLOW language is not present in the COBOL program.

-g

Produce debugging information in the output.

-fdebugdb

When used with -g, store alls debugging information into a file name <modulename>.dbd.

-fsource-location

Generates source location code, enabling information to be dumped on source location when the runtime aborts. Enabled by the -g compiler flag, and by the -debug compiler flag.

-fstack-check

Enables stack checking debug function. Enabled by the -g compiler flag, and by the -debug compiler flag.

-G



Produces debugging information in the output, allowing “C”-level debugging. Use with -fnostrip.
-fdebug-exec

Enables the debugging of code generated by a pre-processor when using the -preprocess compiler flag.

-fdebugging-line

Enables support for debugging lines. (Source lines that contain 'D' in indicator column)

-fmem-info

Enables Dump of Working-Storage when runtime aborts. Use with the -g or -debug compiler flag.

-fnostrip

Causes objects and object and executable files to NOT be stripped. Stripping an object or an executable is the action of removing system level debugging information.

-ftraceall

Generates trace output at runtime, listing SECTION/PARAGRAPH/STATEMENTS names as they are executed.

-ftrace

Generates trace output at runtime, listing SECTION/PARAGRAPH/STATEMENTS names as they are executed.

-fsimple-trace

Generates trace output at runtime for executed SECTION/PARAGRAPHS.

-fsplit-debug-mark

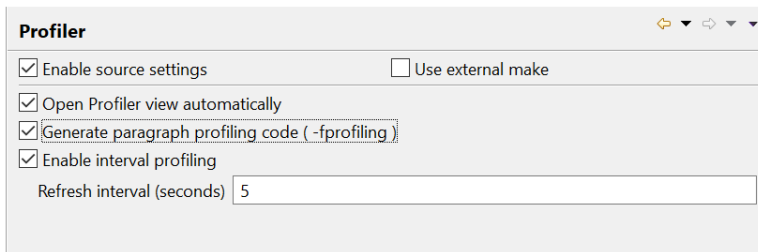
DEBUG marks respect max 72 characters (default).

Debugger socket connection timeout in seconds

Debugger socket connection timeout, set to 10 seconds by default.

DevOps Tools>Profiler

Allows configuration of the Profiler function.



The Profiler configuration dialog box contains the following settings:

- ☒ Enable source settings
- ☐ Use external make
- ☒ Open Profiler view automatically
- ☒ Generate paragraph profiling code (`-fprofiling`)
- ☒ Enable interval profiling
- Refresh interval (seconds):

Open Profile view automatically

Causes the Profiler View to open automatically when compiling with `-fprofiling`

-fprofiling

Causes profiler information to be stored in a .xls file. For more information on Profiling, see Getting Started using the Developer Studio- The Utilities.

Enable interval profiling

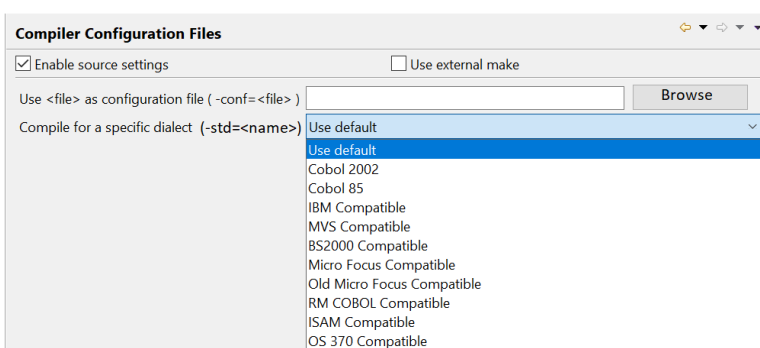
Allows interval profiling, which is displayed in the runtime tab of the profiling view.

Refresh interval (seconds)

For the runtime tab of the profiling view, affects how often the memory/cpu usage graphs are refreshed.

Dialects>Compiler Configuration

Allows selection of compiler configuration file.



The Compiler Configuration Files dialog box contains the following settings:

- ☒ Enable source settings
- ☐ Use external make
- Use <file> as configuration file (`-conf=<file>`)
- Compile for a specific dialect (`-std=<name>`)

The dropdown menu for "Compile for a specific dialect" is open, showing the following options:

- Use default
- Cobol 2002
- Cobol 85
- IBM Compatible
- MVS Compatible
- BS2000 Compatible
- Micro Focus Compatible
- Old Micro Focus Compatible
- RM COBOL Compatible
- ISAM Compatible
- OS 370 Compatible

-conf=<file>

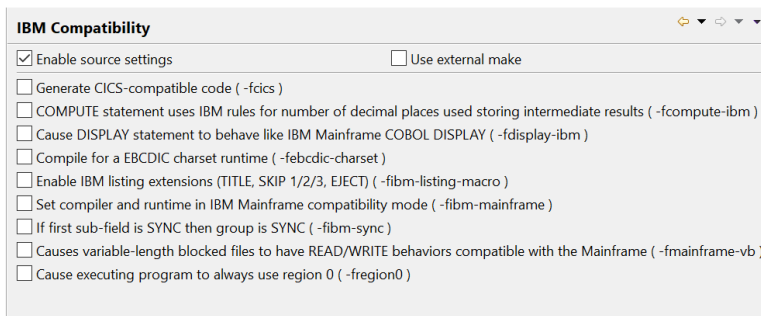
Causes a user-defined compiler configuration file to be referenced either as the default configuration file.

-std=<dialect>

Causes one of the dialect-oriented compiler configuration files to be used instead of the default compiler configuration file.

Dialects>IBM Compatibility

Provides refined compatibility with IBM COBOL.

**-fcics**

Generates CICS-compliant code.

-fcompute-ibm

Causes arithmetic expressions (like $a+B*c$) in COMPUTE statements, and comparisons to use IBM COBOL defined rules for determining the number of decimals used in intermediate results.

-fdisplay-ibm

Causes the output of the DISPLAY Statement for numeric fields to be more compatible with IBM mainframe.

-febcdic-charset

Causes the COBOL-IT Compiler and Runtime to store and manage data in the EBCDIC encoding format. Source code is stored in ASCII format.

-fibm-listing-macro

Enables IBM listing extensions (TITLE, SKIP1/2/3, EJECT ...) (default)

-fibm-mainframe

Causes the compiler and runtime to operate in an IBM Mainframe compatible mode.

-fibm-sync

Applies SYNC attribute to group item if first elementary field is described with the SYNC attribute. (default).

-fmainframe-vb

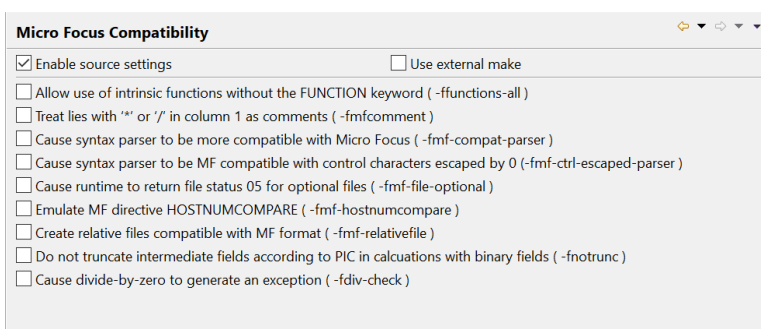
Causes WRITES and READs of Variable Blocked files to assume formats compatible with the Mainframe Z/OS COBOL Format.

-fregion0

Causes the module to always switch to region 0 even if called from another region.

Dialects>Micro Focus Compatibility

Provides refined compatibility with Micro Focus COBOL.

**-ffunctions-all**

Allows use of intrinsic functions without the FUNCTION keyword

-fmfcomment

Treats lines with '*' or '/' in column 1 as comments.

-fmf-compat-parser

Increases compatibility of syntax parser with the Micro Focus syntax parser (default)

-fmf-ctrl-escaped-parser

Syntax parser is MF compatible with control character escaped by 0 (default).

-fmf-file-optional

Causes files declared as OPTIONAL and OPEN in EXTEND to return file-status code “05” if the file is created and file-status code “00” if the file exists.

-fmf-hostnumcompare

The -fmf-hostnumcompare compiler flag affects comparisons of USAGE DISPLAY numeric data items when one of the numeric data items in the comparison contain non-numeric data.

-fmf-relativefile

The -fmf-relativefile compiler flag causes the runtime to assume the Micro Focus format for relative files for both READ and WRITE operations.

-fnotrunc



Causes truncation of binary fields to NOT be made according to the PICTURE clause while performing intermediate computations.

-fdiv-check

Causes divide-by-0 operations to generate an exception.

Dialects>Other COBOL Compatibilities

Provides refined compatibility with other COBOL compilers.

-fas400-like

Causes the LIKE clause to act compatibly with the AS400 implementation. A field declared with the LIKE clause is described as a PIC X (other field's byte size).

-fcarealia-sign

Use CA Realia sign coding for Usage Display.

-fgcos-mode

Causes the compiler to more closely emulate GCOS operations.

Environment>Copy Files

Affects the handling of COPY files. In our sample, we use a copy folder outside the Project folder.

-ext <extension>

Adds <extension> to list of default copy file extensions. For example, to direct the compiler to search for copy files with .fd and .sl extensions, use the compiler flags “-ext fd -ext sl”.

-I <directory>

Allows location of copy files in <directory>.

-fcopy-mark

Adds mark for begin/end of COPY In listing and preprocessed file.

-fcurdir-include

Causes COPY files to first be searched for in the current directory, before locations described with the -I <Path>, or with environment variables.

-fno-curdir-include

Causes COPY files to not be searched for in the current directory, before locations described with the -I <Path>, or with environment variables.

-ffold-copy-lower

Folds COPY file names to lower case.

-ffold-copy-upper

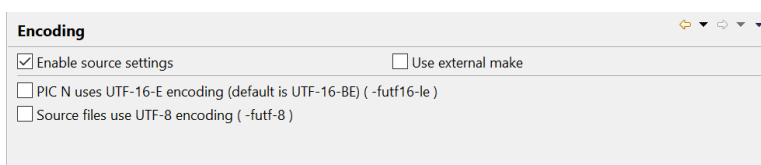
Folds COPY file names to upper case.

-fkeep-copy-statement

In listing and preprocessed file, keep COPY statements.

Environment>Encoding

Allows UTF-8 and UTF-16-LE encoding.

**-fut16-le**

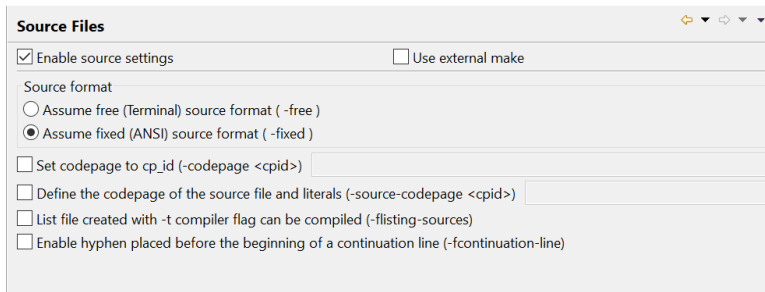
Causes fields declared as PIC N to be stored as UTF16-LE (Little Endian). Note that by default, fields declared as PIC N are stored as UTF16-BE (Big Endian).

-fut-8

Instructs the compiler that the source file, and literals are UTF-8 encoded. The `-futf-8` compiler flag can be used with, or without the `-codepage` compiler flag.

Environment>Source Files

Affects how source is interpreted.



-free

Instructs the compiler that source code is in the free, or terminal source format.

-fixed

Instructs the compiler that source code is in the fixed source format. The `-fixed` compiler flag is assumed, by default.

-codepage <cpid>

Defines the encoding of PIC X in memory.

If `-source-codepage` is specified, the compiler converts from the codepage-id used in the `-source-codepage` compiler flag to the codepage-id used in the `-codepage` compiler flag.

-source-codepage <cpid>

Defines the code page to be used when editing the source and the code page used for string literals in the COBOL source code.

-flisting-sources

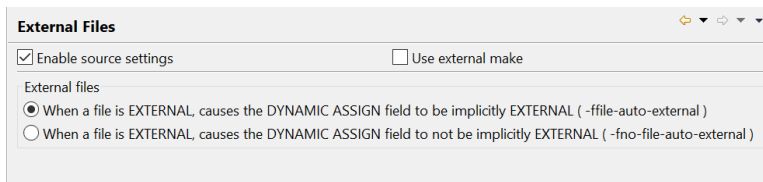
Informs the compiler that source is the result of program listing option (`-t <file>`).

-fcontinuation-line

Allows a hyphen in column 7, with no following text, to be recognized as not being a continuation line.

File Handling>External Files

Affects the handling of External files.



-ffile-auto-external

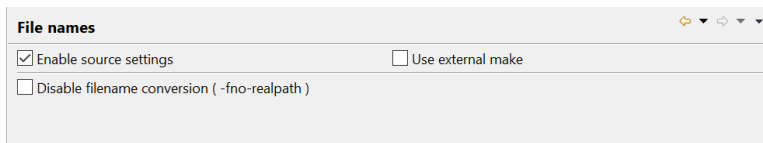
The `-ffile-auto-external` compiler flag affects the way that the compiler treats variables describing file-names for files described as EXTERNAL. (Default)

-fno-file-auto-external

Disables `-ffile-auto-external`. When disabling this functionality, if you have separate programs sharing the same EXTERNAL file that also have file-var fields, then changes made between the programs will not automatically be shared.

File Handling>File names

Affects the interpretation of file names.

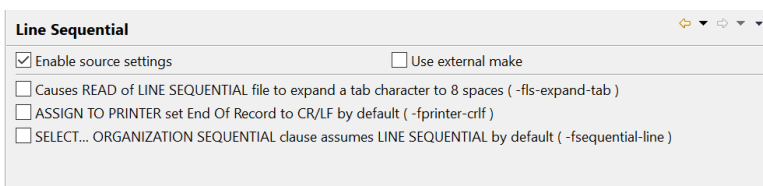


-fno-realpath

Causes file names to NOT be extended to a fully qualified path.

File Handling>Line Sequential

Affects the handling of line sequential files.



-fls-expand-tab

Causes the READ of a LINE SEQUENTIAL file to expand the TAB character to 8 spaces (default)

-fprinter-crlf

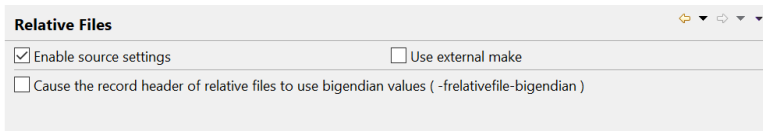
Files declared with ASSIGN TO PRINTER file names are generated with compatibility for DOS printers. This will change the End Of Record to CR/LF (instead of LF)

-fsequential-line

Causes all non-qualified SEQUENTIAL files to be declared as LINE SEQUENTIAL.

File Handling>Relative Files

Affects the handling of relative files.

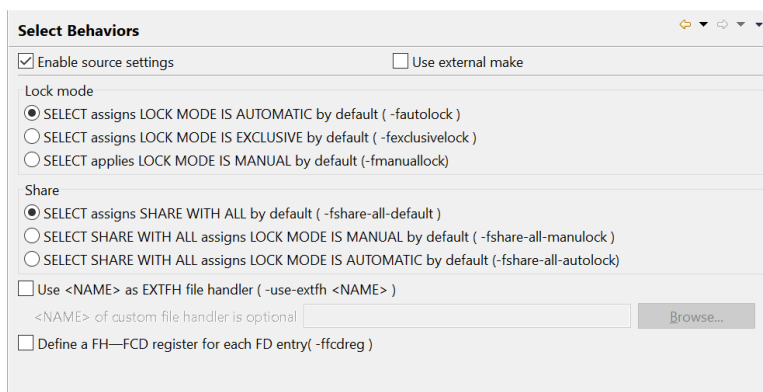


-frelativefile-bigendian

Causes the record header of relative files to be stored in BigEndian format.

File Handling>Select Behaviors

Sets default behaviors for Select statements.



-fautolock

Sets default for SELECT to LOCK MODE IS AUTOMATIC

-fexclusivelock

Causes all files with no LOCK MODE clause in their SELECT statement to be declared implicitly as LOCK MODE is EXCLUSIVE unless a SHARING clause in the SELECT statement or in the OPEN statement indicates otherwise.

-fmainuallock

Causes all files with no LOCK MODE clause in their SELECT statement to be declared implicitly as LOCK MODE is MANUAL unless a SHARING clause in the SELECT statement or in the OPEN statement indicates otherwise.

-fshare-all-default

The -fshare-all-default compiler flag causes all files to be declared implicitly as SHARE WITH ALL.

-fshare-all-manulock

Causes all files with a SHARE WITH ALL clause in their SELECT statement to be declared implicitly as LOCK MODE IS MANUAL.

**-fshare-all-autolock**

Causes all files with a SHARE WITH ALL clause in their SELECT statement to be declared implicitly as LOCK MODE IS AUTOMATIC.

-use-extfh <NAME>

Names an EXTFH File handler to be used, enabling the use of an external file system.

-ffcdreg

Allows a user of an EXTFH compliant data source to directly read and write the File Control Description (FCD) through which information passes to and from an EXTFH-compliant data source. Use with -use-extfh.

File Handling>Sort Files

Affects the behavior of the Sort statement.

Sort Files

☒ Enable source settings ☐ Use external make

☒ Use EXTSM sort module (-use-extsm <NAME>)

<NAME> of custom sort module is optional

-use-extsm <NAME>

Names a runtime module to be used, enabling the use of an external sort handler.

File Handling>Third-party support

Enables the use of EXTFH-compliant file systems.

Third-party support

☒ Enable source settings ☐ Use external make

☒ Use third-party external file handler (EXTFH)

☐ Use Berkeley DB (-fdbd)

☒ Use VBISAM (-fvbisam)

☐ Use DISAM (-fdisam)

☐ Use c-TreeACE for ISAM files (-fctree)

☐ Generate a FieldNumber prefix before field names in xdd (-fctree-field-numbering)

☐ Generate field names without full qualification in xdd (-fctree-no-full-qualification)

-fdbd

Activates the usage of Oracle Berkeley DB isam files.

-fvbisam

Activates the usage of VBISAM isam files.

-fdisam



Activates the usage of DISAM isam files.

-fctree

Activates the usage of CTREE isam files.

-fctree-field-numbering

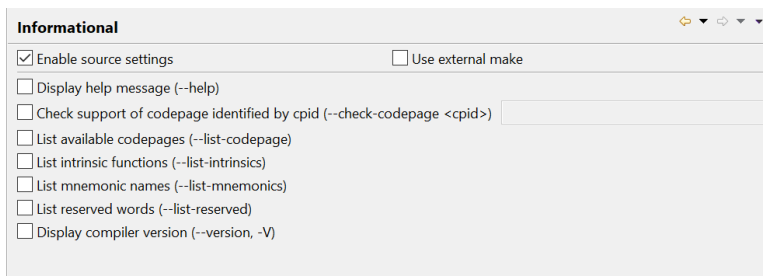
Causes the CTREE XDD generator to generate a prefix F <field-number> before field names.
Use with `-fgen-xdd` compiler flag.

-fctree-no-full-qualification

Causes the CTREE XDD generator to not generate the fully qualified data names in the XDD description of the file. Use with `-fgen-xdd` compiler flag.

Informational

Returns information, does not compile source files.

**--help**

Lists compiler flags.

--check-codepage <cpid>

Checks if a given codepage is recognized by the ICU library.

--list-codepage

Lists all supported codepages in the following format: Codepage: [list of synonyms for codepage]

--list-intrinsics

Lists supported intrinsic functions.

--list-mnemonics

Lists supported mnemonic names.

**--list-reserved**

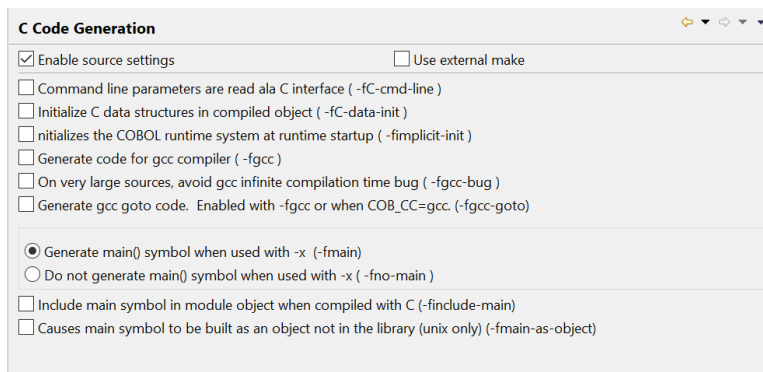
Lists all reserved words.

--version, -V

Displays compiler version.

Link>C Code Generation

Affects the way COBOL is translated into “C”.

**-fC-cmd-line**

When used with `-x`, causes the program to receive command line parameters as though they were given in C.

-fC-data-init (Internal use only)

Controls if the C data structure created by the compiler is initialized in the source (at compilation time) or at runtime. This should not be changed.

-fimplicit-init

Initializes the COBOL runtime system at runtime start-up.

-fgcc

Generates gcc-compliant C code. The `-fgcc` compiler flag is enabled when `COB_CC=gcc`.

Default on Linux platforms.

-fgcc-bug

When using a gcc compiler on very large source files, the gcc compiler could enter an infinite loop. This bug is avoided by using the `-gcc-bug` compiler flag.

**-fgcc-goto**

Generates gcc-computed goto code. Enabled when using the `-fgcc` compiler flag, or when `COB_CC=gcc`.

-fmain

Generates `main()` symbol when used with `-x` (default)

-fnomain

Does not generate `main()` symbol when used with `-x`

-finclude-main

Causes `main` symbol to be included in module object when compiled with `-c`.

-fmain-as-object

Generates `main()` symbol as object not in library (unix only) (default)

Link>C Compiler/Linker

Allows passing options to the C Compiler or Linker

C Compiler/Linker

☒ Enable source settings ☐ Use external make

Pass <define> to C compiler (-D <define>)

Pass CC_opt to C compiler (-Wc CC_opt)

Pass LD_opt to C compiler (-Wl LD_opt)

-D <define>

Passes <define> to the “C” Compiler

-Wc CC_opt

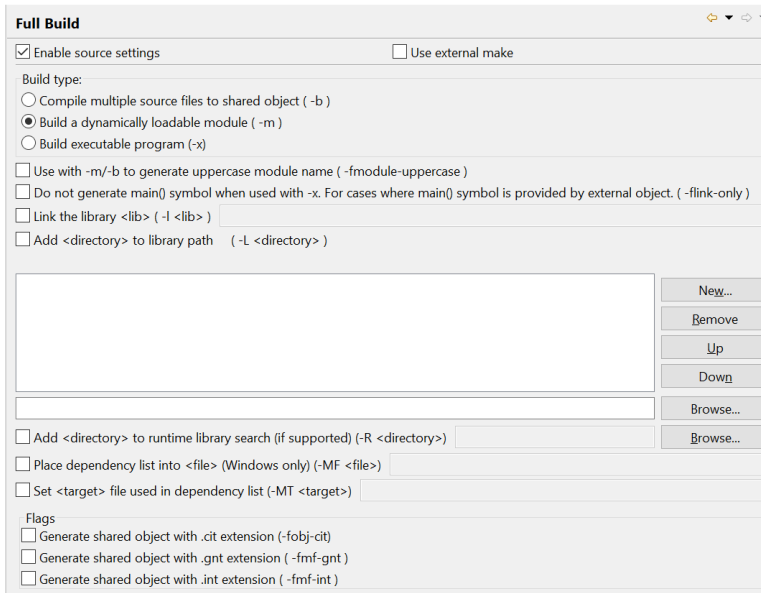
Passes `CC_opt` directly to the C Compiler, where `CC_opt` is a compiler flag, or string, that can be processed by the C compiler.

-Wl LD_opt

Passes `LD_opt` directly to the Linker, where `LD_opt` is an option, or string that can be processed by the Linker.

Link>Full Build

Affects the building of compiled objects generated by the Compiler.



-b

Links multiple input files into a single dynamically loadable module.

-m

Builds a dynamically loadable module. (Default).

-x

Builds an executable program.

-fmodule-uppercase

Causes the output file name to be created in upper-case, when used with the `-m` compiler flag.

-flink-only

Causes the `main()` symbol to not be generated, when used with `-x`.

-l <lib>

Causes the library `<mylib>` to be used by the linker.

-L <dir>

Adds `<directory>` to the library search path.

**-R <dir>**

Adds <directory> to runtime library search path (if supported).

-MF <file>

Writes dependency list into <file>.

-MT <target>

Names the target file used for the dependency list.

-fobj-cit

Causes compiled object to be generated with a cit extension instead of .dll (windows) or .so (unix/linux).

-fmf-gnt

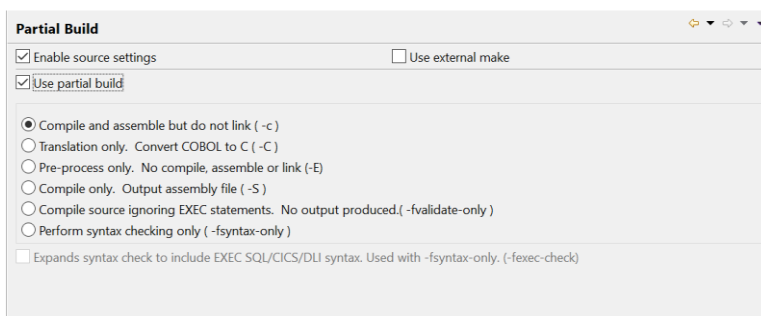
Causes compiled object to be generated with a gnt extension instead of .dll (windows) or .so (unix/linux).

-fmf-int

Causes compiled object to be generated with an int extension instead of .dll (windows) or .so (unix/linux).

Link>Partial Build

Interrupts compilation prior to the creation of a compiled object.

**-c**

Compile and assemble, but do not link.

-C

Interrupts the compilation after converting COBOL to C.

-E

Interrupts the compilation after the preprocessing of the COBOL code, without doing any



translation to “C”, compilation, assembly, or linking.

-S

Interrupts the compilation after output of the assembly file. Translated C files are compiled by cc. The output is saved in a file with a .s extension.

-fvalidate-only

Compile source, no output produced, EXEC are ignored

-fsyntax-only

Performs syntax error checking only. Output is limited to results of syntax check.

-fexec-check

Used with -fsyntax-only, checks the EXEC SQL/CICS/DLI syntax.

Optimize Options

Enables optimizations of a range of functions.

Optimize Options

☒ Enable source settings ☐ Use external make

☐ Enable optimization (-O)

☐ Optimize operations using level-77 data items (-f77-opt)

☐ CALL statements assume symbol is external-link (-fall-external-link)

☐ Enable optimizations on binary operations (-fbin-opt)

☐ Enable optimizations on CALL statements. Do not use with CANCEL (-fcall-opt)

☐ Enables optimizations by buffering decimals (-fdecimal-optimize)

☐ Optimize operations performed with USAGE DISPLAY/COMP-3 data items (-ffast-op)

☐ Enable optimization by buffering indexes(-findex-optimize)

☐ Enable optimization of the INITIALIZE statement(-finitialize-opt)

☐ Enable optimization of the PERFORM RETURN (not valid with -fgcc) (-freturn-opt)

Optimizations on comparisons:

☒ Enable optimizations on comparisons of data items (-fcmp-opt)

☐ Disable optimizations on comparisons of data items (-fno-cmp-opt)

☒ Enable optimizations on fast move of figurative constant (-ffast-figurative-move)

☐ Disable optimizations on fast move of figurative constant (-fno-fast-figurative-move)

-O

Enables optimization. '-O', '-Os' and '-O2' are passed to the “C” compiler as is and used for “C”-level optimization.

-f77-opt

Optimizes the use of integers stored in USAGE DISPLAY or PACKED fields in level-77 data items.

-fall-external-link

Causes the targets of the CALL statement to all be assumed to be external-links.

-fbin-opt

Enables the use of CPU integers when manipulating USAGE COMP and USAGE COMP-5 data elements.

-fcall-opt

Enables CALL statement optimization. Programs containing CANCEL statements should not be compiled with -fcall-opt.

-fdecimal-optimize

Optimizes the conversion from DISPLAY/COMP-3 to binary values in COMPUTE statements.

-ffast-op

Enables the runtime to use faster operations when manipulating data items declared as USAGE DISPLAY or USAGE COMP-3.

-findex-optimize

Improves performance where indexes in tables are evaluated and USAGE DISPLAY fields are used as indexes.

-finitialize-opt

Optimizes the implementation of the initial field initialization at runtime startup and the execution of the INITIALIZE statement by grouping field initializations wherever possible.

-freturn-opt

Generates optimized PERFORM return code. The -freturn-opt compiler flag is ignored when using the -fgcc compiler flag.

-fcmp-opt

Activates optimizations when comparing literals with variables. (default)

-fno-cmp-opt

Disables optimizations when comparing literals with variables.

-ffast-figurative-move

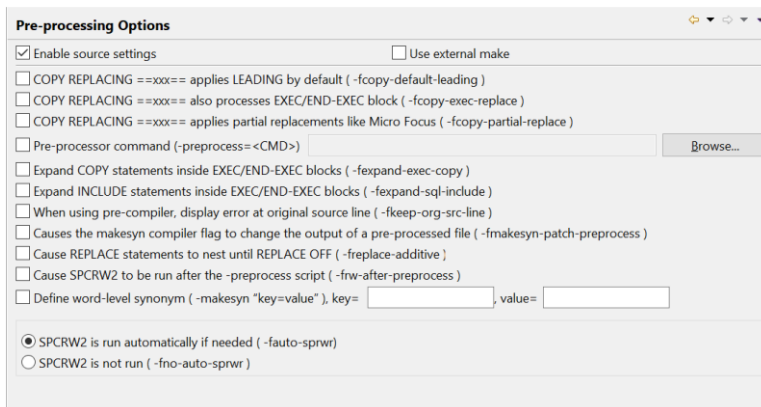
Enables fast MOVES of figurative constants. (default)

-fno-fast-figurative-move

Disables fast MOVES of figurative constants.

Pre-processing Options

Affects pre-processing functionalities.



Pre-processing Options

☒ Enable source settings ☐ Use external make

☐ COPY REPLACING ==xxx== applies LEADING by default (-fcopy-default-leading)

☐ COPY REPLACING ==xxx== also processes EXEC/END-EXEC block (-fcopy-exec-replace)

☐ COPY REPLACING ==xxx== applies partial replacements like Micro Focus (-fcopy-partial-replace)

☐ Pre-processor command (-preprocess= <CMD>)

☐ Expand COPY statements inside EXEC/END-EXEC blocks (-fexpand-exec-copy)

☐ Expand INCLUDE statements inside EXEC/END-EXEC blocks (-fexpand-sql-include)

☐ When using pre-compiler, display error at original source line (-fkeep-org-src-line)

☐ Causes the makesyn compiler flag to change the output of a pre-processed file (-fmakesyn-patch-preprocess)

☐ Cause REPLACE statements to nest until REPLACE OFF (-freplace-additive)

☐ Cause SPCRW2 to be run after the -preprocess script (-frw-after-preprocess)

☐ Define word-level synonym (-makesyn "key=value"), key= value=

☒ SPCRW2 is run automatically if needed (-fauto-sprwr)

☐ SPCRW2 is not run (-fno-auto-sprwr)

-fcopy-default-leading

When using the ==xxx== notation in a COPY REPLACING statement, causes the LEADING phrase to be assumed by default.

-fcopy-exec-replace

When a COPY REPLACING == xxx == statement is performed, causes text inside EXEC / END-EXEC blocks to be also replaced if applicable.

-fcopy-partial-replace

When a pattern like COPY FIC1 REPLACING == WJXX- == BY == WJ03- == is processed : If this flag is on, the preprocessor uses a partial replacement as defined by MF and ANSI2002 standard. If it is off (the default) the IBM mainframe and ANSI85 standard is used.

-preprocess=<CMD>

Causes <CMD> to be run after the COBOL pre-processing step. <CMD> is a script of batch file in which an external pre-processor is run.

-fexpand-exec-cpy

The -fexpand-exec-copy compiler flag causes the compiler to expand COBOL COPY statements inside EXEC ... END-EXEC blocks. This applies to both EXEC SQL and EXEC CICS blocks.

-fexpand-sql-include

Used with -E, expands 'EXEC SQL INCLUDE <File name> END-EXEC' in the -E output.

-fkeep-org-src-line



For use with the integrated pre-processor (`-preprocess`). Causes errors to be reported on the original source line.

-fmakesyn-patch-preprocess

Causes the makesyn compiler flag to change the output of a pre-processed file.

-freplace-additive

Allows for the use of the REPLACE ADD verb, which has the effect of nesting a REPLACE statement inside an existing REPLACE statement.

-frw-after-preprocess

Causes SPCRW2 to be run after the `-preprocess` script.

-makesyn “key=value”

Provides a way to make a reserved word a synonym for another reserved word. A common usage is to make COMP a synonym of COMP-5.

```
>cobc -makesyn comp=comp-5 hello.cbl
```

-fauto-sprwr

Causes SPCRW2 to run automatically when needed before any `-pre-process` script (default).

-fno-auto-sprwr

Causes SPCRW2 to not run automatically when needed before any `-pre-process` script.

Project Options

Affects handling of the build process

Project Options

☒ Enable source settings ☐ Use external make

☐ Always rebuild makefile

Cobol program extension to compile. Enter all extensions separated by ;
cob;cbl;COB;CBL

Cobol program extension to preprocess before compile. Enter all extensions separated by ;
pco;PCO

Setup Script: %COBOLITDIR%\setenv_cobolit.bat

Working directory (default: project directory):

Always rebuild makefile

When selected, the makefile will be re-built for every build.

Cobol program extension to compile

File extensions that the compiler will recognize as source files, and compile in a BUILD.



Cobol program to preprocess before compile

File extensions that will be precompiled when using the `–preprocess` compiler flag.

Setup Script

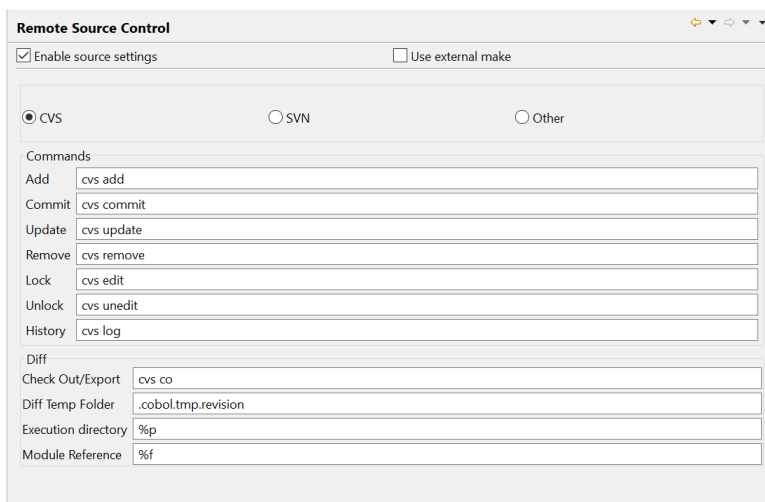
The COBOL-IT setup script.

Working directory

Default is project directory.

Remote Source Control

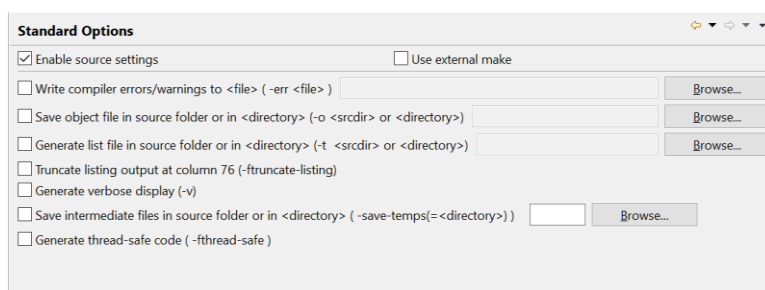
Allows settings for CVS, SVN source code control. This functionality is only supported when using the Remote System Explorer.



The 'Remote Source Control' dialog box has a title bar with standard window controls. It contains two checkboxes at the top: 'Enable source settings' (checked) and 'Use external make' (unchecked). Below these are three radio buttons: 'CVS' (selected), 'SVN', and 'Other'. A section titled 'Commands' contains a list of labels with corresponding text input fields: 'Add' (cvs add), 'Commit' (cvs commit), 'Update' (cvs update), 'Remove' (cvs remove), 'Lock' (cvs edit), 'Unlock' (cvs unedit), and 'History' (cvs log). Below this is a 'Diff' section with 'Check Out/Export' (cvs co), 'Diff Temp Folder' (.cobol.tmp.revision), 'Execution directory' (%p), and 'Module Reference' (%f).

Standard Options

Standard compiler options. In our examples, we have set `-o` to `.\object` and `-t` to `.\lis`



The 'Standard Options' dialog box has a title bar with standard window controls. It contains two checkboxes at the top: 'Enable source settings' (checked) and 'Use external make' (unchecked). Below these are several options, each with a checkbox and a text input field, followed by a 'Browse...' button: 'Write compiler errors/warnings to <file> (-err <file>)', 'Save object file in source folder or in <directory> (-o <srcdir> or <directory>)', 'Generate list file in source folder or in <directory> (-t <srcdir> or <directory>)', 'Truncate listing output at column 76 (-truncate-listing)', 'Generate verbose display (-v)', 'Save intermediate files in source folder or in <directory> (-save-temps(=<directory>))', and 'Generate thread-safe code (-fthread-safe)'.

-err <file>

Causes errors and warnings to be written to <file> instead of stderr.



-o <file> | <dir>

Causes a compiled object to be output into <file> or <directory>.

-t <file> | <dir>

Causes a program listing to be output into <file> or <directory> .

-ftruncate-listing

Causes output of the -t <file> compiler flag to be truncated at column 76.

-v

Produces verbose output.

-save-temps=<directory>

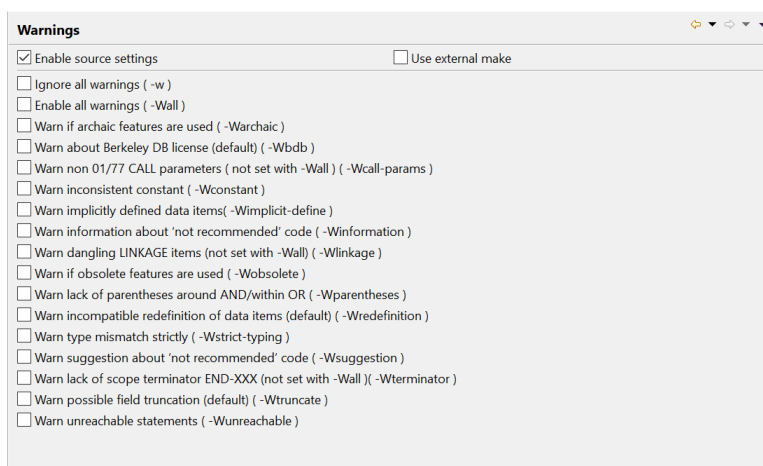
Causes all intermediate files to be preserved.

-fthread-safe

Generates thread-safe executables.

Warnings

Configure how the compiler generates warnings.



-w

Disables all warnings.

-Wall

Enables all warnings.

-Warchaic

Warns if archaic features are used.

-Wbdb

Warns about bdb license. (default).

-Wcall-params

Warns if non 01/77 items are used for CALL parameters (NOT set with Wall).

-Wconstant

Warns if inconsistent constant is used.

-Wimplicit-define

Warns of implicitly defined data items.

-Winformation

Warns information about 'not recommended' code. –Winformation is applied by default.

-Wlinkage

Warns of dangling LINKAGE items. (NOT set with -Wall).

-Wobsolete

Warns if obsolete features are used.

-Wparentheses

Warns of lack of parentheses around AND within OR.

-Wredefinition

Warns if incompatible redefinition of data items are used.

-Wstrict-typing

Warns of type mismatch strictly.

-Wsuggestion

Warns suggestions about 'not recommended' code. –Wsuggestion is applied by default.

-Wterminator

Warns of lack of scope terminator, such as END-XXX. (NOT set with -Wall)

-Wtruncate

Warns of possible field truncations. –Wtruncate is applied by default.

-Wunreachable

Warns of unreachable statements.

Building and Running hello.cbl

In our sample project, the compiler configuration is designed to:

- Set the -o compiler flag to create object files to be created in the .\object folder.
- Set the -t compiler flag to create listing files the .\lst folder.
- Set the -I compiler flag to locate copy files in the .\copy folder.
- Set the -g compiler flag to cause debugging information to be added to the object files, so they can be run in debug mode.

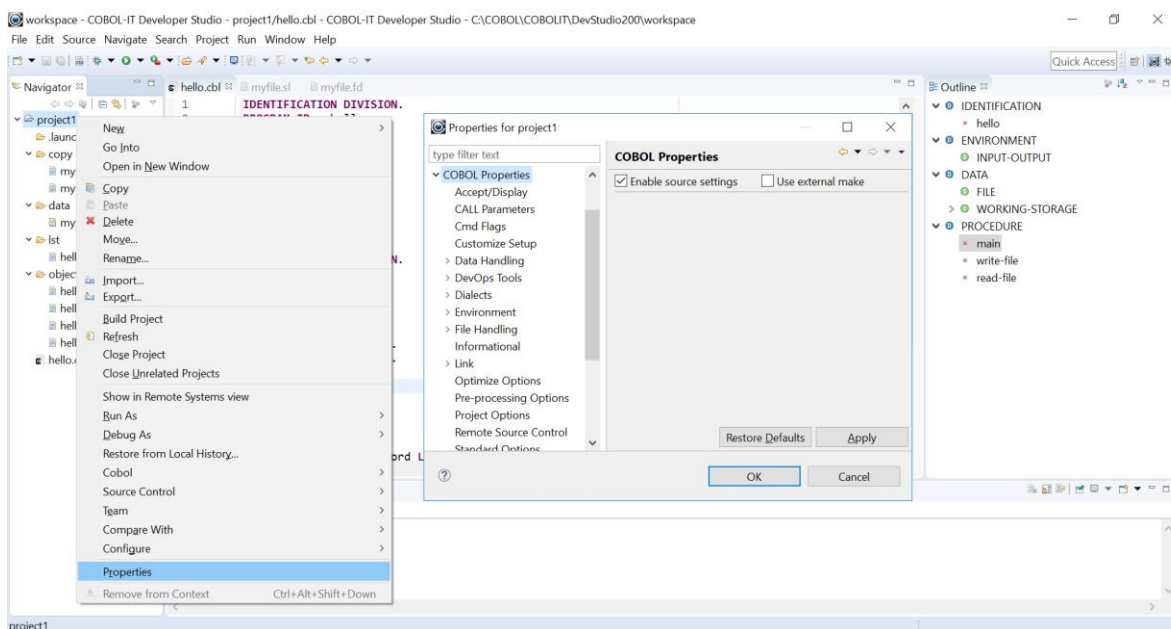
Our Runtime configuration should:

- Set the COB_LIBRARY_PATH to allow the runtime to locate the compiled object.
- Set the COB_FILE_PATH to cause the runtime to locate files in the .\data folder.

Project>Properties>COBOL Properties

Click on the Project folder in the Navigator Window to select it. Right click, and select “Properties” from the right-click dropdown menu to open the Properties dialog window.

In the menu on the left, select “COBOL Properties”. In the COBOL Properties dialog, click “Enable source settings” to enable the setting of compiler flags through the Compiler Properties sub-headings in the panel on the left.



- On the Standard Options screen, set the -o compiler flag to .\object.
- On the Standard Options screen, set the -t compiler flag to .\lst.
- On the Environment>Copy Files screen, set the -I compiler flag to .\copy.
- On the DevOps Tools>Debugging Tools screen, set -g compiler flag.

Click Apply, and then click OK to save your selections, and close the Properties dialog window.

Standardize a Run Configuration

When you select the “Run” function from the main toolbar, or from the main menubar, the standard Developer Studio Behavior is to create and exec script, and then run it.

A sample exec script for hello.dll

```
CALL %COBOLITDIR%\setenv_cobolit.bat  
cmd.exe /c start /wait cobcrun hello
```

The exec script first runs a “Pre-run script”, which by default is set to setenv_cobolit.bat, and then runs the program you wish to execute. The Pre-run script can be customized through the Customize Setup dialog screen.

If all of the programs in your project can be run with the same environment variables, then it is best to set the environment variables in your Pre-run script. In an example in which a program, hello.cbl, has been compiled with the `-o .\object` compiler flag, the runtime requires that the environment variable `COB_LIBRARY_PATH` be set to `.\object`. A standardized run configuration would include a Pre-run script that contained the instruction:

```
(Windows) SET COB_LIBRARY_PATH=.\object  
(Linux) export COB_LIBRARY_PATH=./object
```

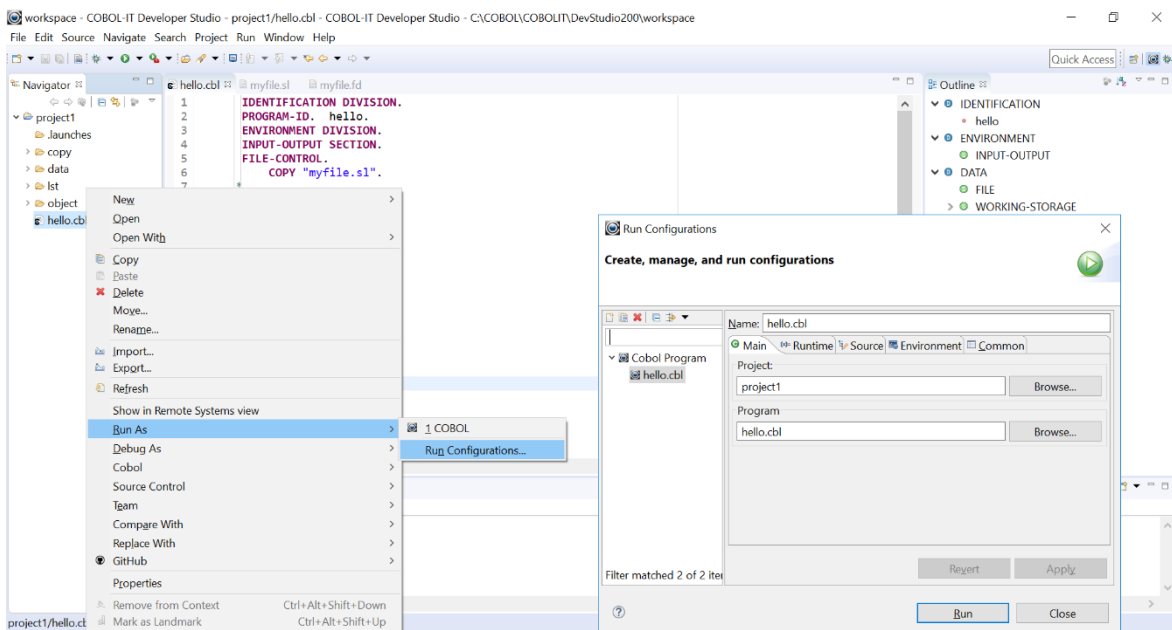
Customize a Run Configuration

You can accept the default Pre-run Script, which is the COBOL-IT setup script, and then include environment variable settings in a Run Configuration.

To create a customized Run Configuration for hello.cbl:

Right-click on the COBOL program hello.cbl in the Navigator Window.

Select Run As.... from the right-click dropdown menu, and then select “Run Configuration...” to open the Run Configuration dialog window.

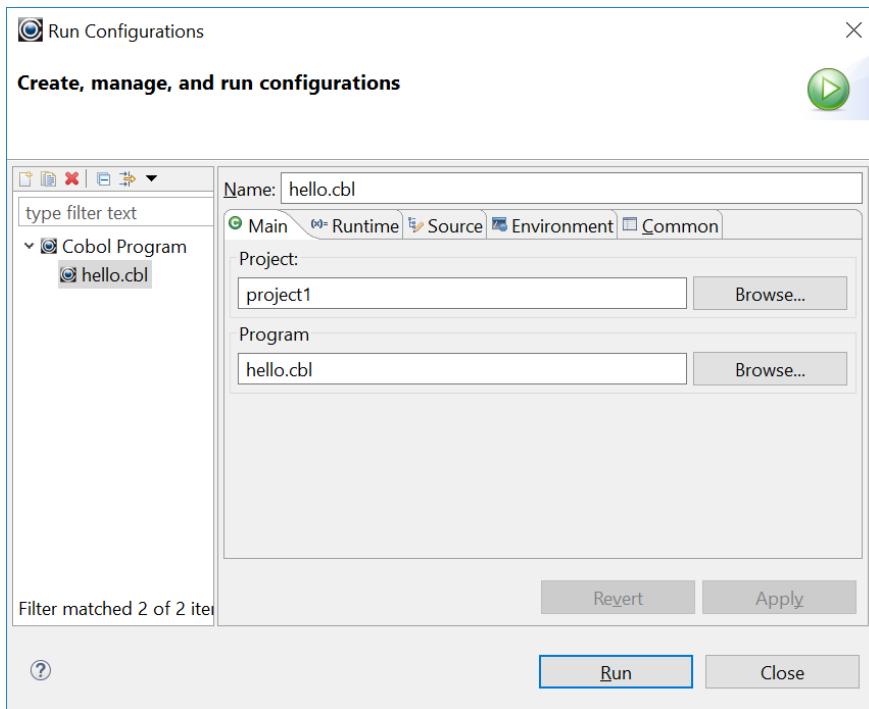


The Run Configuration dialog window

The Run Configurations dialog window consists of a tree structure on the left panel, and a multi-tabbed window in the right panel.

Create a new Runtime Configuration, and Assign it a Name

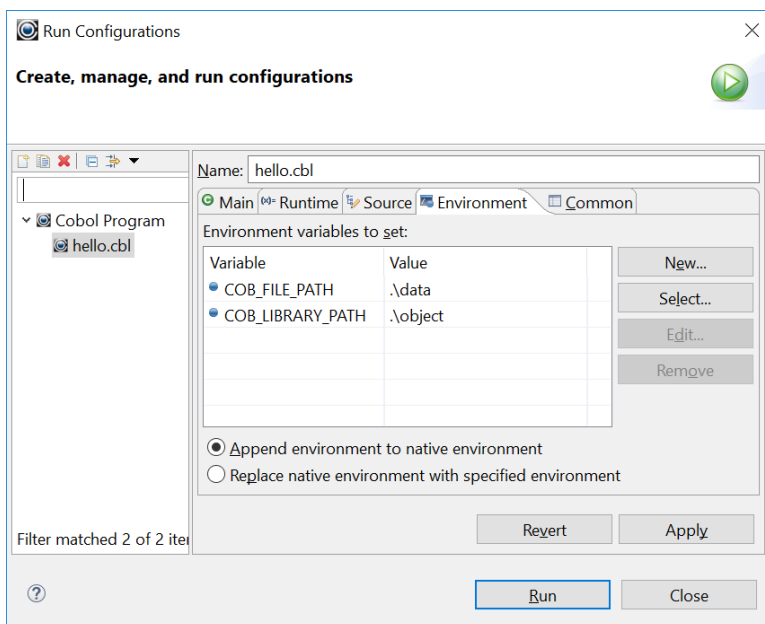
Select “COBOL Program” and click on the “New” toolbar button above the tree structure on the left panel. On the Run Configurations dialog window, change the Name from “New Configuration” to “hello.cbl”. Click on the “Apply” button to change the name of the configuration in the tree structure on the left.



Set runtime environment variables on the Environment tab

The Environment tab is where we will set the runtime environment variables that we need to produce the desired behaviors. On the environment tab, click on the “New” button to open the “New Environment Variable” dialog screen. Create new environment entries for COB_LIBRARY_PATH and COB_FILE_PATH.

Click Apply, and Close, to save your settings, and close the Run Configuration Dialog Screen.



We are now ready to review the Clean, Build, Run, and Debug operations.

Compile, Run, Debug

Key Concepts

Main Toolbar

Project>Build All and Project>Build Project can be used to Compile, and not Run a Program

A Build can be “forced” by using the “Clean” function before running any of the “Build”, “Run”, or “Debug” functions.

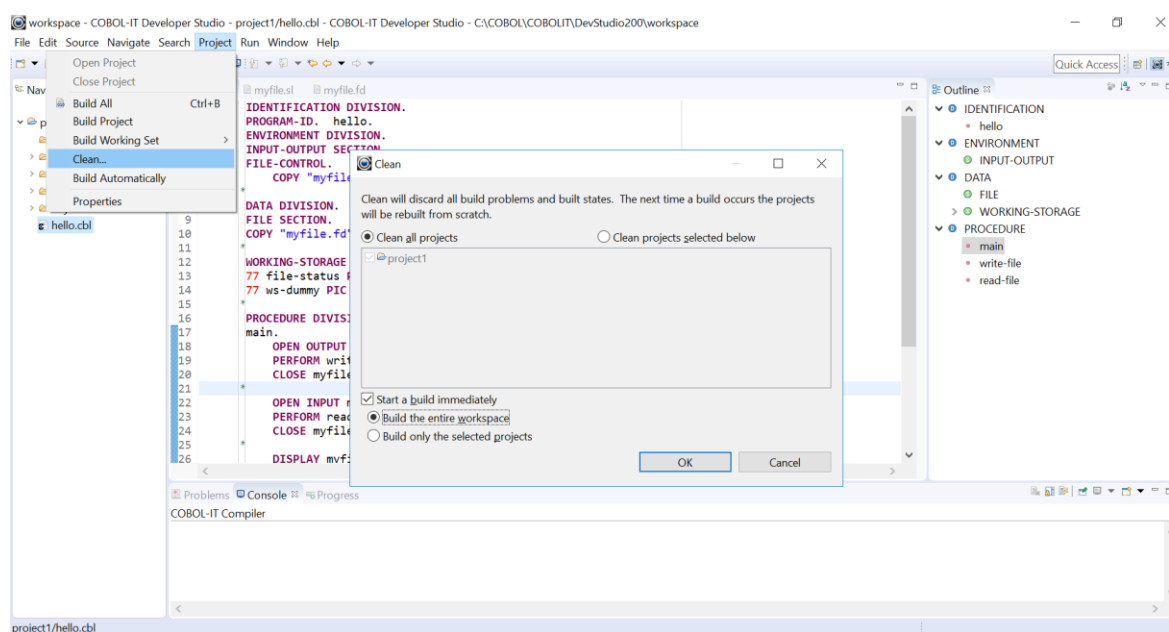
The Run toolbar button on the Developer Studio main toolbar builds (if necessary) and runs the program.

Compiler console window

Results of the Compile can be checked in the Compiler Console Window.

Clean, then Build

Select Project from the Main Menu, and then Clean... from the dropdown menu to open the Clean dialog screen.



The Clean Dialog Screen

Retain the defaults, which will “Clean all projects”, “Start a build immediately”, and “Build the entire workspace.”.

Note- When you have multiple projects in your Workspace, it may be convenient to only build selected projects.

The Clean will force a compile of the Project. The Build that is executed automatically is a compile of all the programs in the project, using the compiler flags set earlier in this exercise.

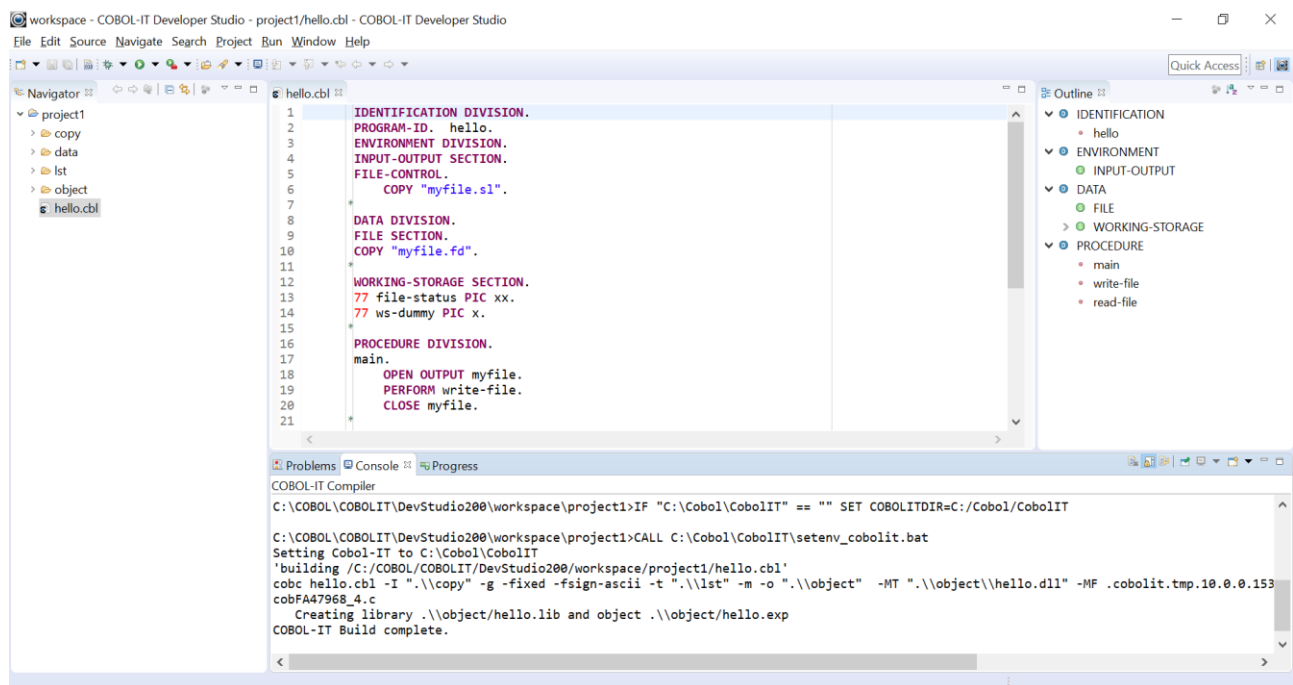
Clean and Build does not trigger a Run of the program.

Clean>Build updates the COBOL-IT Compiler console.

The COBOL-IT Compiler console window is updated with the results of the Build. In between informational messages that reference the Build function, you will see the command-line that is being executed, with `cobc`, the compiler flags that are being used, and the program name.

When the compile is successful, as in the example below, you will see the name of the “C” program that was successfully compiled by the host “C” compiler, and information on intermediate files that were created.

When the compile is not successful, you will see compiler error reports, as they would appear if you had executed the compile command on the command line. We will examine this case more closely later in this document.



```

workspace - COBOL-IT Developer Studio - project1/hello.cbl - COBOL-IT Developer Studio
File Edit Source Navigate Search Project Run Window Help

Navigator
  project1
    copy
    data
    lst
    object
      hello.cbl

hello.cbl
1  IDENTIFICATION DIVISION.
2  PROGRAM-ID.  hello.
3  ENVIRONMENT DIVISION.
4  INPUT-OUTPUT SECTION.
5  FILE-CONTROL.
6      COPY "myfile.s1".
7
8  DATA DIVISION.
9  FILE SECTION.
10     COPY "myfile.fd".
11
12  WORKING-STORAGE SECTION.
13     77 file-status PIC xx.
14     77 ws-dummy PIC x.
15
16  PROCEDURE DIVISION.
17     main.
18         OPEN OUTPUT myfile.
19         PERFORM write-file.
20         CLOSE myfile.
21

Outline
  IDENTIFICATION
    hello
  ENVIRONMENT
  INPUT-OUTPUT
  DATA
    FILE
    WORKING-STORAGE
  PROCEDURE
    main
    write-file
    read-file

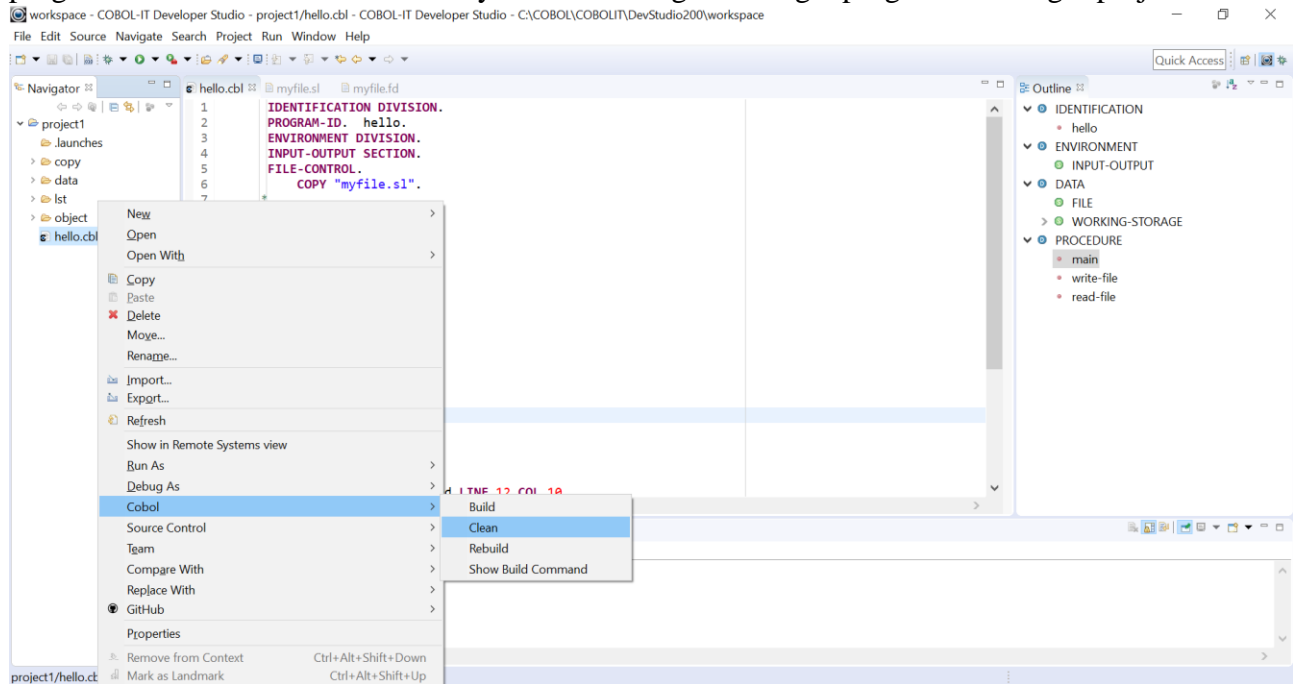
Problems Console Progress
COBOL-IT Compiler
C:\COBOL\COBOLIT\DevStudio200\workspace\project1>IF "C:\Cobol\CobolIT" == "" SET COBOLITDIR=C:\Cobol\CobolIT

C:\COBOL\COBOLIT\DevStudio200\workspace\project1>CALL C:\Cobol\CobolIT\setenv_cobolit.bat
Setting Cobol-IT to C:\Cobol\CobolIT
'building /C:/COBOL/COBOLIT/DevStudio200/workspace/project1/hello.cbl'
cobc hello.cbl -I ".\copy" -g -fixed -fsign-ascii -t ".\lst" -m -o ".\object" -MT ".\object\hello.d11" -MF .cobolit.tmp.10.0.0.153
cobFA47968_4.c
Creating library .\object\hello.lib and object .\object\hello.exp
COBOL-IT Build complete.
  
```

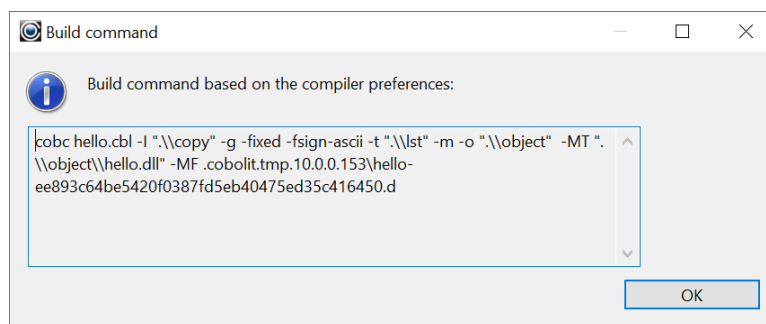
Clean, Build, and Rebuild a single program

Right click on a program in the Navigator window, and select Cobol>Clean to clean a single program. Select Cobol>Build to build a single program. Select Cobol>Rebuild to rebuild a single

program. Use these functions when you are working on a single program in a larger project.



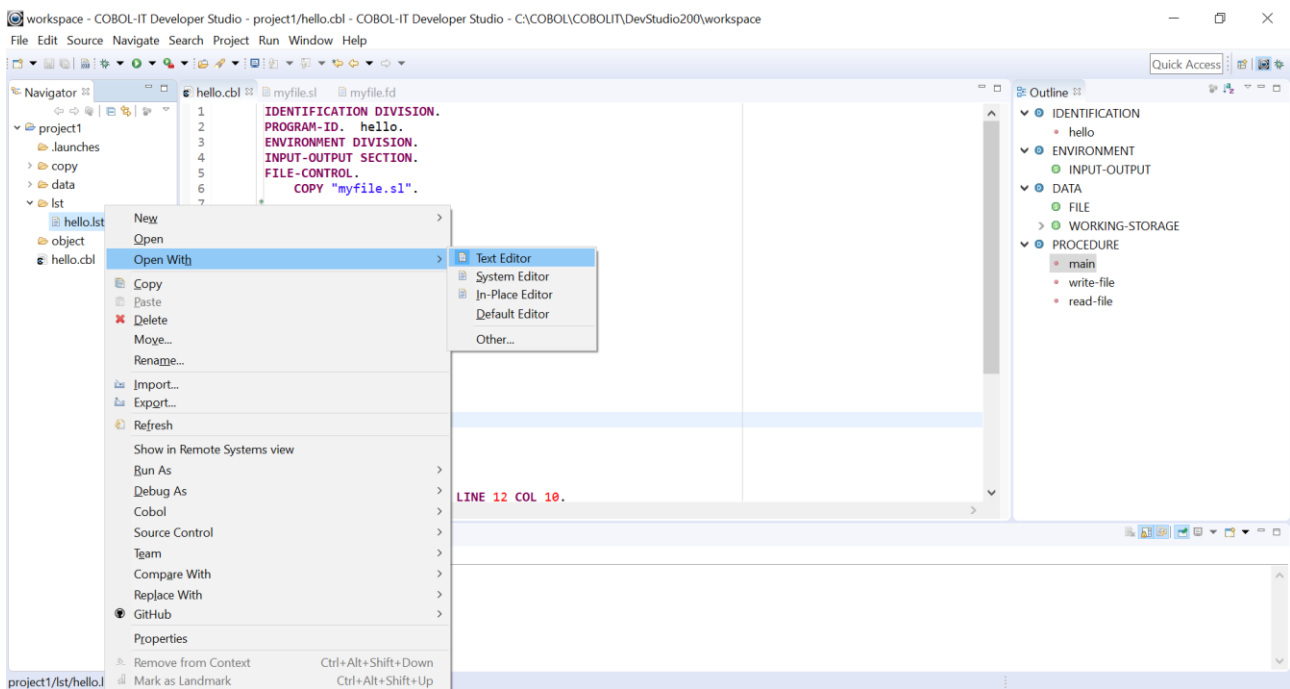
Use the Show Build Command to review the build command prior to executing the build:




Open With...>Text Editor to view text files

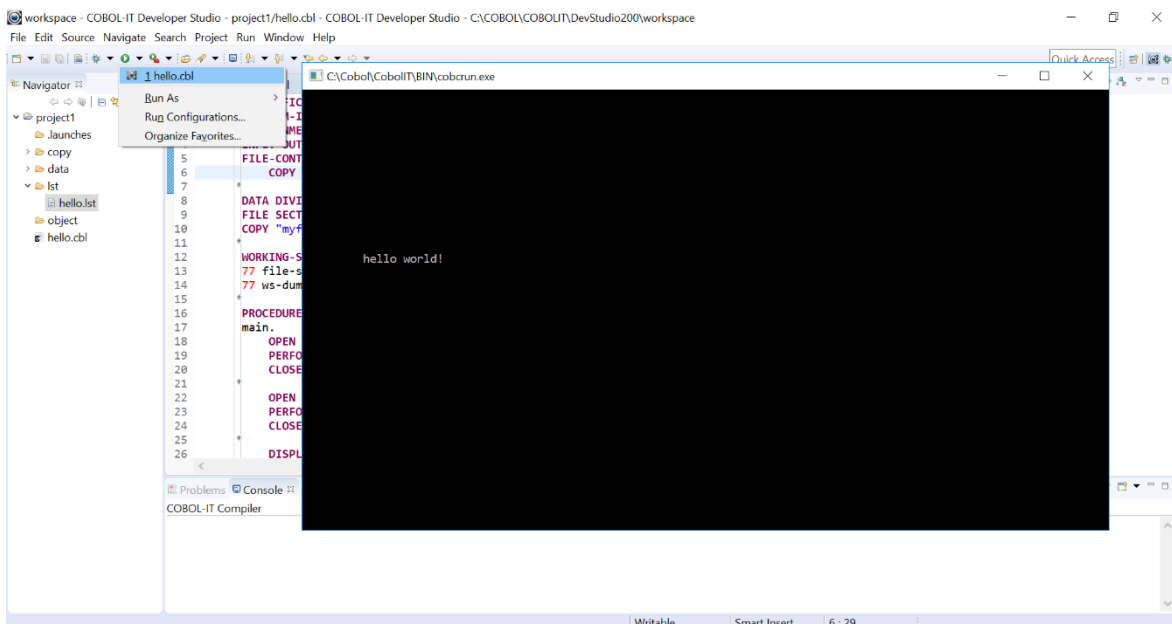
In this example, we have created a list file, called “hello.lst” in the lst folder. The list file is a text file.

To open hello.lst in an Editor window, single-click hello.lst to select it, then right-click, and select Open With>Text Editor.



Running the COBOL program

To Run hello.cbl, first open the file in the Code Editor. This places focus on the source file in the Navigator view, and makes the Run button on the main toolbar visible. Then, click on the  Run button to run hello.cbl.



Running in the Debugger Perspective

You are now ready to Run the COBOL program in the Debugger Perspective.

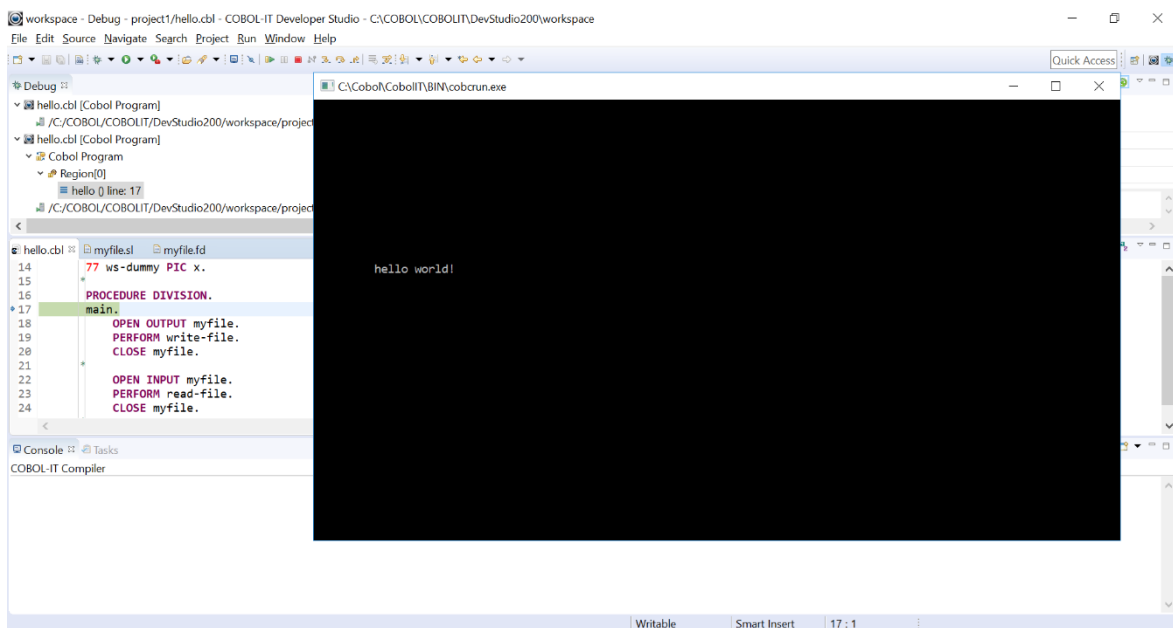
- [x] We included the `-g` compiler flag in our compile string, and
- [x] Our Window>Preferences>Run/Debug>Perspectives dialog has been set to open the Debugger Perspective when we launch the debugger.

To Run `hello.cbl` in the Debugger Perspective, first open the file in the Code Editor. This places focus on the source file in the Navigator view, and makes the Debug button on the main toolbar visible. Then, click on the



Debug button on the Developer Studio toolbar.

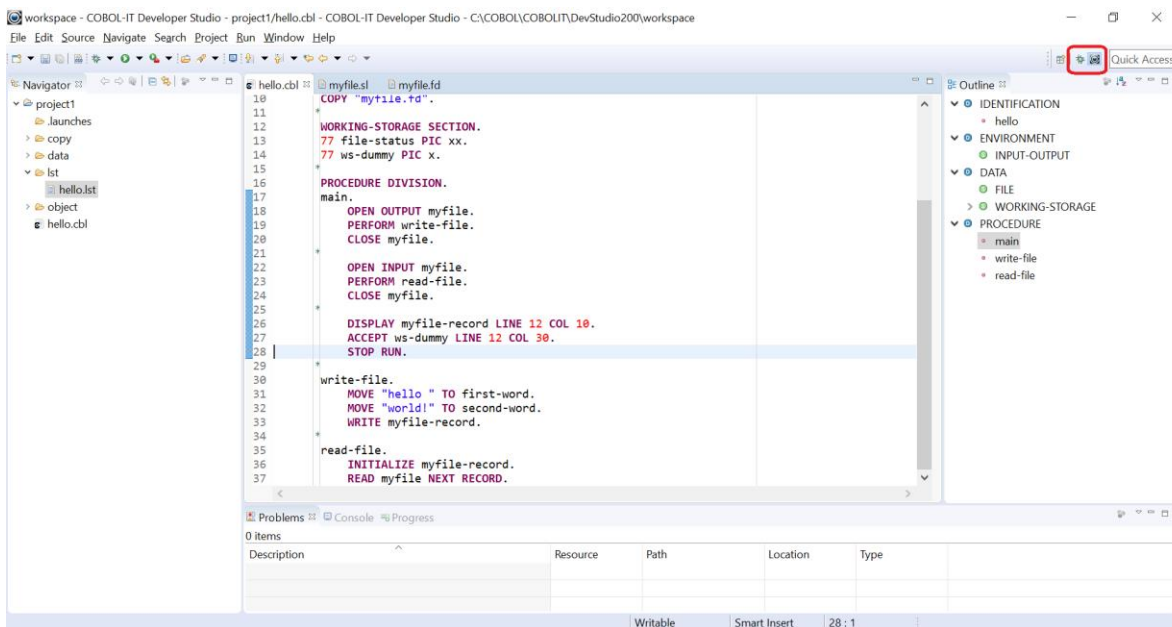
This will cause the Debugger Perspective to open and run `hello.cbl`.



Single step through the STOP RUN command to terminate the program.

Toggle Perspectives to re-enter the Developer Studio Perspective

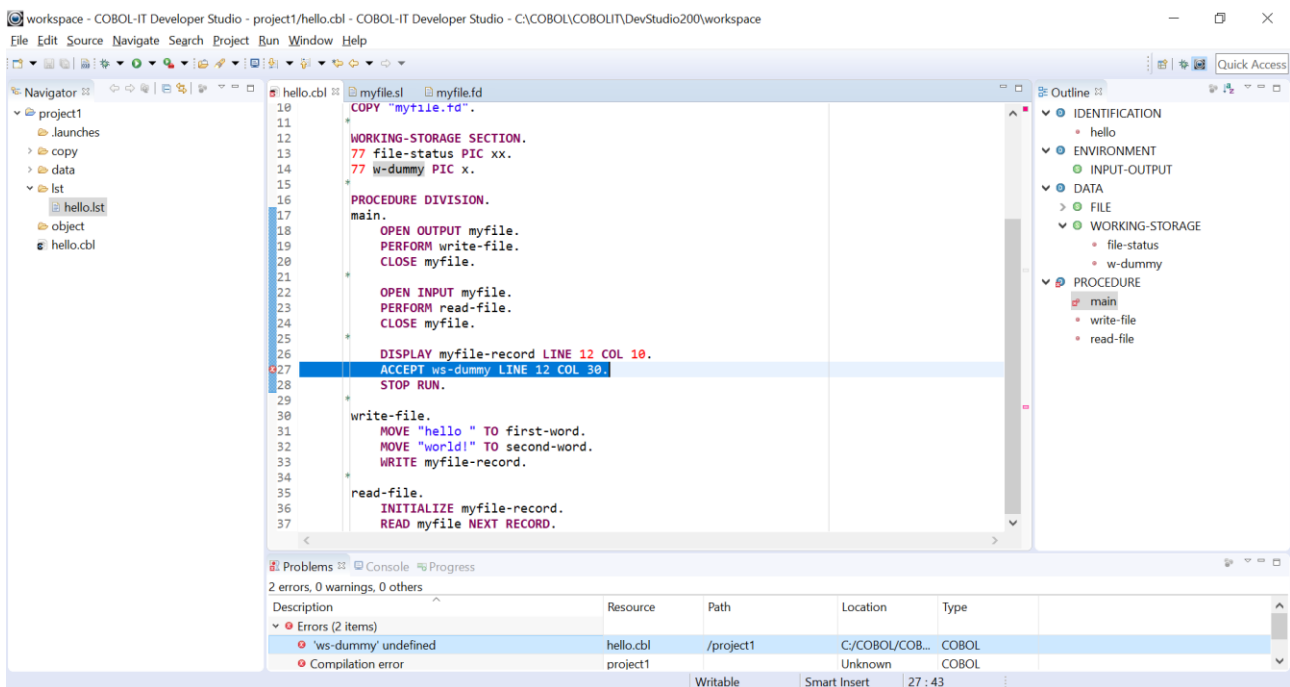
After terminating a debug session, you can toggle back to the Developer Studio Perspective, and resume development. You can widen the tab area that displays available perspectives by dragging it to the left. When you have widened the tab, you will see the two perspectives, COBOL-IT Debugger Perspective and COBOL-IT Developer Studio Perspective. To toggle between the two, just click on from one tab to the other.



Correcting compiler errors from the Problems View

Compiler errors are recorded on the Problems View, which records program name, and line number, and provides a clickable interface to go to the error. In the example below, a variable has been misspelled, in the statement `ACCEPT w-dummy`. In the Problems View, click on the red (x) next to the informational message “w-dummy undefined” to select it, and then double-click, and the error line is located.

You will notice that the error line in the source has also been marked with a red (x), and that the line in which the error is located has been highlighted in blue.

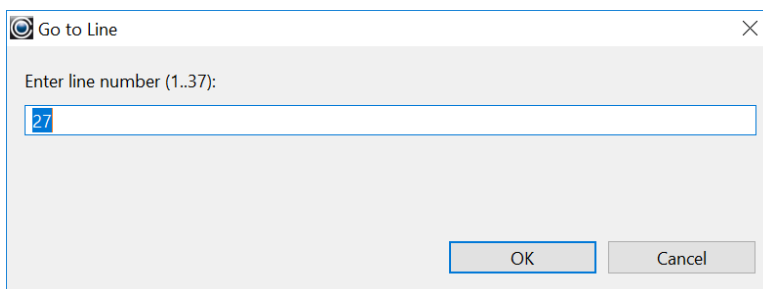


Correcting compiler errors from the Compiler Console View

Compiler errors are also recorded on the Compiler Console View, as follows:

```
C:/COBOL/CobolIT/train/project1/hello.cbl: In paragraph 'main':
C:/COBOL/CobolIT/train/project1/hello.cbl:27: Error: 'ws-dummy' undefined
```

This output is not in a clickable interface. However, you can easily isolate **the line number** in which the error occurred, and use the Go To Line Number (Ctl + L) function in the Code Editor to locate the error.

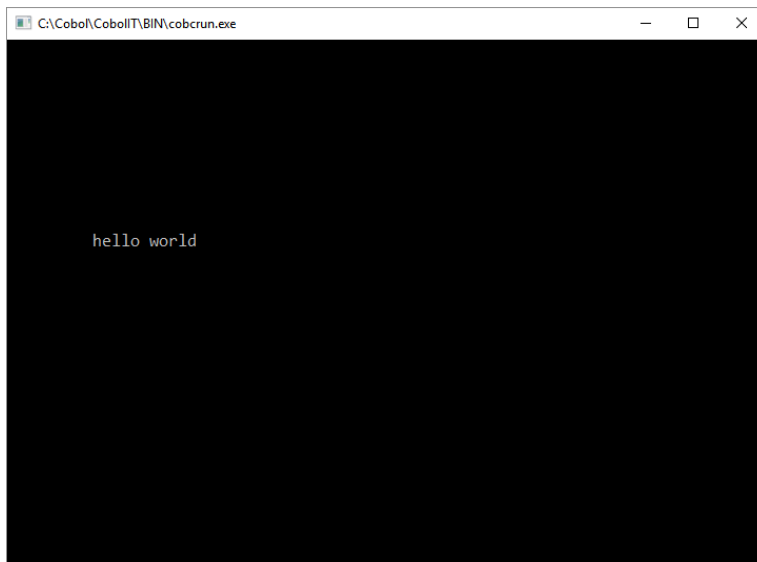


After correcting a compiler error

After correcting a compiler error, you should:

- >SAVE your changes
- >CLEAN
- >BUILD, (or REBUILD, from the Project Cobol>Rebuild function)
- >Verify that the problem has been corrected in the Compiler Console Window and>or the Problems Window.

>Run to validate that the problem is fixed.



Summarizing key features of the Developer Studio

In Summary, Key features of the Developer Studio include:

Desktop icons which cause setup batch files to execute.

The setup batch files ensure that the “C” compiler, and COBOL-IT Compiler Suite executables can all be located by the Developer Studio.

New COBOL Project and New COBOL Program Wizards

We stepped through the use of the New Project, New Folder and New COBOL Program wizards

IDE Configuration Interfaces

We reviewed important IDE Configuration interfaces in the Window>Preferences>General, Window>Preferences>Run/Debug, and Window>Preferences>COBOL dialog screens.

COBOL-Aware Code Editor

We created a small COBOL program, and observed how the Outline Window could be used to facilitate navigation within a COBOL program. We SAVE'd our program in the Project folder.

Setting Compiler flags at the Workspace, or Project Level

We set compiler options that would allow us to store compiled objects in the .\objects folder (-o), to store list files in the .\lst folder (-t), and to compile for use with the Debugger Perspective at the Workspace Level.

Creating Standard or Customized Runtime Configurations

Standard Runtime Configurations can be made by setting environment variables in the COBOL-IT setup script. Runtime Configuration interface to set runtime environment variables

We created a runtime configuration for our program hello.cbl, so that the runtime would be able to locate the compiled objects in the .\object directory (SET COB_LIBRARY_PATH).

Clean, Build, and check output in the Compiler Console Window

We used the Clean and Build function to compile the program, and then opened the Compiler Console Window to view the results of the Compile.

Run, and Run in the COBOL-IT Debugger Perspective

We used the Run and Debug functions on the Developer Studio toolbar to run the program, and then run the program in the Debugger Perspective.

Compiler errors can be located through a clickable interface in the Problems Window

We deliberately created an error condition in the program, and observed the results in the Problems window, as well as in the Compiler Console Window. We corrected the problem, and ran the program.

Additional development scenarios

Using existing source code in its current location

This chapter guides the user through the use of the Developer Studio with existing source.

The chapter presents a practical exercise that includes launching a workspace, creating a new project using existing source code, and developing, compiling, running and debugging the existing COBOL programs.

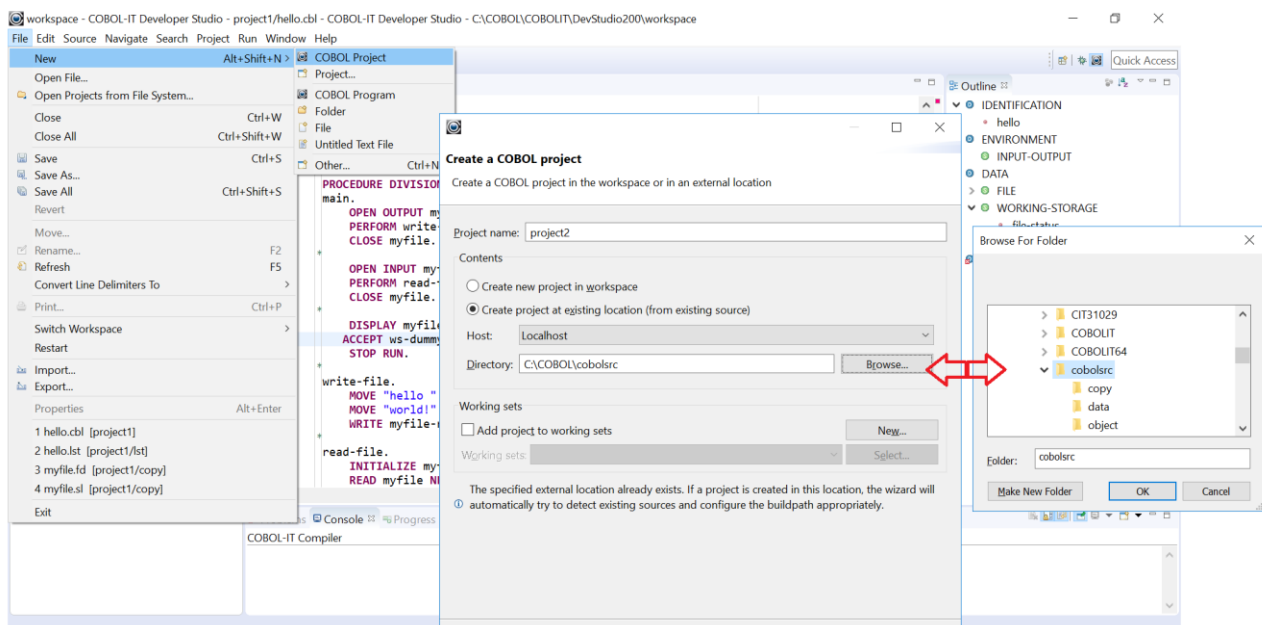
The “New COBOL Project” wizard with “Use Existing Source” adds project information to the selected directory containing the existing source.

Select New>Project, and then select COBOL>COBOL Project to open the Create COBOL Project Wizard.

In the Create COBOL Project Wizard, enter a new project name, “project2”, and select the radio button “Create project from existing source”.

New Project Using Existing Source

Select File>New>Project...>COBOL>COBOL Project , and click on [Next] to open the COBOL Project Wizard



In the Create a COBOL project Wizard, enter a project name. In the example below, we create a project called project2.

Select the radio button titled “Create project at existing location (from existing source). Browse, and select the sample directory at C:\COBOL\cobolsrc. The new project project2 will be added to the Workspace. Eclipse artifacts, such as the .project file, will be created in the existing directory. Click [Finish].

Eclipse artifacts are created in the existing directory

Note that eclipse artifacts, such as the .buildpath and .project files have been added to the existing directory as a result of having created a new Project in the existing directory.

```
C:\COBOL\cobolsrc>dir
Volume in drive C is OS
Volume Serial Number is F4D5-6238
```

Directory of C:\COBOL\cobolsrc

```
12/18/2017 05:46 PM <DIR>      .
12/18/2017 05:46 PM <DIR>      ..
12/18/2017 03:52 PM          106 .buildpath
12/18/2017 05:54 PM <DIR>      .cobolit.tmp.10.0.0.153
12/18/2017 04:44 PM <DIR>      .launches
12/18/2017 03:52 PM          512 .project
12/18/2017 04:37 PM <DIR>      .settings
12/18/2017 05:49 PM <DIR>      c
07/13/2017 02:08 PM <DIR>      copy
12/18/2017 05:53 PM <DIR>      data
12/18/2017 05:47 PM          1,231 holidaysIX.cbl
07/28/2017 09:08 AM          6,260 labfile2.cbl
12/18/2017 05:47 PM <DIR>      lst
12/18/2017 05:49 PM <DIR>      object
         4 File(s)      8,109 bytes
        10 Dir(s) 350,442,024,960 bytes free
```

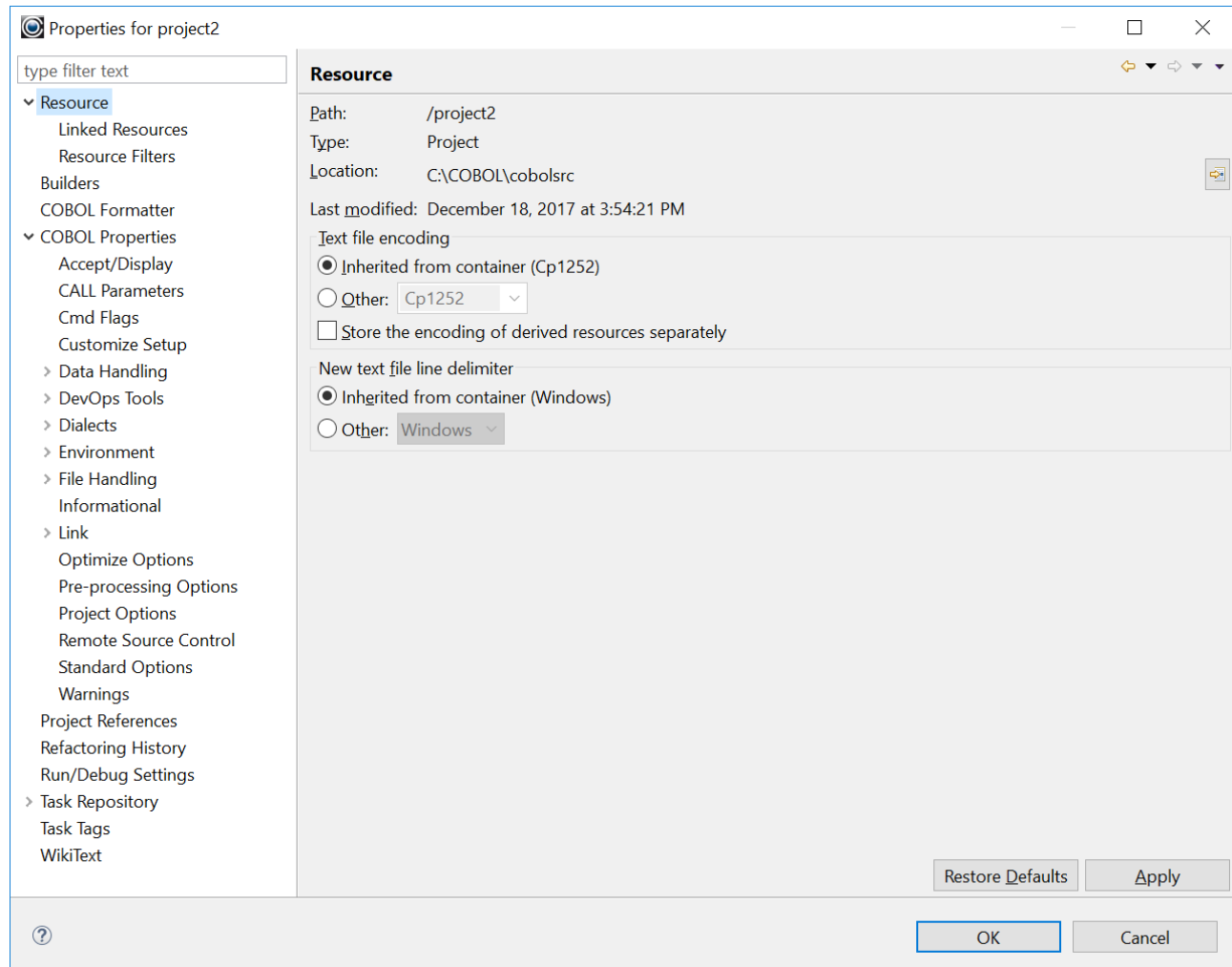
Existing files and folders appear in the Navigator Window

If you add or delete folders or files here, they are added/deleted to/from the system folders. If you add or delete files or folders at the system level, they will be added/deleted in your project as well.



Project>Properties>Resource

Selec project2 by clicking on it, then right-click, and select Properties from the right-click dropdown menu to verify that location of the project folder is at the location of the existing source:



Project>Properties>COBOL

Use the Project>Properties>COBOL dialog screen to check, and set compiler flags for this project. The compiler flags for project1 were set at the project level, and are not inherited by project2. Set the `-I <directory>`, `-t <directory>`, `-o <directory>`, and `-g` compiler flags.

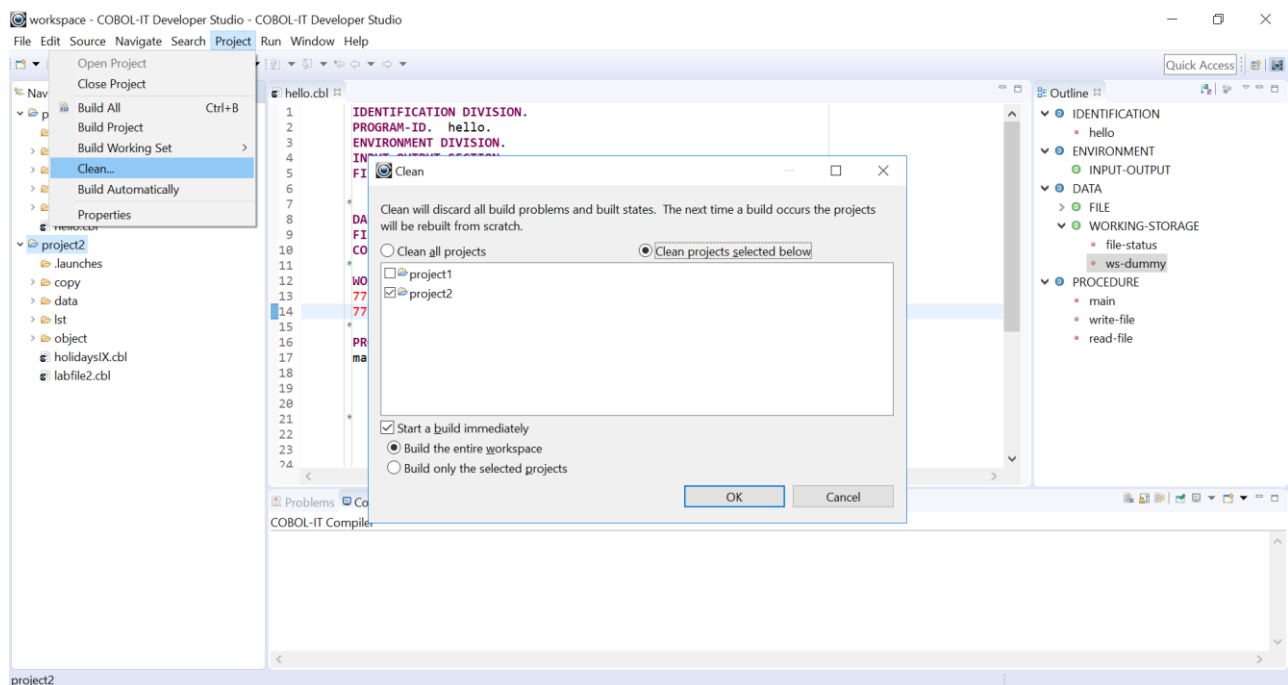
Clean and build project2

As there are now two projects in the Workspace, both the Clean and Build portions of the dialog screen contains options.

In the Clean portion of the dialog screen, select the radio-button titled “Clean projects selected below”, and select the checkbox titled “project2”.

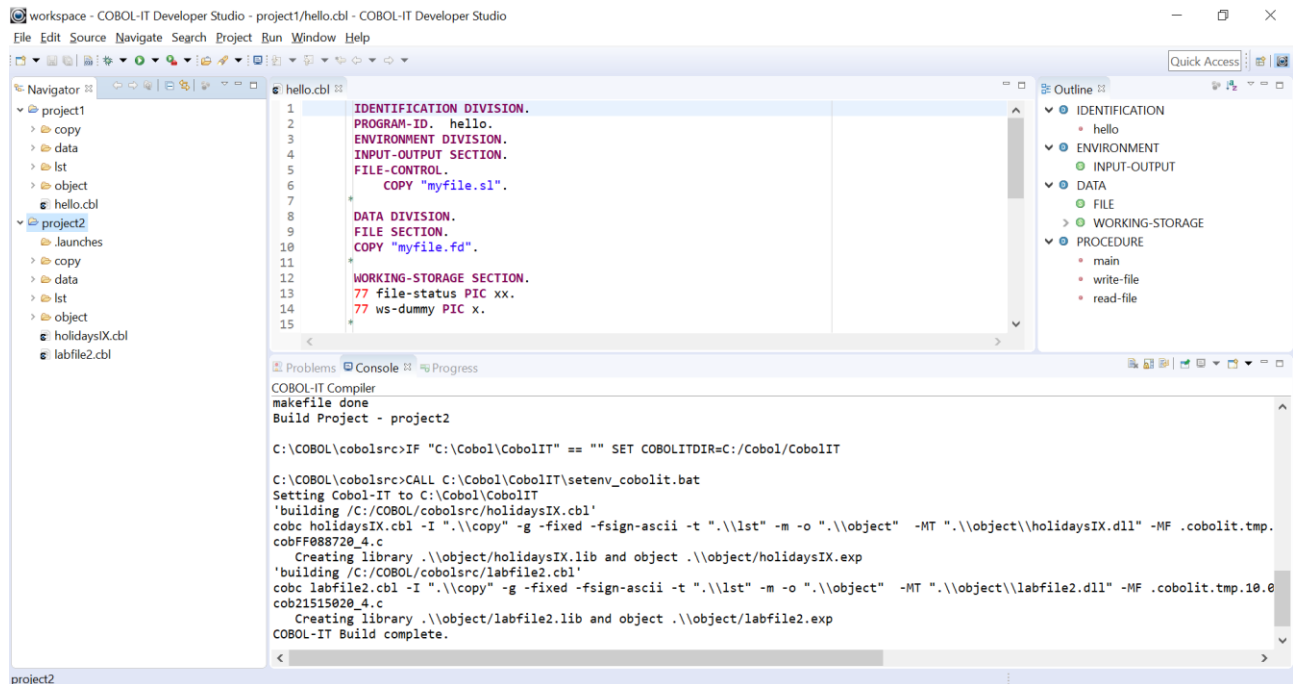
In the Build portion of the dialog screen, select the radio-button titled “Build only selected projects”.

Click OK.



The Compiler Console Window

The results of the compile are in the Compiler Console Window:



```

workspace - COBOL-IT Developer Studio - project1/hello.cbl - COBOL-IT Developer Studio
File Edit Source Navigate Search Project Run Window Help

Navigator
  project1
    copy
    data
    lst
    object
  hello.cbl
  project2
    .launches
    copy
    data
    lst
    object
  holidaysIX.cbl
  labfile2.cbl

hello.cbl
1 IDENTIFICATION DIVISION.
2 PROGRAM-ID. hello.
3 ENVIRONMENT DIVISION.
4 INPUT-OUTPUT SECTION.
5 FILE-CONTROL.
6 COPY "myfile.s1".
7
8 DATA DIVISION.
9 FILE SECTION.
10 COPY "myfile.fd".
11
12 WORKING-STORAGE SECTION.
13 77 file-status PIC XX.
14 77 ws-dummy PIC X.
15

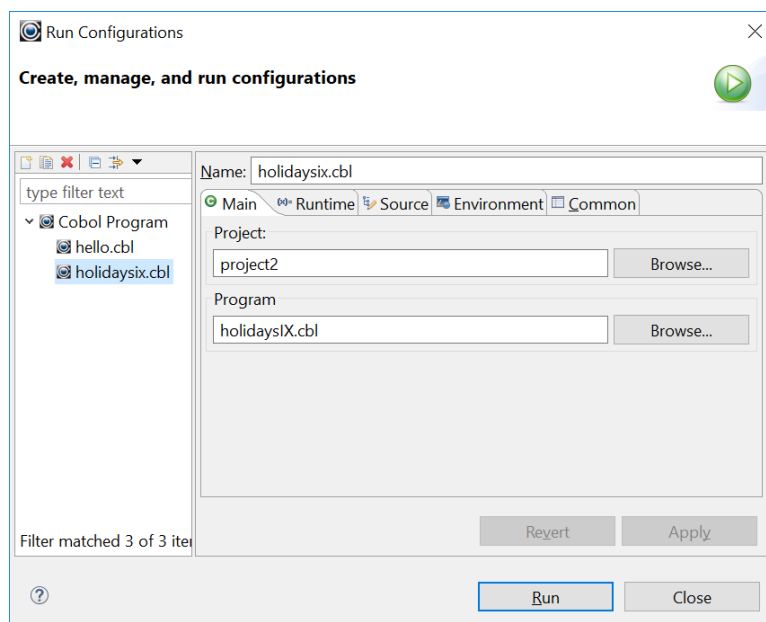
Problems Console Progress
COBOL-IT Compiler
makefile done
Build Project - project2

C:\COBOL\cobolsrc>IF "C:\Cobol\CobolIT" == "" SET COBOLITDIR=C:\Cobol\CobolIT

C:\COBOL\cobolsrc>CALL C:\Cobol\CobolIT\setenv_cobolit.bat
Setting Cobol-IT to C:\Cobol\CobolIT
'building /C:/COBOL/cobolsrc/holidaysIX.cbl'
cobc holidaysIX.cbl -I ".\copy" -g -fixed -fsign-ascii -t ".\lst" -m -o ".\object" -MT ".\object\holidaysIX.dll" -MF .cobolit.tmp.cobF088720_4.c
Creating library .\object\holidaysIX.lib and object .\object\holidaysIX.exp
'building /C:/COBOL/cobolsrc/labfile2.cbl'
cobc labfile2.cbl -I ".\copy" -g -fixed -fsign-ascii -t ".\lst" -m -o ".\object" -MT ".\object\labfile2.dll" -MF .cobolit.tmp.10.cob21515020_4.c
Creating library .\object\labfile2.lib and object .\object\labfile2.exp
COBOL-IT Build complete.
  
```

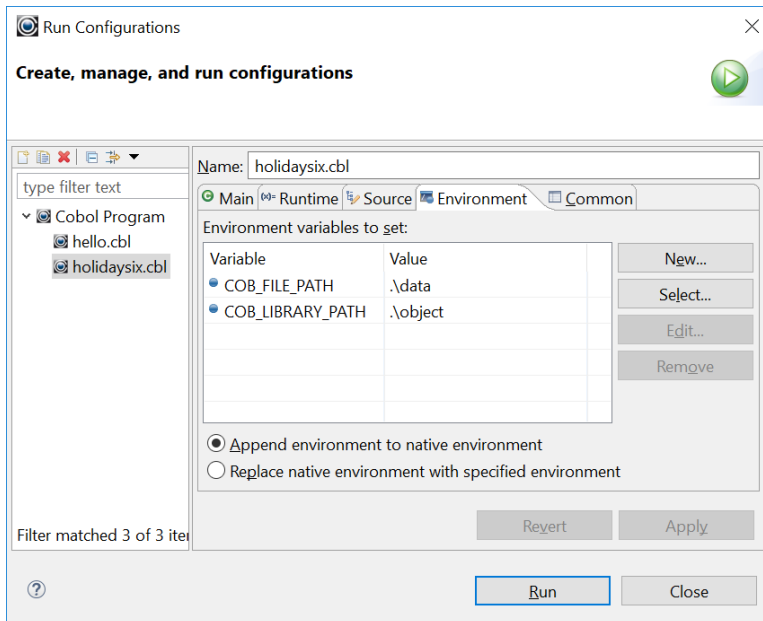
Create a Run Configuration for project2>holidaysix.cbl

Right-click on holidaysix.cbl, select “Run As” from the dropdown menu, and then select “Run Configurations” from the subsequent dropdown menu. In the Run Configurations wizard, select holidaysIX.cbl in project2 on the Main tab.

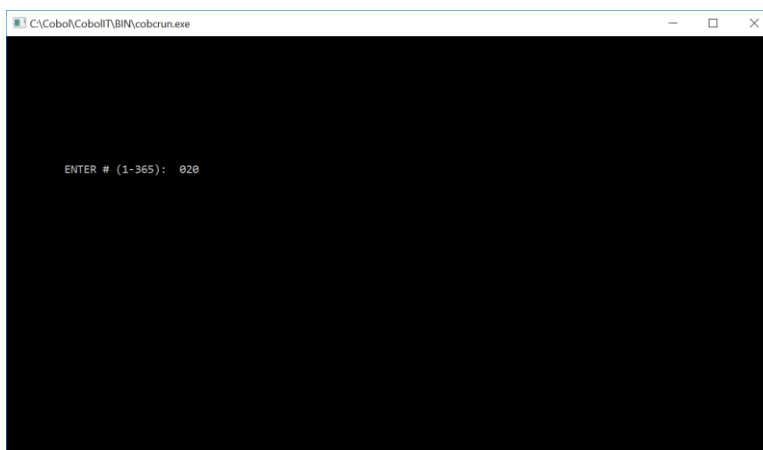


Add the environment variables

Set the Environment Variables on the Environment tab.



Run the COBOL program



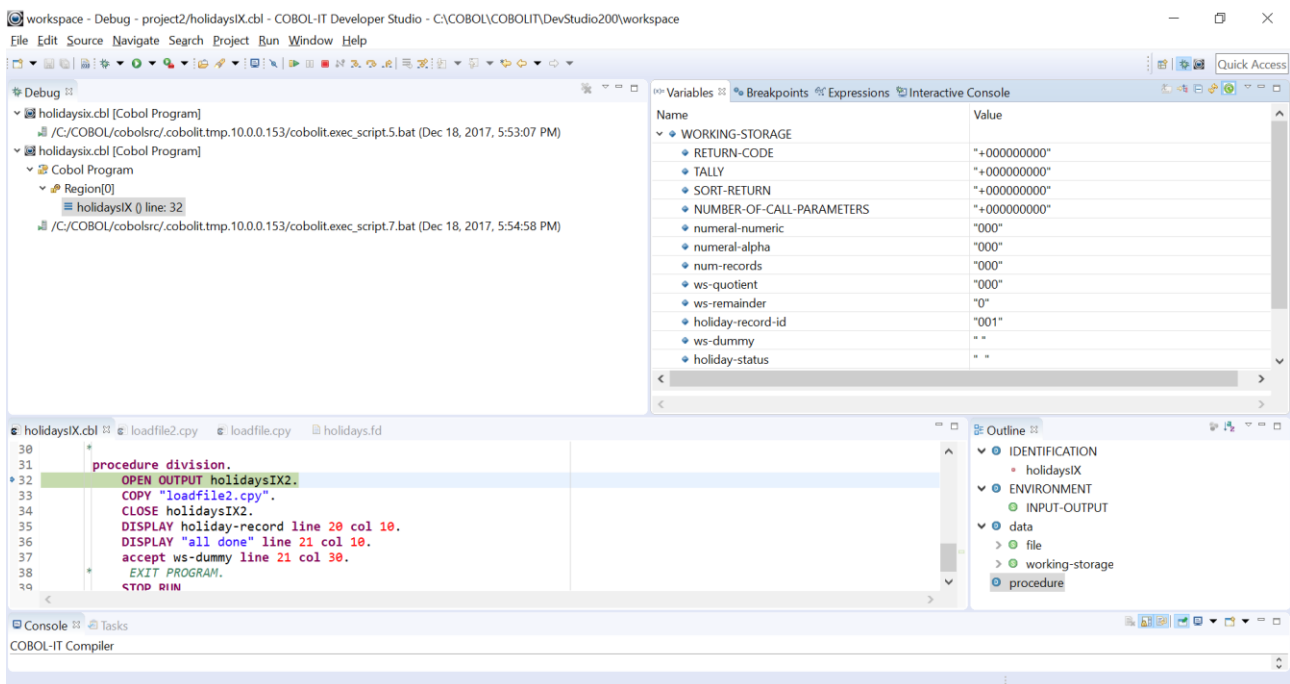
Running the COBOL program in the Debugger Perspective

Click on the “Debug” button on the Developer Studio toolbar to run holidaysIX in the Debugger Perspective.

Single step with the Step Into (F5) function.

Run the program with the Resume (F8) function.

Details on the Debugger Perspective are contained the the Debugger Perspective Chapter.



Importing existing source code into a Project structure

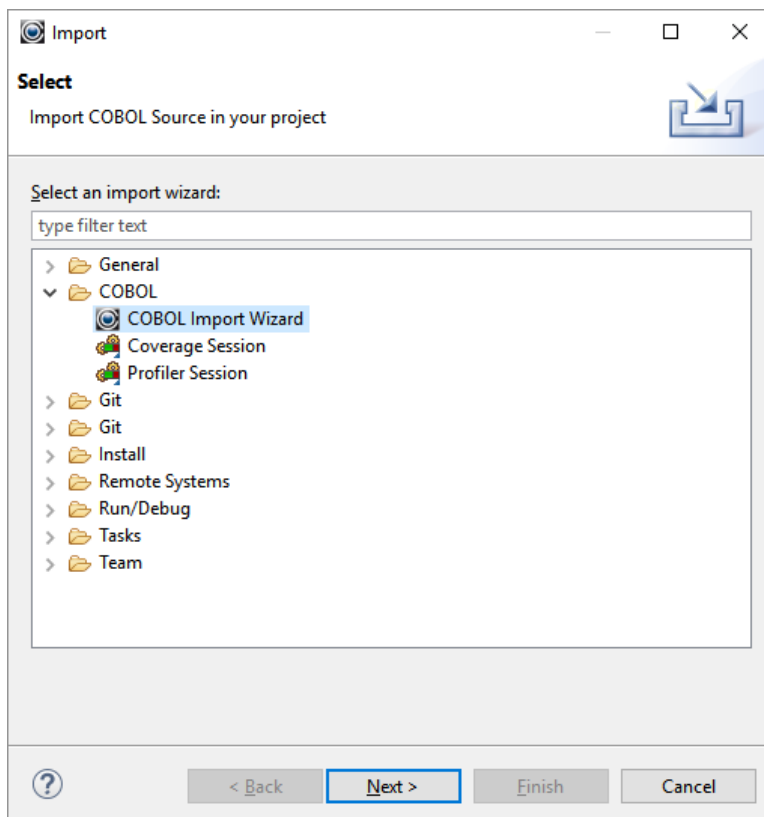
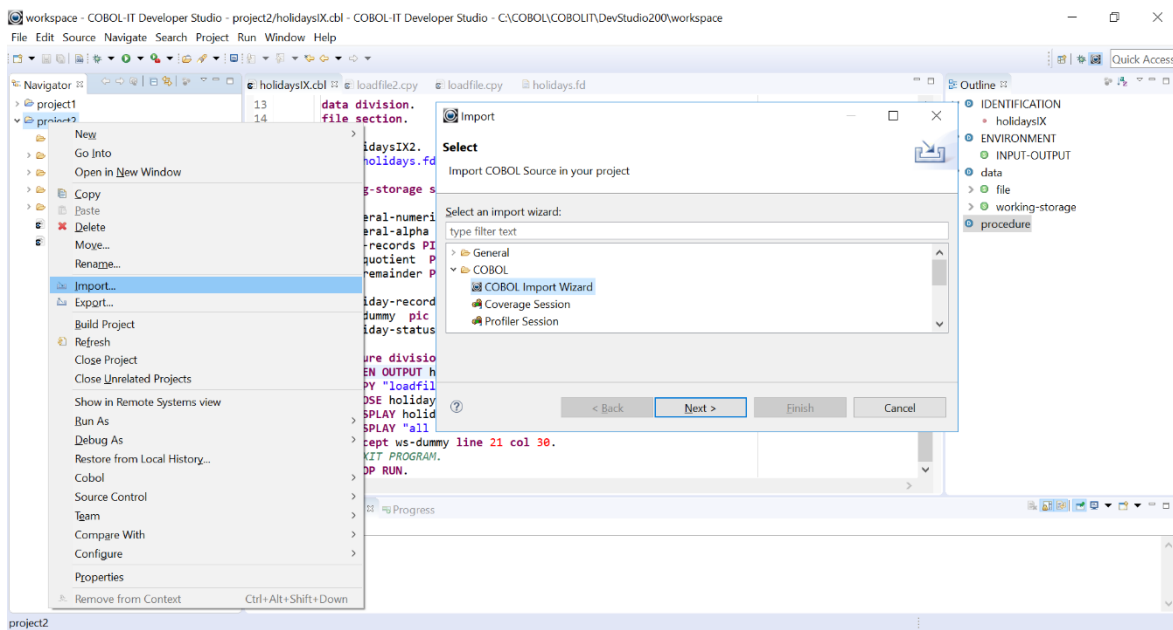
The COBOL Import Wizard provides a way for you to copy existing source into an existing Project folder structure. When you import source into an existing Project, all modifications are made to the copies of the source that have been made in the existing Project locations.

The COBOL Import Wizard

The COBOL Import Wizard requires an existing Project. In this exercise, we will import a COBOL source file from the COBOL-IT sample programs into our project1.

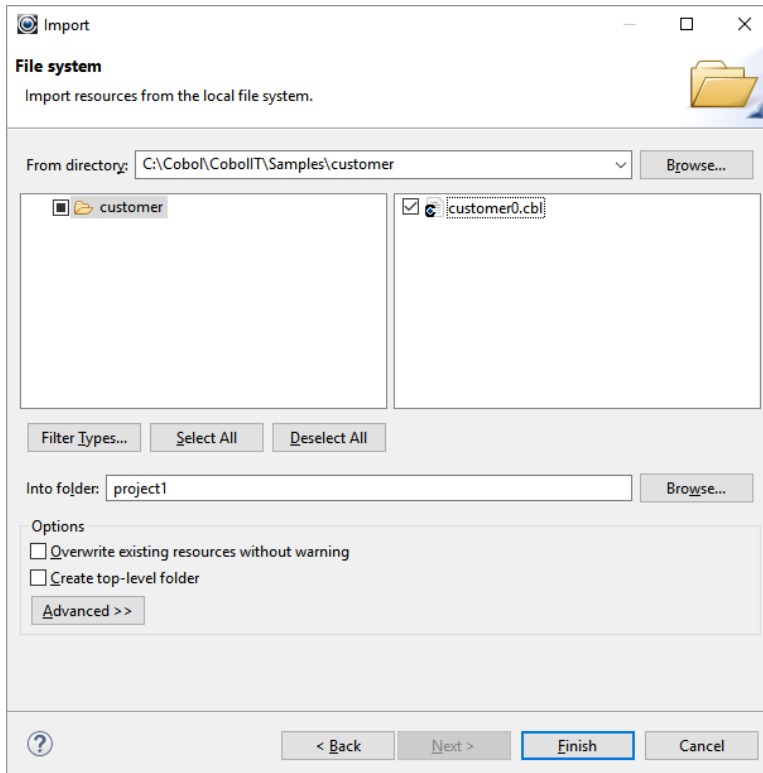
To use the COBOL Import Wizard, right-click on the Project folder, and select Import... from the right-click dropdown menu.

From the Import dialog screen, expand the COBOL folder, and select the COBOL Import Wizard, and then click on the [Next] button.



Select the Import Directory

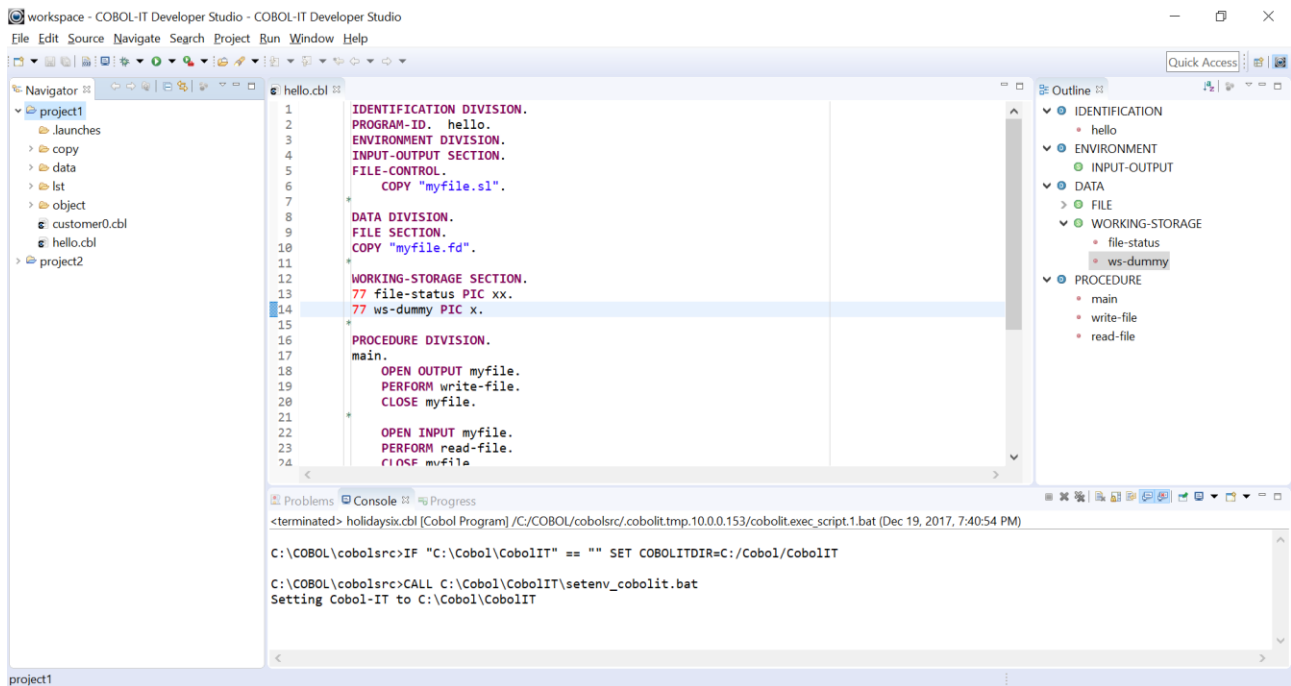
In the Import resources dialog screen, begin by clicking on the Browse.. button, which will open the “Import from directory” dialog screen. In the “Import from directory” dialog, select a directory, and click OK. This will cause the From directory: entry-field to be filled with your choice.



To select only the file (in this case customer0.cbl), just select the checkbox in the file in the panel on the right. Click on the Finish button, to import the files into the existing project.

Imported files are automatically displayed in the project folder

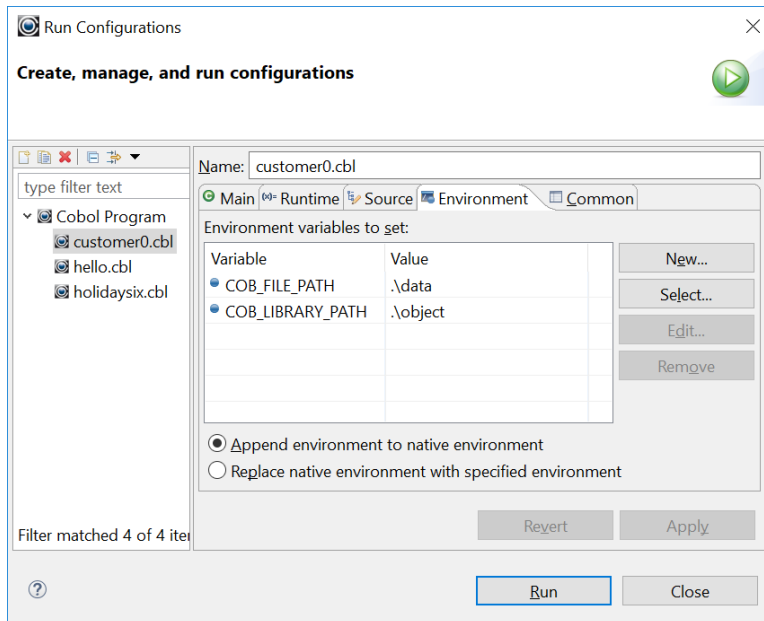
The selected source file is copied into the existing Project Folder, and displayed in the Navigator Window.



Compiler Configuration

Source files imported into a Project inherit the compiler flags that have been set with Project>Properties. The program “customer0.cbl” that we have imported can be compiled with existing compiler flags, so no new action needs to be taken.

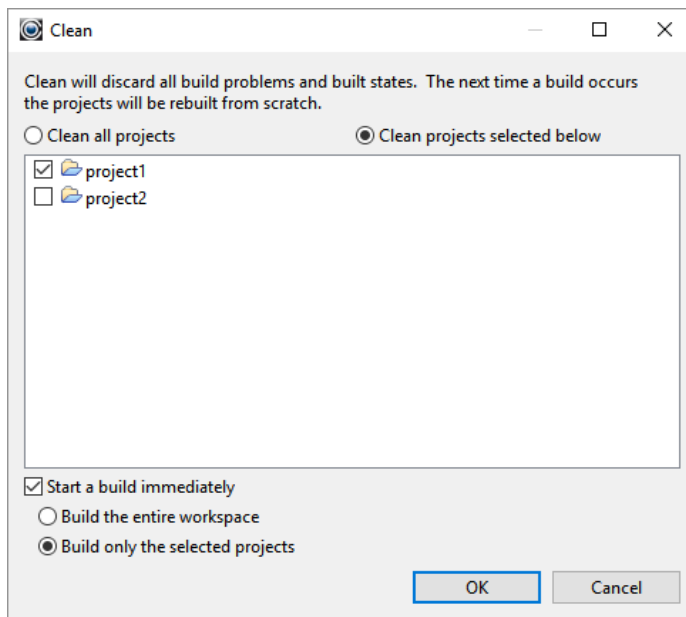
Create a Run Configuration for the new source file(s)



Customer0.cbl requires the COB_LIBRARY_PATH and the COB_FILE_PATH environment variables be set.

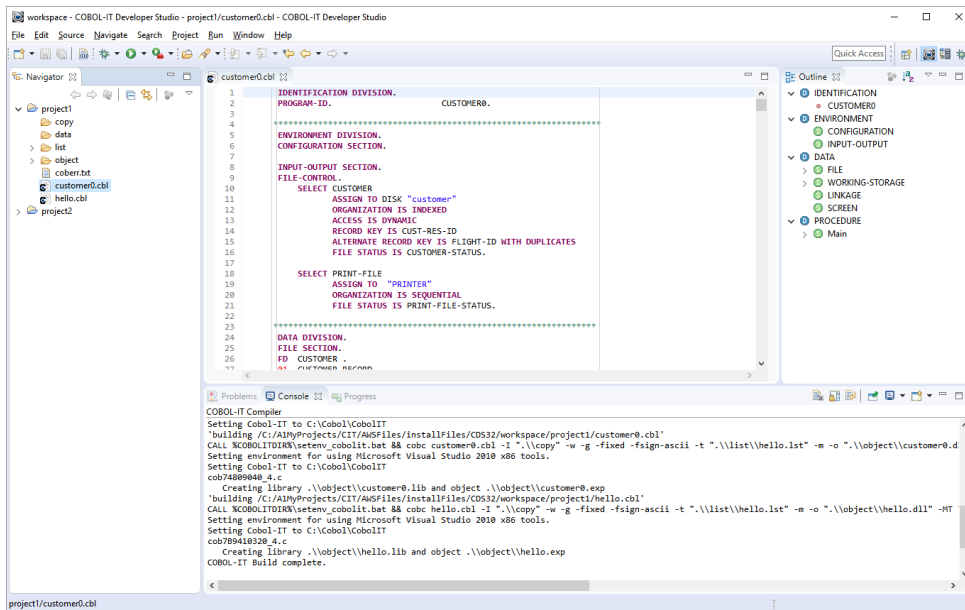
Clean and Build

Clean and Build project1, which now contains the imported source file.



Check the Compiler Console Window

This Build is successful.



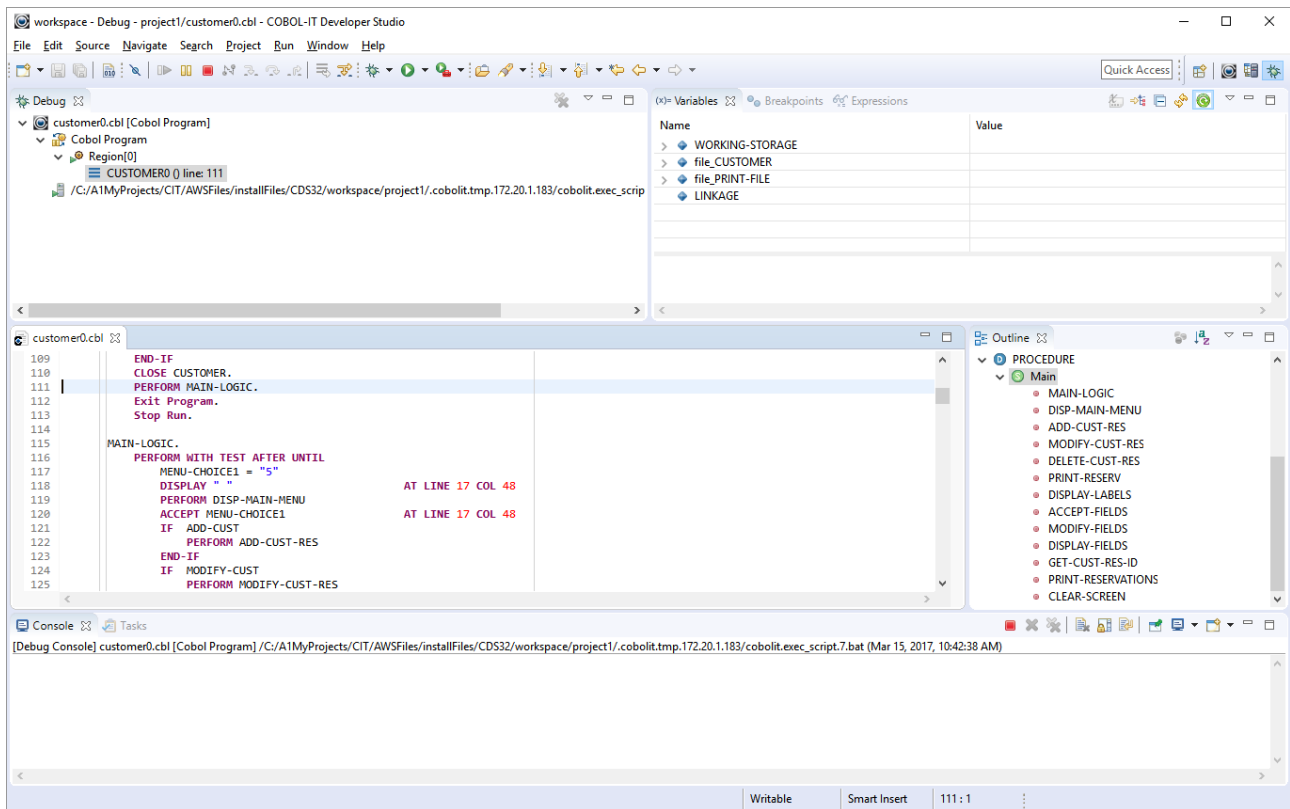
Run

Click on the “Run” button on the Developer Studio toolbar.



Run in Debug

Click on the “Debug” button on the Developer Studio toolbar.
Single step through the source with the Step Into (F5) toolbar button.

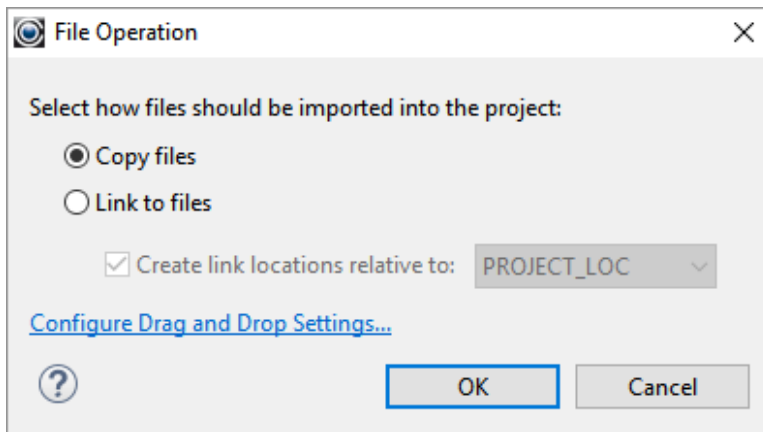


Dragging and dropping files and folders into a Project

An alternative way to import files and folders into a Project is to select them, and drag and drop them onto the Project folder in the Navigator window. In the Windows Explorer, selected a file, or a group of files and perform a “drag and drop” operation.

File and Folder Operation

The File and Folder Operation dialog screen provides a number of options for using existing files and folders. Select the “Copy files and folders” radio-button, and click “OK”.



Navigator Window updated

When the files have been COPY'ed into the Project folder, the Navigator Window is updated.

Summary

New Projects can be associated with Existing Source through the New Project wizard.

When using Existing Source, all Eclipse file artifacts are added to the existing source directories.

All editing is done on the files in the Existing Source directories

Working on multiple projects within a Workspace is possible, though you will notice how certain screens, such as the Clean and Build screen provide more options when this is the case.

Configurations can be made at the Workspace level from within the Window>Preferences interfaces. These configuration settings are automatically applied to all Projects within a Workspace.

Configurations can be made at the Project level, from within the Project>Properties interfaces. These configuration settings do not transfer from one project to another, as you add projects to the workspace.

Configurations can be made at the Program level, by right-clicking on a program, and selecting Project>Properties. These configuration settings apply only to the selected program.

Runtime configurations are useful in cases where a program requires a special configuration. However, using Standard Configurations, in which the COBOL-IT setup file is altered to include the necessary runtime environment variable settings is likely to be a more convenient solution.

Drag-and-drop functionality from the Windows Explorer directly into the Project folder in the Developer Studio is supported.

The Developer Studio automatically launches the Debugger perspective when a debug operation is launched. Make sure that your programs are compiled with `-g` prior to launching the Debugger perspective.

The Enterprise Edition of the Developer Studio can be used to compile, run, and debug programs in projects on remote machines.

FAQ

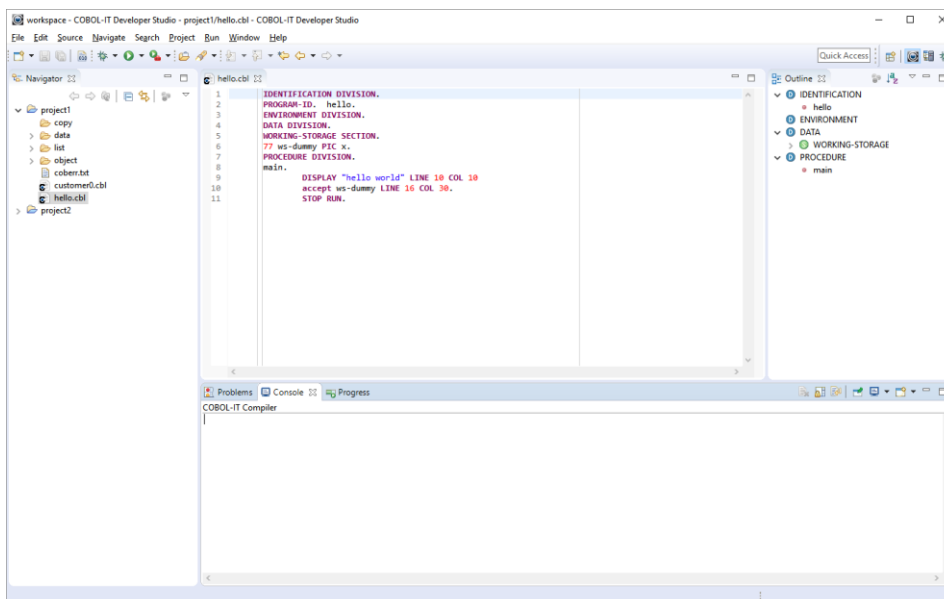
Using “Views” in Eclipse

Key Concepts

The Eclipse IDE is divided into a number of tabbed interfaces called Views. These Views can be Minimized/Maximized, Opened/Closed, Detached/Attached, Repositioned with Drag and Drop.

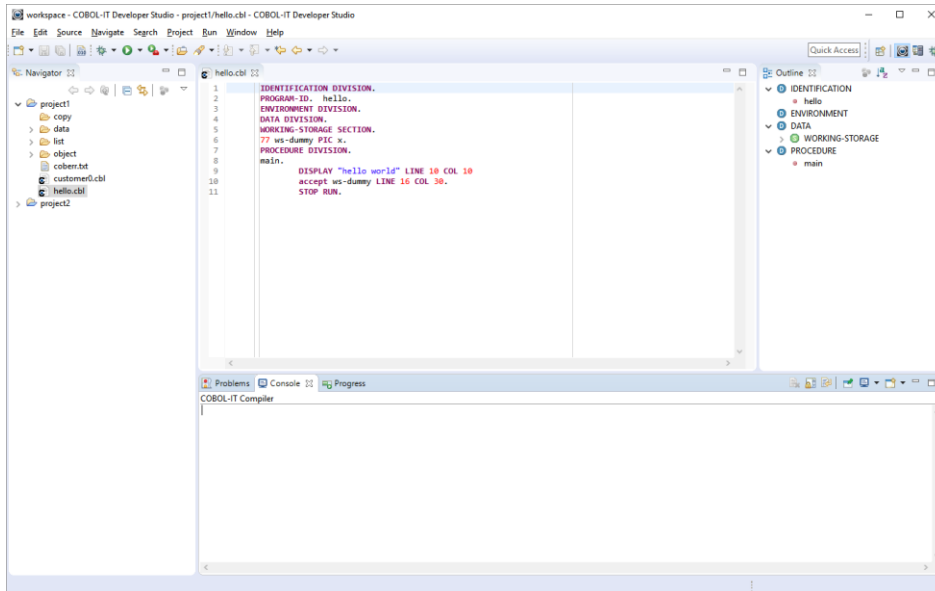
Lets consider an example:



In the graphic below, the tabbed interfaces are titled “Navigator”, hello.cbl, Outline, Problems, Console, and Progress. These are referred to, respectively, as the Navigator View, Code Editor View, Outline View, Problems View, Console View, and Progress View.

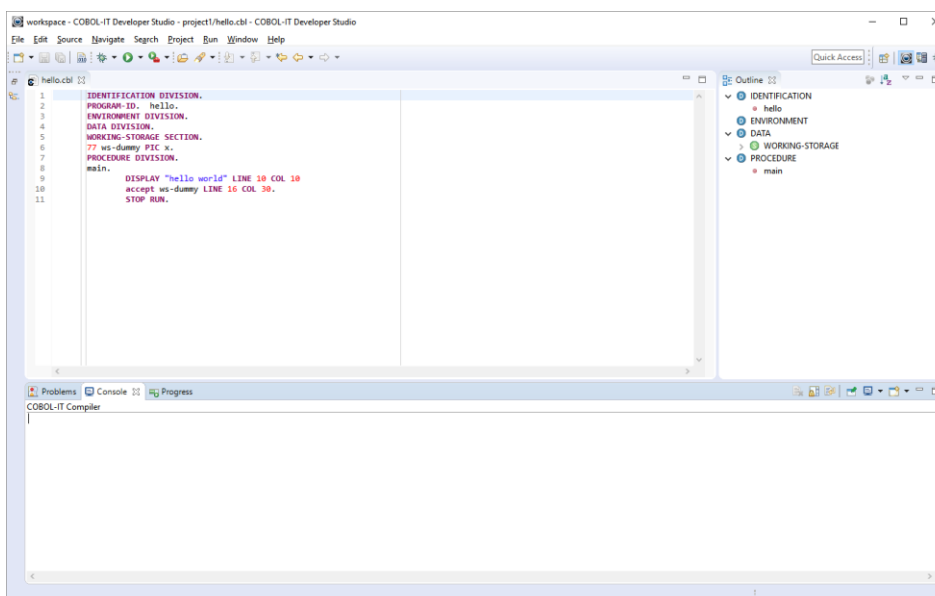



Minimize/Restore a View

Minimize / Maximize buttons are located in the upper right-hand corner of each of the Views on your Developer Studio IDE.




To Minimize the Navigator View, click on the Minimize  button in the upper right-hand corner of the Navigator View. The Navigator View minimizes to the left-hand side of the Developer Studio, and is shown by the icon  (see graphic below).



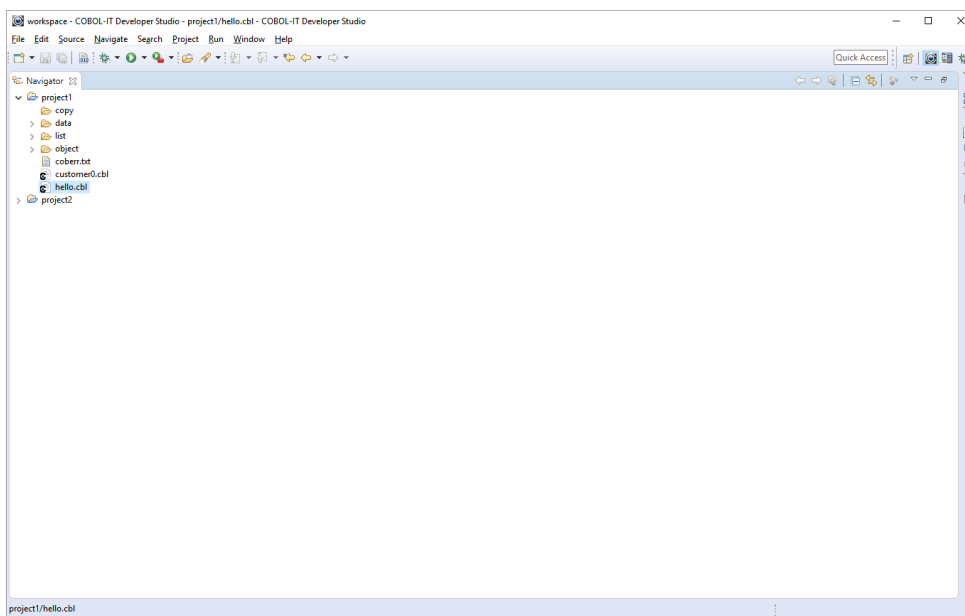
To Restore the Navigator Window to its original position, click on the Restore  icon positioned directly above the Navigator icon.

Maximize/Restore a View

To Maximize the Navigator View, click on the Maximize  button in the upper right-hand corner of the Navigator View. The Navigator View occupies the entire screen, and all other views are minimized.

Note that the Toolbar for the maximized Navigator View now has a “Restore” button on it, where the “Maximize” button was formerly placed. Clicking on this “Restore” button restores the desktop.

Note also that the other views that were open have been mimized, and are shown minimized as icons on the right hand side of the Developer Studio, along with “Restore” buttons. The desktop can be partially or fully restored by clicking on these icons.



Clicking on the “Restore” icon above the Code Editor icon restores the Code Editor.

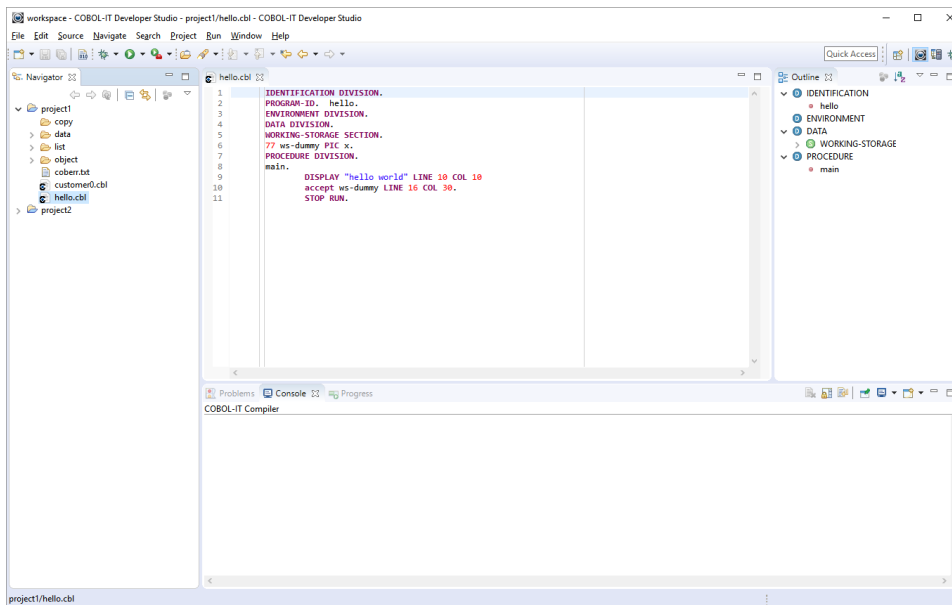
Clicking on the “Restore” icon above the Outline View icon restores the entire desktop to the way it was before maximizing the Navigator View.

Clicking on the “Restore” icon at the bottom of the screen restores the entire desktop.

Clicking on any of the minimized View icons restores that View.

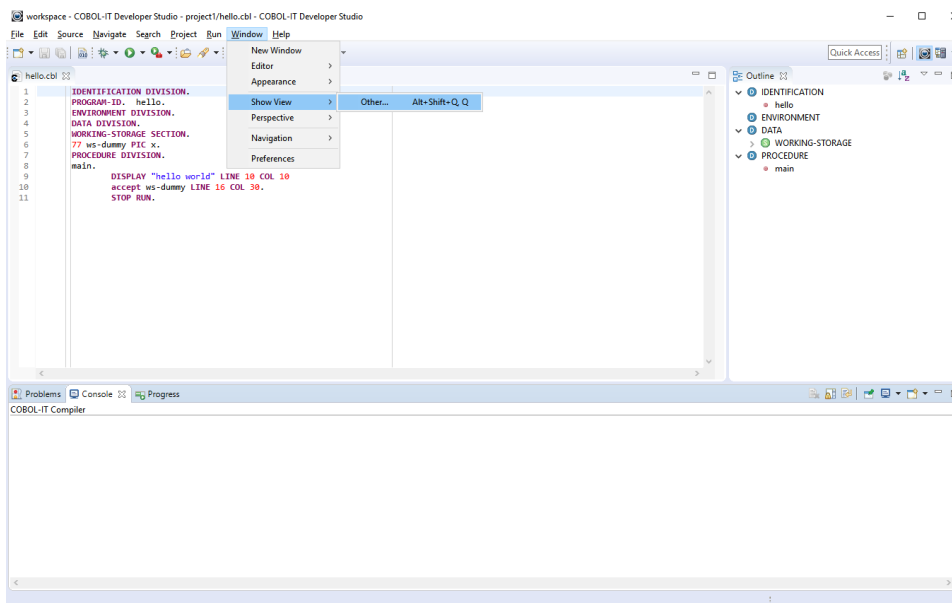
Close/Open a View

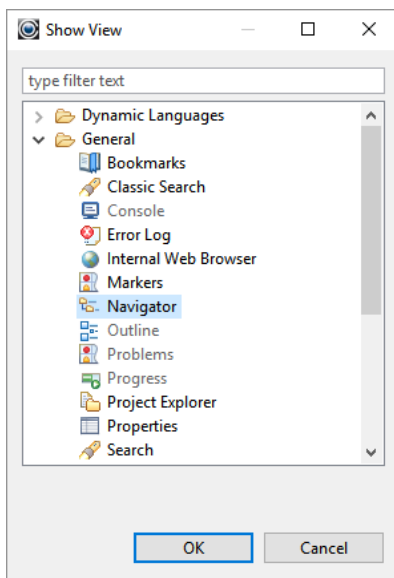
To Close the Navigator View, click on the “Close” icon in the right-hand portion of the tab title for the View. When you “Close” a View, it is removed from the Developer Studio Desktop.



To Open a View

In the graphic below, the Navigator View has been Closed. To Open the Navigator Window, select **Window>Show View>Other** . Then, in the Show View dialog screen, select **General>Navigator**, and click “Ok”.

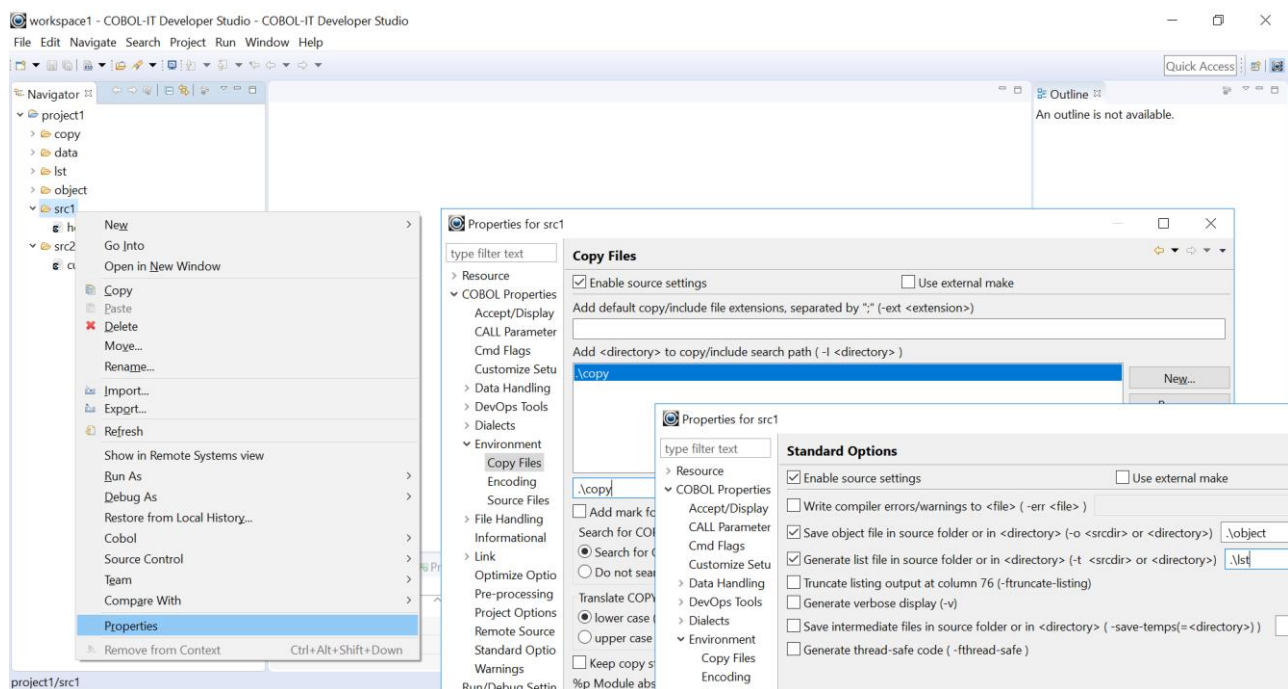




Managing Multiple Source Folders

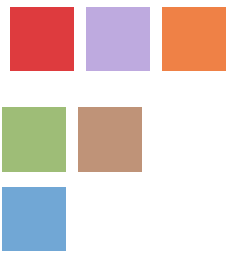
Key Concepts

To set the compiler flags for a Source Folder, right click on the Source Folder, and select Properties>COBOL Properties>Enable Source Settings. Note that when following this set of functions, the Window title for the COBOL Properties dialog window reflects the name of the Source Folder. In the example below, this window title is: “Properties for src1”.





- Compiler flag and Environment settings, such as the `-I` setting in the example above, may use relative notations. Where you see relative notations, the “.” refers to the root directory of the Project, not the Source directory.
- In the Workspace we have created for these Getting Started exercises, we have set a compiler flag of `-o .\object` at the Workspace level. This will cause the object files to be created in the object directory located under the Project directory. This behavior is the same as we saw when the source files were contained in the root Project directory.
- If there were no `-o` compiler flag setting, the Developer Studio would create the object files in the Source Directory.



www.cobol-it.com

June, 2020

