CT MANUAL

CT

SOFTWARE FOR
SAFE WORLD

SURESOFT

User Manual

2023.12 — Last update: Dec 12, 2023

Suresofttech

Table of Contents

1. Before Starting

Purpose of Document

This document provides the information on how to use the CT 2023.12 Product.

✻ Some images contained in this document may vary slightly depending on the version, but the image corresponding to the feature described is the same as the version specified in the documentation.

2. Overview

Introduction

CT 2023.12 is a test automation solution for unit and integration tests of software developed and executed in various environments.

Toolchain supported in CT 2023.12

CT 2023.12 supports about 100 toolchain. For more information, please contact the Technical support contact at the bottom of this document Troubleshooting page.

Features

CT 2023.12 is a source code-based software test automation tool for unit and integration tests and the major features are as follows.

Test design

1. Automatically create tests and test data
2. Intuitive test design interface
3. Ability to import test data in various format
4. Ability to design of integration test for complex nested structures
5. Ability to design scenario tests for cycle functions

Achieving coverage goals

1. Supports statement, branch, MC/DC and function call coverage
2. Provides guides to achieve the goal of MC/DC
3. Checks the coverage results by linking the control flow graph with the source code
4. The coverage goal can be achieved quickly by testing only uncovered section after measuring the system coverage (QualityScroll COVER product).

Others

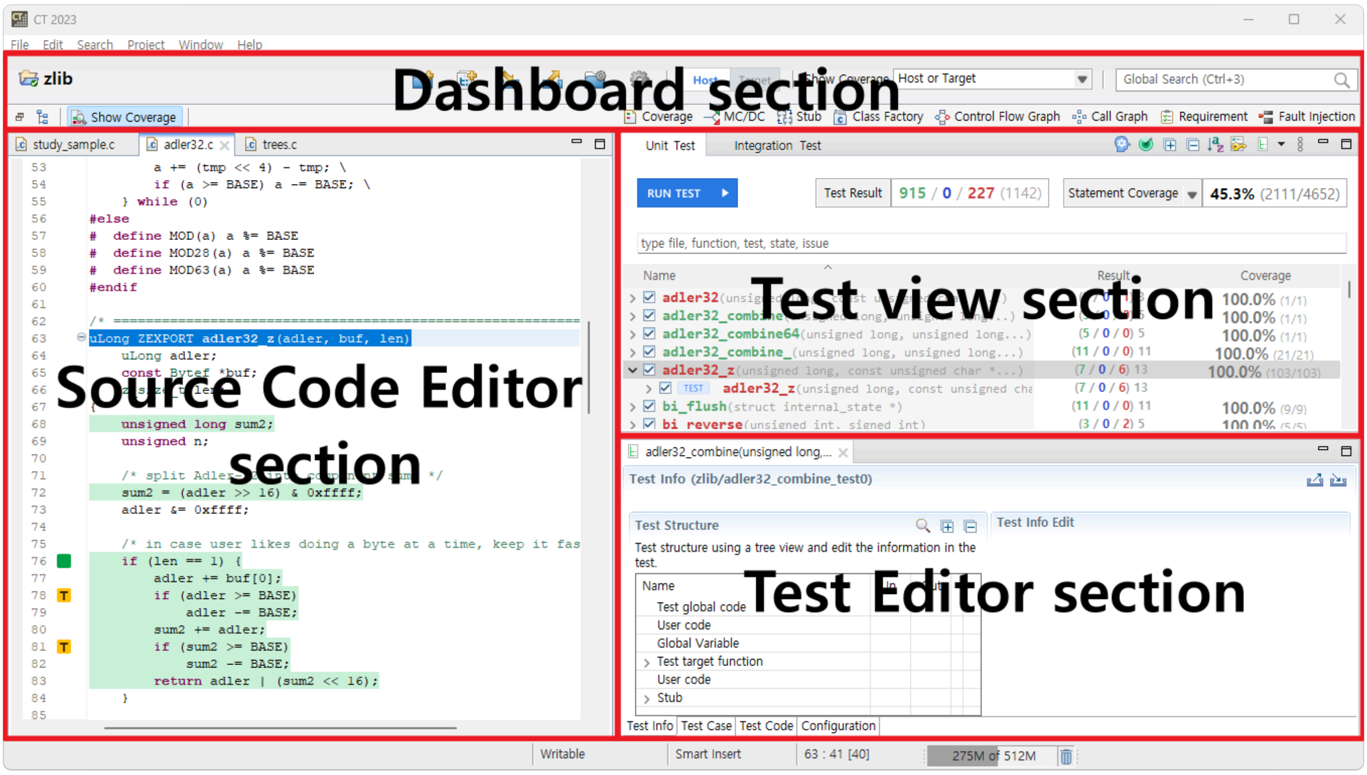
1. Supports the simulation and the actual target environment tests
2. Links with DevOps(issue management + continuous integration + configuration management) tools
3. Shares project settings with CodeScroll product family: By carrying out the project settings only once, coding rule inspection + runtime error detection + unit/integration test can be possible.
4. Reports in various formats
5. Interaction with requirements management tools to support traceability of requirements to tests and results
6. Team testing feature that allows testing simultaneously on multiple PCs
7. Jenkins plugin that allows automating tests

Standard certification

1. IEC 61508-3 (Electrical/Electronic)
2. ISO 26262-8 (Automotive)
3. IEC 60880 (Nuclear)
4. IEC 62279 / EN 50128 (Railway)
5. DO-178C / DO-330 (Aviation)
6. IEC 62304 (Medical device)

Overall screen of CT 2023.12

It provides high DOF (degrees of freedom) windows made by Eclipse RCP. User can set them in [Window] menu and each view.


CT 2023
File Edit Search Project Window Help
zlib
Dashboard section
Host Target
Show Coverage
Host or Target
Global Search (Ctrl+3)
Show Coverage
Coverage MC/DC Stub Class Factory Control Flow Graph Call Graph Requirement Fault Injection
study_sample.c adler32.c trees.c
Source Code Editor section
Unit Test Integration Test
RUN TEST
Test view section
adler32_combine(unsigned long,...
Test Editor section
Test Info Test Case Test Code Configuration
Writable Smart Insert 63 : 41 [40] 275M of 512M

```
        a += (tmp << 4) - tmp; \
        if (a >= BASE) a -= BASE; \
    } while (0)
#else
#  define MOD(a) a %= BASE
#  define MOD28(a) a %= BASE
#  define MOD63(a) a %= BASE
#endif

/* ==========================================================
uLong ZEXPORT adler32_z(adler, buf, len)
    uLong adler;
    const Bytef *buf;
    z_size_t len;
{
    unsigned long sum2;
    unsigned n;

    /* split Adler-32 into component sums */
    sum2 = (adler >> 16) & 0xffff;
    adler &= 0xffff;

    /* in case user likes doing a byte at a time, keep it fas
    if (len == 1) {
        adler += buf[0];
        if (adler >= BASE)
            adler -= BASE;
        sum2 += adler;
        if (sum2 >= BASE)
            sum2 -= BASE;
        return adler | (sum2 << 16);
    }
```

Test Result 915 / 0 / 227 (1142)

Statement Coverage 45.3% (2111/4652)

type file, function, test, state, issue

Name	Result	Coverage
☑ adler32(unsigned long, const unsigned char ...)	([illegible] / 0 / 1) 3	100.0% (1/1)
☑ adler32_combine(unsigned long, unsigned long...)	([illegible] / 0 / 0) 5	100.0% (1/1)
☑ adler32_combine64(unsigned long, unsigned long...)	(5 / 0 / 0) 5	100.0% (1/1)
☑ adler32_combine_(unsigned long, unsigned long...)	(11 / 0 / 0) 11	100.0% (21/21)
☑ adler32_z(unsigned long, const unsigned char *...)	(7 / 0 / 6) 13	100.0% (103/103)
☑ TEST adler32_z(unsigned long, const unsigned cha	(7 / 0 / 6) 13	
☑ bi_flush(struct internal_state *)	(11 / 0 / 0) 11	100.0% (9/9)
☑ bi_reverse(unsigned int, signed int)	(3 / 0 / 2) 5	100.0% (5/5)

Test Info (zlib/adler32_combine_test0)

Test Structure

Test structure using a tree view and edit the information in the test.

Test Info Edit

Name
Test global code
User code
Global Variable
Test target function
User code
Stub

3. Install

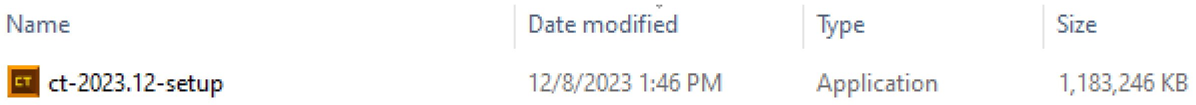
Installation requirements

OS	Microsoft Windows 7/10/11 (64bit)
RAM	4GB or more
Storage	Free space about 10GB (GCC Compiler installed) (When carrying out tests actually, storage usage may be increased due to the test results.)

Install CT 2023.12 for Windows

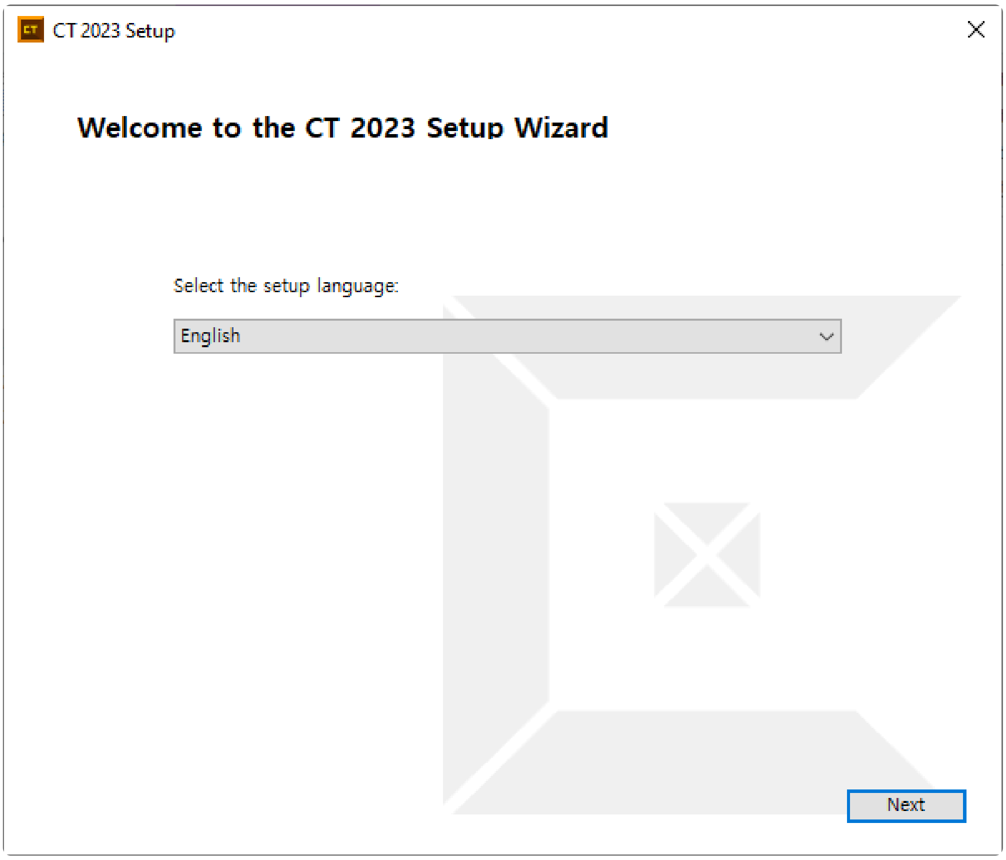
By using the install package, you can install CT 2023.12 as follows:

1. Execute `ct-xxxx-setup.exe` file.



Name	Date modified	Type	Size
ct-2023.12-setup	12/8/2023 1:46 PM	Application	1,183,246 KB

2. The installation wizard will launch and select the installation language. Click [Next].

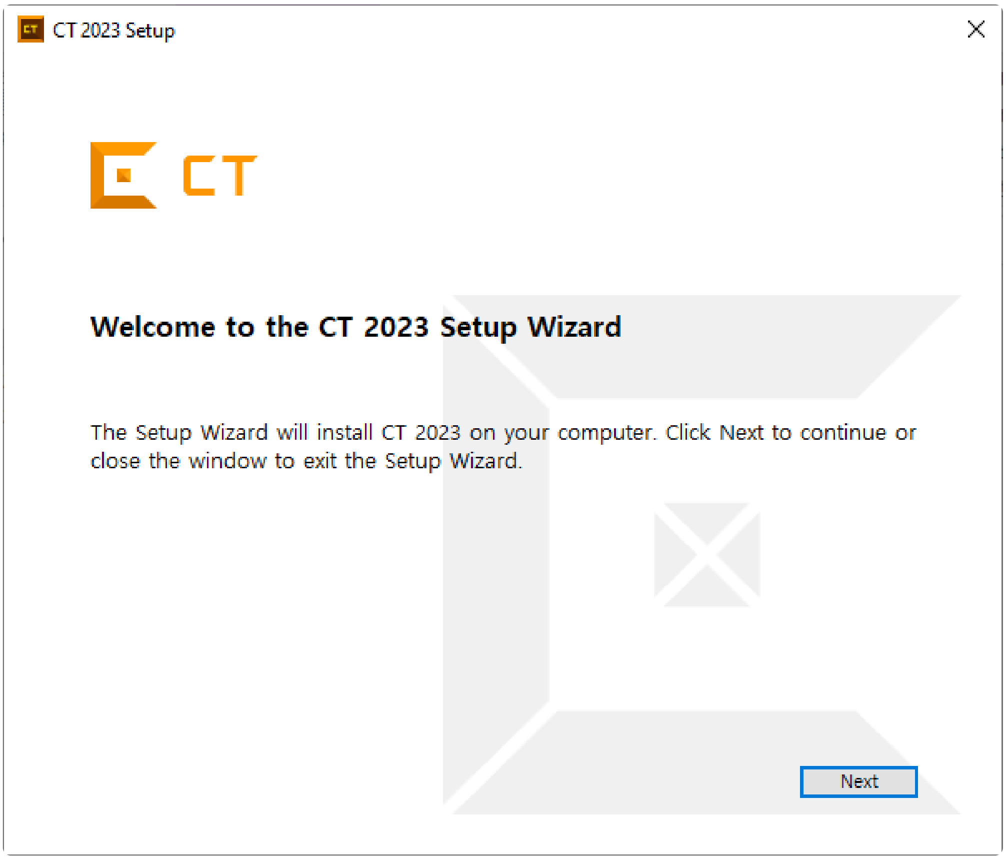


CT 2023 Setup

Welcome to the CT 2023 Setup Wizard

Select the setup language: English

3. Click [Next] after the installation wizard runs and gathers installation information.

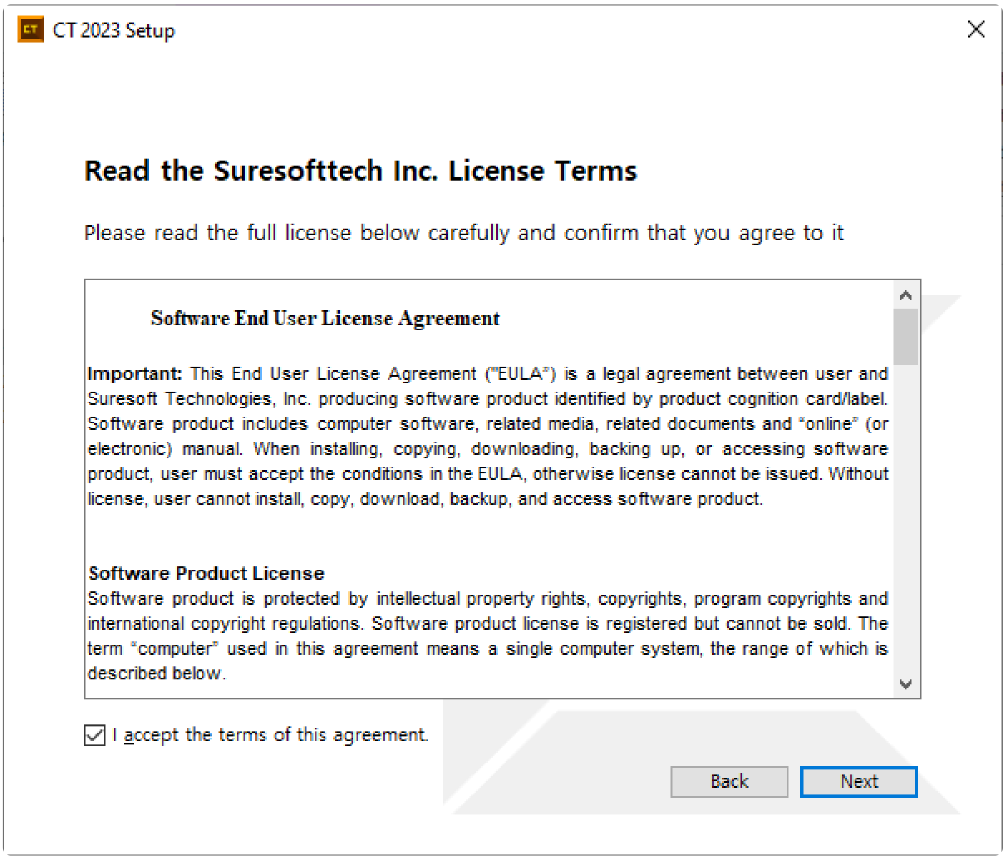


CT 2023 Setup

Welcome to the CT 2023 Setup Wizard

The Setup Wizard will install CT 2023 on your computer. Click Next to continue or close the window to exit the Setup Wizard.

4. Accept the end-user license and click [Next].



CT 2023 Setup

Read the Suresofttech Inc. License Terms

Please read the full license below carefully and confirm that you agree to it

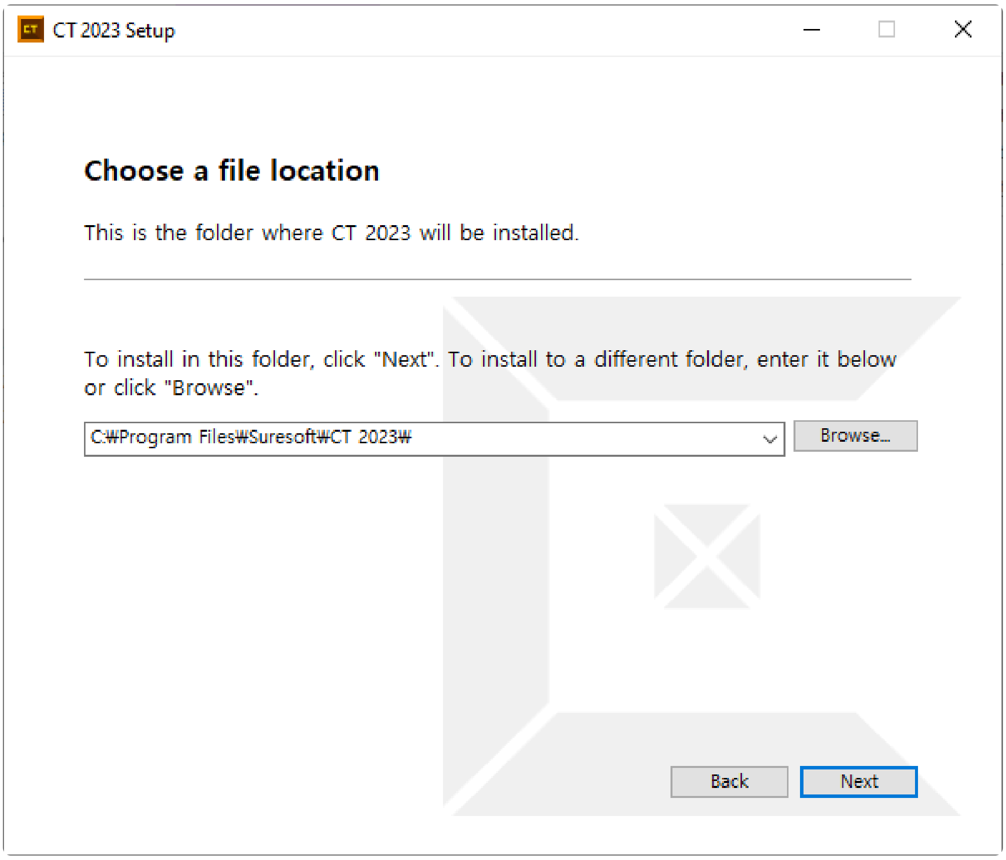
Software End User License Agreement

Important: This End User License Agreement ("EULA") is a legal agreement between user and Suresoft Technologies, Inc. producing software product identified by product cognition card/label. Software product includes computer software, related media, related documents and "online" (or electronic) manual. When installing, copying, downloading, backing up, or accessing software product, user must accept the conditions in the EULA, otherwise license cannot be issued. Without license, user cannot install, copy, download, backup, and access software product.

Software Product License
Software product is protected by intellectual property rights, copyrights, program copyrights and international copyright regulations. Software product license is registered but cannot be sold. The term "computer" used in this agreement means a single computer system, the range of which is described below.

☑ I accept the terms of this agreement.

5. Set the path to install CT 2023.12 and click [Next].



CT 2023 Setup

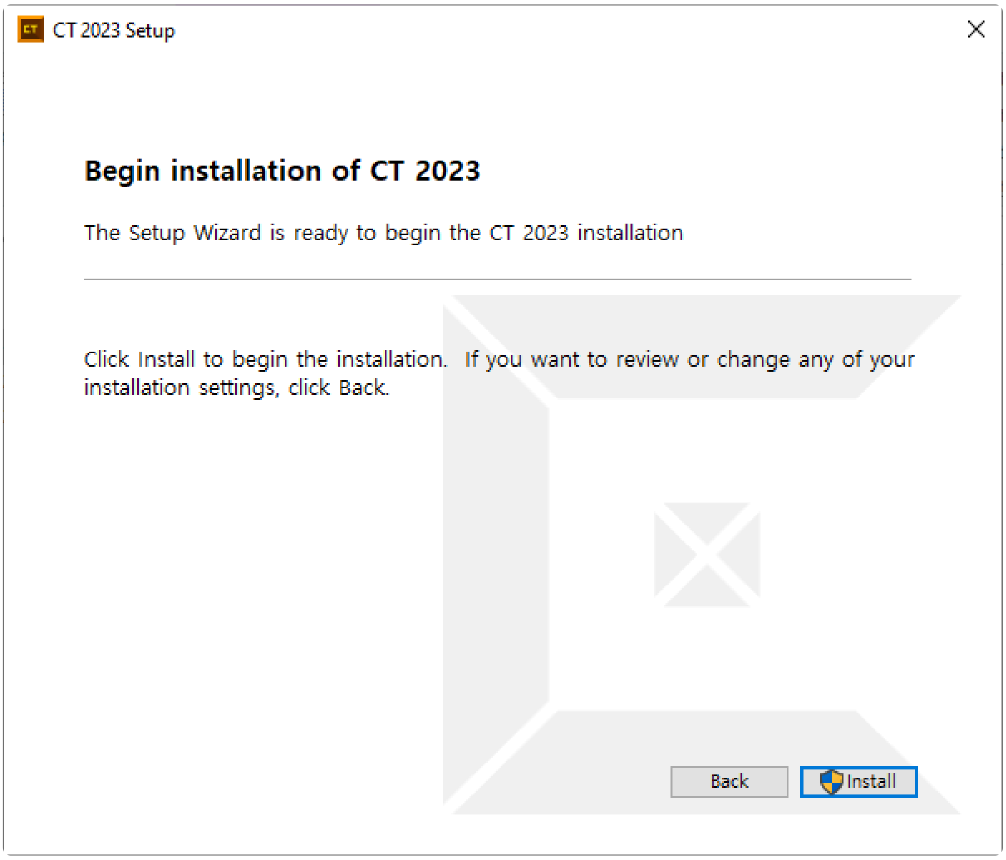
Choose a file location

This is the folder where CT 2023 will be installed.

To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".

C:₩Program Files₩Suresoft₩CT 2023₩

6. All required information for the installation has been collected. Click [Install].



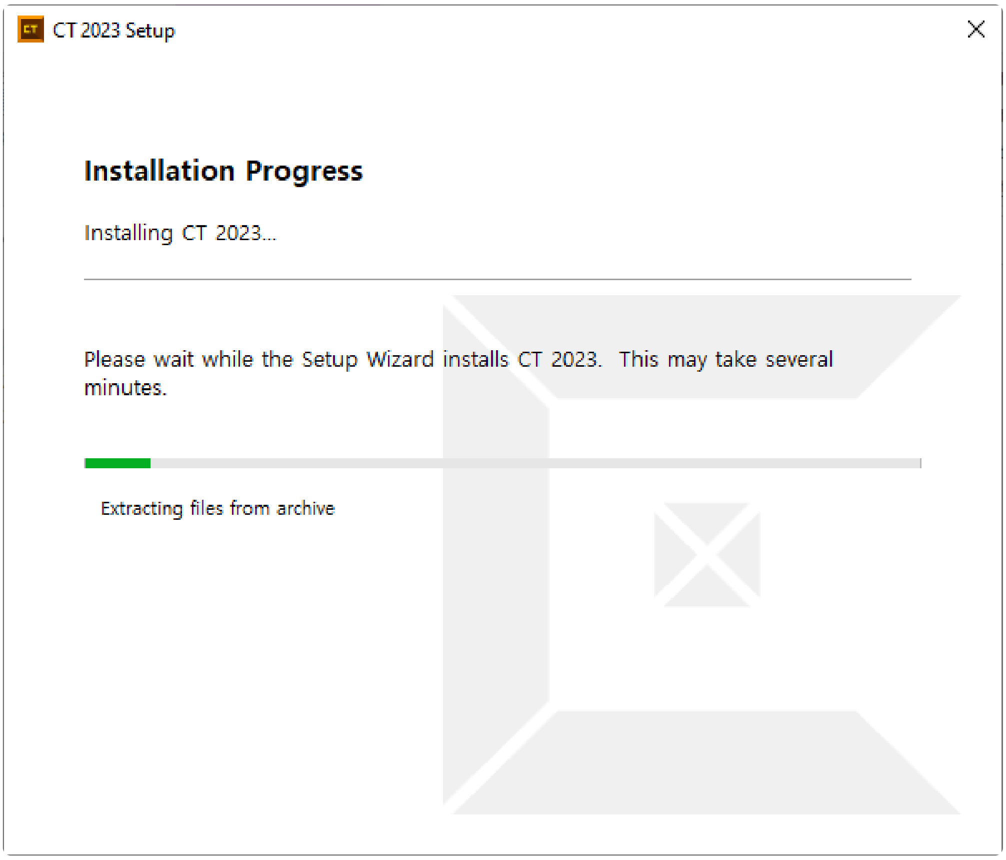
CT 2023 Setup

Begin installation of CT 2023

The Setup Wizard is ready to begin the CT 2023 installation

Click Install to begin the installation. If you want to review or change any of your installation settings, click Back.

7. Install CT 2023.12.



CT 2023 Setup

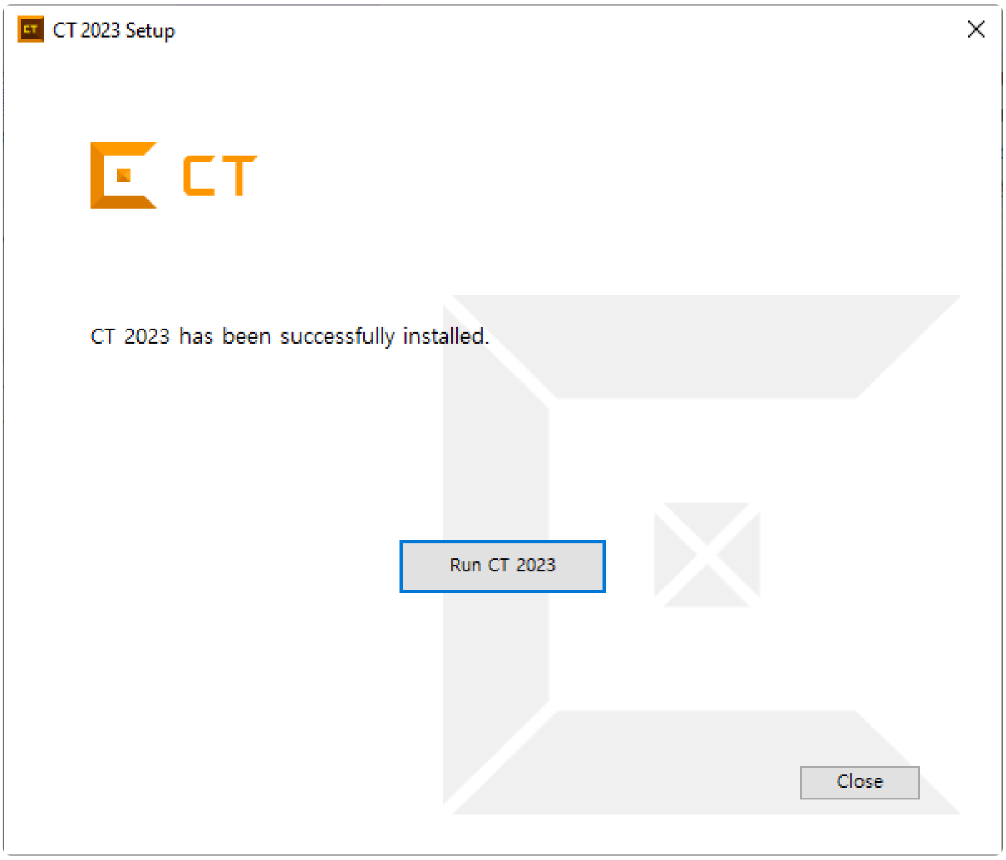
Installation Progress

Installing CT 2023...

Please wait while the Setup Wizard installs CT 2023. This may take several minutes.

Extracting files from archive

8. Click [Run xxxx] to run CT 2023.12 immediately after installation is complete, and click [Finish] to end the installation.



CT 2023 Setup

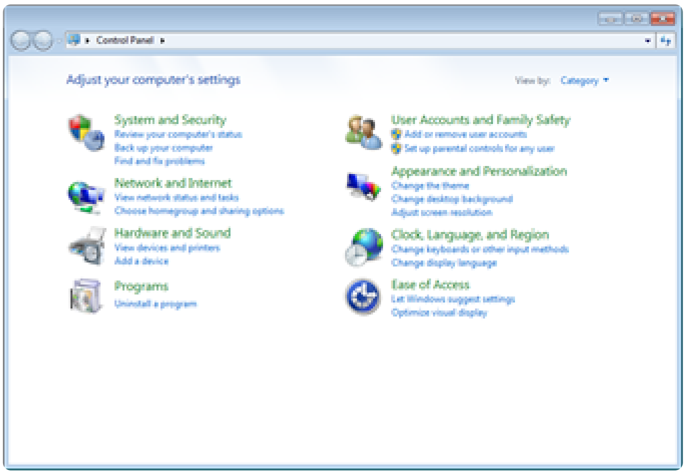
CT 2023 has been successfully installed.

4. Uninstall

Uninstall CT 2023.12

How to uninstall CT 2023.12 is as follows.

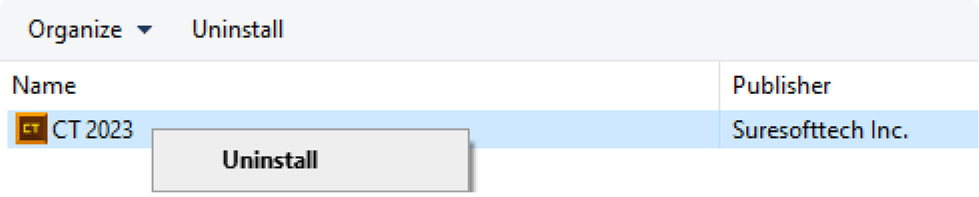
1. Uninstall using [Control Panel] > [Uninstall a program]


Control Panel
Adjust your computer's settings
View by: Category
System and Security
Review your computer's status
Back up your computer
Find and fix problems
Network and Internet
View network status and tasks
Choose homegroup and sharing options
Hardware and Sound
View devices and printers
Add a device
Programs
Uninstall a program
User Accounts and Family Safety
Add or remove user accounts
Set up parental controls for any user
Appearance and Personalization
Change the theme
Change desktop background
Adjust screen resolution
Clock, Language, and Region
Change keyboards or other input methods
Change display language
Ease of Access
Let Windows suggest settings
Optimize visual display

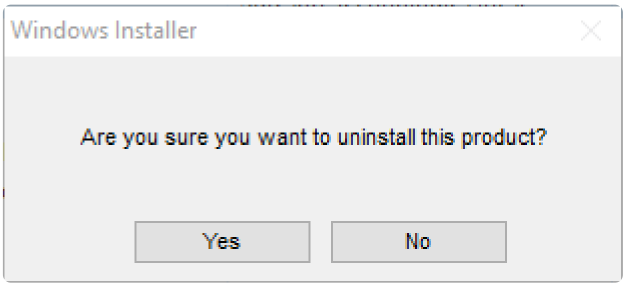
✻ "Uninstall CT 2023.12" removes the files necessary to operate the CT 2023.12. The workspaces set by users are not removed.

The procedures for [Uninstall a program]

1. Click [Control Panel] > [Uninstall a program].



2. Click [Yes] to uninstall CodeScroll CT 2023.12

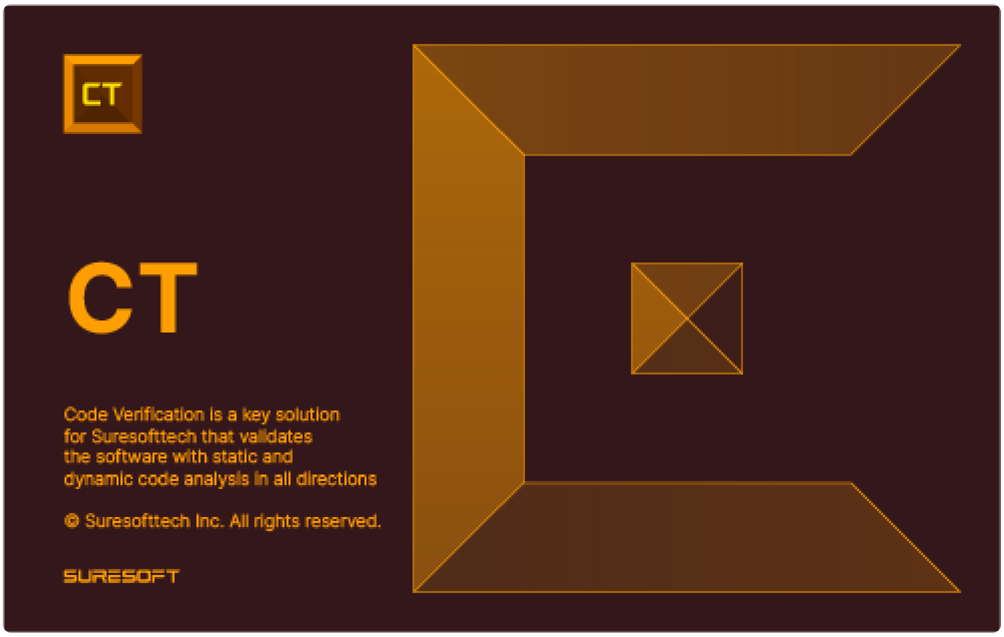


Are you sure you want to uninstall this product?

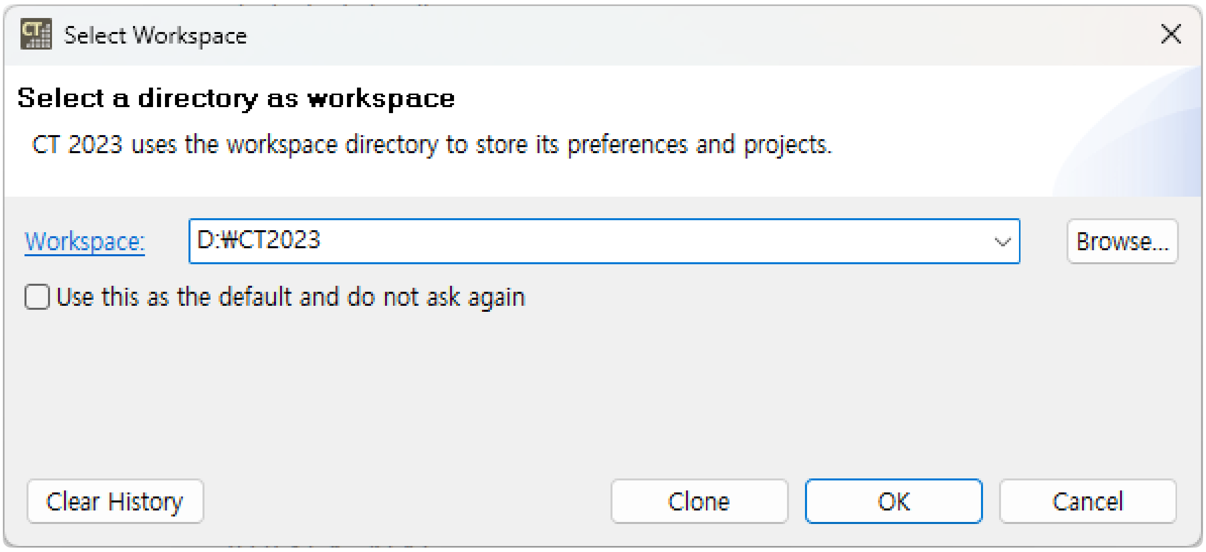
3. All the necessary information for uninstalling has been collected. When the CT 2023.12 is successfully uninstalled, the window closes.

5. Run

Select the shortcut icon or [Start] > [All programs] > [CT xxxx]


CT
CT
Code Verification is a key solution for Suresofttech that validates the software with static and dynamic code analysis in all directions
© Suresofttech Inc. All rights reserved.
SURESOFT

Select the workspace (working space) following the splash screen of the CT 2023.12. You can select either the already existed directory or enter a new directory as the workspace path. You can also use the currently selected workspace as the default so that you do not need to reselect the workspace the next time you run again. When the path has been set, click the [OK] button.


Select Workspace

Select a directory as workspace

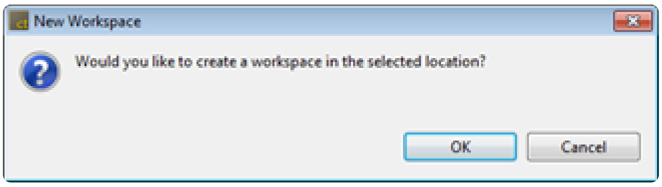
CT 2023 uses the workspace directory to store its preferences and projects.

Workspace: D:₩CT2023

□ Use this as the default and do not ask again

- Click [Clear History] to delete the workspace list.

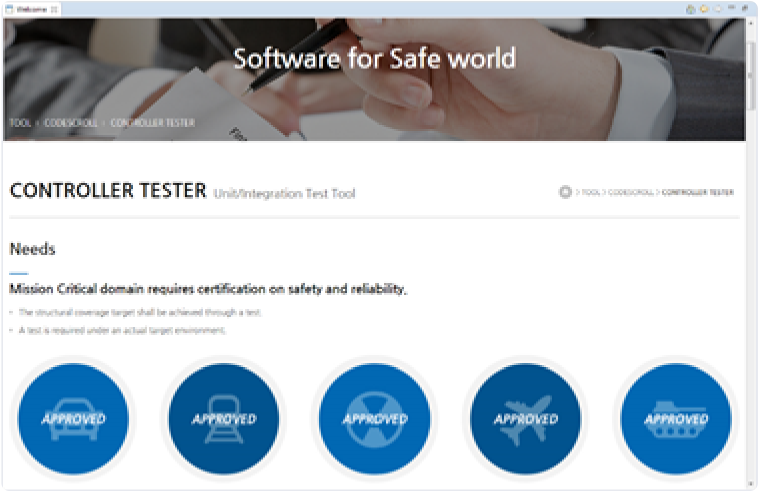
If the selected directory does not exist, confirm the user whether to create the directory.


New Workspace

Would you like to create a workspace in the selected location?

Create a directory in the workspace you have set and the welcome page of the tool and [Create a

Project] wizard is displayed. The welcome page is displayed only when creating a workspace newly, and is not displayed when selecting the workspace created previously.



CONTROLLER TESTER Unit/Integration Test Tool

TOOL > CODESCROLL > CONTROLLER TESTER

Needs

Mission Critical domain requires certification on safety and reliability.

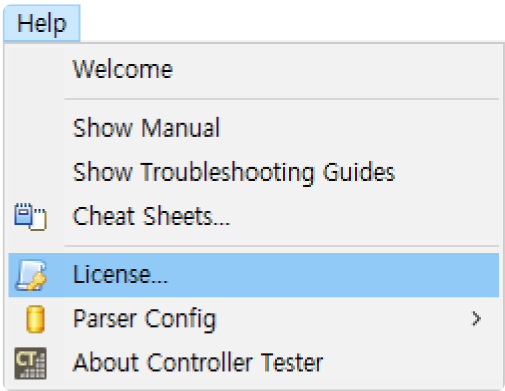
- The structural coverage target shall be achieved through a test.
- A test is required under an actual target environment.

Close the welcome page and the product screen is displayed.

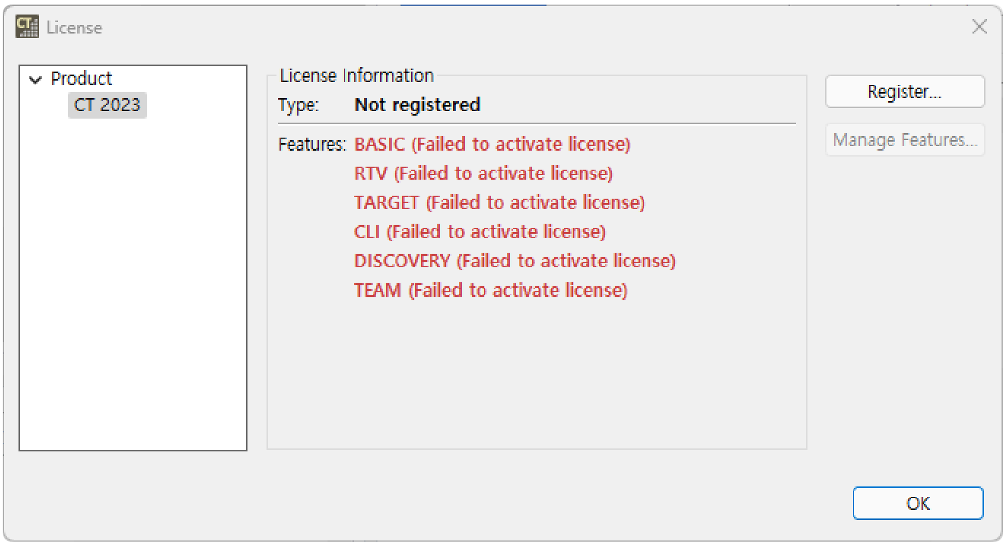
6. Set License

To use CT 2023.12, you must register the license first. The procedures for registering the license are as follows.

1. Select [Help] > [License] in Menu.



2. Select [Product] > [CT `version`] and click [Register…].

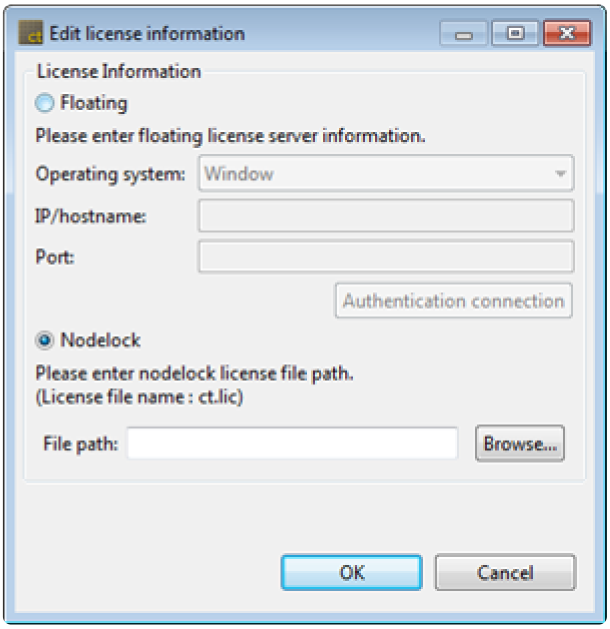


License Information

Type: **Not registered**

Features: BASIC (Failed to activate license)
RTV (Failed to activate license)
TARGET (Failed to activate license)
CLI (Failed to activate license)
DISCOVERY (Failed to activate license)
TEAM (Failed to activate license)

3. Enter the provided license in [Editing License Information] and click [OK] button to register the license.



Edit license information

License Information

○ Floating

Please enter floating license server information.

Operating system: Window

IP/hostname:

Port:

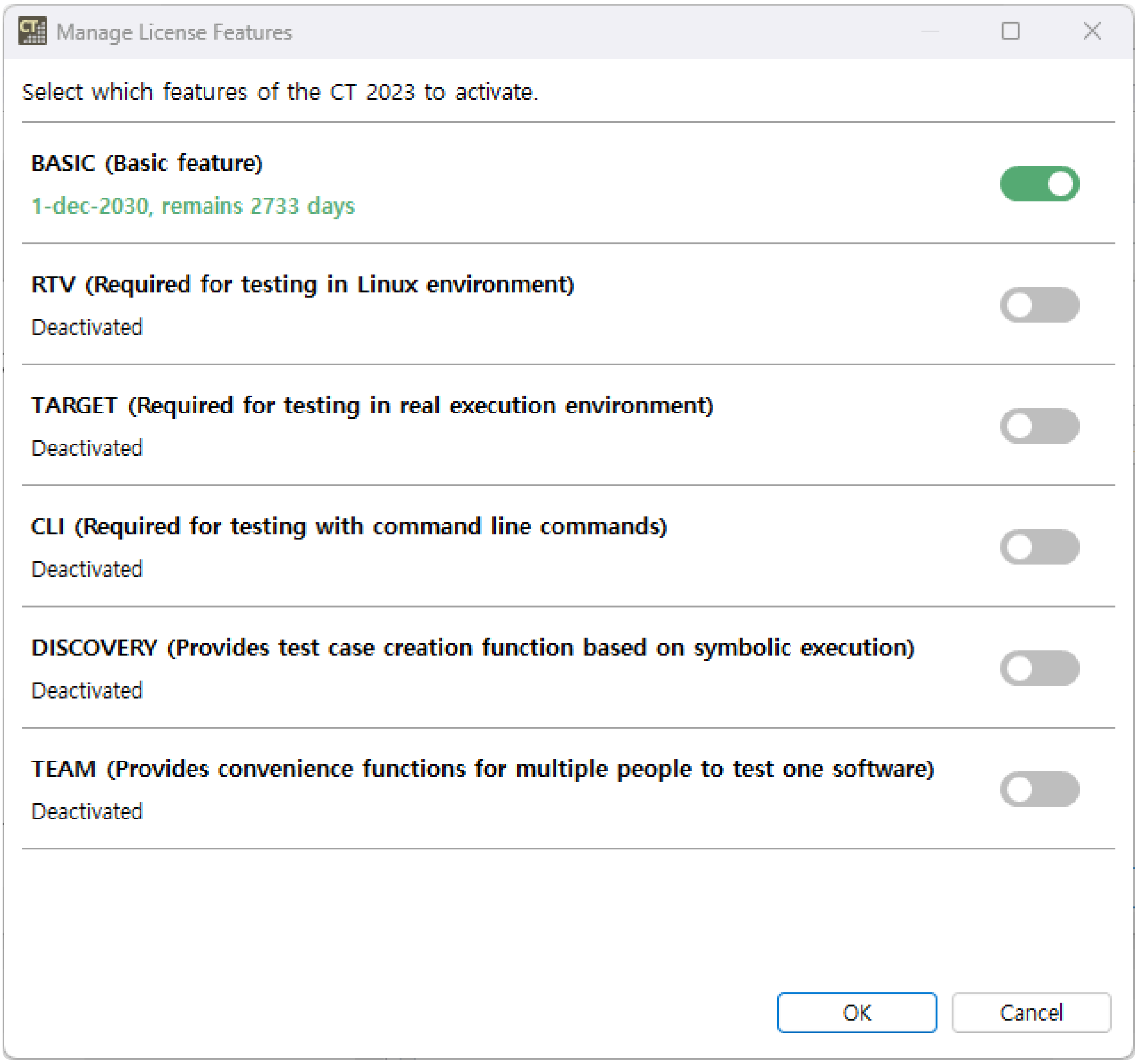
● Nodelock

Please enter nodelock license file path.
(License file name : ct.lic)

File path:

- Floating: Register it through the license server. Enter the server information (operating system, IP, port) and click [Authentication connection] button.
- Nodelock: Register the license file provided.

4. Click [Manage Features…] button to select the features to activate.



Manage License Features

Select which features of the CT 2023 to activate.

BASIC (Basic feature)
1-dec-2030, remains 2733 days

RTV (Required for testing in Linux environment)
Deactivated

TARGET (Required for testing in real execution environment)
Deactivated

CLI (Required for testing with command line commands)
Deactivated

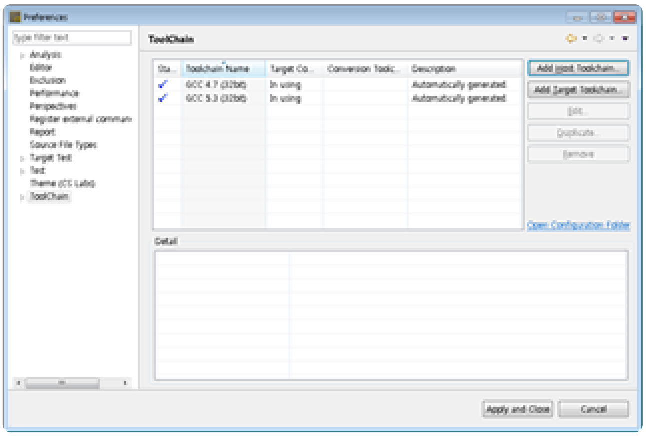
DISCOVERY (Provides test case creation function based on symbolic execution)
Deactivated

TEAM (Provides convenience functions for multiple people to test one software)
Deactivated

7. Set a Toolchain (Analyzer)

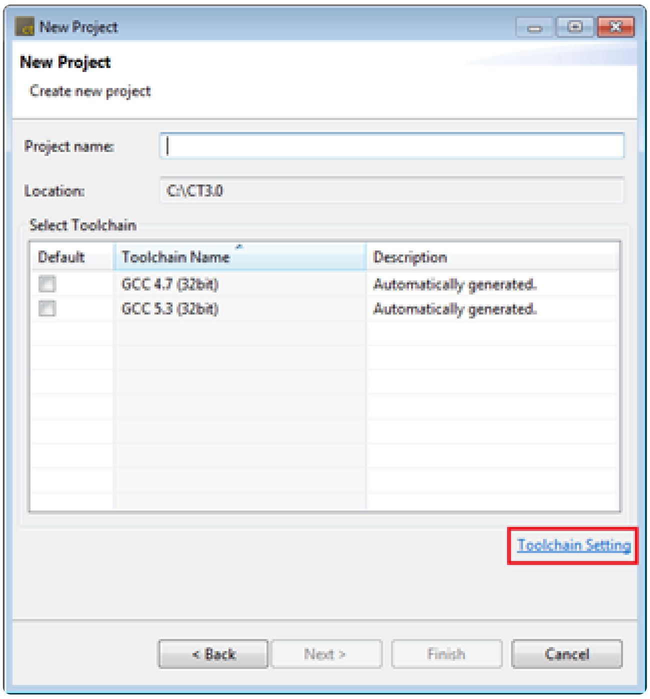
To perform the test using CT 2023.12, the toolchain setting is required.
To create a project, you must have a toolchain(compiler information) of the sources to test.

The toolchain can be set in [Window] -> [Preferences] -> [Toolchain].



Sta...	Toolchain Name	Target Co...	Conversion Tools...	Description
✓	GCC 4.7 (32bit)	In using		Automatically generated.
✓	GCC 5.3 (32bit)	In using		Automatically generated.

And it can also be set through [Toolchain setting] in Create a source file C/C++ project wizard or in Create a C/C++ Project from Embedded wizard.



Project name:

Location: C:\CT3.0

Select Toolchain

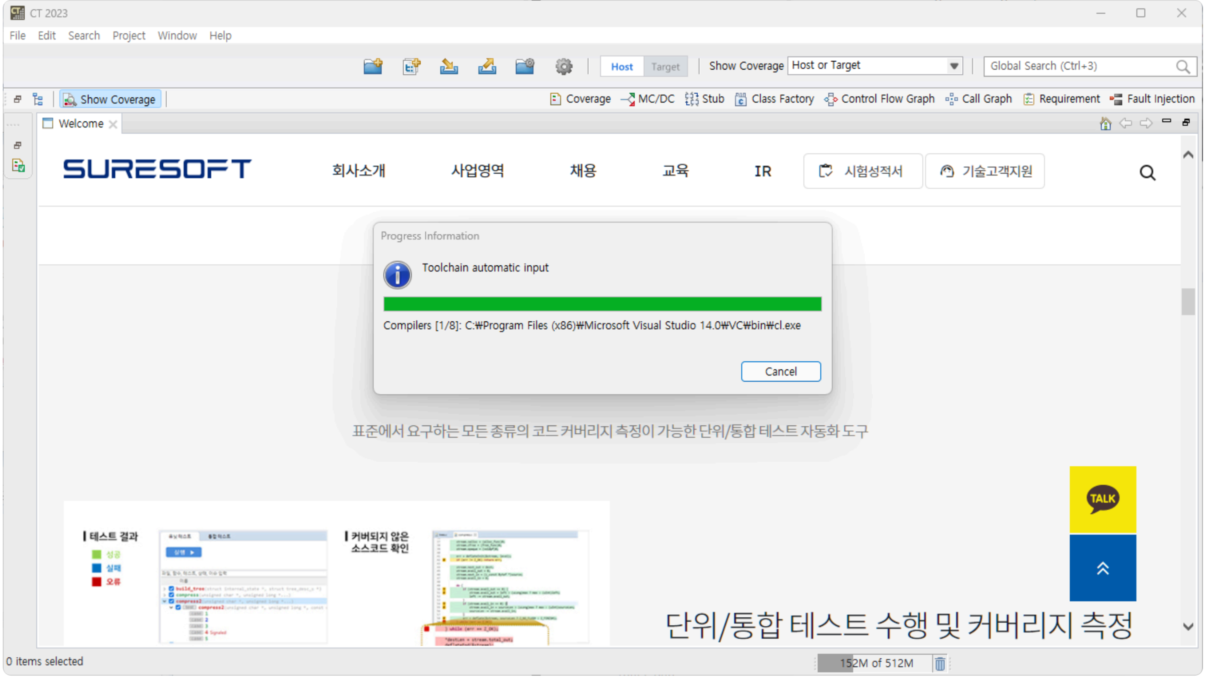
Default	Toolchain Name	Description
□	GCC 4.7 (32bit)	Automatically generated.
□	GCC 5.3 (32bit)	Automatically generated.

The functions related to the toolchain setting provided by CT 2023.12 are as follows.

- Auto-registration of Toolchain
- Add a Toolchain
- Edit a Toolchain
- Duplicate a Toolchain
- Remove a Toolchain
- Export a Toolchain
- Import a Toolchain

7.1. Auto-registration of Toolchain

When executing the CT 2023.12, it extracts the information of Visual Studio compiler installed in user PC and the information GCC compiler installed along with the CT 2023.12 and registers the toolchain automatically (the registered toolchain is not registered again.).


CT 2023
File Edit Search Project Window Help
Host Target
Show Coverage Host or Target
Global Search (Ctrl+3)
Show Coverage
Coverage MC/DC Stub Class Factory Control Flow Graph Call Graph Requirement Fault Injection
Welcome
SURESOFT
회사소개 사업영역 채용 교육 IR 시험성적서 기술고객지원
표준에서 요구하는 모든 종류의 코드 커버리지 측정이 가능한 단위/통합 테스트 자동화 도구
단위/통합 테스트 수행 및 커버리지 측정
TALK
0 items selected
152M of 512M

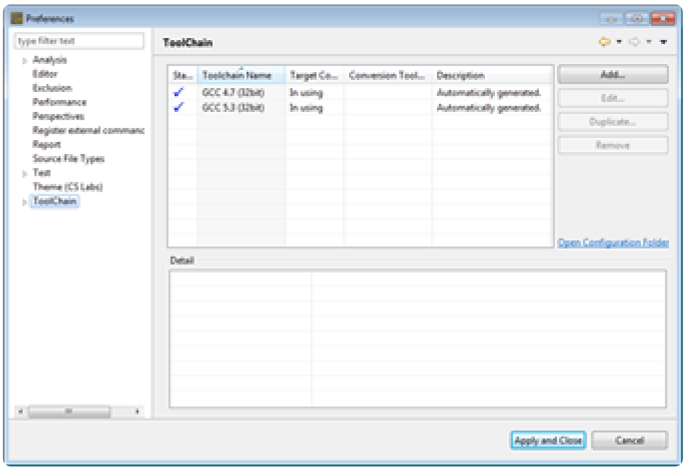
Progress Information

Toolchain automatic input

Compilers [1/8]: C:₩Program Files (x86)₩Microsoft Visual Studio 14.0₩VC₩bin₩cl.exe

Cancel

The auto-registered toolchain can be checked in [Window] -> [Preferences] -> [Toolchain] window, and it displays the message “Automatically generated.” in the description.

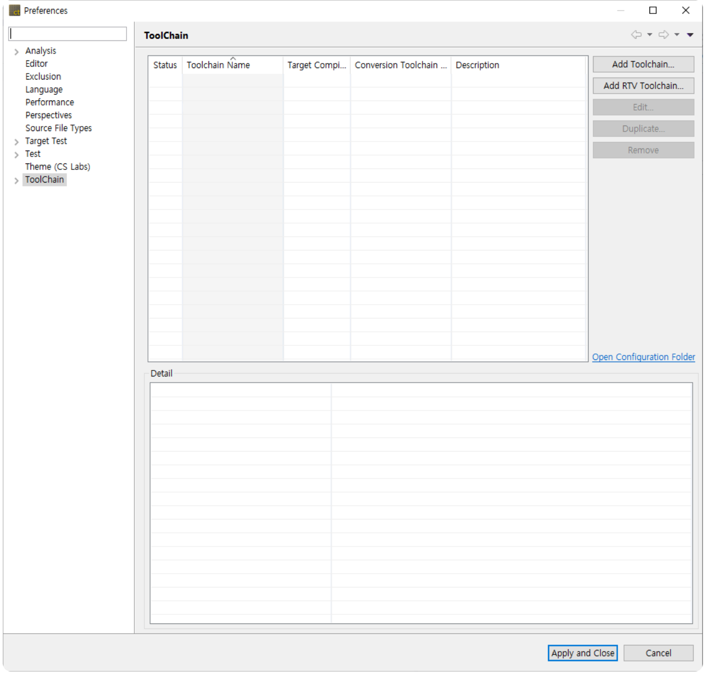


ToolChain

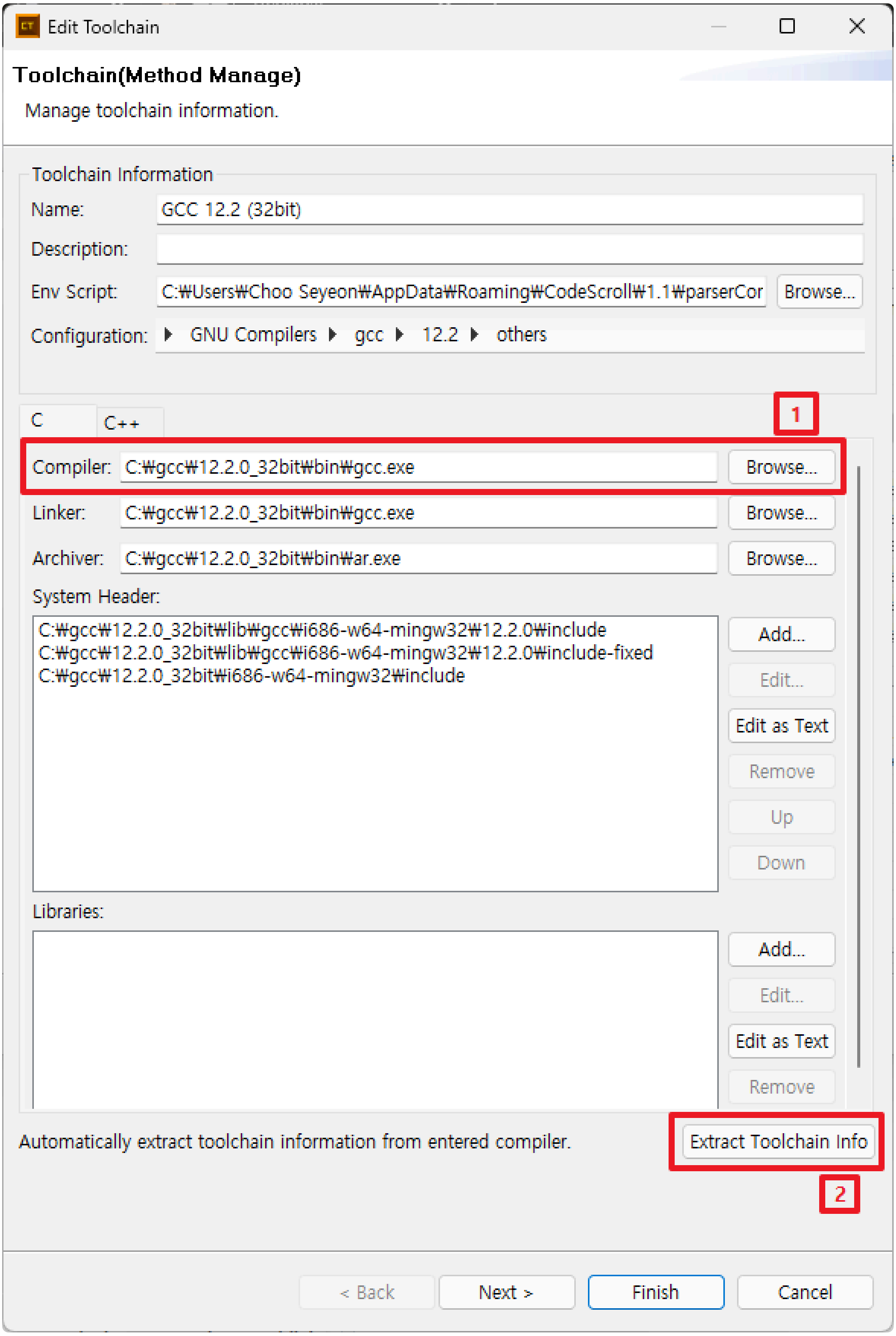
Sta...	Toolchain Name	Target Co...	Conversion Tool...	Description
✓	GCC 4.7 (32bit)	In using		Automatically generated.
✓	GCC 5.3 (32bit)	In using		Automatically generated.

7.2. Add a Toolchain

1. In [Window] -> [Preferences] -> [Toolchain] window, click the [Add Toolchain] button.



2. In [Add a toolchain] window, enter the toolchain information.



Edit Toolchain

Toolchain(Method Manage)

Manage toolchain information.

Toolchain Information

Name: GCC 12.2 (32bit)

Description:

Env Script: C:₩Users₩Choo Seyeon₩AppData₩Roaming₩CodeScroll₩1.1₩parserCor

Configuration: ▸ GNU Compilers ▸ gcc ▸ 12.2 ▸ others

Compiler: C:₩gcc₩12.2.0_32bit₩bin₩gcc.exe

Linker: C:₩gcc₩12.2.0_32bit₩bin₩gcc.exe

Archiver: C:₩gcc₩12.2.0_32bit₩bin₩ar.exe

System Header:

```
C:₩gcc₩12.2.0_32bit₩lib₩gcc₩i686-w64-mingw32₩12.2.0₩include
C:₩gcc₩12.2.0_32bit₩lib₩gcc₩i686-w64-mingw32₩12.2.0₩include-fixed
C:₩gcc₩12.2.0_32bit₩i686-w64-mingw32₩include
```

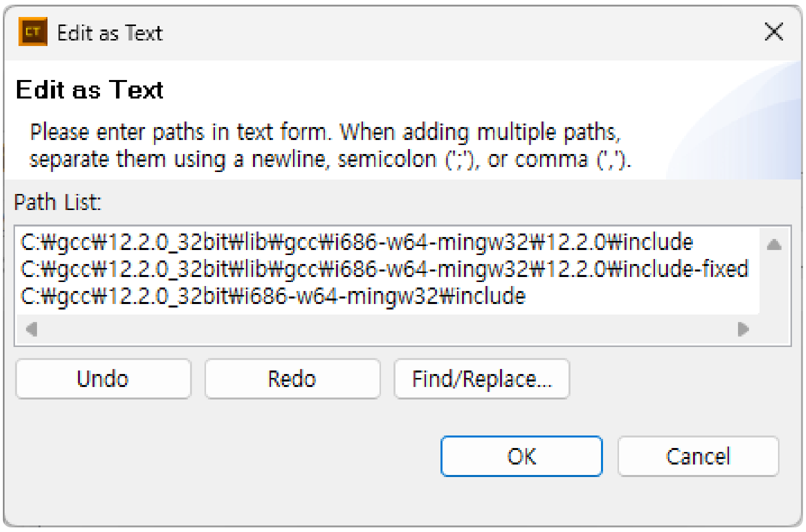
Libraries:

Automatically extract toolchain information from entered compiler.

- When you click [Extract toolchain Info]2 button after [Compiler]1, the toolchain information is extracted automatically from the compiler entered.
- In [Compiler]1, enter the compiler path.
    - Ex:
        - If it is based on Visual Studio: `C:\program Files (x86)\Microsoft Visual Studio 10.0\VS\bin\cl.exe`

- If it is based on GCC: `C:\MinGW\bin\gcc.exe`
- CodeWarrior 5.x or higher for Freeescale HC (s) 12: `C:\Program Files (x86)\Freescale\CWS12v5.1\Prog\chc12.exe`

- Select [Edit as Text] button to edit as text.


Edit as Text

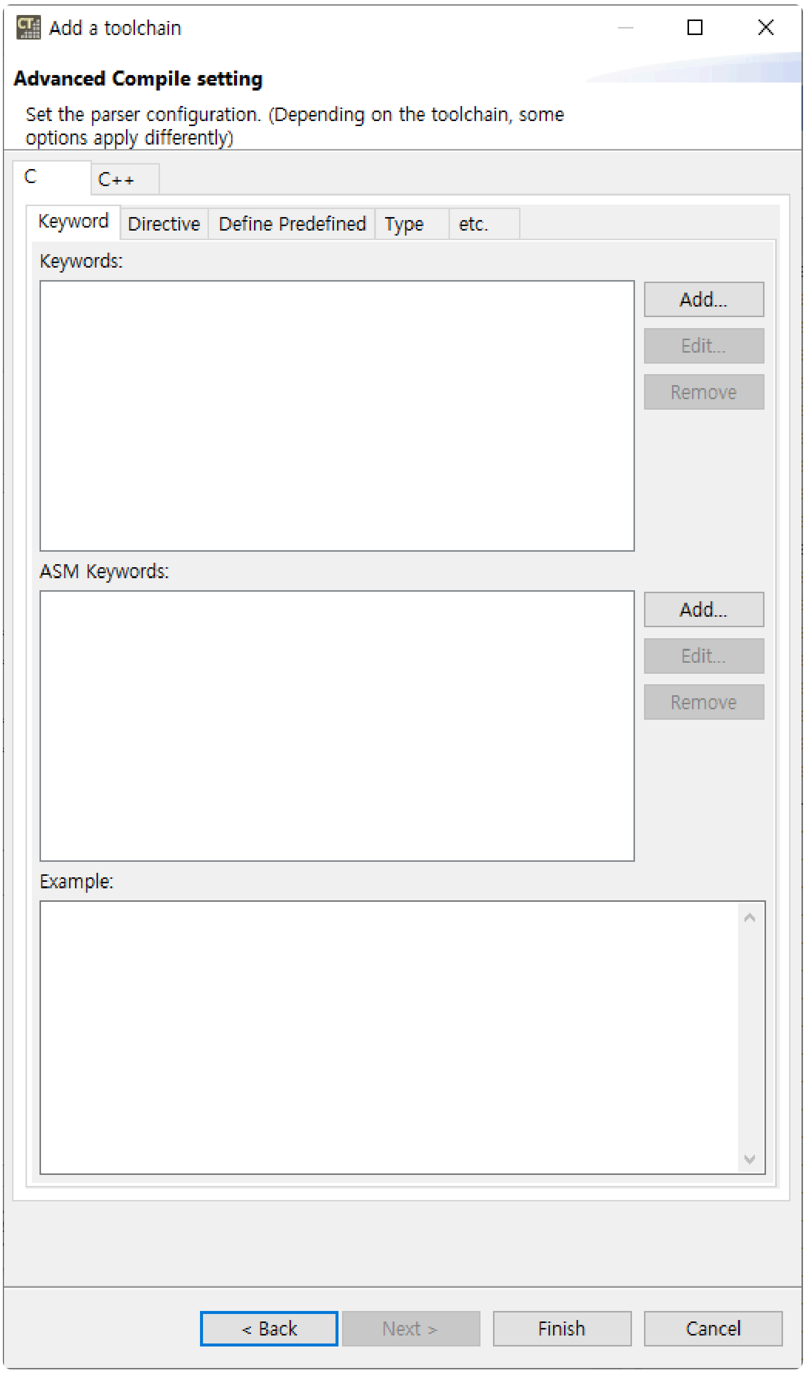
Edit as Text

Please enter paths in text form. When adding multiple paths, separate them using a newline, semicolon (';'), or comma (',').

Path List:

```
C:₩gcc₩12.2.0_32bit₩lib₩gcc₩i686-w64-mingw32₩12.2.0₩include
C:₩gcc₩12.2.0_32bit₩lib₩gcc₩i686-w64-mingw32₩12.2.0₩include-fixed
C:₩gcc₩12.2.0_32bit₩i686-w64-mingw32₩include
```

3. In [Name], enter the name of toolchain to be created.
4. In [Description], enter the description of toolchain to be created.
5. The entry information of [Env Script], [Configuration] and [C/C++] is set automatically by extracting the information from the compiler or can be entered directly by user.
6. After entering the toolchain information, click the [Next] or [Finish] button.

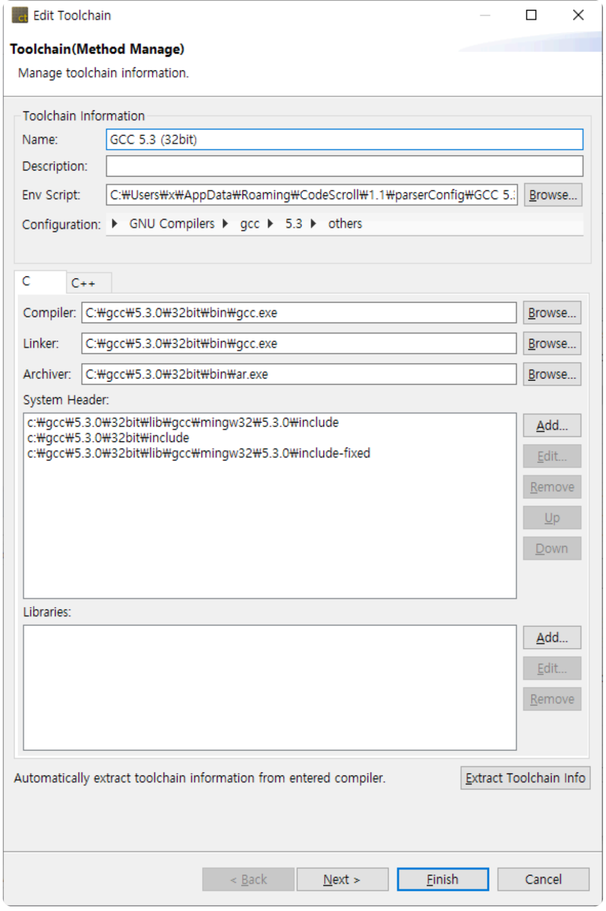


7. In [Advanced Compile setting] window displayed when clicking the [Next] button, the detailed items related to the configurations selected in the [Configuration] are shown. Each item can be changed by the user. The application of the changed items can be checked in [Example].

✻ For the detailed setting procedure for the other toolchain detail, please contact the Technical support contact at the bottom of this document Troubleshooting page.

7.3. Edit a Toolchain

1. Select the toolchain to be edited and click the [Edit] button.



Edit Toolchain

Toolchain(Method Manage)

Manage toolchain information.

Toolchain Information

Name: GCC 5.3 (32bit)

Description:

Env Script: C:₩Users₩x₩AppData₩Roaming₩CodeScroll₩1.1₩parserConfig₩GCC 5.:

Configuration: ▸ GNU Compilers ▸ gcc ▸ 5.3 ▸ others

Compiler: C:₩gcc₩5.3.0₩32bit₩bin₩gcc.exe

Linker: C:₩gcc₩5.3.0₩32bit₩bin₩gcc.exe

Archiver: C:₩gcc₩5.3.0₩32bit₩bin₩ar.exe

System Header:

```
c:₩gcc₩5.3.0₩32bit₩lib₩gcc₩mingw32₩5.3.0₩include
c:₩gcc₩5.3.0₩32bit₩include
c:₩gcc₩5.3.0₩32bit₩lib₩gcc₩mingw32₩5.3.0₩include-fixed
```

Libraries:

Automatically extract toolchain information from entered compiler.

2. Edit the information of toolchain.
3. Click the [Finish] button.

7.4. Duplicate a Toolchain

1. Select the toolchain to be copied and click the [Duplicate] button.
   (It can copy only a toolchain which a compiler is not entered.)
2. Edit the toolchain information that you want to change.
3. Click the [Finish] button.

7.5. Remove a Toolchain

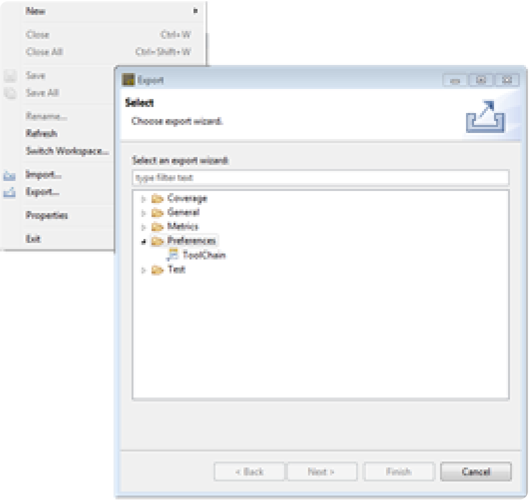
Select the toolchain to remove and click the [Remove] button.

> ! If there is a project using the toolchain you want to remove, the project will not work properly.

7.6. Export a Toolchain

The toolchain information can be exported via ‘Export’ function.

1. Click [File] > [Export] in menu or [Export] on dashboard section, and then select [Toolchain] in [Preferences].



Export

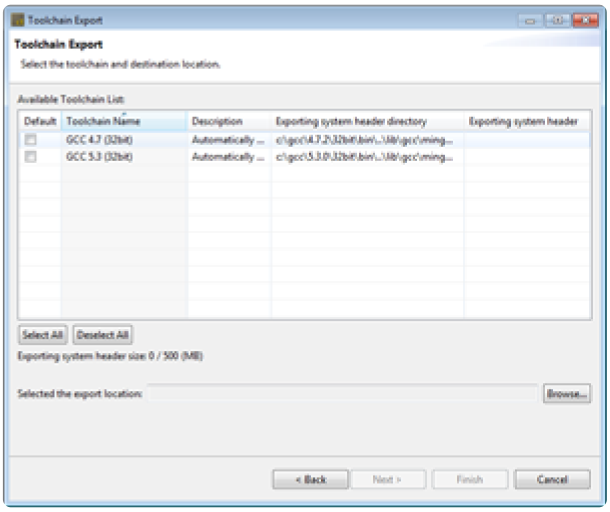
Select

Choose export wizard.

Select an export wizard:

type filter text

2. Select the toolchain to be exported and click [Browse] button to specify the path to be exported. If you set the system header file in the toolchain settings, a checkbox will be displayed in the [Exporting system header] column, where you can choose whether to export or not.



Toolchain Export

Toolchain Export

Select the toolchain and destination location.

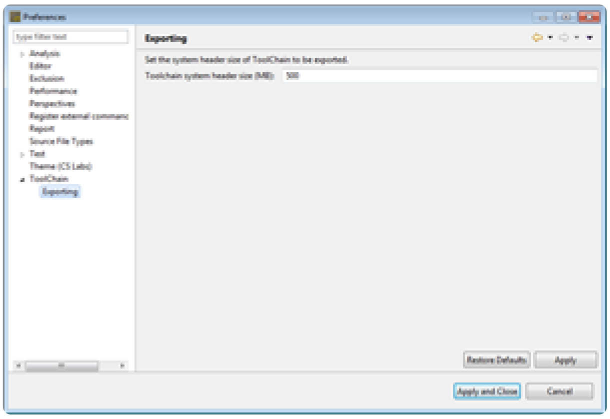
Available Toolchain List:

Default	Toolchain Name	Description	Exporting system header directory	Exporting system header
□	GCC 4.7 (32bit)	Automatically ...	c:\gcc\4.7.2\32bit\bin\..\lib\gcc\ming...	
□	GCC 5.3 (32bit)	Automatically ...	c:\gcc\5.3.0\32bit\bin\..\lib\gcc\ming...	

Exporting system header size: 0 / 500 (MB)

Selected the export location:

3. Click [Window] > [Preferences] > [Toolchain] > [Exporting] in menu to set the system header size to be exported. If the size of the system header is larger than the set value, the system header cannot be exported.



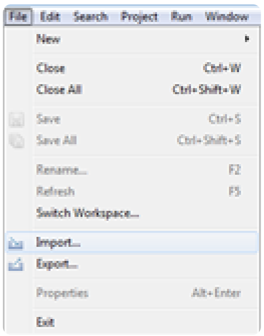
Set the system header size of ToolChain to be exported.

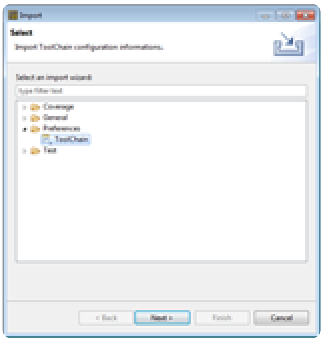
Toolchain system header size (MB): 500

7.7. Import a Toolchain

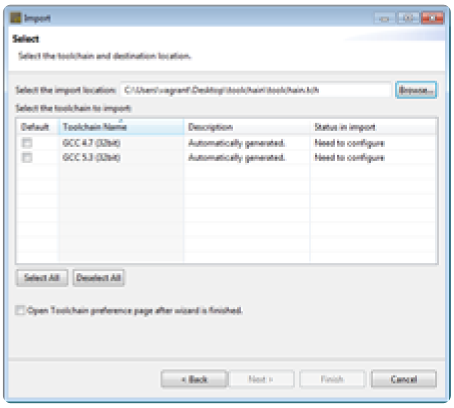
The exported toolchain can be imported via the [Import] function.

1. Click [File] > [Import] in menu or [Import] on dashboard section, and then select [Toolchain] in [Preferences].





2. Select the file to import and check the toolchain to import when the toolchain of the file is displayed.



Select the import location: C:\Users\vagrant\Desktop\toolchain\toolchain.tch

Select the toolchain to import:

Default	Toolchain Name	Description	Status in import
□	GCC 4.7 (32bit)	Automatically generated.	Need to configure
□	GCC 5.3 (32bit)	Automatically generated.	Need to configure

□ Open Toolchain preference page after wizard is finished.

The name of the toolchain to import is duplicated with the existing toolchain name, the status of ‘import’ becomes “Need to configure”. The name of the toolchain to import can be modified in [Select how to resolve] dialog shown when clicking the [Next] button.

8. Create a Project

Checklist before creating a project

Since CT 2023.12 is a tool that detects errors by actually executing source codes, the source code under test must be executable. In other words, the source code under test must be buildable for normal testing.

Before creating and testing a project, you need to set up a ‘toolchain’ that takes into account the development environment of the target software. Please refer to Set a toolchain for details.

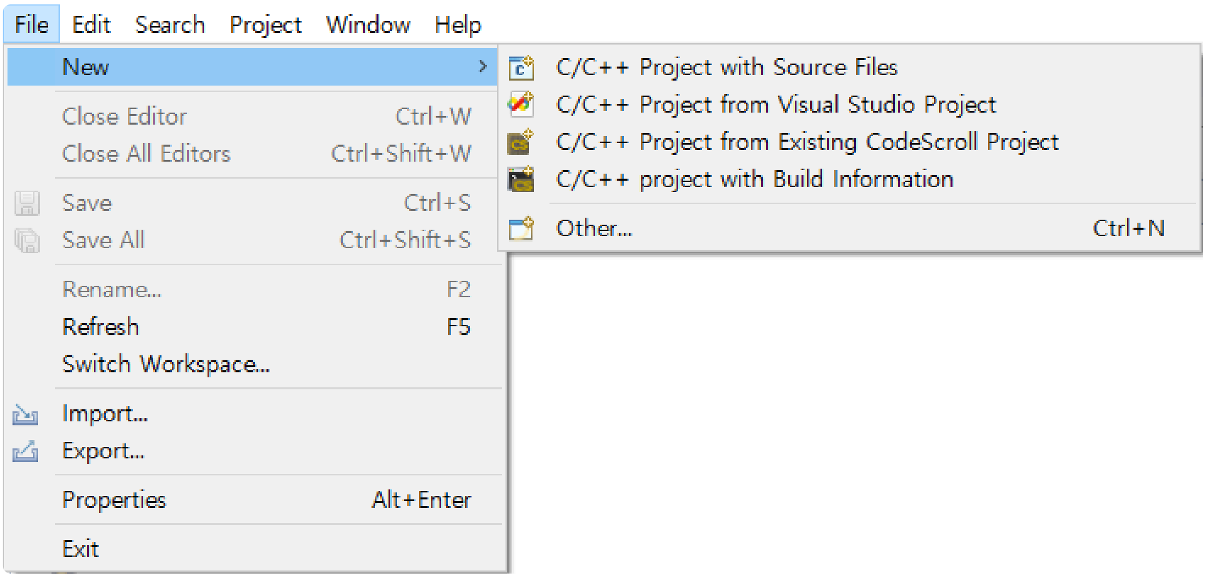
CT 2023.12 automatically generates a stub if the target object to link does not exist during the build process. However, the automatic test stub generation feature may have limitations in performing tests, so it is recommended to prepare an appropriate test strategy in advance.

Also, the name of the project cannot be more than 100 characters.

Create a project

To create a CT 2023.12 project, execute [Create a Project wizard].

Select [File] -> [New] or click the shortcut icon.


File
Edit
Search
Project
Window
Help
New
Close Editor Ctrl+W
Close All Editors Ctrl+Shift+W
Save Ctrl+S
Save All Ctrl+Shift+S
Rename... F2
Refresh F5
Switch Workspace...
Import...
Export...
Properties Alt+Enter
Exit
C/C++ Project with Source Files
C/C++ Project from Visual Studio Project
C/C++ Project from Existing CodeScroll Project
C/C++ project with Build Information
Other... Ctrl+N

The following types of project creation wizards are provided.

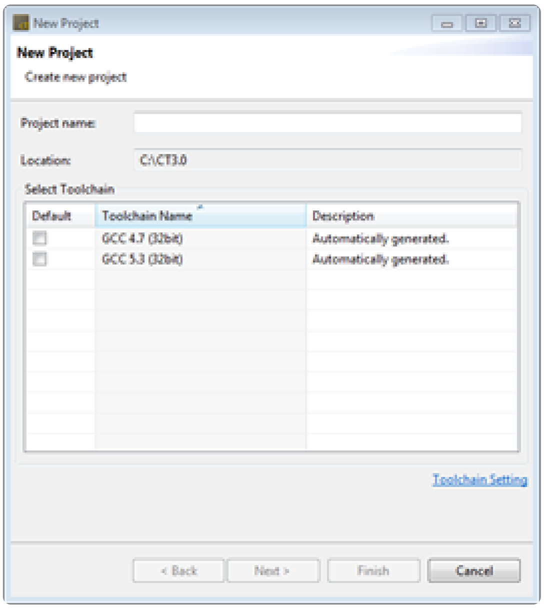
- C/C++ Project with Source Files
  Creates a project by selecting the source file directly.
- C/C++ Project from Visual Studio Project
  Creates a project by using Visual Studio dsw, sln, vcxproj and vcproj files.
- C/C++ Project form Existing CodeScroll Project
  Creates a project by using the CodeScroll project created previously.
- Creates a C/C++ Project with Build Information

Creates a project by using a makefile and build script.

8.1. C/C++ Project with Source Files

Create a project with C/C ++ source code files. The user needs to enter the necessary information to build the source code.

1. Enter the project name in [Project name].



New Project

Create new project

Project name:

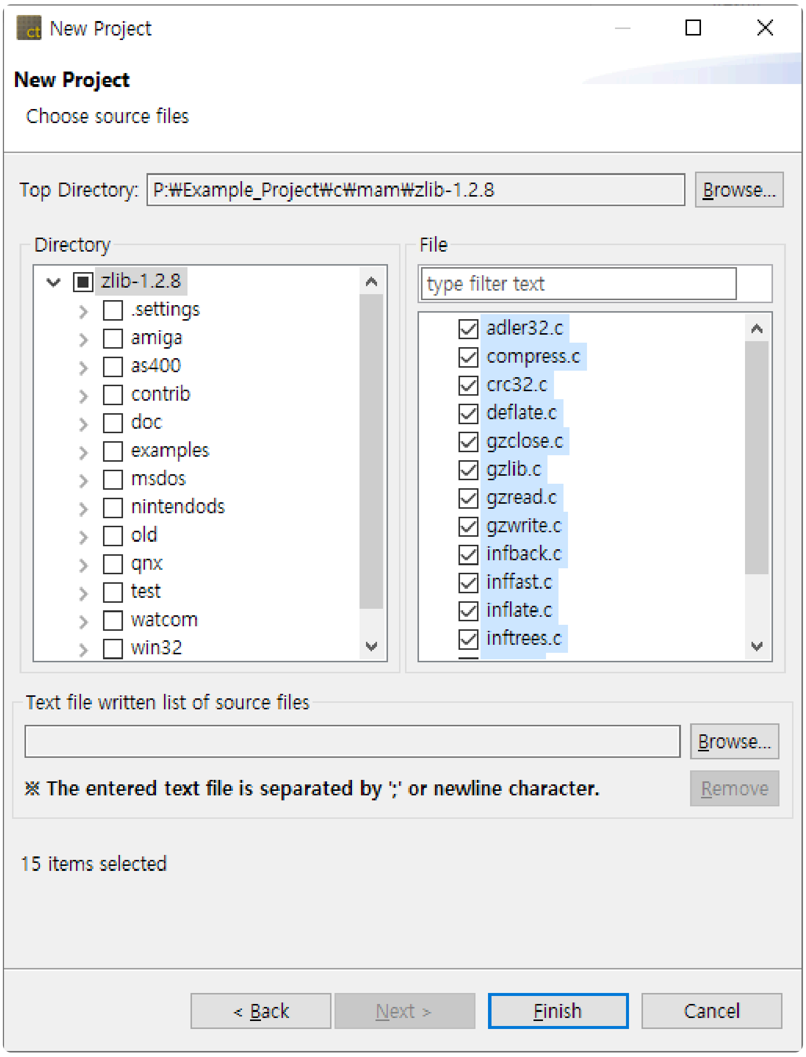
Location: C:\CT3.0

Select Toolchain

Default	Toolchain Name	Description
□	GCC 4.7 (32bit)	Automatically generated.
□	GCC 5.3 (32bit)	Automatically generated.

2. In [Select Toolchain], select the toolchain to use in the project. If there is no created toolchain, create a toolchain through [Toolchain Setting]. Please refer to Set a Toolchain for details.

3. Click the [Next] button to move to the next screen. If you click the [Finish] button, an empty project containing no source file is created.



New Project

Choose source files

Top Directory: P:₩Example_Project₩c₩mam₩zlib-1.2.8

Directory:
- ■ zlib-1.2.8
  - □ .settings
  - □ amiga
  - □ as400
  - □ contrib
  - □ doc
  - □ examples
  - □ msdos
  - □ nintendods
  - □ old
  - □ qnx
  - □ test
  - □ watcom
  - □ win32

File: type filter text
- ☑ adler32.c
- ☑ compress.c
- ☑ crc32.c
- ☑ deflate.c
- ☑ gzclose.c
- ☑ gzlib.c
- ☑ gzread.c
- ☑ gzwrite.c
- ☑ infback.c
- ☑ inffast.c
- ☑ inflate.c
- ☑ inftrees.c

Text file written list of source files

※ The entered text file is separated by ';' or newline character.

15 items selected

- You can select the source file directly, or through a text file with a file path.

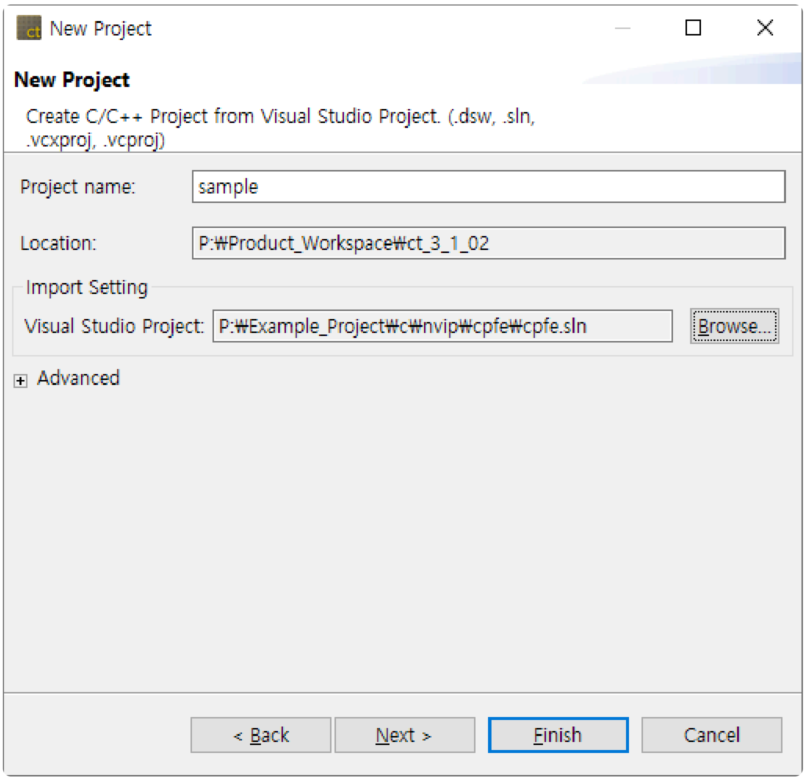
4. Select source files directly.
   1. Click [Browse …] to specify the [Top Directory] to be displayed in the directory screen below.
      - Except in special cases, make the directory one level higher than the directory containing the source files you want to select as the top-level directory.
   2. On the [Directory] screen shown on the left, select the directory containing the source files to be used for project creation.
   3. The files in the selected directory appear on the [File] screen shown on the right. Check the files to add.

5. Select by using a text file with the file paths.
   1. On the [Text file written list of source files] screen shown below, click [Browse …] to select a text file with a list of source files(absolute file path).
   2. Clicking the [Remove] button deselects the selected text file and the source file selected through the file.

6. After all settings are completed, click the [Finish] button to create the project.

8.2. C/C++ Project from Visual Studio Project

Create a project with a Microsoft Visual Studio project file(.dsw, .sln, .vcxproj, .vcproj). Except in special cases, the information required for the build is automatically entered, so there is nothing to specify by the user.



New Project

Create C/C++ Project from Visual Studio Project. (.dsw, .sln, .vcxproj, .vcproj)

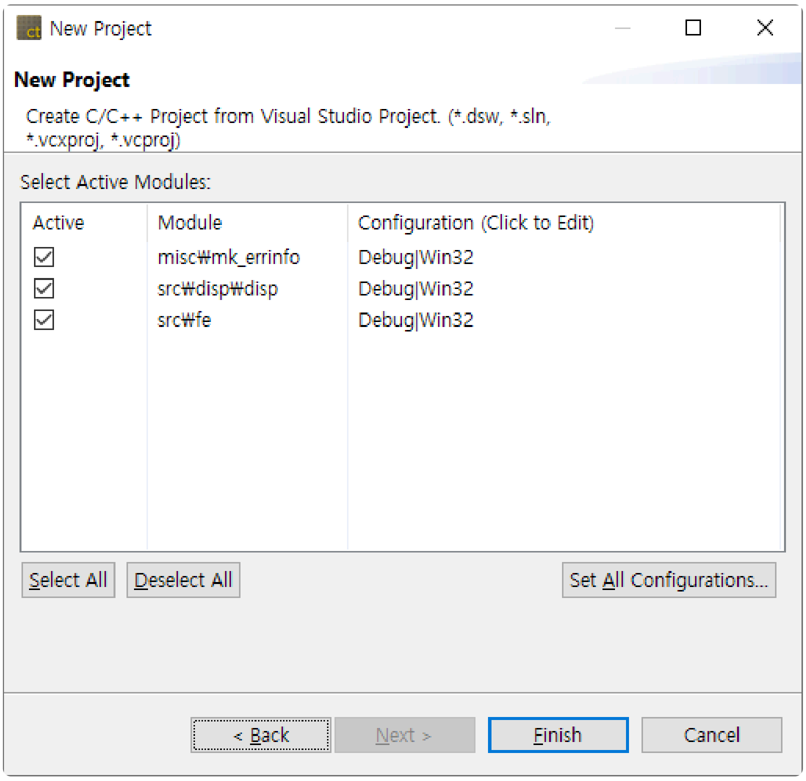
Project name: sample

Location: P:₩Product_Workspace₩ct_3_1_02

Import Setting

Visual Studio Project: P:₩Example_Project₩c₩nvip₩cpfe₩cpfe.sln

1. Enter the project name in [Project name].
2. Specify the Visual Studio project file to import in [Visual Studio Project].
3. If there are values that must be set before calling the compiler of the toolchain to be registered, add a script file to set the values to [Advanced]-> [Environment Script File].
4. Click [Next] to move to the next screen. When you click Done, module settings are randomly selected for the imported Visual Studio project.



New Project

New Project

Create C/C++ Project from Visual Studio Project. (*.dsw, *.sln, *.vcxproj, *.vcproj)

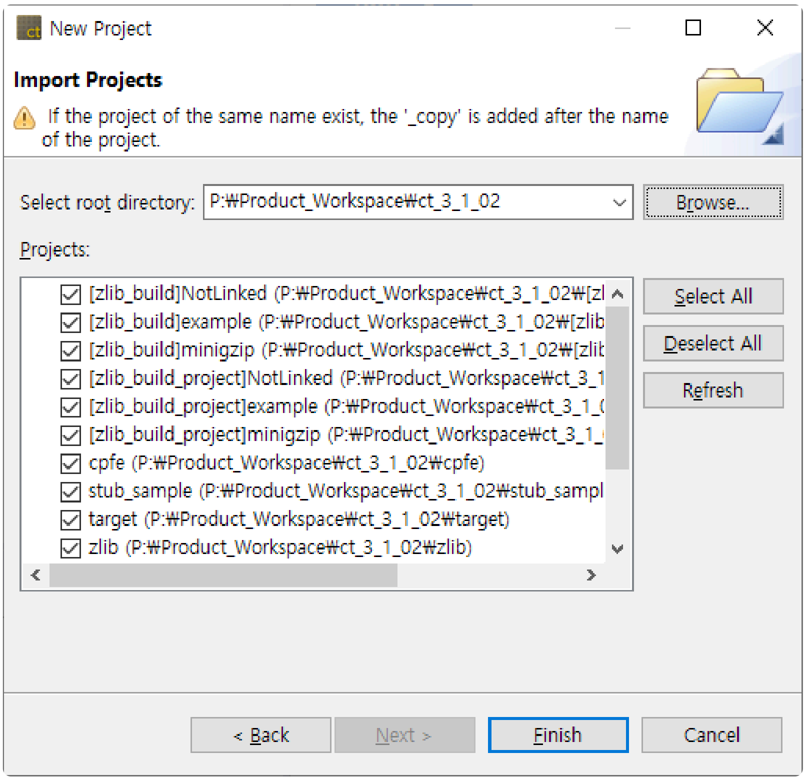
Select Active Modules:

Active	Module	Configuration (Click to Edit)
☑	misc₩mk_errinfo	Debug|Win32
☑	src₩disp₩disp	Debug|Win32
☑	src₩fe	Debug|Win32

5. Select the module to be activated from the modules included in the Visual Studio project.
6. Select the configuration of each module.
    - [Set All Configurations …] allows you to change the configuration for all modules in a batch.
7. After all settings are completed, click the [Finish] button to create the project.

8.3. C/C++ Project form Existing CodeScroll Project

Import an existing CodeScroll project and create a new project with that information. You can easily create a new project with the same configuration(source file, exclude/include analysis, compile flags) as the existing project.



New Project

Import Projects

If the project of the same name exist, the '_copy' is added after the name of the project.

Select root directory: P:₩Product_Workspace₩ct_3_1_02

Projects:

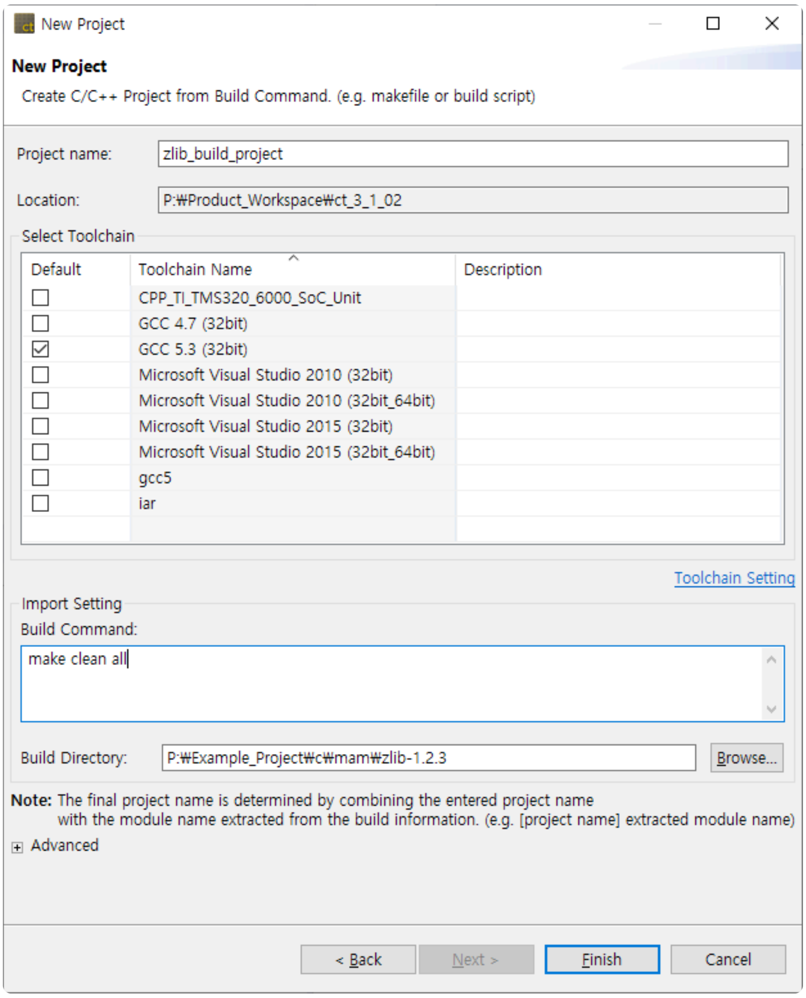
- ☑ [zlib_build]NotLinked (P:₩Product_Workspace₩ct_3_1_02₩[zl
- ☑ [zlib_build]example (P:₩Product_Workspace₩ct_3_1_02₩[zlib
- ☑ [zlib_build]minigzip (P:₩Product_Workspace₩ct_3_1_02₩[zlib
- ☑ [zlib_build_project]NotLinked (P:₩Product_Workspace₩ct_3_1
- ☑ [zlib_build_project]example (P:₩Product_Workspace₩ct_3_1_(
- ☑ [zlib_build_project]minigzip (P:₩Product_Workspace₩ct_3_1_
- ☑ cpfe (P:₩Product_Workspace₩ct_3_1_02₩cpfe)
- ☑ stub_sample (P:₩Product_Workspace₩ct_3_1_02₩stub_sampl
- ☑ target (P:₩Product_Workspace₩ct_3_1_02₩target)
- ☑ zlib (P:₩Product_Workspace₩ct_3_1_02₩zlib)

1. Use the [Browse …] button to select the CodeScroll workspace or CodeScroll project path.
2. Projects existing in the selected path are displayed in the [Projects] list.
    - When the CodeScroll workspace is selected, all the projects under it are displayed.
3. Click [Finish] to create the project.

8.4. Create a C/C++ Project with Build Information

Create a C / C ++ project from build information. The project is created as many as the number of modules extracted from the build information.

1. Enter a project name in [Project name]. The final project name is determined by combining the entered project name with the module name extracted from the build information.
   - Ex) [Project name]Extracted module name



New Project

Create C/C++ Project from Build Command. (e.g. makefile or build script)

Project name: zlib_build_project

Location: P:₩Product_Workspace₩ct_3_1_02

Select Toolchain

Default	Toolchain Name	Description
☐	CPP_TI_TMS320_6000_SoC_Unit	
☐	GCC 4.7 (32bit)	
☑	GCC 5.3 (32bit)	
☐	Microsoft Visual Studio 2010 (32bit)	
☐	Microsoft Visual Studio 2010 (32bit_64bit)	
☐	Microsoft Visual Studio 2015 (32bit)	
☐	Microsoft Visual Studio 2015 (32bit_64bit)	
☐	gcc5	
☐	iar	

Toolchain Setting

Import Setting

Build Command:

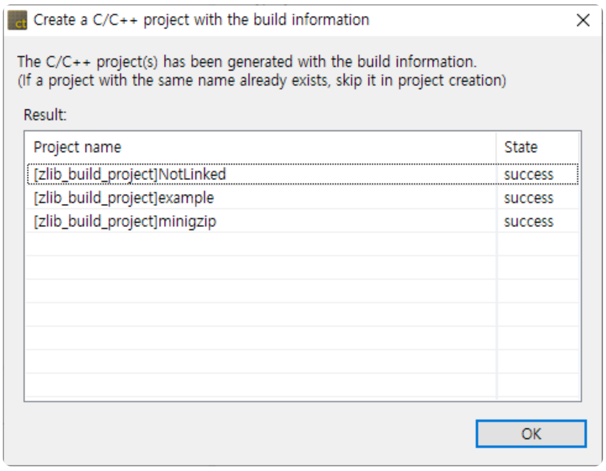
```
make clean all
```

Build Directory: P:₩Example_Project₩c₩mam₩zlib-1.2.3 Browse...

Note: The final project name is determined by combining the entered project name with the module name extracted from the build information. (e.g. [project name] extracted module name)

⊞ Advanced

2. Choose the same toolchain as the compiler you use for the build.
3. In [Import Setting]-> [Build Command], enter the command required for the build.
   - Ex) Make all / make clean
4. Specify the path where the makefile is located in [Import Setting]-> [Build Directory].
5. If there are values that must be set before calling the compiler of the toolchain to be registered, add a script file to set the values to [Advanced]-> [Environment Script File].
6. After completing all settings, click [Finish] to create the project.
7. When the project creation is completed after building, the result screen appears.



Create a C/C++ project with the build information

The C/C++ project(s) has been generated with the build information.
(If a project with the same name already exists, skip it in project creation)

Result:

Project name	State
[zlib_build_project]NotLinked	success
[zlib_build_project]example	success
[zlib_build_project]minigzip	success

- Success: Project creation complete.
- Error: If the creation failed due to an error during project creation.
- Exclude: If the same project name exists in the workspace.

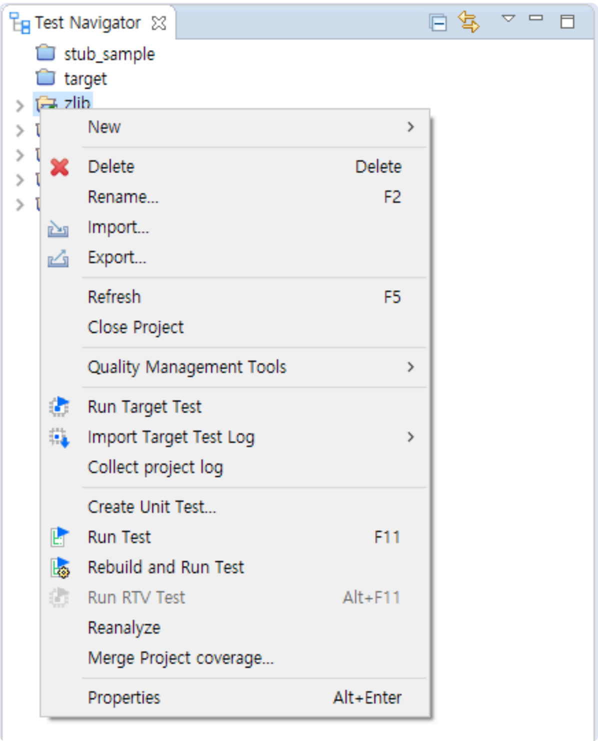
9. Create a Test

Generate test data and test code to test the functions of the source code. You can create individual tests for each function.

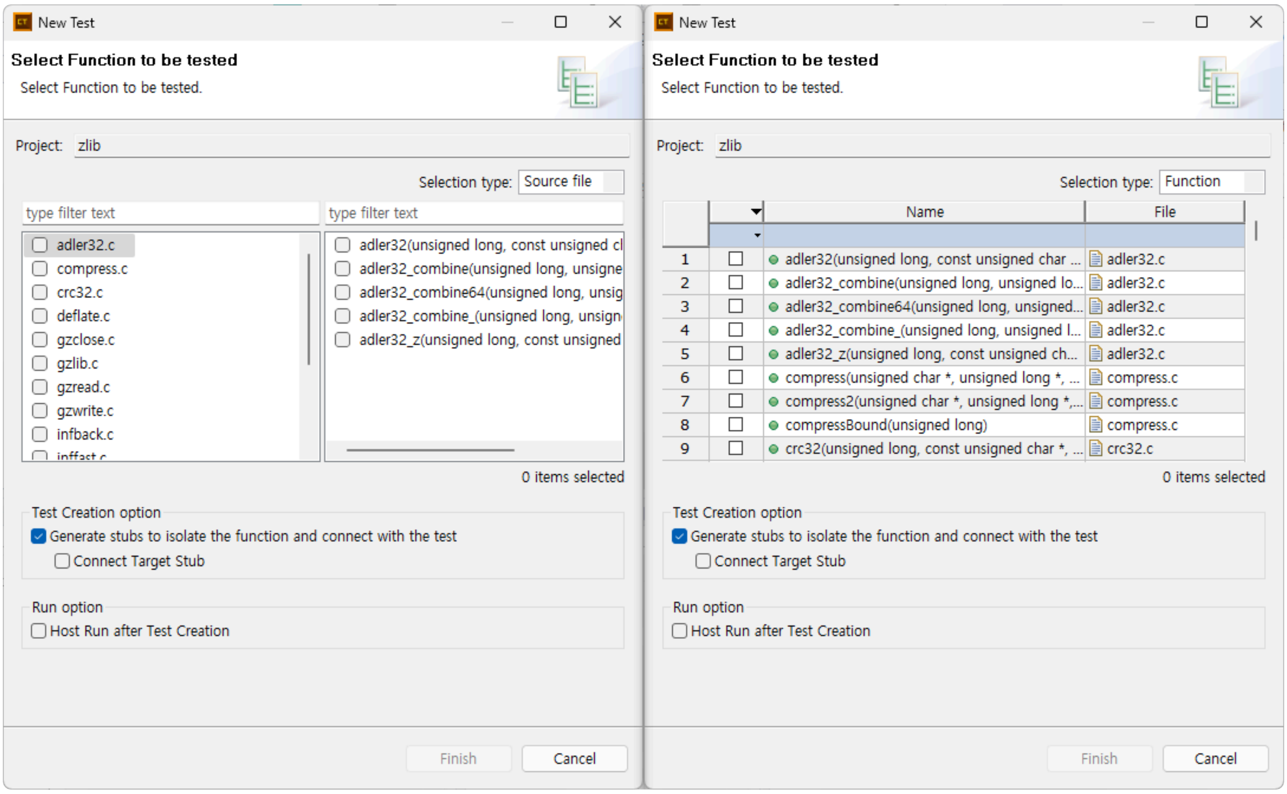
Create unit tests

Generate test data and test code for each function under test.

1. Select the project or module to create unit tests, right-click and click the [Create Unit Test] menu.



2. After the analysis is finished, in [Select function to be tested], select the function to perform the unit test.



New Test

Select Function to be tested

Select Function to be tested.

Project: zlib

Selection type: Source file

type filter text | type filter text

☐ adler32.c
☐ compress.c
☐ crc32.c
☐ deflate.c
☐ gzclose.c
☐ gzlib.c
☐ gzread.c
☐ gzwrite.c
☐ infback.c
☐ inffast.c

☐ adler32(unsigned long, const unsigned cl
☐ adler32_combine(unsigned long, unsigne
☐ adler32_combine64(unsigned long, unsig
☐ adler32_combine_(unsigned long, unsign
☐ adler32_z(unsigned long, const unsigned

0 items selected

Test Creation option

☑ Generate stubs to isolate the function and connect with the test

☐ Connect Target Stub

Run option

☐ Host Run after Test Creation

Finish Cancel

New Test

Select Function to be tested

Select Function to be tested.

Project: zlib

Selection type: Function

		Name	File
1	☐	adler32(unsigned long, const unsigned char ...	adler32.c
2	☐	adler32_combine(unsigned long, unsigned lo...	adler32.c
3	☐	adler32_combine64(unsigned long, unsigned...	adler32.c
4	☐	adler32_combine_(unsigned long, unsigned l...	adler32.c
5	☐	adler32_z(unsigned long, const unsigned ch...	adler32.c
6	☐	compress(unsigned char *, unsigned long *, ...	compress.c
7	☐	compress2(unsigned char *, unsigned long *,...	compress.c
8	☐	compressBound(unsigned long)	compress.c
9	☐	crc32(unsigned long, const unsigned char *, ...	crc32.c

0 items selected

Test Creation option

☑ Generate stubs to isolate the function and connect with the test

☐ Connect Target Stub

Run option

☐ Host Run after Test Creation

Finish Cancel

a. You can filter the function under test using [type filter text].
b. You can use the [Selection type] combo box to select the function to be tested based on the source file or function.
c. You can easily select and deselect all functions under test with the right-click menu.
d. Selecting [Test Creation option] generates stubs to isolate the functions called by the target function, and generated stubs are connected with host stubs of tests.
   - Selecting [Connect Target Stub], generated stubs are connected with target stub of tests.
e. If [Host Run after Test Creattion] is selected, prepare the test data and run the tests.

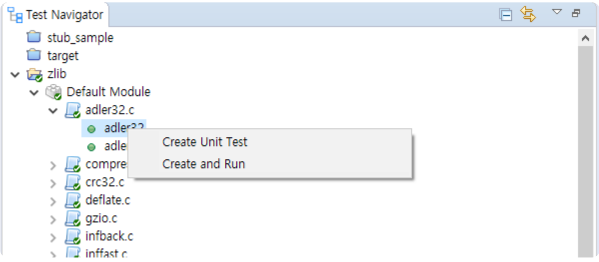
1. When [Run after Test Creation] is selected, the test is executed after the test data is generated.

1. Click [Finish] to create the unit test.

Create and run tests

The [Create and Run] function allows you to create and run unit tests at once without using the [Create Unit Test] function.

1. Select the function to be tested in the test navigator and right-click.

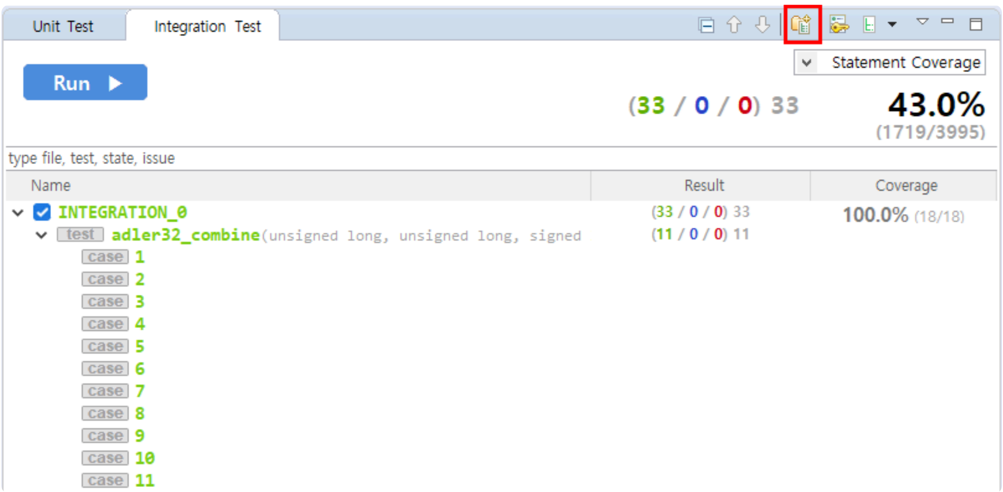


2. If you select the [Create and Run] menu, it creates a test for the target function and then runs the

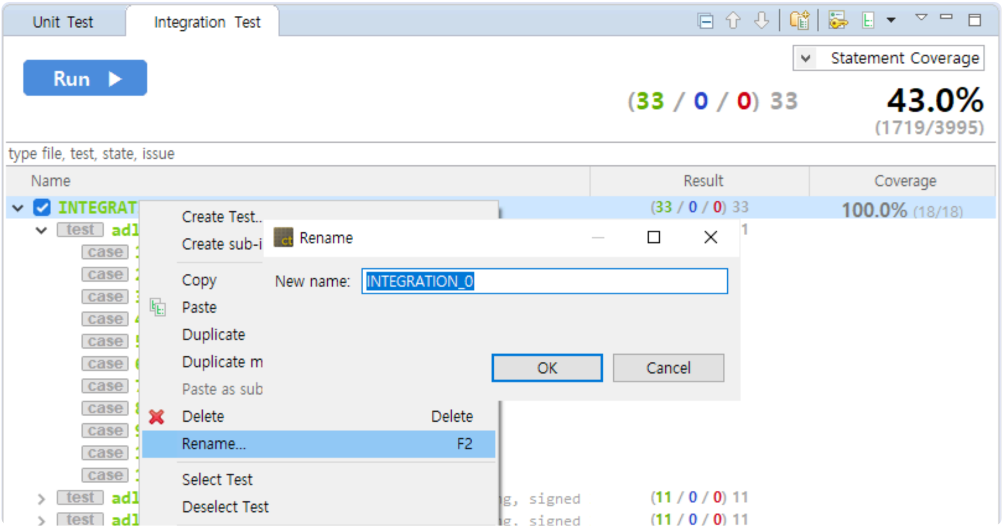
test.

Create an integration test

You can use the toolbar menu to create an integrated test.

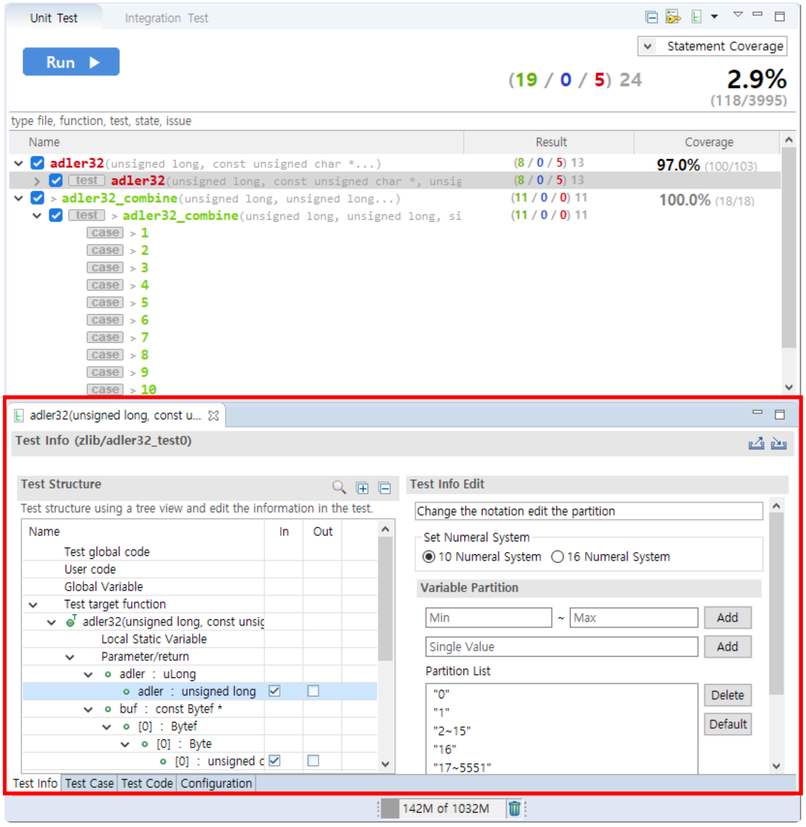


The integration test name is automatically assigned and can be renamed using the [Rename] context menu.



10. Test Editor

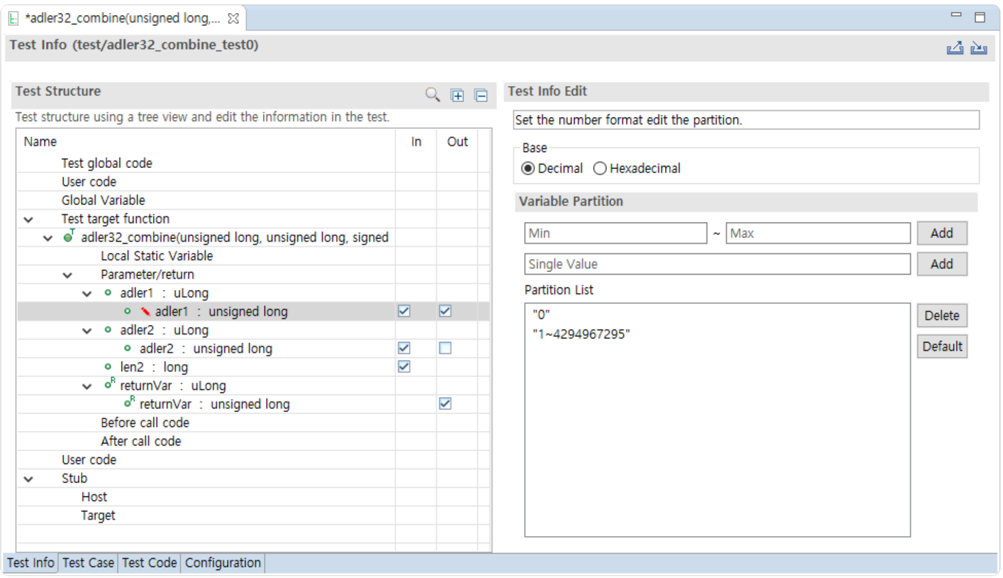
The test editor can be opened by double-clicking the test or test case in each test view, located at the bottom of the unit/integrated test view.



You can move the editor and open it in a separate window.

10.1. Test Info

The Test Information tab is a feature that presents the test code as a tree of test structures, making it easy for users to modify the test code.



*adler32_combine(unsigned long,...

Test Info (test/adler32_combine_test0)

Test Structure

Test structure using a tree view and edit the information in the test.

Name	In	Out
Test global code		
User code		
Global Variable		
Test target function		
adler32_combine(unsigned long, unsigned long, signed		
Local Static Variable		
Parameter/return		
adler1 : uLong		
adler1 : unsigned long	☑	☑
adler2 : uLong		
adler2 : unsigned long	☑	□
len2 : long	☑	
returnVar : uLong		
returnVar : unsigned long		☑
Before call code		
After call code		
User code		
Stub		
Host		
Target		

Test Info Edit

Set the number format edit the partition.

Base: ● Decimal ○ Hexadecimal

Variable Partition

Min ~ Max [Add]

Single Value [Add]

Partition List

"0"
"1~4294967295"

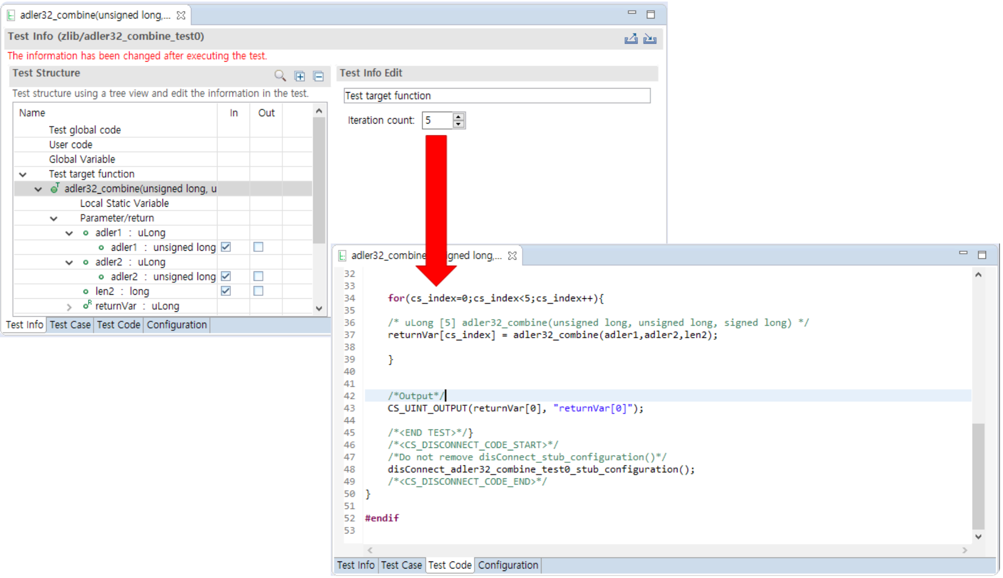
[Delete] [Default]

Test Info | Test Case | Test Code | Configuration

- User code can be inserted into the test code.
- You can control global variables related to the function under test.
- You can control the input and output of the function parameters and return values.
- You can enter the code to be executed just before calling the function under test.
- ✎ markers appear at modified items. When you save modifications, the markers disappear.

Repeat function calls

You can have the function under test be called multiple times.



adler32_combine(unsigned long,...

Test Info (zlib/adler32_combine_test0)

The information has been changed after executing the test.

Test Structure

Test structure using a tree view and edit the information in the test.

Name	In	Out
Test global code		
User code		
Global Variable		
Test target function		
adler32_combine(unsigned long, u		
Local Static Variable		
Parameter/return		
adler1 : uLong		
adler1 : unsigned long	☑	□
adler2 : uLong		
adler2 : unsigned long	☑	□
len2 : long	☑	□
returnVar : uLong		

Test Info Edit

Test target function

Iteration count: 5

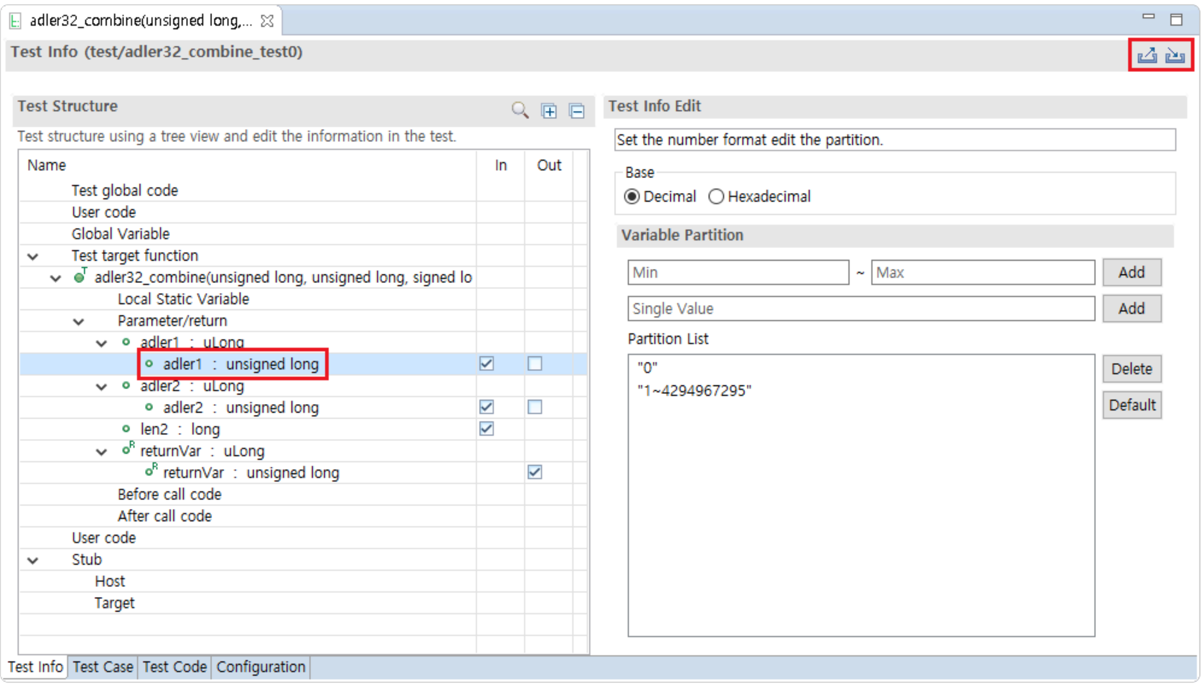
adler32_combine(unsigned long,...

```


    for(cs_index=0;cs_index<5;cs_index++){

    /* uLong [5] adler32_combine(unsigned long, unsigned long, signed long) */
    returnVar[cs_index] = adler32_combine(adler1,adler2,len2);

    }


    /*Output*/
    CS_UINT_OUTPUT(returnVar[0], "returnVar[0]");

    /*<END TEST>*/}
    /*<CS_DISCONNECT_CODE_START>*/
    /*Do not remove disConnect_stub_configuration()*/
    disConnect_adler32_combine_test0_stub_configuration();
    /*<CS_DISCONNECT_CODE_END>*/
}

#endif
```

Test Info | Test Case | Test Code | Configuration

Export/Import variable partition

You can export/import variable partition information by selecting a variable on the Test Information tab.



adler32_combine(unsigned long,...

Test Info (test/adler32_combine_test0)

Test Structure

Test structure using a tree view and edit the information in the test.

Name	In	Out
Test global code		
User code		
Global Variable		
Test target function		
adler32_combine(unsigned long, unsigned long, signed lo		
Local Static Variable		
Parameter/return		
adler1 : uLong		
adler1 : unsigned long	☑	□
adler2 : uLong		
adler2 : unsigned long	☑	□
len2 : long	☑	
returnVar : uLong		
returnVar : unsigned long		☑
Before call code		
After call code		
User code		
Stub		
Host		
Target		

Test Info Edit

Set the number format edit the partition.

Base: ● Decimal ○ Hexadecimal

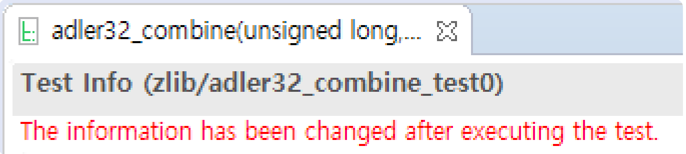
Variable Partition

Partition List:
"0"
"1~4294967295"

Menu	Description
Export Variable Partition	Export the partition information of the selected variable.
Import Variable Partition	Import the partition information of the selected variable.

Change detection

If you edit and save the information of a test that has already been executed, “The information has been changed after executing the test.” is displayed at the top of the test editor.



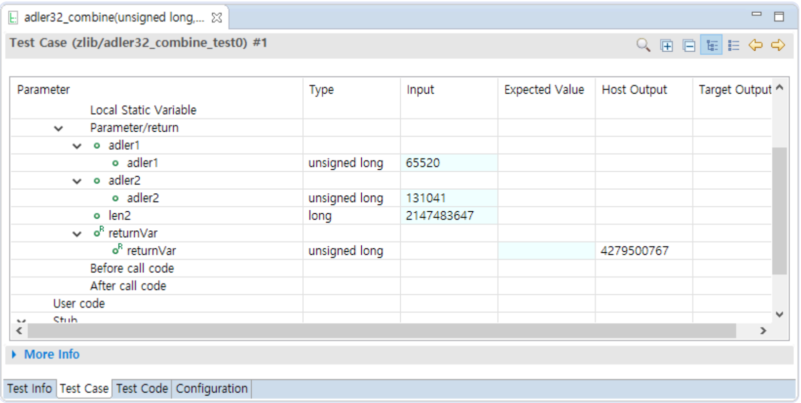
adler32_combine(unsigned long,...

Test Info (zlib/adler32_combine_test0)

The information has been changed after executing the test.

10.2. Test Case

Test Case Tab provide the ability to edit inputs for a function under test and the expected value for the execution result.



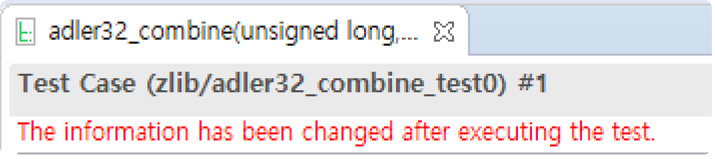
Test Case (zlib/adler32_combine_test0) #1

Parameter	Type	Input	Expected Value	Host Output	Target Output
Local Static Variable					
Parameter/return					
adler1					
adler1	unsigned long	65520			
adler2					
adler2	unsigned long	131041			
len2	long	2147483647			
returnVar					
returnVar	unsigned long			4279500767	
Before call code					
After call code					
User code					
Stub					

- In the Test Structure tree, you can enter input values for the variables specified as input.
    - **If there is no input value, the value of the variable is ‘undefined value’, and the tool initializes the variable with no value entered as 0 (Blank if a string) for the convenience of the user.**
- You can switch the representation of the Test Structure as a table or tree with the [Show as Tree], [Show as Table] toolbar menu.
- With the [Apply the test case in a lump] context menu, you can apply the input and expected values of the test case to other test cases in the same test at once.
- If you select the ‘Out’ of a variable in the Test Structure tree, You can check the value of the variable after the test is performed.
- Editable cells are displayed in a pale sky color.
- If the expected value is different from the host/target output, it is displayed in blue.
- If the host and target output values are different, it is displayed in yellow.
- You can use ~ (range) and logical operators! (Not), & (and), and | (or) in expected values.
- The following shortcuts are available.
    - Undo : `Ctrl` + `Z`
    - Move row: arrow keys (↑, ↓)
    - Editable cell focus: `Enter`
    - Editable cell focus out: `Esc`
    - Move column (editable cell): `Tab`(right), `Shift` + `Tab`(left)
    - Move test cases: `Ctrl` + ← / →

Change detection

If you edit and save the information of a test case that has already been executed, “The information has been changed after executing the test.” is displayed at the top of the test editor.

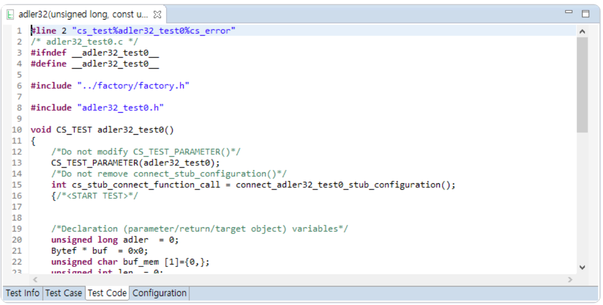


Test Case (zlib/adler32_combine_test0) #1

The information has been changed after executing the test.

10.3. Test Code

You can check the test code by clicking the Test Code tab in the test editor.

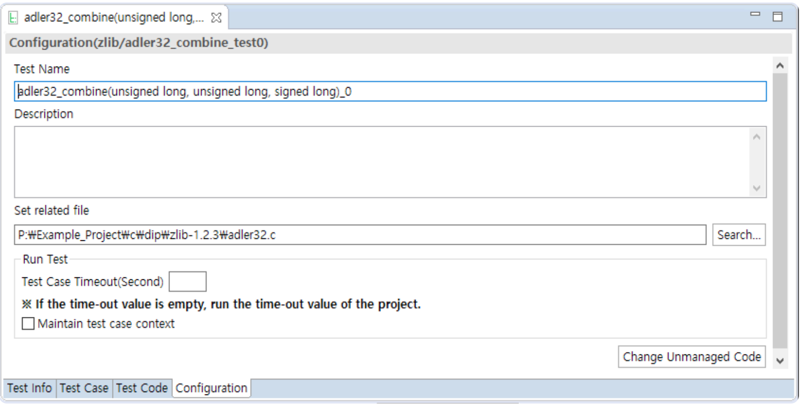


```
#line 2 "cs_test%adler32_test0%cs_error"
/* adler32_test0.c */
#ifndef __adler32_test0__
#define __adler32_test0__

#include "../factory/factory.h"

#include "adler32_test0.h"

void CS_TEST adler32_test0()
{
    /*Do not modify CS_TEST_PARAMETER()*/
    CS_TEST_PARAMETER(adler32_test0);
    /*Do not remove connect_stub_configuration()*/
    int cs_stub_connect_function_call = connect_adler32_test0_stub_configuration();
    {/*<START TEST>*/


    /*Declaration (parameter/return/target object) variables*/
    unsigned long adler  = 0;
    Bytef * buf  = 0x0;
    unsigned char buf_mem [1]={0,};
    unsigned int len  = 0;
```

- If the user edits and saves the test structure tree, the changes are automatically reflected in the test code.
- If the return type of the function under test is a primitive type, a macro that outputs the return value is automatically generated.
- If you want to modify the test code yourself, you must switch the test to unmanaged code.
- The test execution function must have a return type and an input parameter of a void type.

10.4. Configuration

On the configuration tab, you can make various settings for unit testing.



Configuration(zlib/adler32_combine_test0)

Test Name

adler32_combine(unsigned long, unsigned long, signed long)_0

Description

Set related file

P:₩Example_Project₩c₩dip₩zlib-1.2.3₩adler32.c

Run Test

Test Case Timeout(Second)

※ If the time-out value is empty, run the time-out value of the project.

□ Maintain test case context

- If you modify and save the test name, the test name that appears in the unit test view changes.
- You can enter a description for the test.
- With the related file settings, you can select the file to which the function under test belongs.
- You can set the timeout for the test.
- You can choose whether to keep the context for the test.
- If you want to write test code yourself, you need to do [Change Unmanaged Code].

10.5. Test Macro

CT 2023.12 provides several macros to help users write test code more easily. You can check and write the macro provided using the shortcut(`Ctrl` + `Spacebar`) in the Test Editor.

ASSERT macro

Examine the conditional expression and print the success/failure in the Test Case Tab.

Macro	Parameter	Example
CS_ASSERT(_b)	_b: conditional expression	`CS_ASSERT(val!=1);`
CS_ASSERT_MSG(_B, _msg)	_B: conditional expression _mgs: message to print when the conditional expression is false	`CS_ASSERT_MSG(val==1, "val is not 1!");`

Output macro

Print the values of specific variables in the Test Case Tab.

Macro	Parameter	Example

CS_INT_OUTPUT(_v, _s)
CS_UINT_OUTPUT(_v, _s)
CS_FLT_OUTPUT(_v, _s)
CS_STR_OUTPUT(_v, _s)
	v: a variable to print the value
	_s: a name to show in the Test Case Tab
		`CS_INT_OUTPUT(int_var, "int_var_name");`
		`CS_UINT_OUTPUT(unsigned_int_var, "unsigned_int_var_name");`
		`CS_FLT_OUTPUT(float_var, "float_var_name");`
		`CS_STR_OUTPUT(string_var, "string_var_name");`

Input macro

Pass test data to the function under test.

Macro	Parameter	Example

CS_INT_INPUT(_t, _s)
CS_UINT_INPUT(_t, _s)
CS_FLT_INPUT(_t, _s)
CS_STR_INPUT(_t, _s)
	_t: a type of the variable
	_s: a name to show in the Test Case Tab
		`CS_INT_INPUT(int, "int_var_name");`
		`CS_UINT_INPUT(unsigned int, "unsigned_int_var_name");`
		`CS_FLT_INPUT(float, "float_var_name");`
		`CS_STR_INPUT(char*, "string_var_name");`

Address-related macros

If there is a part that directly assigns or fetches the value in the embedded address in the converted source code, it may not operate normally when executed on the local computer. In this case, you can use an address-related macro for the virtual address.

Macro	Description
CS_VIRTUAL_ADDR(_b,_e)	Creates the space from the address (_b) to the address (_e)

CS_ADDR_ASSIGN(_t,_a,_v)
CS_ADDR_SET(_t,_a,_v)
	Assigns the value (_v) of type (_t) to the address (_a)

CS_ADDR_GET(_t,_a)	Fetches the value of type (_t) from the address (_a)
CS_VIRTUAL_ADDR_CLEAR()	Frees the memory space created

Address-related macro example

```
// Create a virtual memory area of size 100 from 0xFFE40000U.
CS_VIRTUAL_ADDR(0xFFE40000U, 0xFFE40000U+100);

// Assign value 10 of int type to 0xFFE40000U
CS_ADDR_ASSIGN(int ,0xFFE40000U, 10);
CS_ADDR_SET(int ,0xFFE40000U, 10);

// Return the value from 0xFFE40000U to the variable a.
int a = CS_ADDR_GET(int ,0xFFE40000U);

// Return an address of 0xFFE40000U into variable ptr of pointer type.
int* ptr = CS_ADDR_PTR(0xFFE40000U);

// Frees the memory space created.
CS_VIRTUAL_ADDR_CLEAR();
```

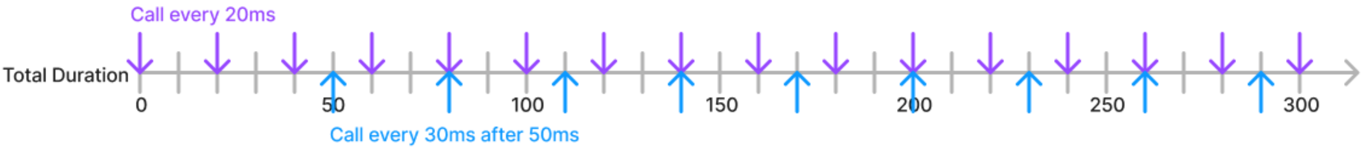
✻ For more information about address-related macros, see the Virtual Address Usage Guide page in the User Guides.

Other macros

Macro	Parameter	Description	Example
CS_LOG(_msg)	_msg: log message	Outputs user log	`CS_LOG("User Log");`
CS_TESTCASENO()		Returns the number of the test currently running	`int testCaseNum = CS_TESTCASENO();`

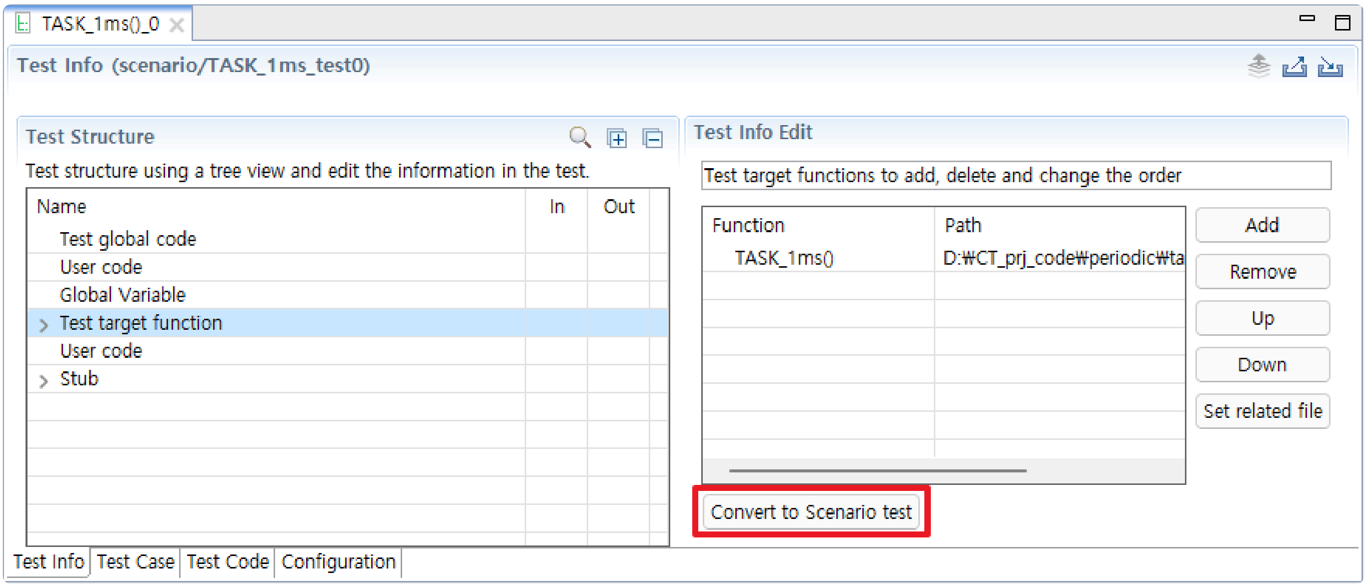
10.6. Scenario Test

CT 2023.12 provides a scenario testing feature that allows testing various scenarios. Using the scenario tests of CT 2023.12, you can test several functions that are periodically called.



Convert to Scenario Test

Select [Test Editor] > [Test Info] > [Test Target Function] > [Convert to Scenario test] to convert a normal test to a scenario test. Once converted, it cannot be reverted to a normal test.



Test structure using a tree view and edit the information in the test.

Name	In	Out
Test global code		
User code		
Global Variable		
Test target function		
User code		
Stub		

Test target functions to add, delete and change the order

Function	Path
TASK_1ms()	D:₩CT_prj_code₩periodic₩ta

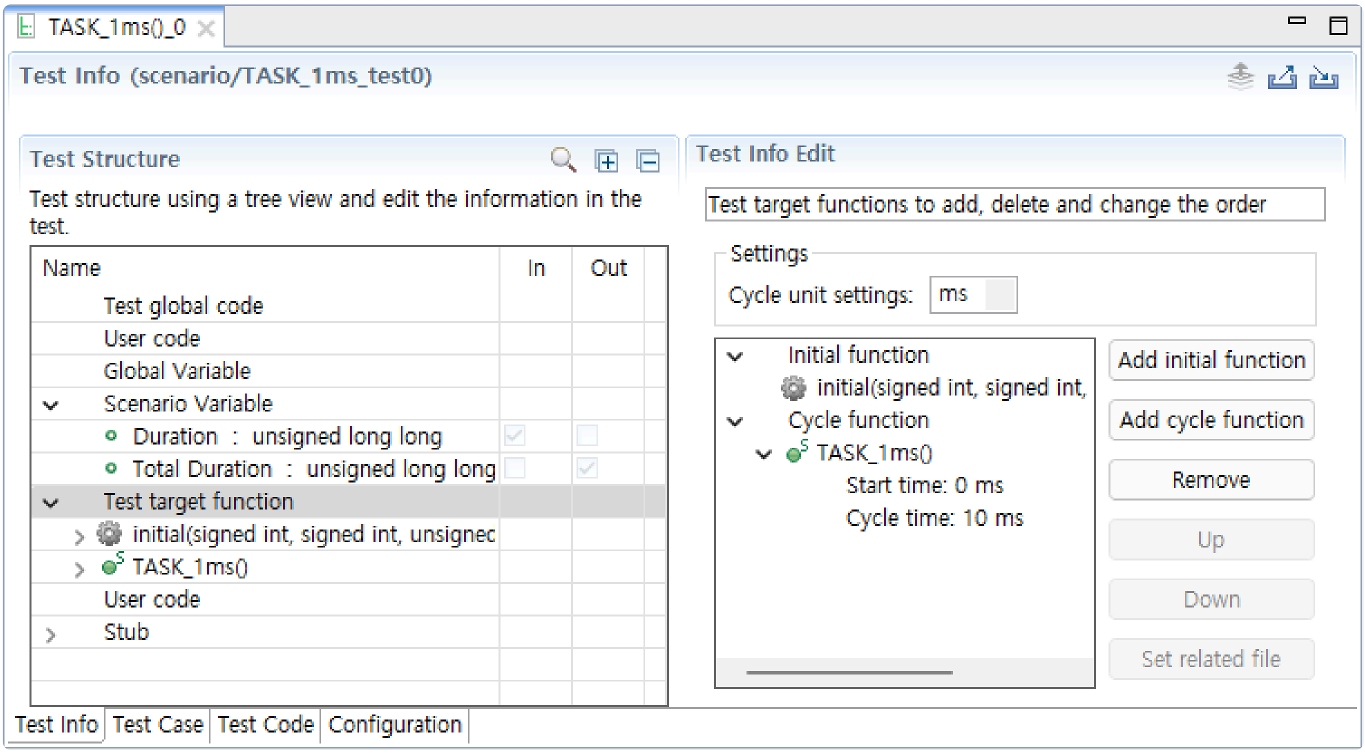
- Cases where you cannot convert to scenario tests
  - Project language isn't C.
  - If [Test Target Function] includes functions that cannot be used as cycle functions.
    - Functions usable as cycle functions are those with a return type of void and no parameters.

Designing Scenario Tests

After converting to scenario test, you can design scenario tests in [Test Info] and [Test Case] tabs of [Test Editor]. The context of the test cases is maintained in scenario test.

Designing Scenario Tests – [Test Info] Tab

When converting to scenario test, scenario variables are added to [Test Info] tab, and the editor for [Test Target Function] is changed.



TASK_1ms()_0

Test Info (scenario/TASK_1ms_test0)

Test Structure

Test structure using a tree view and edit the information in the test.

Name	In	Out
Test global code		
User code		
Global Variable		
⌄ Scenario Variable		
○ Duration : unsigned long long	☑	□
○ Total Duration : unsigned long long	□	☑
⌄ Test target function		
› ⚙ initial(signed int, signed int, unsignec		
› ● TASK_1ms()		
User code		
› Stub		

Test Info Edit

Test target functions to add, delete and change the order

Settings

Cycle unit settings: ms

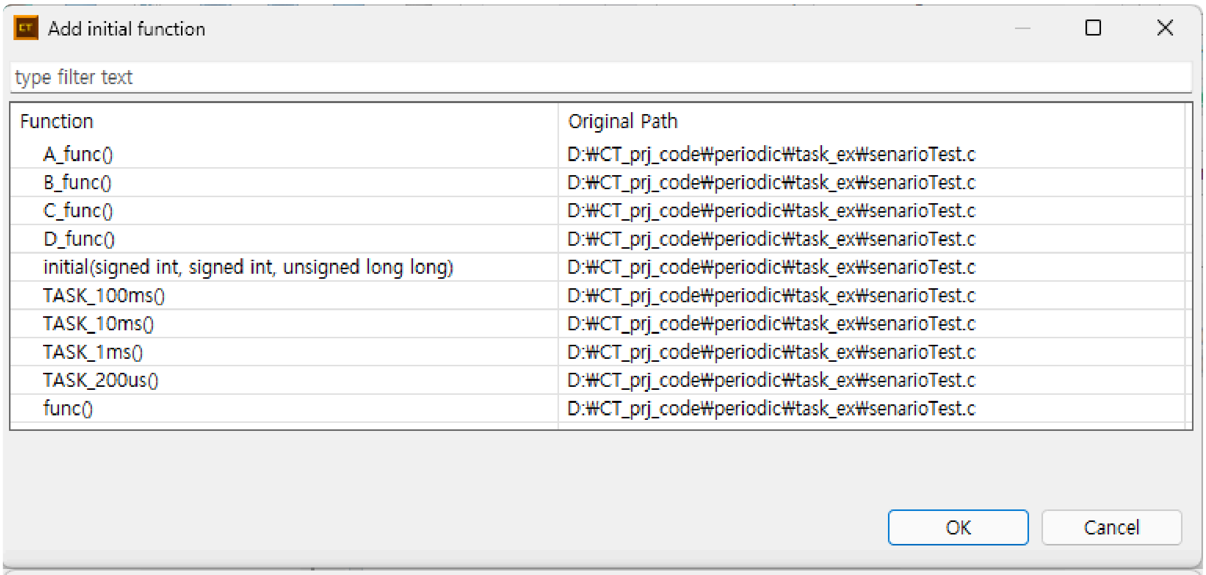
- ⌄ Initial function
  - ⚙ initial(signed int, signed int,
- ⌄ Cycle function
  - ⌄ ● TASK_1ms()
    - Start time: 0 ms
    - Cycle time: 10 ms

Scenario Test Icons

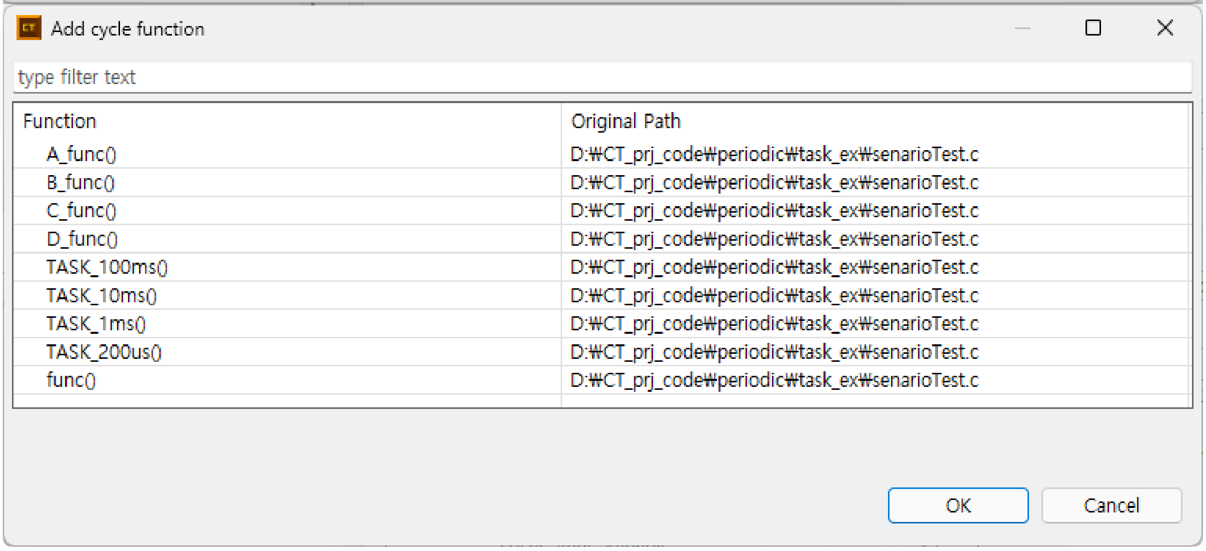
Icon	Description
⚙	Initial function
●	Cycle function

Test Target Function

- Initial Function
  - A function called once before the cycle begins
  - You can add functions like global variable initialization that need to be executed before running tests.
- Cycle Function
  - A function repeatedly called at regular time intervals
  - To be a cycle function, it must have a return type of void and no parameters.
  - Diverse designs are possible using user code and before/after call code.
- Cycle Time
  - The time interval for function repetition
  - Adjust the test running time by inputting suitable values for scenario variables in [Test Case] tab.
- Cycle Unit Settings
  - Set the representation unit for the cycle in ms, μs, or ns in [Test Editor] and test reports. The default unit can be changed in project properties.
- Add initial function/Add cycle function



Function	Original Path
A_func()	D:₩CT_prj_code₩periodic₩task_ex₩senarioTest.c
B_func()	D:₩CT_prj_code₩periodic₩task_ex₩senarioTest.c
C_func()	D:₩CT_prj_code₩periodic₩task_ex₩senarioTest.c
D_func()	D:₩CT_prj_code₩periodic₩task_ex₩senarioTest.c
initial(signed int, signed int, unsigned long long)	D:₩CT_prj_code₩periodic₩task_ex₩senarioTest.c
TASK_100ms()	D:₩CT_prj_code₩periodic₩task_ex₩senarioTest.c
TASK_10ms()	D:₩CT_prj_code₩periodic₩task_ex₩senarioTest.c
TASK_1ms()	D:₩CT_prj_code₩periodic₩task_ex₩senarioTest.c
TASK_200us()	D:₩CT_prj_code₩periodic₩task_ex₩senarioTest.c
func()	D:₩CT_prj_code₩periodic₩task_ex₩senarioTest.c

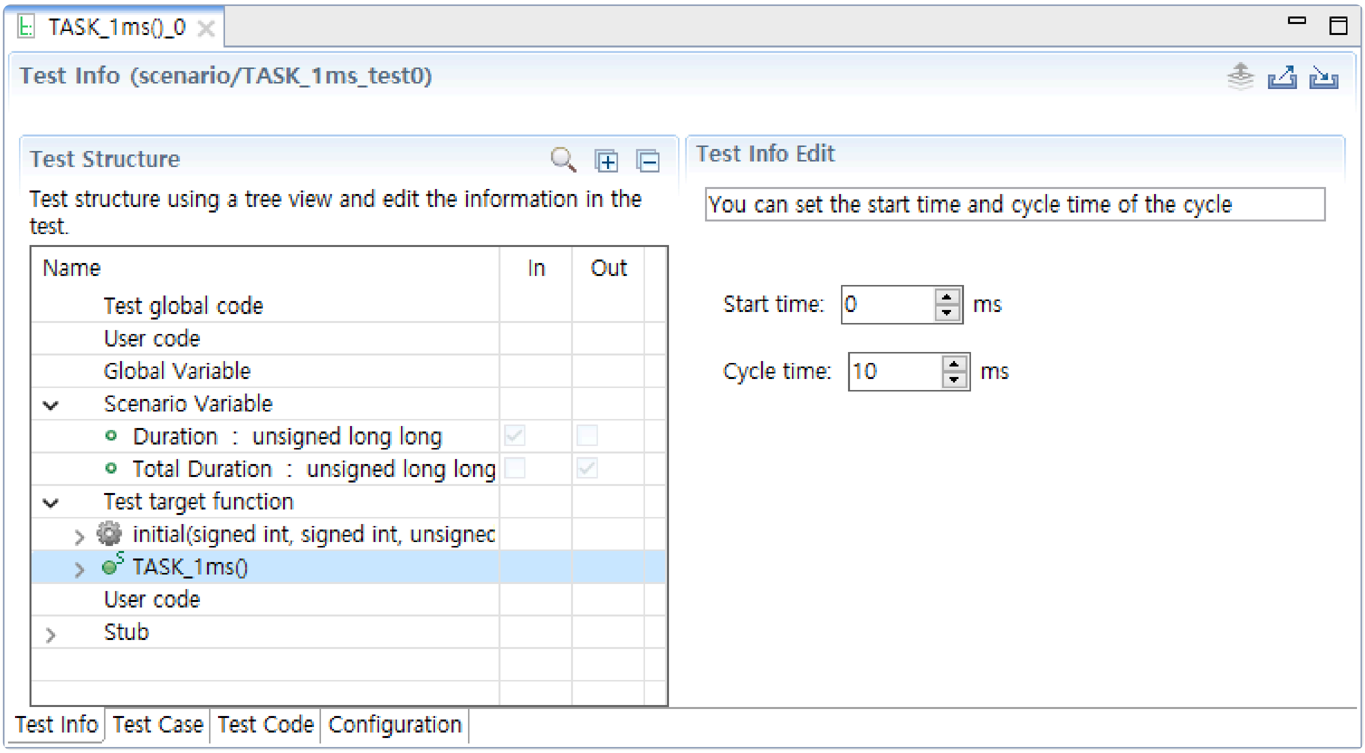


Function	Original Path
A_func()	D:₩CT_prj_code₩periodic₩task_ex₩senarioTest.c
B_func()	D:₩CT_prj_code₩periodic₩task_ex₩senarioTest.c
C_func()	D:₩CT_prj_code₩periodic₩task_ex₩senarioTest.c
D_func()	D:₩CT_prj_code₩periodic₩task_ex₩senarioTest.c
TASK_100ms()	D:₩CT_prj_code₩periodic₩task_ex₩senarioTest.c
TASK_10ms()	D:₩CT_prj_code₩periodic₩task_ex₩senarioTest.c
TASK_1ms()	D:₩CT_prj_code₩periodic₩task_ex₩senarioTest.c
TASK_200us()	D:₩CT_prj_code₩periodic₩task_ex₩senarioTest.c
func()	D:₩CT_prj_code₩periodic₩task_ex₩senarioTest.c

  - Selecting [Add initial function] displays all functions in the list.
  - Selecting [Add cycle function] shows only functions usable as cycle functions.
  - When adding a cycle function, the start time is set to 0, and the cycle time is set to 10.
- Remove
  - Deletes initial and cycle functions. Deletion is possible if there are more than two cycle functions.
- Up/Down
  - Moves initial and cycle functions up/down to change the call order.
- Set related file
  - Sets or changes the source code containing that function.

Functions

Select periodic functions to set start time and cycle time.



TASK_1ms()_0

Test Info (scenario/TASK_1ms_test0)

Test Structure

Test structure using a tree view and edit the information in the test.

Name	In	Out
Test global code		
User code		
Global Variable		
⌄ Scenario Variable		
○ Duration : unsigned long long	☑	□
○ Total Duration : unsigned long long	□	☑
⌄ Test target function		
› initial(signed int, signed int, unsignec		
› TASK_1ms()		
User code		
› Stub		

Test Info Edit

You can set the start time and cycle time of the cycle

Start time: 0 ms

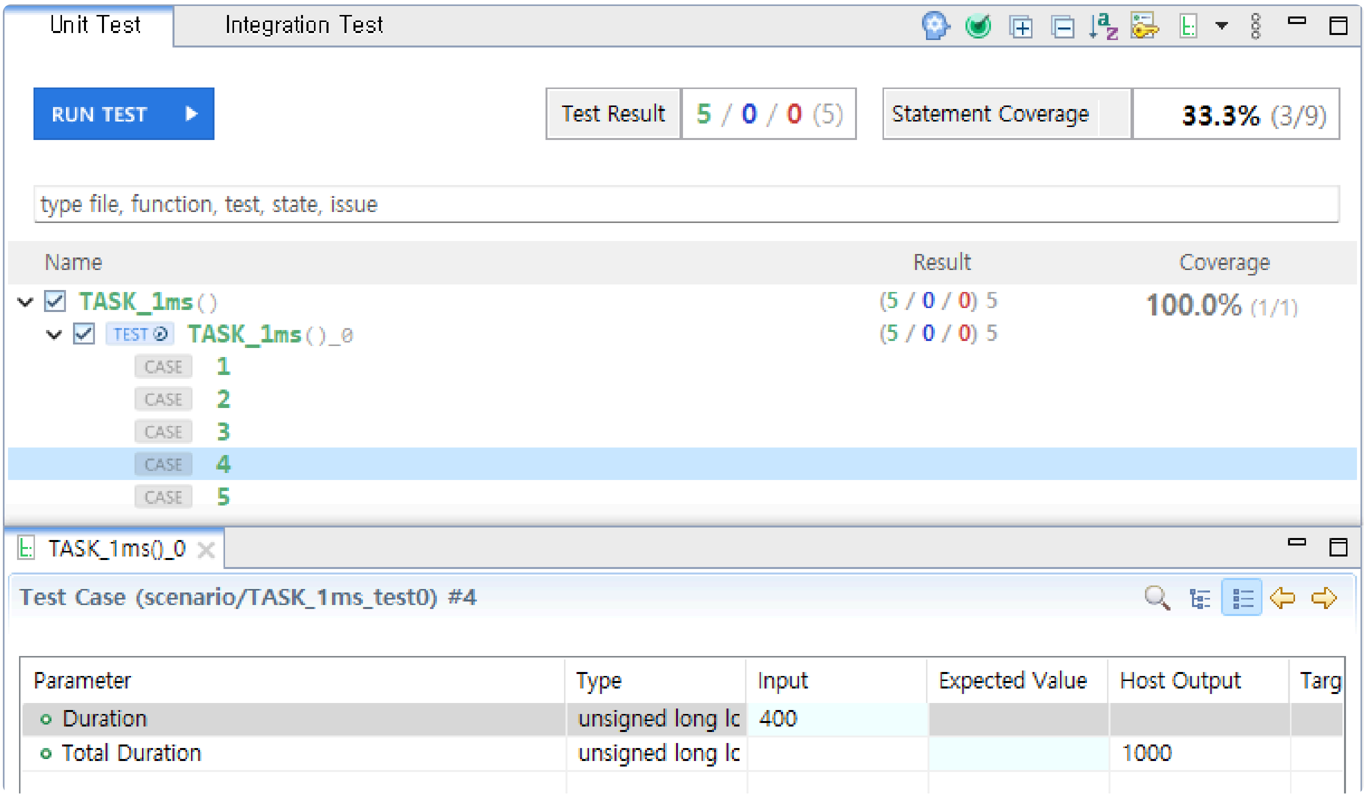
Cycle time: 10 ms

Scenario Variables

- Duration: Variable for inputting running time per test case
- Total Duration: Variable for outputting the total time that scenario test has run

Designing Scenario Tests – [Test Case] Tab

In [Test Case] tab of scenario test, you can check scenario variables. Input value per test case in [Duration], then run the test to confirm the actual execution time displayed in [Total Duration].



Test Result 5 / 0 / 0 (5)

Statement Coverage 33.3% (3/9)

type file, function, test, state, issue

Name	Result	Coverage
⌄ ☑ TASK_1ms()	(5 / 0 / 0) 5	100.0% (1/1)
⌄ ☑ TEST TASK_1ms()_0	(5 / 0 / 0) 5	
CASE 1		
CASE 2		
CASE 3		
CASE 4		
CASE 5		

TASK_1ms()_0

Test Case (scenario/TASK_1ms_test0) #4

Parameter	Type	Input	Expected Value	Host Output	Targ
○ Duration	unsigned long lc	400			
○ Total Duration	unsigned long lc			1000	

✻ For detailed information on scenario tests, please refer to the User Guide’s [Scenario Testing Usage Guide]

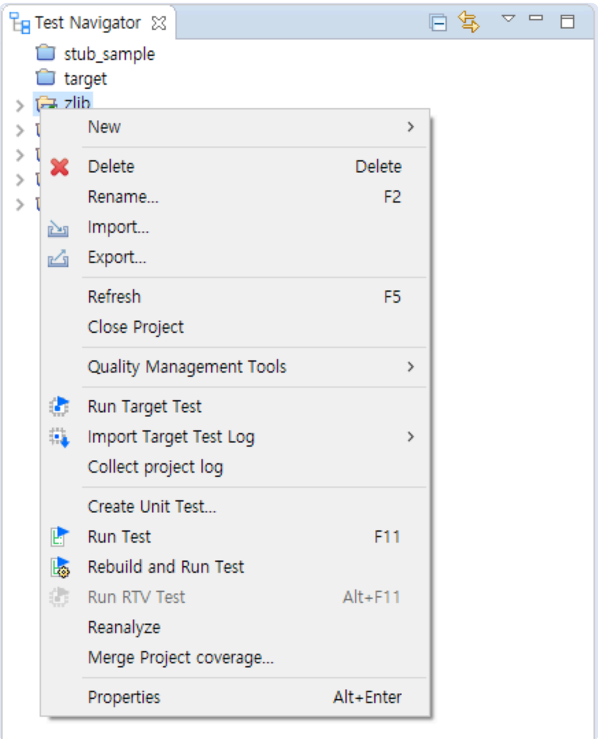
11. Test Run

Testing can be performed in a variety of ways.

Run all tests

Run the selected tests in the [Unit Test] view and [Integration Test] view.

1. Select the project to run the test, right-click ans slect [Run test]

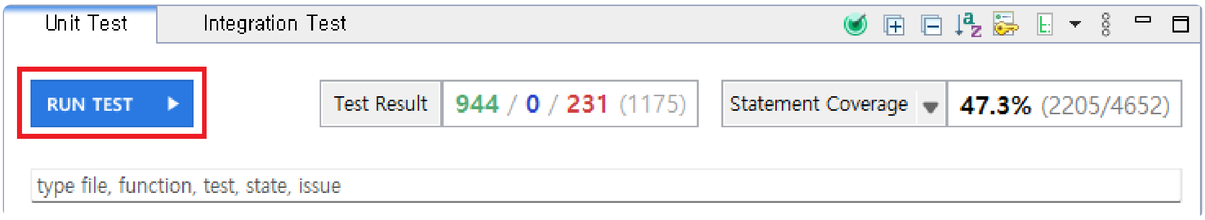


2. A progress monitor of the test opens. When the test is completed, you can check the results through each test view.

Run unit tests

Run the selected unit tests in the [Unit Test] view.

1. Click the [Run Test] button on the dashboard in the [Unit Test] view.



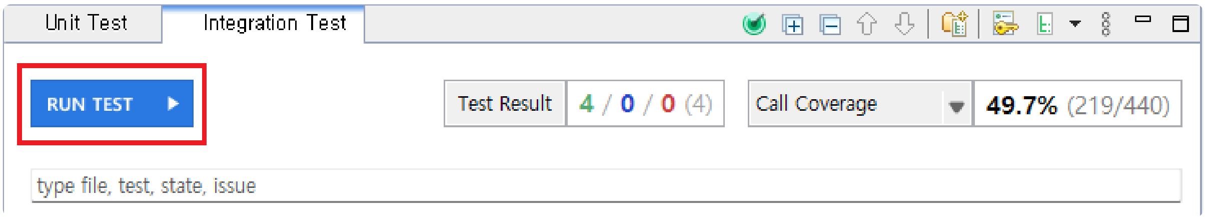
2. A progress monitor of the test opens. When the test is completed, you can check the results through each test view.

To perform only a specific test case, select the test case you want to run and right-click the mouse and click the [Run Test Case] menu.

Run integration tests

Run the selected tests in the [Integration Test] view.

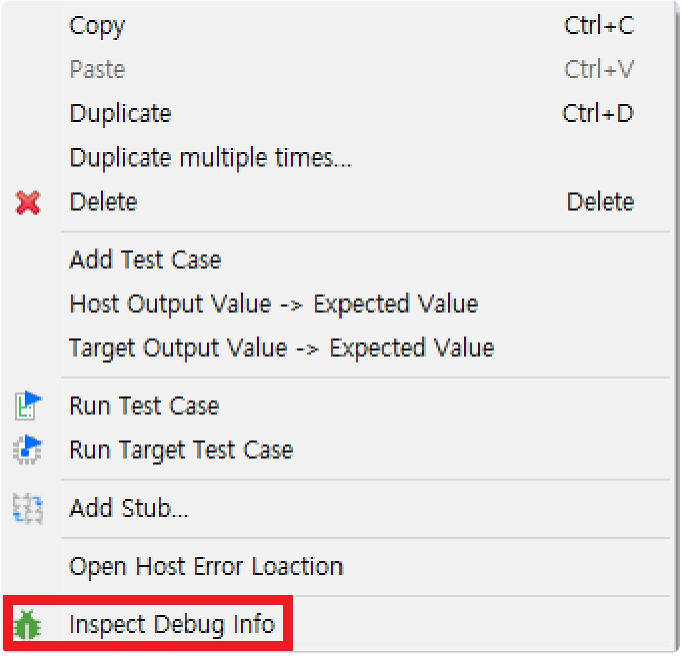
1. Click the [Run Test] button on the dashboard in the [Integration Test] view.



2. A progress monitor of the test opens. When the test is completed, you can check the results through each test view.

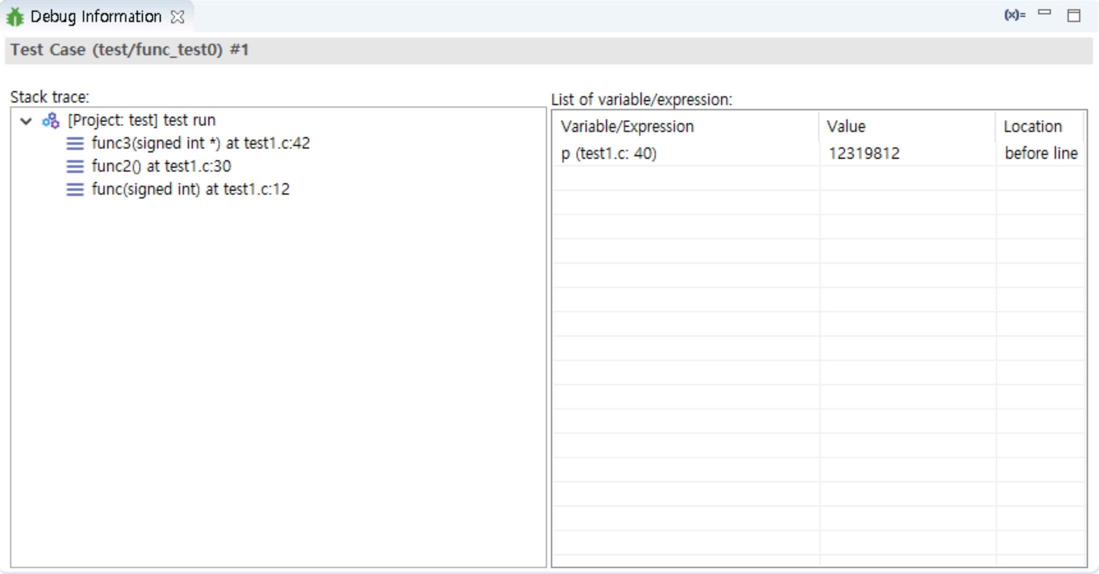
12. Inspect Debug Information

If an error occurs while running the test case, you can use the [Inspect Debug Info] function to determine the cause of the error.
[Inspect Debug Info] function can be checked in the unit test view with the context menu of the test case.



Test cases that have not been executed are automatically executed before [Check Debug Information] is performed.

When [Inspect Debug Info] is performed, debug information is displayed in the [Inspect Debug Info].



Test Case (test/func_test0) #1

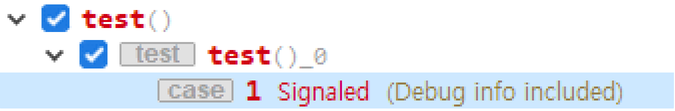
Stack trace:

```
[Project: test] test run
    func3(signed int *) at test1.c:42
    func2() at test1.c:30
    func(signed int) at test1.c:12
```

List of variable/expression:

Variable/Expression	Value	Location
p (test1.c: 40)	12319812	before line

The test case (Debug info included) is displayed in the test case where the [Inspect Debug Info] was performed.



test()

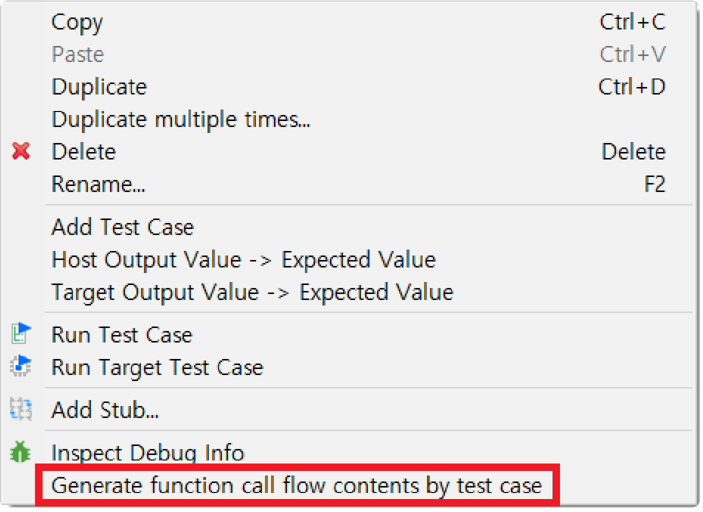
test test()_0

case 1 Signaled (Debug info included)

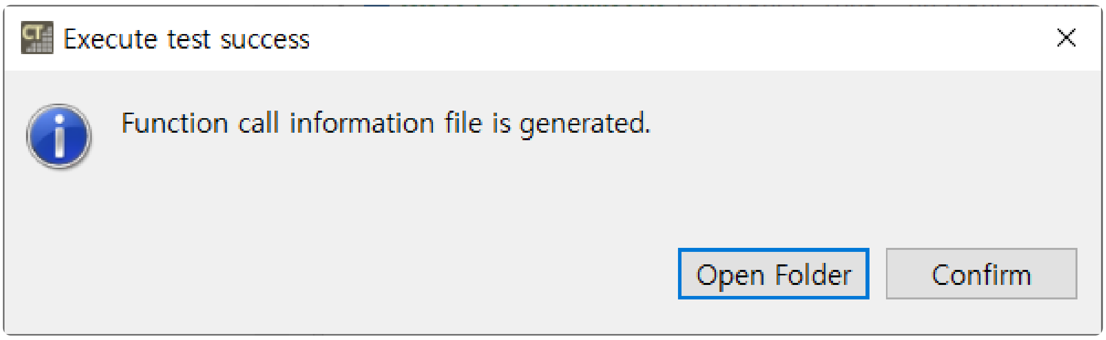
13. Generate Function Call Flow Contents

Using [Generate Function Call Flow Contents by Test case] feature, you can print the called functions sequentially when you run the test case.

1. At the Unit Test View, right-click the test case and select [Generate Function Call Flow Contents by Test case].

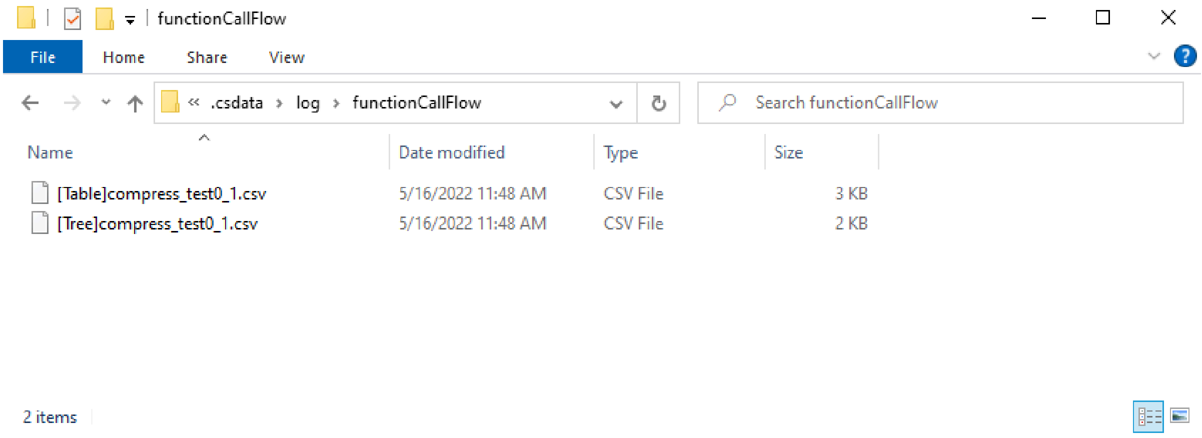

Copy Ctrl+C
Paste Ctrl+V
Duplicate Ctrl+D
Duplicate multiple times...
Delete Delete
Rename... F2
Add Test Case
Host Output Value -> Expected Value
Target Output Value -> Expected Value
Run Test Case
Run Target Test Case
Add Stub...
Inspect Debug Info
Generate function call flow contents by test case

2. When [Generate Function Call Flow Contents by Test case] is executed, the [Execute Test Success] window pops up.



Function call information file is generated.

3. Click the [Open Folder] button in [Execute Test Success] window. The directory containing the function call flow content file is opened.



Name	Date modified	Type	Size
[Table]compress_test0_1.csv	5/16/2022 11:48 AM	CSV File	3 KB
[Tree]compress_test0_1.csv	5/16/2022 11:48 AM	CSV File	2 KB

✻ The output file name is in the format of `[type]test name_test case number.csv`.

- The file includes name and parameters of the functions. There are two types in displaying function call flow.
    - Table
        - The calling relationship is displayed in two columns.
        - The caller functions are in the first column, and the callee functions are in the second column.
    - Tree
        - The function call information is displayed in multiple columns depending on the call depth.
        - The function call information is displayed on different lines if the call is located at different locations.

- If a function is consecutively called several times, calls are printed in an abbreviated way.
    - The number of calls is indicated by appending `[called # times]` after the function signature.
    - e.g., If the a function is consecutively called 5 times, `[called 5 times]` is appended to the first function signature.

Example

```
// example code
void callee() { /*doing something*/ }
void callee2() { /*doing something*/ }
void func1() { callee(); callee2(); }
void func2() { callee(); callee(); callee(); }
void caller() { func1(); func2(); }
```

- Table

caller-function	callee-function
caller()	func1()
func1()	callee()
func1()	callee2()
caller()	func2()
func2()	callee() [called 3 times]

- Tree

caller()	func1()	callee()
		callee2()
	func2()	callee() [called 3 times]

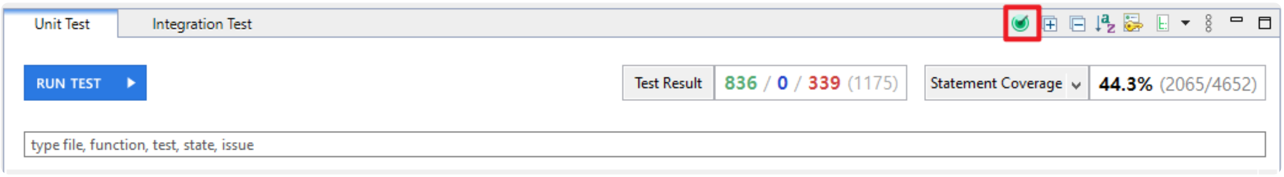
❗ Constructors, destructors, operators and functions without definition (e.g., system functions) are excluded from the output. Functions called from ternary operators or from try and catch statements may not output properly.

14. Fault Localization

Fault Localization finds the fault location from errors or failed test cases.

1. There are four methods to execute Fault Localization.

- Click the [Fault Localization] icon from the [Toolbar] in the [Test View].

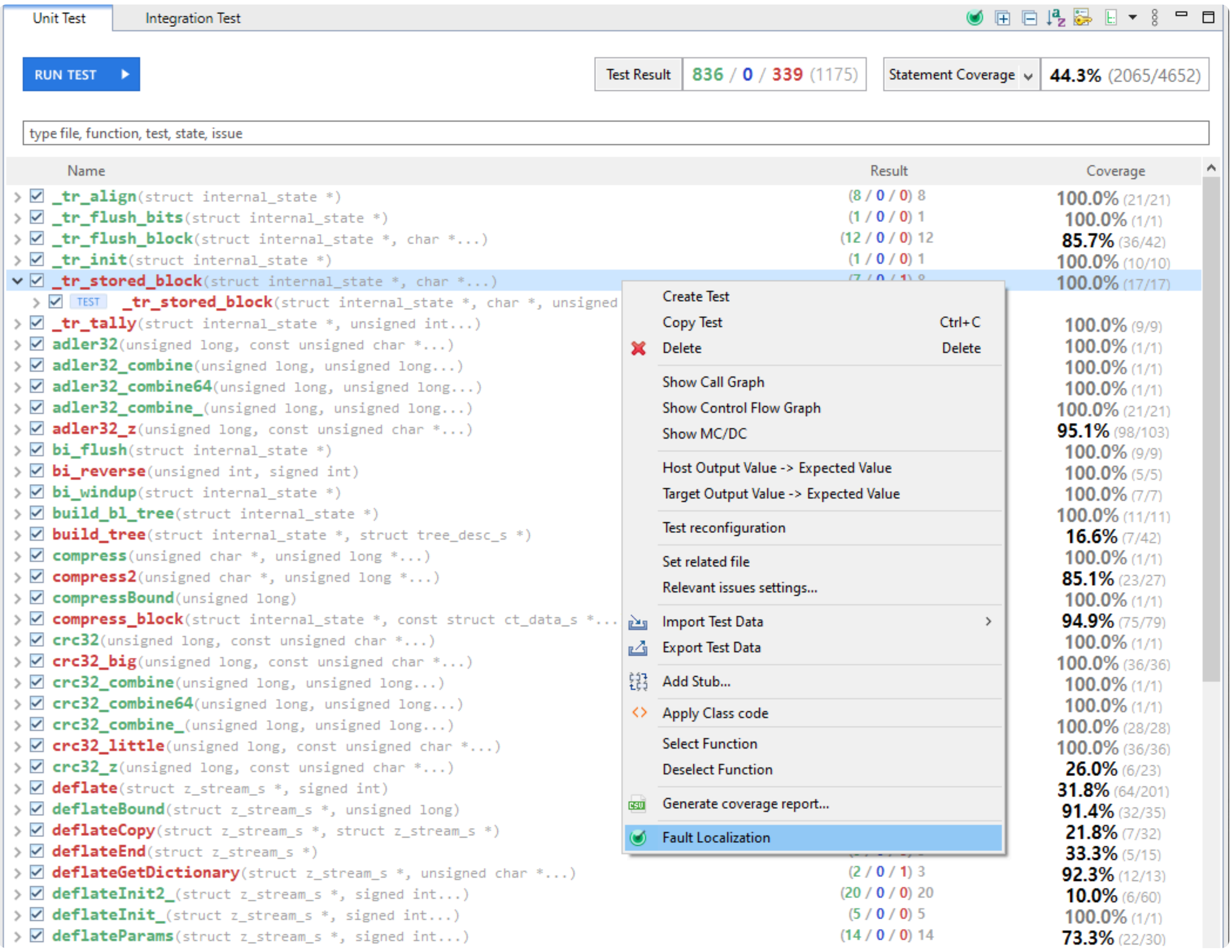


Test Result 836 / 0 / 339 (1175)

Statement Coverage 44.3% (2065/4652)

type file, function, test, state, issue

- Right-click the test function in the [Test View Area] and select [Fault Localization]



Test Result 836 / 0 / 339 (1175)

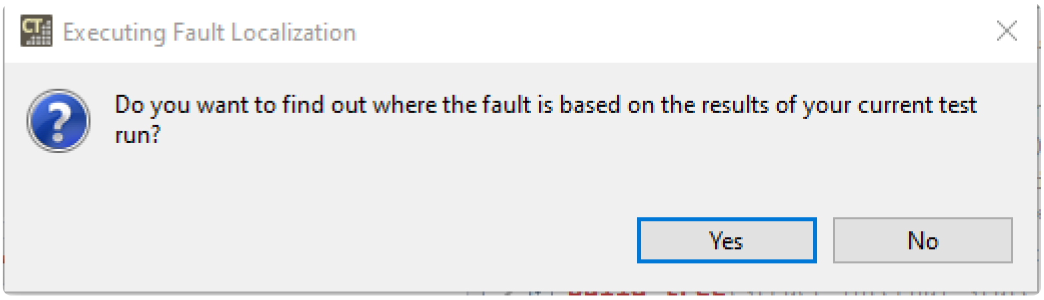
Statement Coverage 44.3% (2065/4652)

type file, function, test, state, issue

Name	Result	Coverage
☑ _tr_align(struct internal_state *)	(8 / 0 / 0) 8	100.0% (21/21)
☑ _tr_flush_bits(struct internal_state *)	(1 / 0 / 0) 1	100.0% (1/1)
☑ _tr_flush_block(struct internal_state *, char *...)	(12 / 0 / 0) 12	85.7% (36/42)
☑ _tr_init(struct internal_state *)	(1 / 0 / 0) 1	100.0% (10/10)
☑ _tr_stored_block(struct internal_state *, char *...)	(7 / 0 / 1) 8	100.0% (17/17)
☑ TEST _tr_stored_block(struct internal_state *, char *, unsigned		
☑ _tr_tally(struct internal_state *, unsigned int...)		100.0% (9/9)
☑ adler32(unsigned long, const unsigned char *...)		100.0% (1/1)
☑ adler32_combine(unsigned long, unsigned long...)		100.0% (1/1)
☑ adler32_combine64(unsigned long, unsigned long...)		100.0% (1/1)
☑ adler32_combine_(unsigned long, unsigned long...)		100.0% (21/21)
☑ adler32_z(unsigned long, const unsigned char *...)		95.1% (98/103)
☑ bi_flush(struct internal_state *)		100.0% (9/9)
☑ bi_reverse(unsigned int, signed int)		100.0% (5/5)
☑ bi_windup(struct internal_state *)		100.0% (7/7)
☑ build_bl_tree(struct internal_state *)		100.0% (11/11)
☑ build_tree(struct internal_state *, struct tree_desc_s *)		16.6% (7/42)
☑ compress(unsigned char *, unsigned long *...)		100.0% (1/1)
☑ compress2(unsigned char *, unsigned long *...)		85.1% (23/27)
☑ compressBound(unsigned long)		100.0% (1/1)
☑ compress_block(struct internal_state *, const struct ct_data_s *...		94.9% (75/79)
☑ crc32(unsigned long, const unsigned char *...)		100.0% (1/1)
☑ crc32_big(unsigned long, const unsigned char *...)		100.0% (36/36)
☑ crc32_combine(unsigned long, unsigned long...)		100.0% (1/1)
☑ crc32_combine64(unsigned long, unsigned long...)		100.0% (1/1)
☑ crc32_combine_(unsigned long, unsigned long...)		100.0% (28/28)
☑ crc32_little(unsigned long, const unsigned char *...)		100.0% (36/36)
☑ crc32_z(unsigned long, const unsigned char *...)		26.0% (6/23)
☑ deflate(struct z_stream_s *, signed int)		31.8% (64/201)
☑ deflateBound(struct z_stream_s *, unsigned long)		91.4% (32/35)
☑ deflateCopy(struct z_stream_s *, struct z_stream_s *)		21.8% (7/32)
☑ deflateEnd(struct z_stream_s *)		33.3% (5/15)
☑ deflateGetDictionary(struct z_stream_s *, unsigned char *...)	(2 / 0 / 1) 3	92.3% (12/13)
☑ deflateInit2_(struct z_stream_s *, signed int...)	(20 / 0 / 0) 20	10.0% (6/60)
☑ deflateInit_(struct z_stream_s *, signed int...)	(5 / 0 / 0) 5	100.0% (1/1)
☑ deflateParams(struct z_stream_s *, signed int...)	(14 / 0 / 0) 14	73.3% (22/30)

- Right-click the test in the [Test View Area] and select [Fault Localization]
- Right-click the test case in the [Test View Area] and select [Fault Localization].

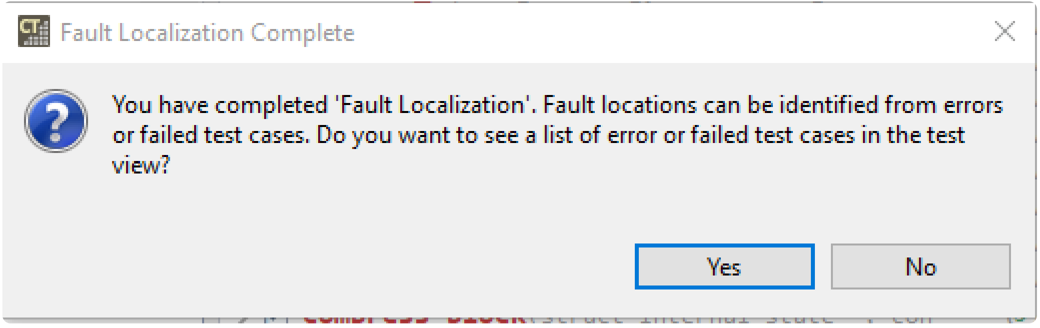
2. When you click on [Fault Localization], the [Executing Fault Localization] dialog appears. Press [Yes] to proceed Fault Localization.



Executing Fault Localization

Do you want to find out where the fault is based on the results of your current test run?

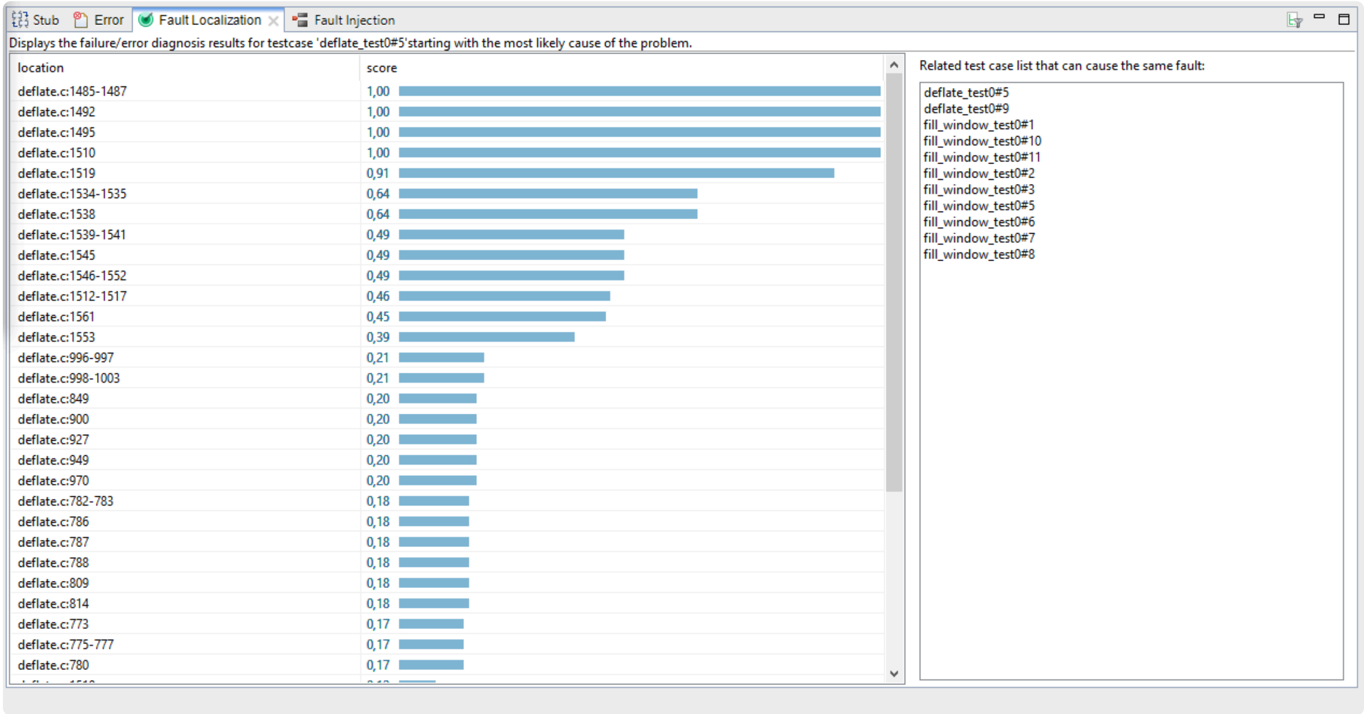
3. Once the Fault Localization is completed, the [Fault Localization Complete] dialog box appears. Press the [Yes] button to view only the failed or error cases gathered.



Fault Localization Complete

You have completed 'Fault Localization'. Fault locations can be identified from errors or failed test cases. Do you want to see a list of error or failed test cases in the test view?

4. The Fault Location View provides information about the fault locations via double clicking on the tests that fault localization performed in [Unit Test View]. The faults are sorted in descending order based on the probability of occurrence.



Displays the failure/error diagnosis results for testcase 'deflate_test0#5'starting with the most likely cause of the problem.

location	score
deflate.c:1485-1487	1,00
deflate.c:1492	1,00
deflate.c:1495	1,00
deflate.c:1510	1,00
deflate.c:1519	0,91
deflate.c:1534-1535	0,64
deflate.c:1538	0,64
deflate.c:1539-1541	0,49
deflate.c:1545	0,49
deflate.c:1546-1552	0,49
deflate.c:1512-1517	0,46
deflate.c:1561	0,45
deflate.c:1553	0,39
deflate.c:996-997	0,21
deflate.c:998-1003	0,21
deflate.c:849	0,20
deflate.c:900	0,20
deflate.c:927	0,20
deflate.c:949	0,20
deflate.c:970	0,20
deflate.c:782-783	0,18
deflate.c:786	0,18
deflate.c:787	0,18
deflate.c:788	0,18
deflate.c:809	0,18
deflate.c:814	0,18
deflate.c:773	0,17
deflate.c:775-777	0,17
deflate.c:780	0,17

Related test case list that can cause the same fault:

deflate_test0#5
deflate_test0#9
fill_window_test0#1
fill_window_test0#10
fill_window_test0#11
fill_window_test0#2
fill_window_test0#3
fill_window_test0#5
fill_window_test0#6
fill_window_test0#7
fill_window_test0#8

15. Properties

CT 2023.12 provides a page that enables to set the properties of the project, module, and source files.

The property page types are:

- Project Properties
- Module Properties
- Source File Properties

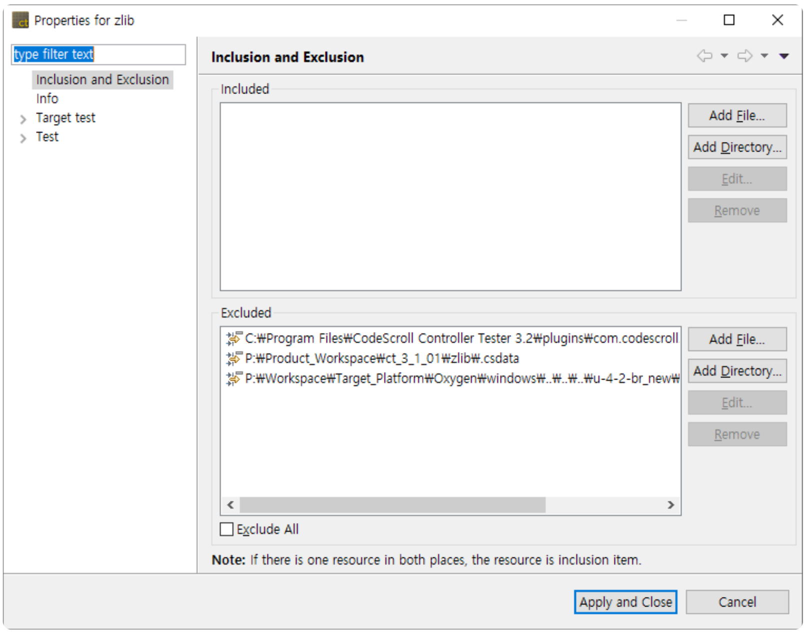
15.1. Project Properties

You can edit the properties of the created project.
Select [Project] > [Properties] from the menu or right-click the project in the Test Navigator view and click the [Properties] menu.

Inclusion and Exclusion Info

You can set what to exclude or include when analyzing the project.

> To analyze only selected directories or files, add the targets to be analyzed to [Included] and check [Exclude All].



C:₩Program Files₩CodeScroll Controller Tester 3.2₩plugins₩com.codescroll
P:₩Product_Workspace₩ct_3_1_01₩zlib₩.csdata
P:₩Workspace₩Target_Platform₩Oxygen₩windows₩..₩..₩..₩u-4-2-br_new₩

☐ Exclude All

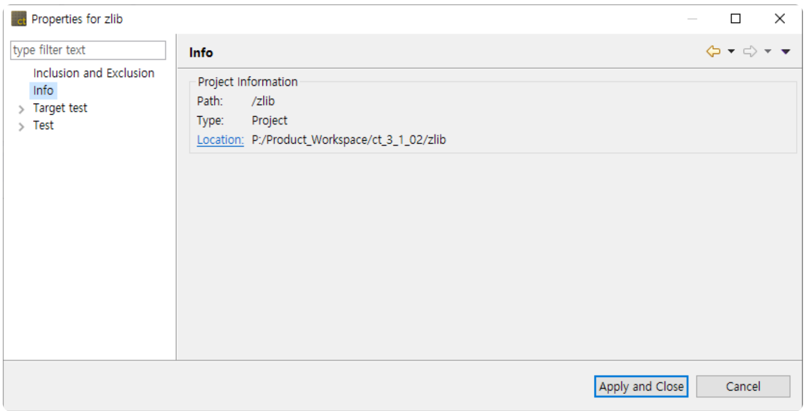
Note: If there is one resource in both places, the resource is inclusion item.

- Add targets to include in the analysis.
  1. Click the [Add File] or [Add Directory] button.
  2. Select files or a directory to analyze.
  3. Click the [Open] or [OK] button.

- Add targets to exclude from the analysis.
  1. Click the [Add File] or [Add Directory] button.
  2. Select files or a directory to exclude from the analysis.
  3. Click the [Open] or [OK] button.

Info

Shows brief information(path, type, location) about the project.



Project Information

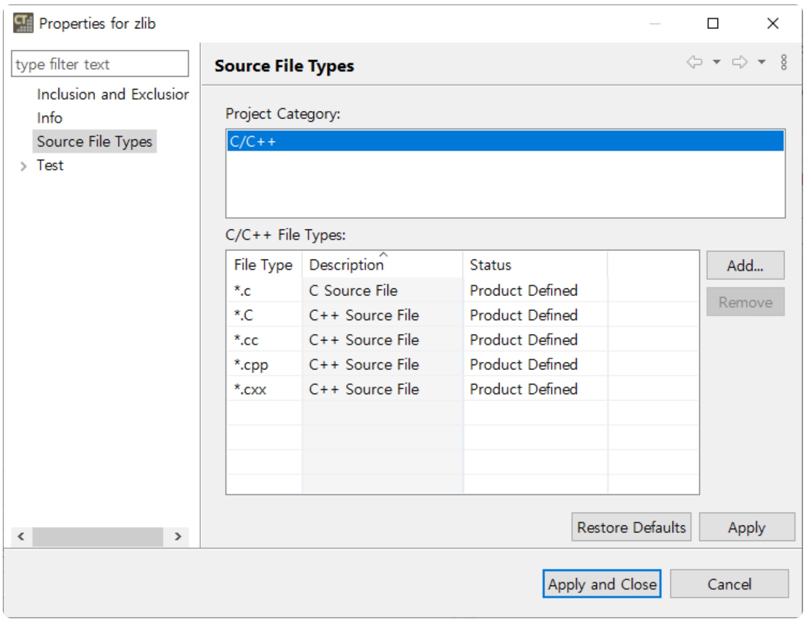
Path: /zlib

Type: Project

Location: P:/Product_Workspace/ct_3_1_02/zlib

Source File Types

You can define source file types of the project.



Project Category:

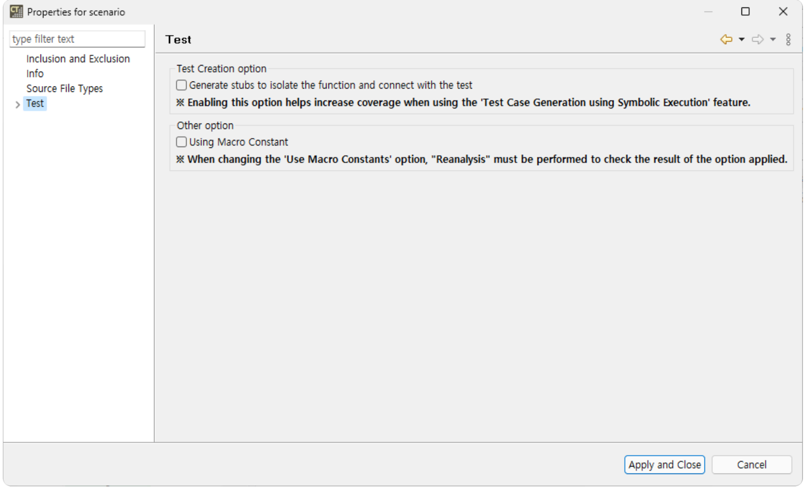
C/C++

C/C++ File Types:

File Type	Description	Status
*.c	C Source File	Product Defined
*.C	C++ Source File	Product Defined
*.cc	C++ Source File	Product Defined
*.cpp	C++ Source File	Product Defined
*.cxx	C++ Source File	Product Defined

Test

You can set test-related options.



Test Creation option

□ Generate stubs to isolate the function and connect with the test

※ Enabling this option helps increase coverage when using the 'Test Case Generation using Symbolic Execution' feature.

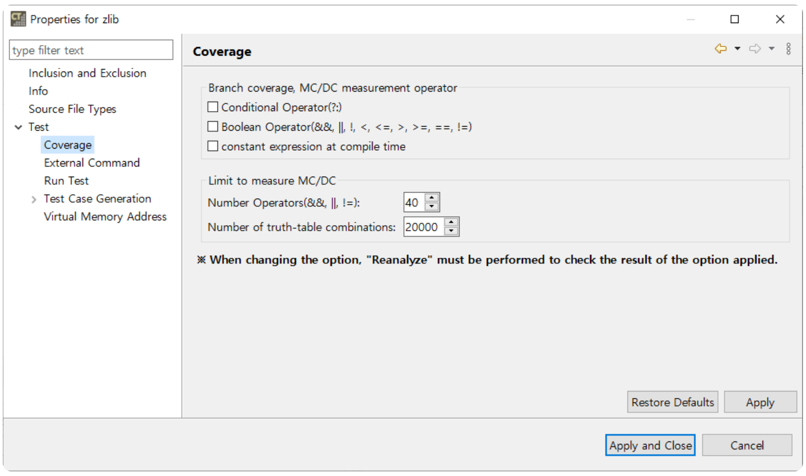
Other option

□ Using Macro Constant

※ When changing the 'Use Macro Constants' option, "Reanalysis" must be performed to check the result of the option applied.

Coverage

You can set the coverage options.



Branch coverage, MC/DC measurement operator

□ Conditional Operator(?:)

□ Boolean Operator(&&, ||, !, <, <=, >, >=, ==, !=)

□ constant expression at compile time

Limit to measure MC/DC

Number Operators(&&, ||, !=): 40

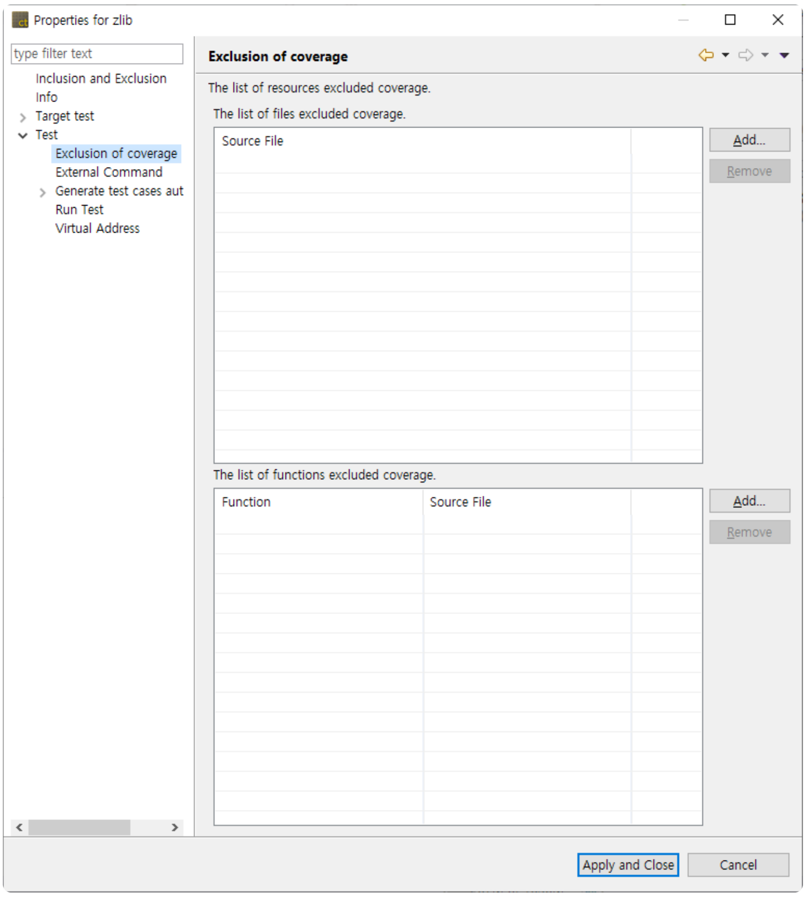
Number of truth-table combinations: 20000

※ When changing the option, "Reanalyze" must be performed to check the result of the option applied.

For detailed information about the options, please refer to the Coverage tab in the Configuration > Test page.

Coverage Exclusion

You can set coverage exclusions on a per-file or per-function basis.
You can see that the coverage of the excluded function is excluded from the coverage results obtained by running the test.



The list of resources excluded coverage.

The list of files excluded coverage.

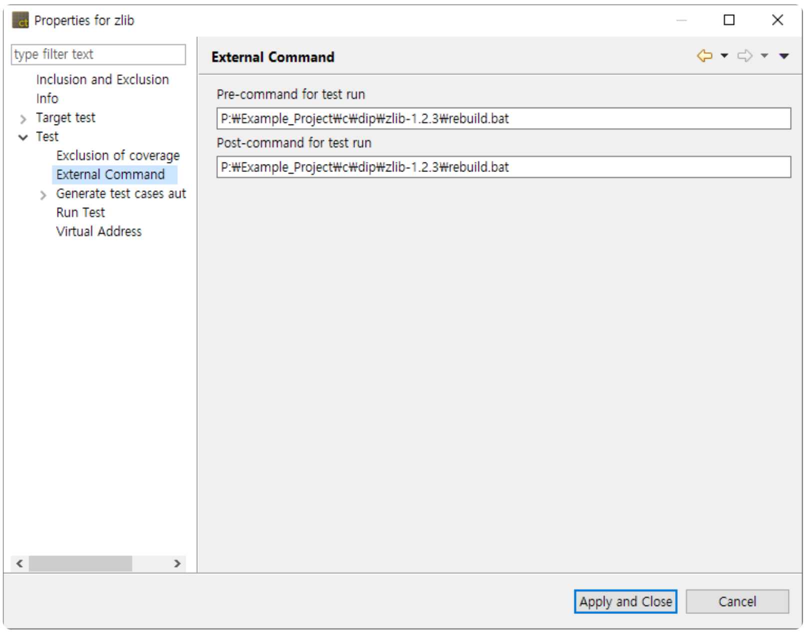
Source File

The list of functions excluded coverage.

Function	Source File

External Command

You can enter external commands to run before or after the test run.
In [Pre-command for test run], you can enter a command or batch file to execute an external command before running the test.
In [Post-command for test run], you can enter a command or batch file to execute an external command after running the test.

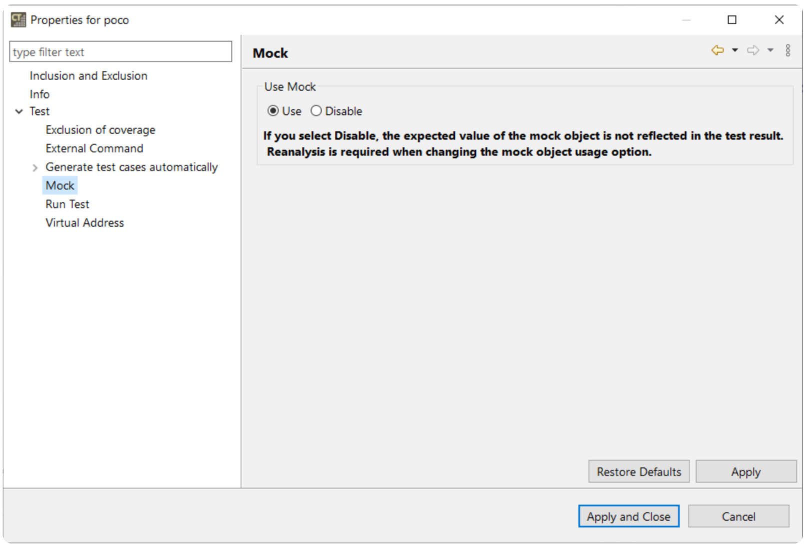


Pre-command for test run: P:₩Example_Project₩c₩dip₩zlib-1.2.3₩rebuild.bat

Post-command for test run: P:₩Example_Project₩c₩dip₩zlib-1.2.3₩rebuild.bat

Mock Object

For C++ project, you can select an option to use mock objects. [Use] is selected by default for toolchains(GCC 6.0 or later, Visual Studio 2015 or later) that can use mock objects.



Use Mock

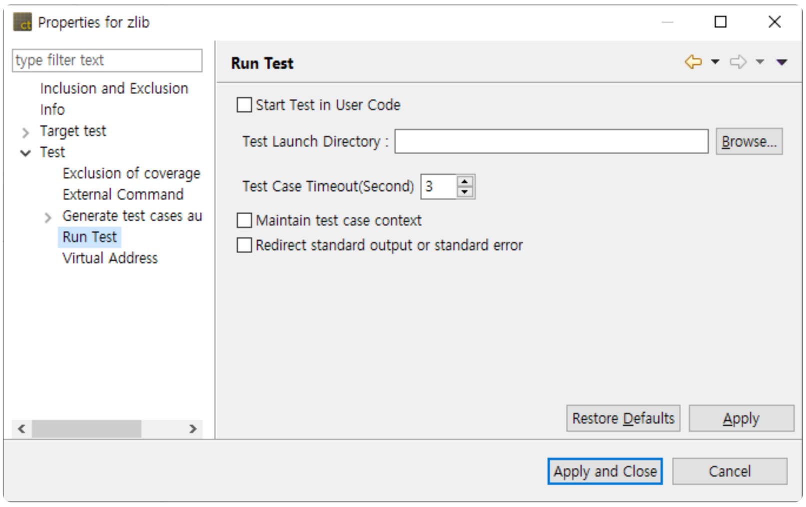
● Use ○ Disable

If you select Disable, the expected value of the mock object is not reflected in the test result. Reanalysis is required when changing the mock object usage option.

Run Test

Set the generated tests to run in a user-specified directory, not in a workspace. In this case, you do not need to copy the library or header files used by the target under test to the workspace or change the link settings.

Click the [Start Test in User Code] checkbox.
Select the home directory to run the test and click the [Apply] button.



Run Test

□ Start Test in User Code

Test Launch Directory : [Browse...]

Test Case Timeout(Second) 3

□ Maintain test case context

□ Redirect standard output or standard error

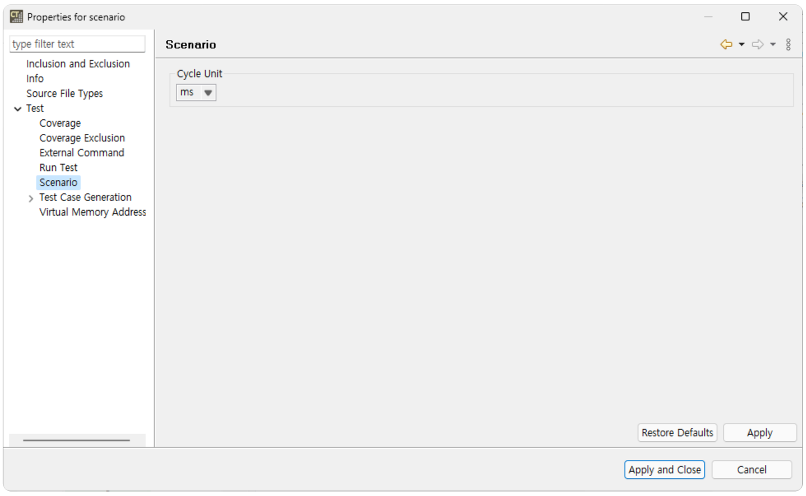
[Test Case Timeout] Set the time to be used as the timeout judgment when executing the test case. If the test execution time exceeds the test case timeout time, the test for that test case ends and the result is reported as a timeout.

[Maintain test case context] is a feature that performs all test cases with one launcher. The previous test execution result (static, global variable) is maintained during the test, and each test case result value does not appear independently. This makes the relationship between the test case result values clear.

[Redirect standard output or standard error] is a feature to record standard output and standard error in the log file for each test case.

Scenario

You can set the default cycle unit used in scenario tests for C projects.



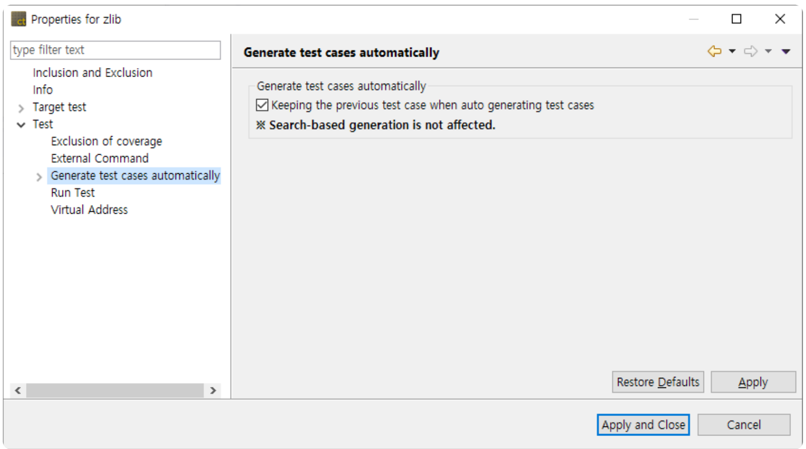
Scenario

Cycle Unit

ms

Test Case Generation

You can set to keep previous test cases when automatically generating test cases.



Generate test cases automatically

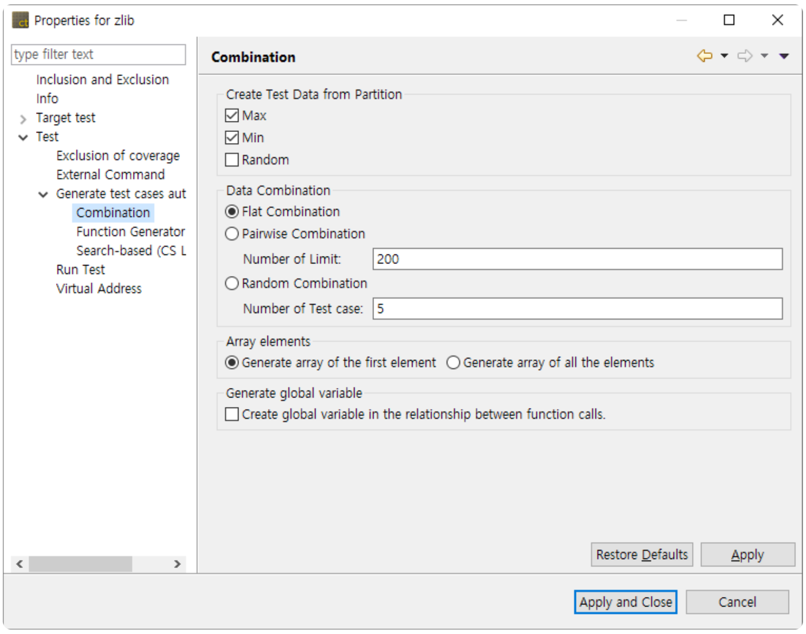
Generate test cases automatically

☑ Keeping the previous test case when auto generating test cases

※ Search-based generation is not affected.

Combination

You can set up how to extract test data if the variable partition is range.



Combination

Create Test Data from Partition

☑ Max

☑ Min

☐ Random

Data Combination

● Flat Combination

○ Pairwise Combination

Number of Limit: 200

○ Random Combination

Number of Test case: 5

Array elements

● Generate array of the first element ○ Generate array of all the elements

Generate global variable

☐ Create global variable in the relationship between function calls.

Select the desired test data extraction method by checking the checkbox. The meaning of each value is as follows.

Method	Description
Max value	Selects the maximum value of the partition section.
Min value	Selects the minimum value of the partition section.
Random value	Selects a random value among partition sections.

You can select multiple test methods of data extraction.
When all are unchecked, the default is automatically set to the maximum and minimum values.

[Data combination] supports Flat, Pairwise and Random. The meaning of the combination is shown in the following table.

Combination	Description
Flat	Combines simply based on variables having the largest number of test data.
Pairwise	Combines so that each selected parameter data is paired at least once with the parameter data other than itself. Pairwise is performed as many as the maximum number(default 200) of symbols used for the combination, and when the number of symbols is exceeded, Flat is performed.
Random	Combines the test data as many as the number of test cases that the user defines any value between the minimum value and the maximum value for the variable partition of input parameters(default 5).

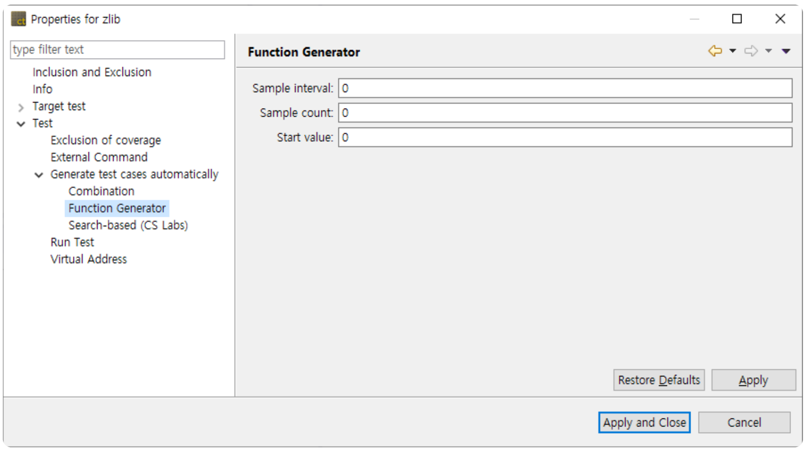
[Array elements] is a feature to select how to generate test data for each array element.

Method	Description
Generate an array of the first element	Creates only the first element regardless of the array size.
Generate an array of all the elements	Creates elements as much as the array size.

When creating a test, global variable creation is an option to create all global variables used by all functions called from the function under test.

Function Generator

When using the function generator to automatically generate test cases, specify common setting values that each function has in common.



Function Generator

Sample interval: 0

Sample count: 0

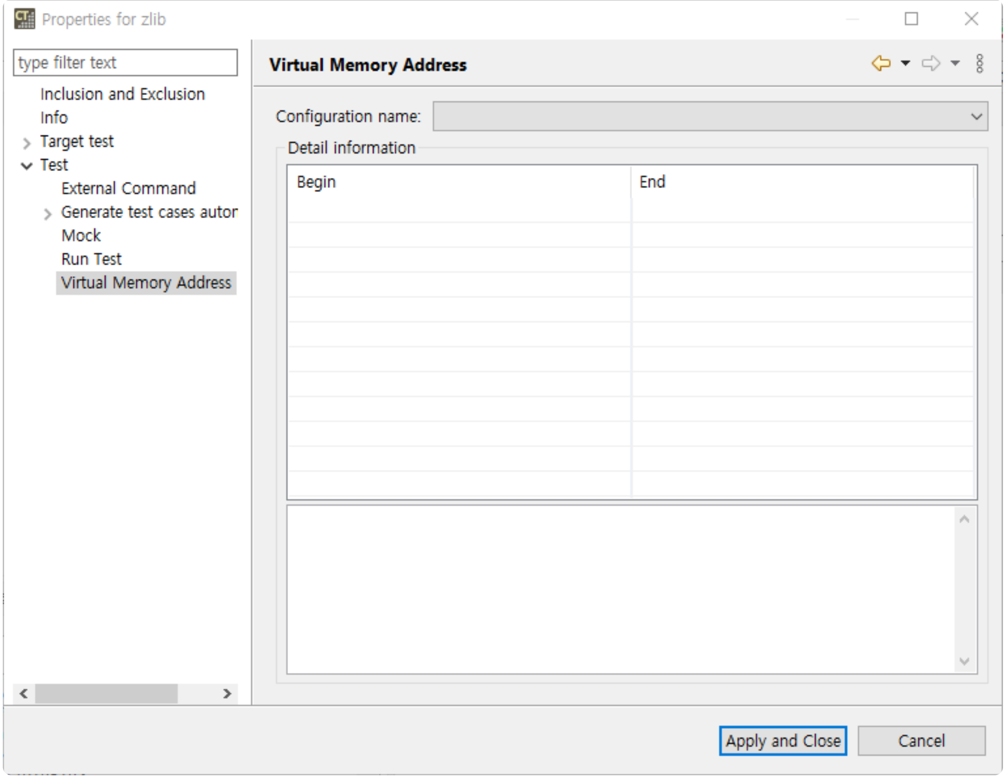
Start value: 0

Option	Description
Sample interval	Interval of samples when sampling from function
Sample count	Number of samples when sampling from function (Number of test cases)

Start value	Default value at which the function starts, and generates a value based on the value

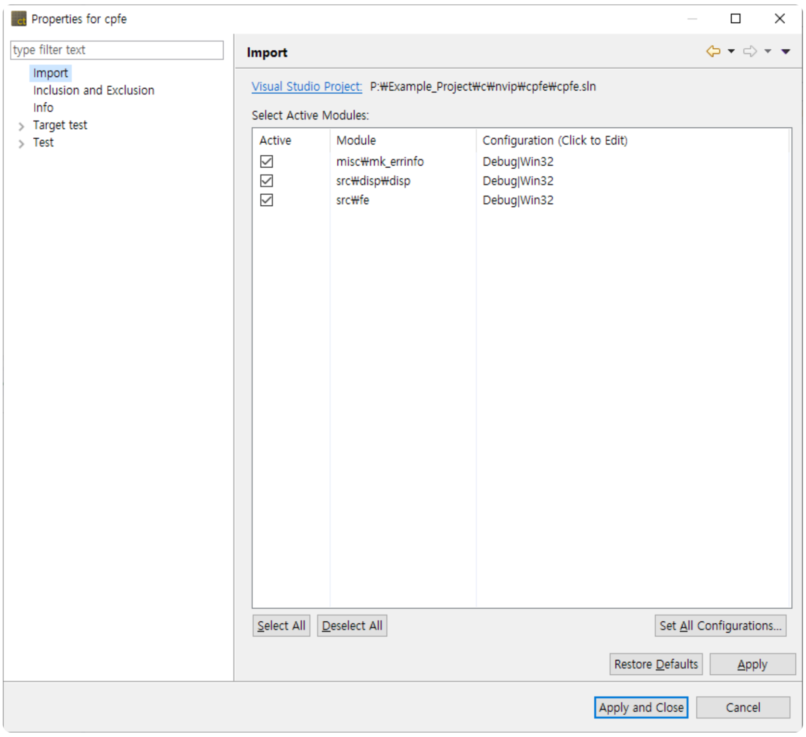
Virtual Memory Address

You can select a memory setting managed by the Virtual Memory Address preference.
If the toolchain of the project cannot use virtual memory (e.g., host toolchain), a warning will be displayed.



Import settings

Project created by Visual Studio project



Visual Studio Project: P:₩Example_Project₩c₩nvip₩cpfe₩cpfe.sln

Select Active Modules:

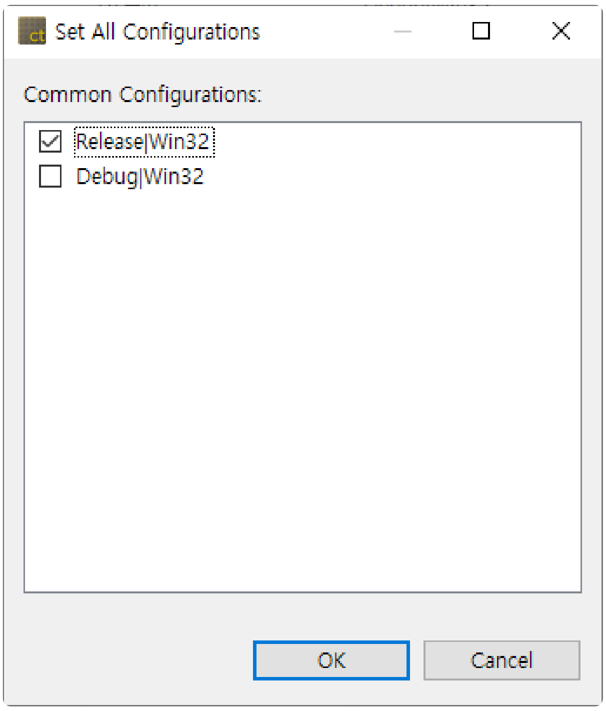
Active	Module	Configuration (Click to Edit)
☑	misc₩mk_errinfo	Debug|Win32
☑	src₩disp₩disp	Debug|Win32
☑	src₩fe	Debug|Win32

You can see the path of the Visual Studio project used for creating the project and the modules active in the selected project.

You can change whether each module is active or not and the configuration.

You can change the configuration of all modules collectively through the [Set All Configurations] menu.

1. If you click the [Set All Configurations] button, a dialog box where you can select one of the configurations common to all modules opens.



Common Configurations:

☑ Release|Win32

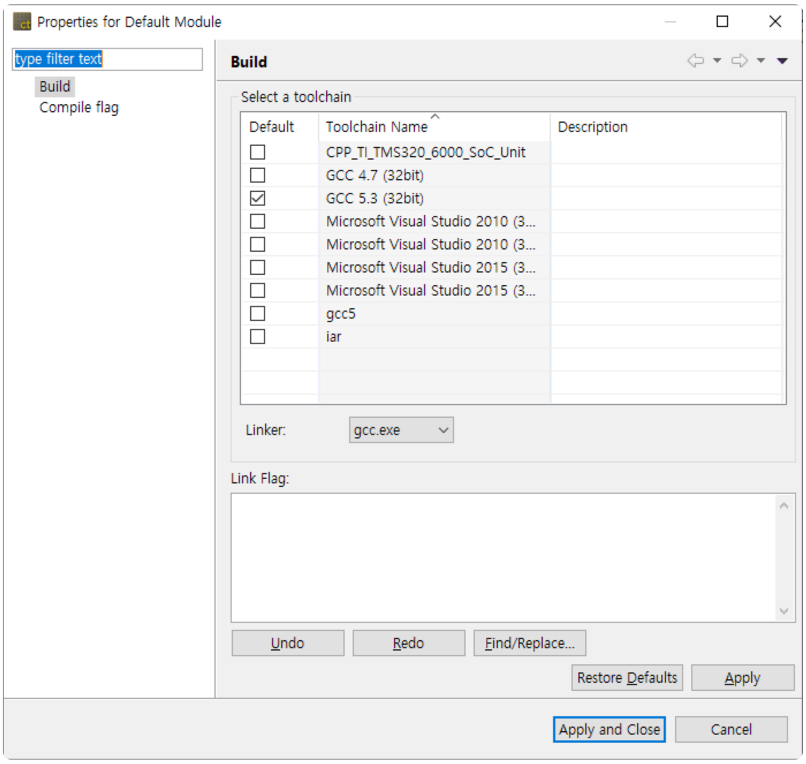
□ Debug|Win32

2. Select the configuration to be applied to all modules in common and click the [OK] button.

15.2. Module Properties

Build

You can set toolchain related information (toolchain, linker) and link flags for the module. Changing the toolchain also changes the toolchain set in all source files under the module.



Select a toolchain

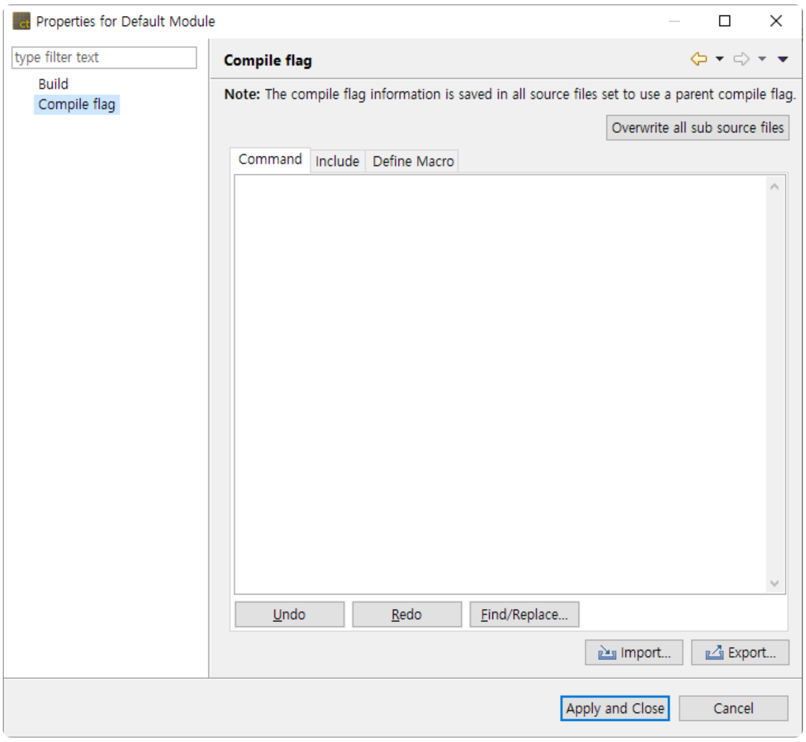
Default	Toolchain Name	Description
□	CPP_TI_TMS320_6000_SoC_Unit	
□	GCC 4.7 (32bit)	
☑	GCC 5.3 (32bit)	
□	Microsoft Visual Studio 2010 (3...	
□	Microsoft Visual Studio 2010 (3...	
□	Microsoft Visual Studio 2015 (3...	
□	Microsoft Visual Studio 2015 (3...	
□	gcc5	
□	iar	

Linker: gcc.exe

Link Flag:

Compile flag

You can set compile flag information for that module.



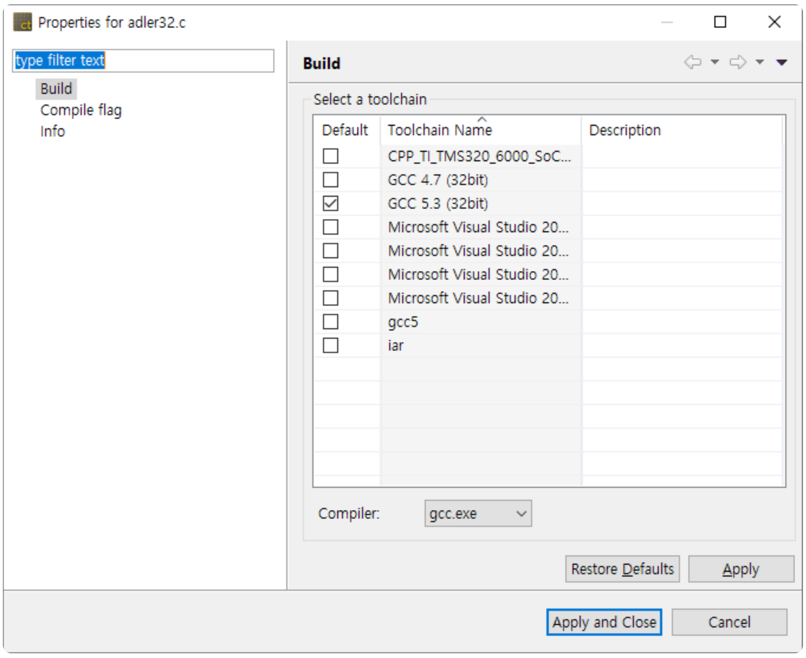
Note: The compile flag information is saved in all source files set to use a parent compile flag.

- Enter compile flags in [Command] tab. [Include] tab and [Define Macro] tab help to enter compile flags easily.
- [Overwrite all sub source files] overwrites the compile flag entered to all source files under the module.
- [Import] imports an external compile flag. [Export] saves the current compile flag externally.
  - Import
    1. Click the [Import] button.
    2. Select the file (.cf file) which has compile flags from the file open dialog.
  - Export
    1. Click the [Export] button.
    2. In the save dialog, enter the name and location of the file to enter the compile flag and save.

15.3. Source File Properties

Build

You can set toolchain related information (toolchain, compiler) for the source file.



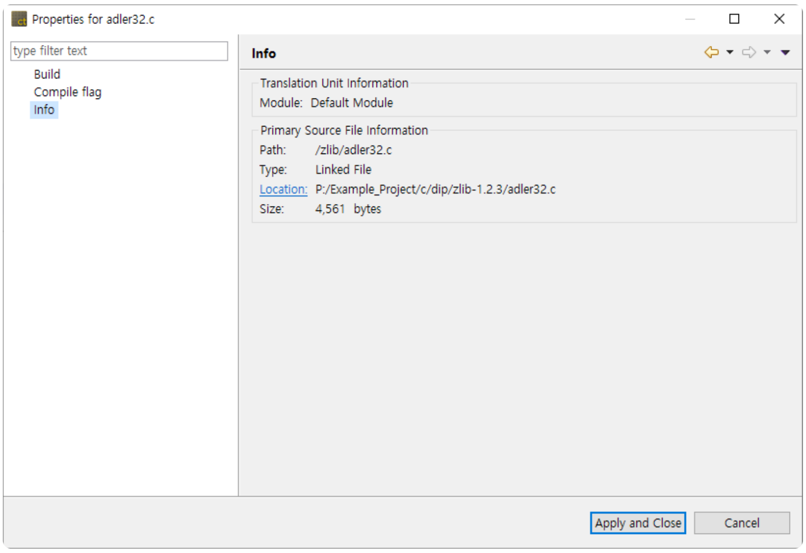
Select a toolchain

Default	Toolchain Name	Description
□	CPP_TI_TMS320_6000_SoC...	
□	GCC 4.7 (32bit)	
☑	GCC 5.3 (32bit)	
□	Microsoft Visual Studio 20...	
□	Microsoft Visual Studio 20...	
□	Microsoft Visual Studio 20...	
□	Microsoft Visual Studio 20...	
□	gcc5	
□	iar	

Compiler: gcc.exe

Info

Shows the information of the source file and the module containing the source file.

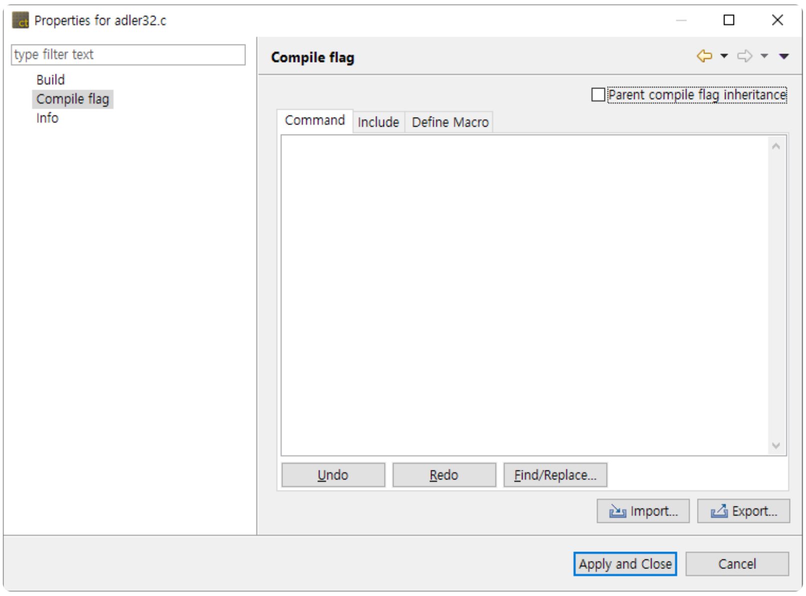


Translation Unit Information
Module: Default Module

Primary Source File Information
Path: /zlib/adler32.c
Type: Linked File
Location: P:/Example_Project/c/dip/zlib-1.2.3/adler32.c
Size: 4,561 bytes

Compile flag

You can set compile flags for source files.



- If you check the [Parent compile flag inheritance] checkbox, the compile flag of the module containing the source file is applied. Conversely, you can change the current compile flag information by unchecking the checkbox.
- [Import] imports an external compile flag. [Export] saves the current compile flag externally.
    - Import
        1. Click the [Import] button.
        2. Select the file (.cf file) which has compile flags from the file open dialog.
    - Export
        1. Click the [Export] button.
        2. In the save dialog, enter the name and location of the file to enter the compile flag and save.

16. Preferences

In the preference menu, you can check or change the current settings of the tool.

The preferences provided by CT 2023.12 are as follows.

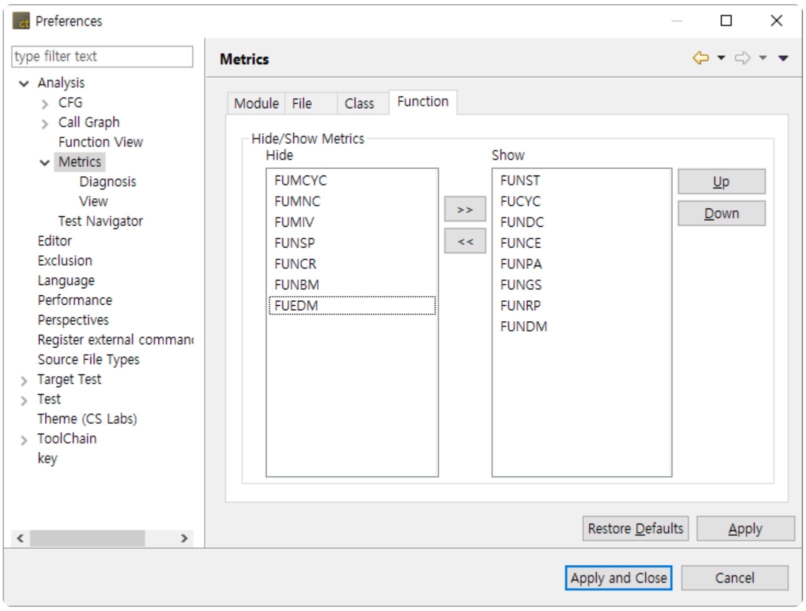
- Analysis
- Exclusion
- Performance
- Source File Types
- Language
- Test
- Toochain
- Editor

16.1. Analysis

You can check or change the settings related to the analysis.

Metric

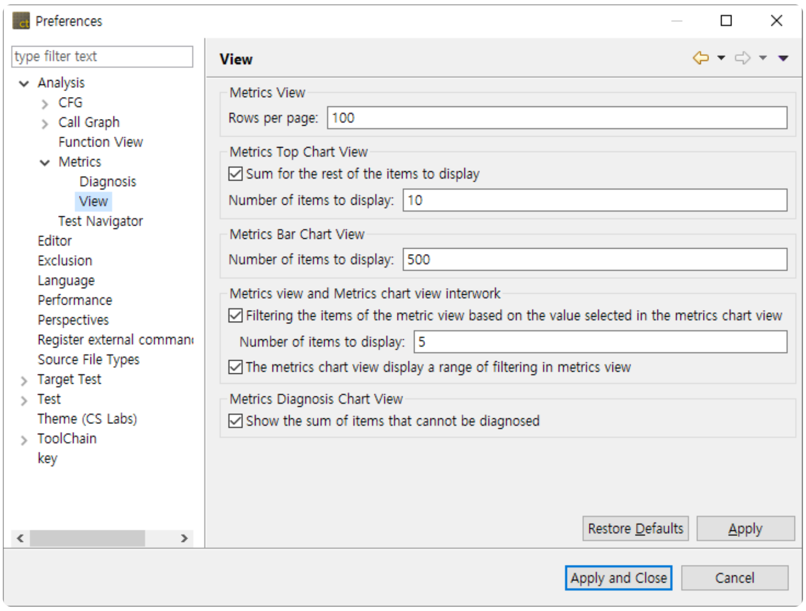
For any view showing metric data, you can set which metrics are visible or hidden and the order in which they are displayed.
The name of the selected metric is displayed as a tooltip message.



After selecting a metric, you can move to the ‘Hide’ list or the ‘Show’ list with the [>>] or [<<] button.
After selecting a metric in the ‘Show’ list, you can change the order in which the metrics are displayed with the [Up] or [Down] button.

Metrics View

You can change the settings of the views showing metric data.



View

Metrics View
Rows per page: 100

Metrics Top Chart View
☑ Sum for the rest of the items to display
Number of items to display: 10

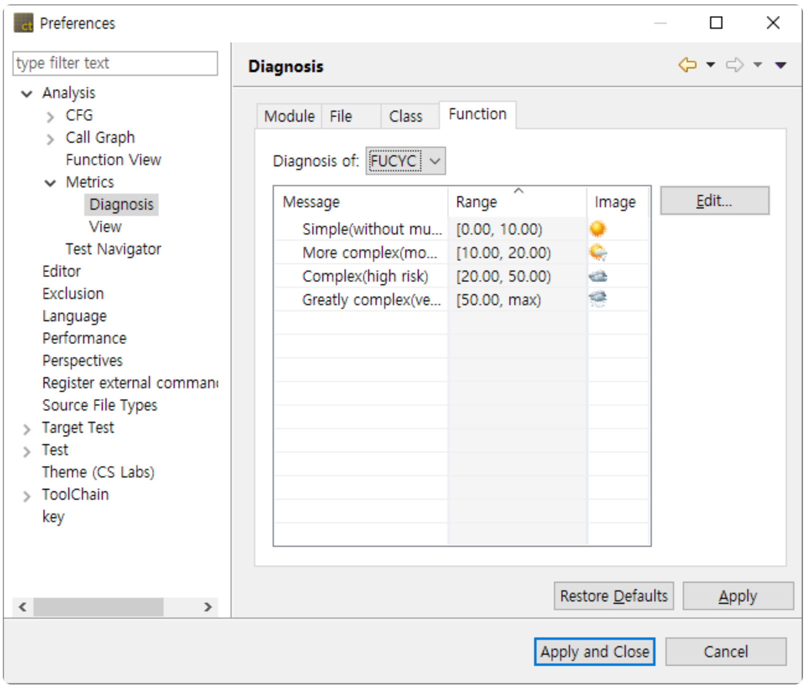
Metrics Bar Chart View
Number of items to display: 500

Metrics view and Metrics chart view interwork
☑ Filtering the items of the metric view based on the value selected in the metrics chart view
Number of items to display: 5
☑ The metrics chart view display a range of filtering in metrics view

Metrics Diagnosis Chart View
☑ Show the sum of items that cannot be diagnosed

Diagnosis

You can check or set diagnostic information for metrics.
Set the message and diagnostic image (shown in the metrics view) to be displayed when the selected metric value is included in each range.

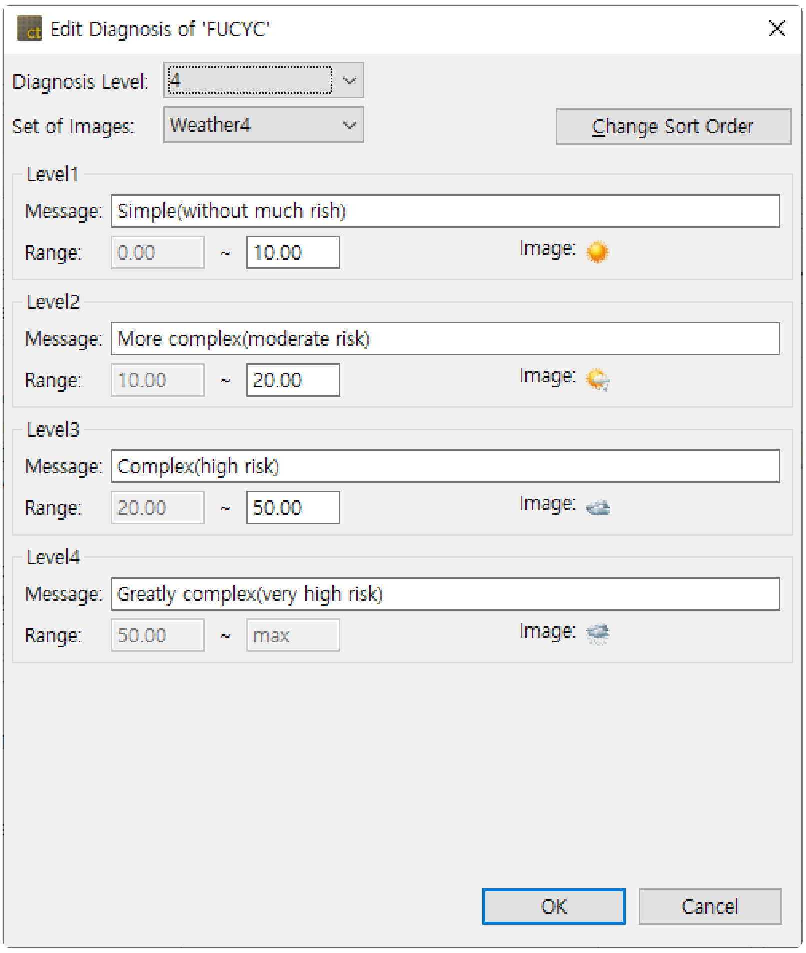


Diagnosis

Diagnosis of: FUCYC

Message	Range	Image
Simple(without mu...	[0.00, 10.00)	☀
More complex(mo...	[10.00, 20.00)	⛅
Complex(high risk)	[20.00, 50.00)	☁
Greatly complex(ve...	[50.00, max)	🌧

To edit the diagnostic information, click the [Edit] button.
A dialog box appears where you can edit the diagnostic information for the selected metric.



Edit Diagnosis of 'FUCYC'

Diagnosis Level: 4

Set of Images: Weather4

Level1

Message: Simple(without much rish)

Range: 0.00 ~ 10.00 Image:

Level2

Message: More complex(moderate risk)

Range: 10.00 ~ 20.00 Image:

Level3

Message: Complex(high risk)

Range: 20.00 ~ 50.00 Image:

Level4

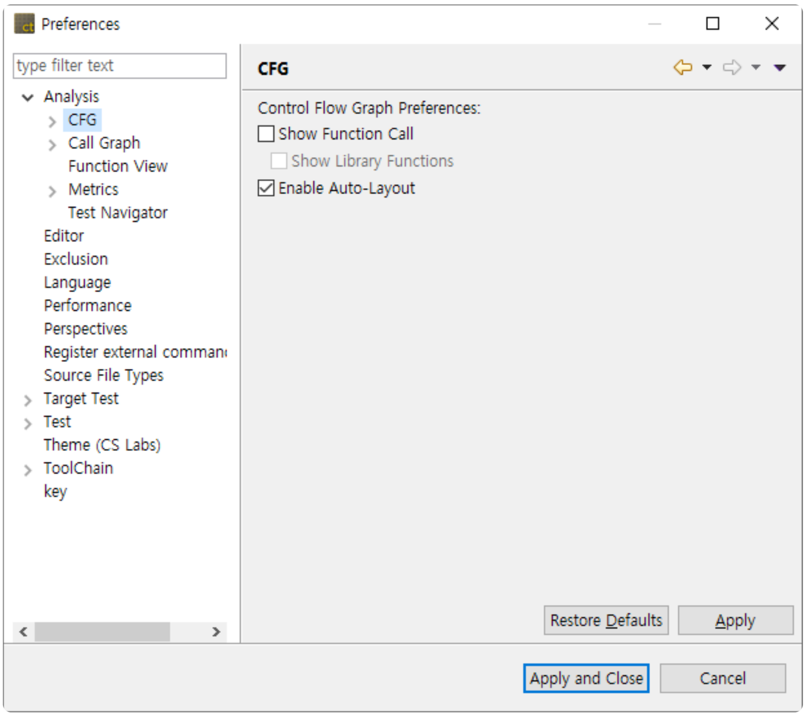
Message: Greatly complex(very high risk)

Range: 50.00 ~ max Image:

1. Set the diagnostic stage (2 ~ 5).
2. Sets the diagnostic image to show in the metrics view.
3. Press the [Change Sort Order] button to change the sort order of diagnostic images.
4. Enter the diagnostic message and diagnostic range for each step.
5. Select the [OK] button.

CFG

You can change the settings for the control flow graph displayed in the control flow graph view.



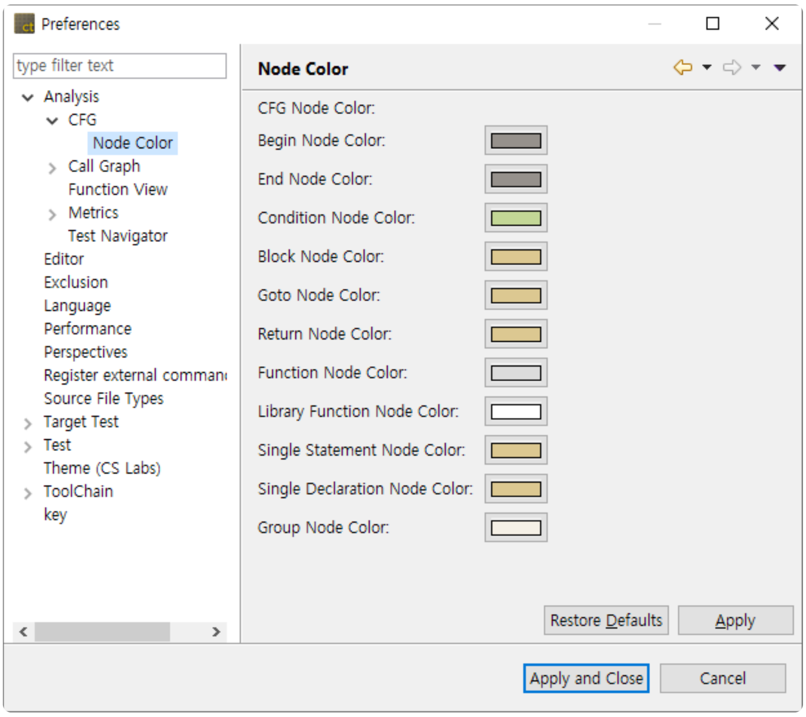
CFG

Control Flow Graph Preferences:

- ☐ Show Function Call
- ☐ Show Library Functions
- ☑ Enable Auto-Layout

Node Color

You can change the color of nodes in the control flow graph.



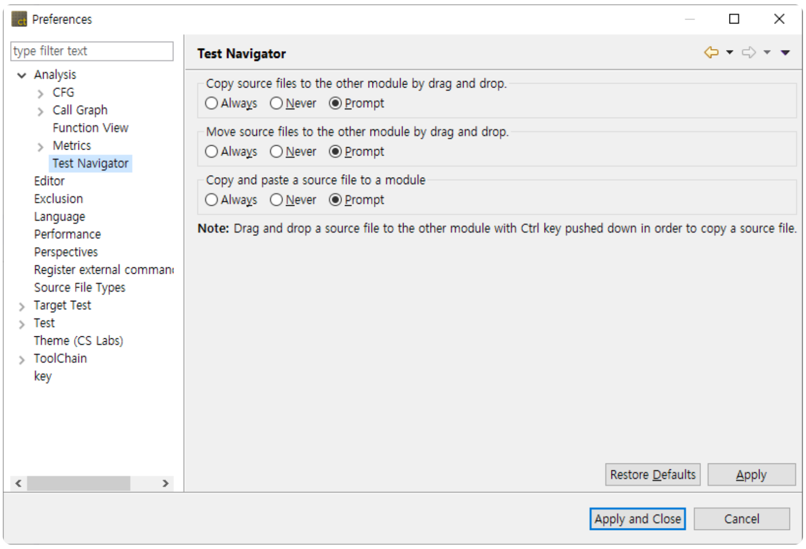
Node Color

CFG Node Color:

Begin Node Color:	▨
End Node Color:	▨
Condition Node Color:	🟩
Block Node Color:	🟨
Goto Node Color:	🟨
Return Node Color:	🟨
Function Node Color:	⬜
Library Function Node Color:	⬜
Single Statement Node Color:	🟨
Single Declaration Node Color:	🟨
Group Node Color:	⬜

Test Navigator

For each operation that copies or moves source files in the Test Navigator view, you can set options to ask whether or not to continue.



Test Navigator

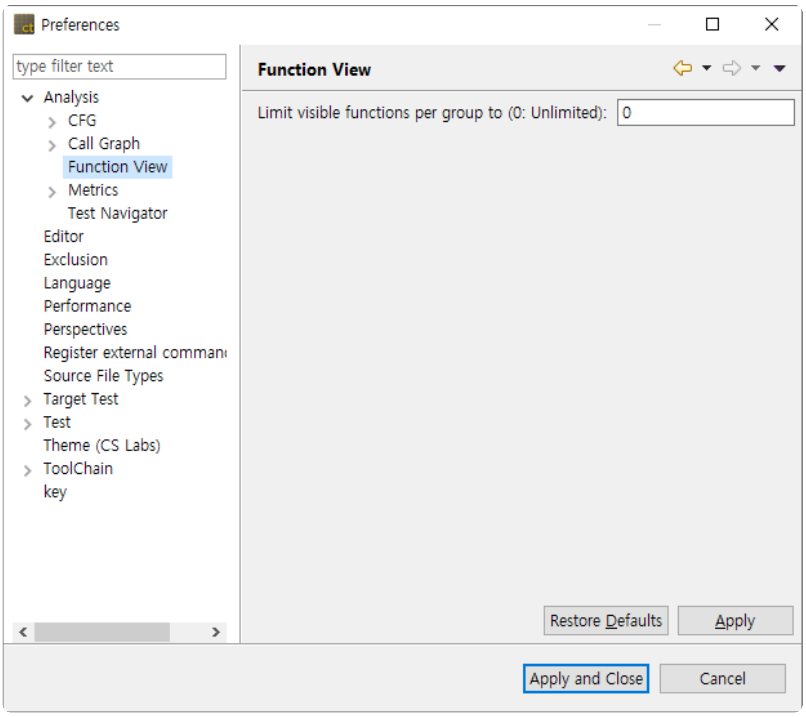
Copy source files to the other module by drag and drop.
○ Always ○ Never ● Prompt

Move source files to the other module by drag and drop.
○ Always ○ Never ● Prompt

Copy and paste a source file to a module
○ Always ○ Never ● Prompt

Note: Drag and drop a source file to the other module with Ctrl key pushed down in order to copy a source file.

Function View

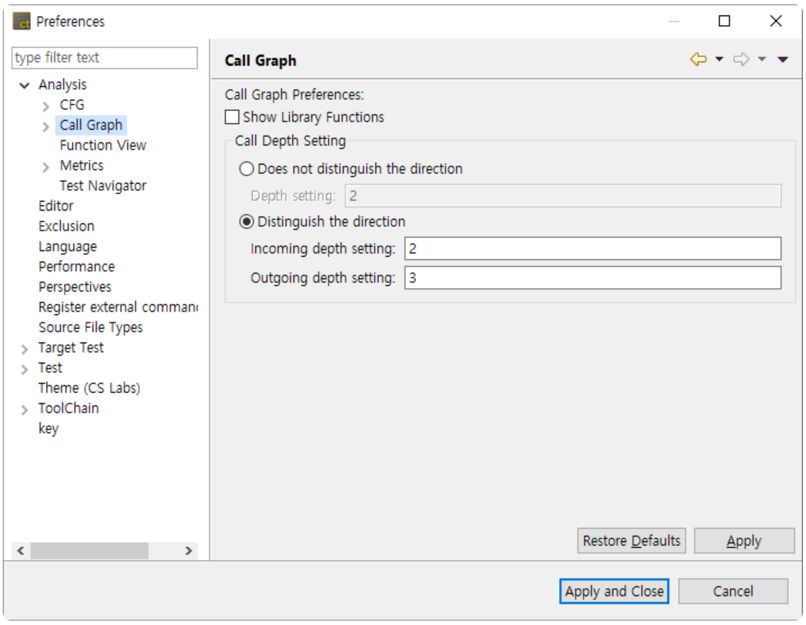


Function View

Limit visible functions per group to (0: Unlimited): 0

Call Graph

You can change the settings of the function call graph displayed in the call graph view.



Call Graph

Call Graph Preferences:

□ Show Library Functions

Call Depth Setting

○ Does not distinguish the direction

Depth setting: 2

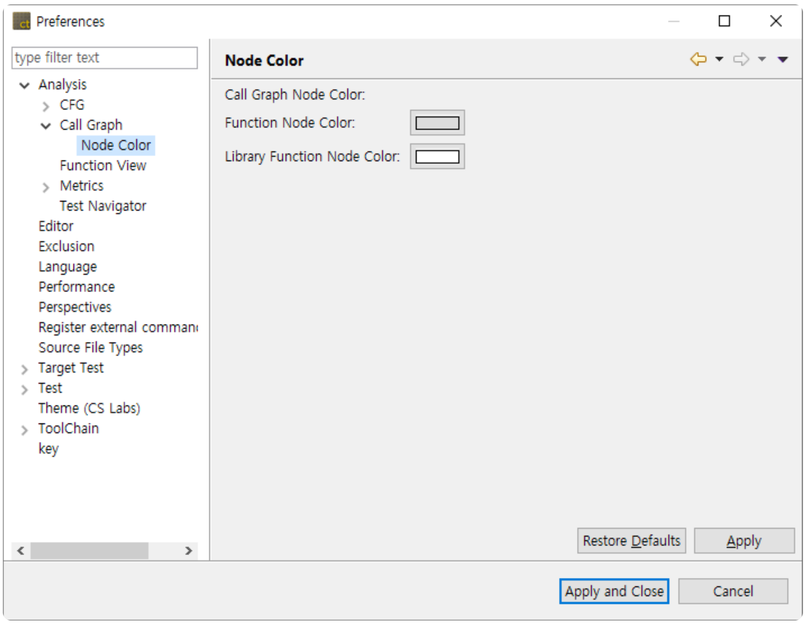
● Distinguish the direction

Incoming depth setting: 2

Outgoing depth setting: 3

The [Show Library Functions] checkbox allows you to set whether or not to display library functions. If you set the value of ‘Does not distinguish the direction’ to ‘2’ in ‘Call Depth Setting’, it shows the call information of one depth for both the caller and callee, centering on the selected function(Just the callers or callee of the selected function shown).

If you want to set the caller and callee separately, you can specify the value of each step by selecting the sub-option. You can change the color of nodes visible in the function call graph.



Node Color

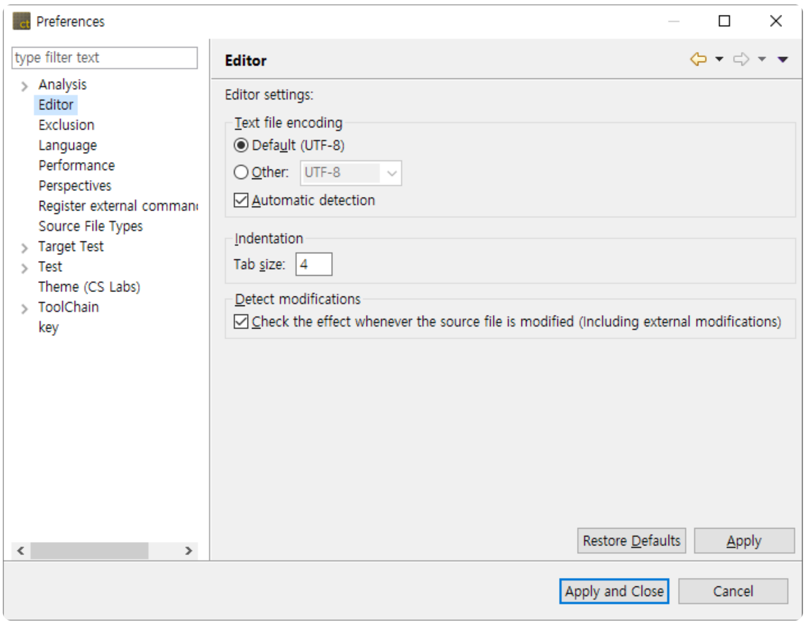
Call Graph Node Color:

Function Node Color:

Library Function Node Color:

16.2. Exclusion

You can set the directories and files to exclude from the analysis.



Editor

Editor settings:

Text file encoding

● Default (UTF-8)

○ Other: UTF-8

☑ Automatic detection

Indentation

Tab size: 4

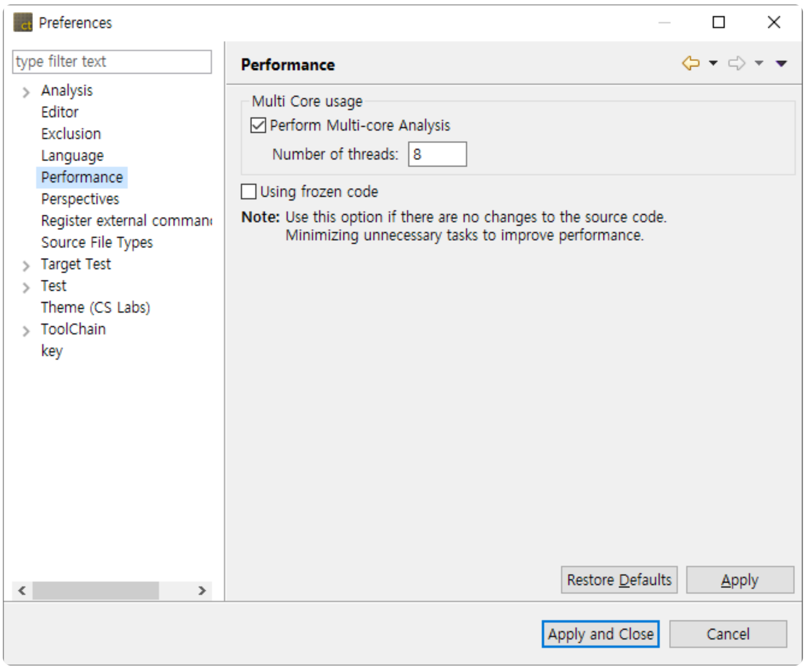
Detect modifications

☑ Check the effect whenever the source file is modified (Including external modifications)

- Add the analysis exclusion target.
    1. Click [Add].
    2. Select the directories or files to be excluded.
    3. Click [OK] or [Open].
- Delete the analysis exclusion target.
    1. Select the directories or files to be deleted.
    2. Click [Remove].

16.3. Performance

It provides the settings that can improve the work performance suitably for the user environment.



Performance

Multi Core usage

☑ Perform Multi-core Analysis

Number of threads: 8

□ Using frozen code

Note: Use this option if there are no changes to the source code.
Minimizing unnecessary tasks to improve performance.

Multi-Core Usage

The option [Multi Core usage] improves performance by using multiple cores when executing the project analysis. (If PC has not enough CPU resource, it can affect the performance of the other tasks.)

- Perform Multi-core Analysis: Enter the number of the core to be used when analyzing the source code. (The range of the core number: 2 ~ the maximum number of cores in the execution environment)

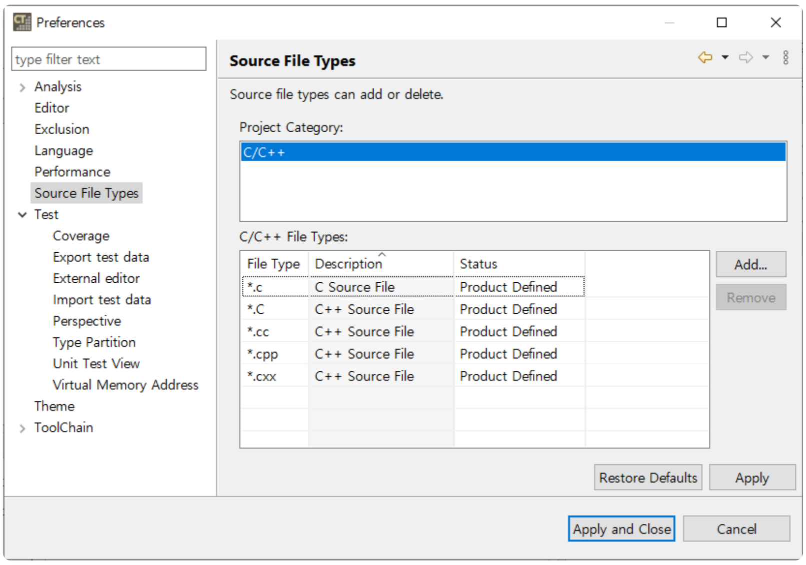
Using frozen code

The option [Using frozen code] improves the performance by minimizing unnecessary tasks (detecting and re-analyzing source code modifications etc.) assuming that there is no change in the source code configuration.
Use this option only if the PC performance is very slow and the source code configuration is never changed during testing. (If the source code or analysis setting is changed while the option is enabled, it may cause unexpected problems.)

Difference with Editor – [Detect modifications] option
While if [Detect modifications] option of Editor is enabled, it analyzes the modified source code when executing [Analyze], if [Using frozen code] option of analysis is enabled, it does not analyze the modified source code until re-analyzed even though the source codes are modified. In addition, Editor – [Detect modifications] option is ignored.

16.4. Source File Types

You can set the extension to be used as a source file for each project type.



Source File Types

Source file types can add or delete.

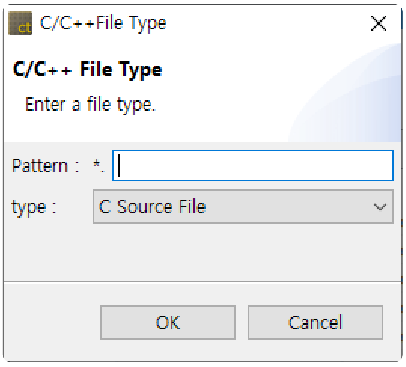
Project Category:

C/C++

C/C++ File Types:

File Type	Description	Status
*.c	C Source File	Product Defined
*.C	C++ Source File	Product Defined
*.cc	C++ Source File	Product Defined
*.cpp	C++ Source File	Product Defined
*.cxx	C++ Source File	Product Defined

- Add a source file extension.
    1. Select the project type.
    2. Click [Add].
    3. Enter an extension, select the type and click [OK].



C/C++ File Type

Enter a file type.

Pattern : *.

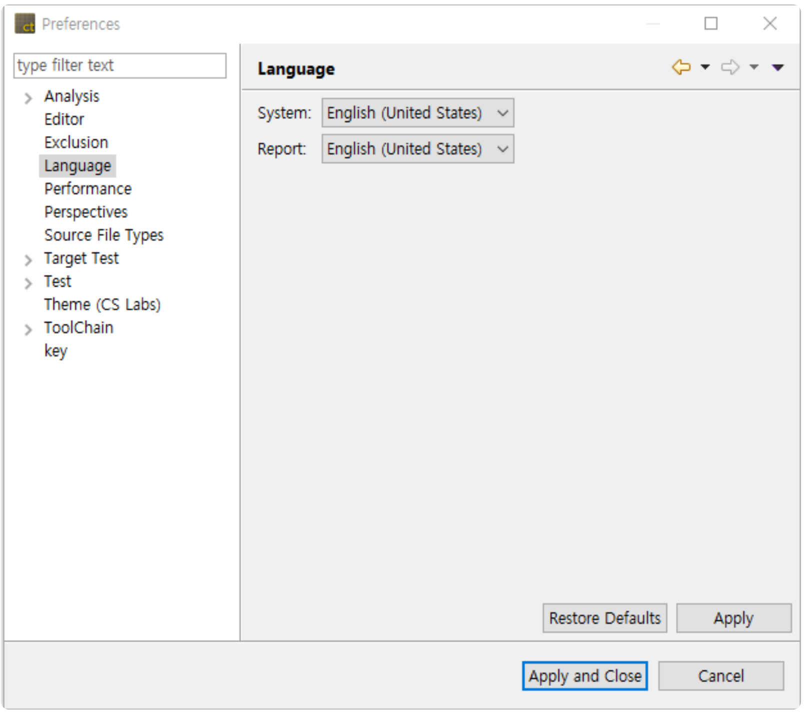
type : C Source File

- Remove a source file extension.
    1. Select the project type.
    2. Select the extension to be removed.
    3. Click [Remove].

The source file extension settings take precedence over project settings.

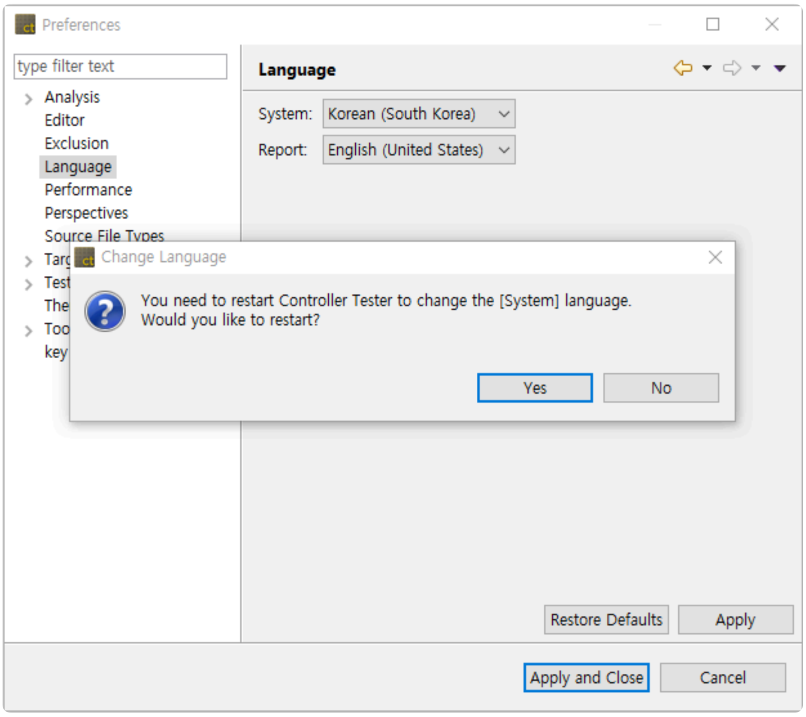
16.5. Language

Sets the language to be displayed in tools and reports.
You can select a language from the drop-down menu for [System] and [Report].



System: English (United States)
Report: English (United States)

If you click the [Apply] button after changing the [System], a dialog box asking you to restart CT 2023.12 will open.



System: Korean (South Korea)
Report: English (United States)

You need to restart Controller Tester to change the [System] language.
Would you like to restart?

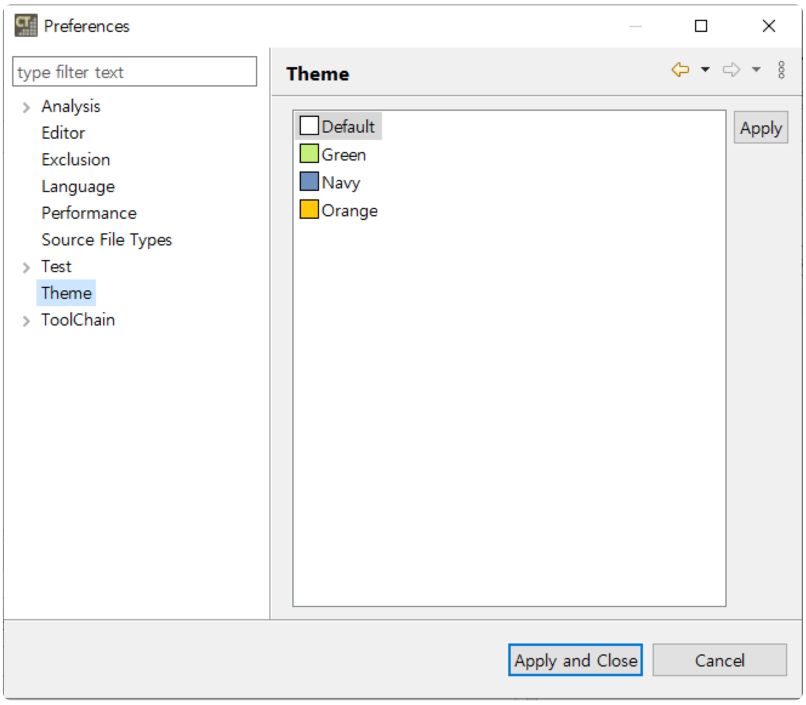
When you change the system language, the report language also changes automatically.

To set the report language differently from the system language, change the report language after restart.

16.6. Theme

Theme provides settings to change the theme of CT 2023.12.

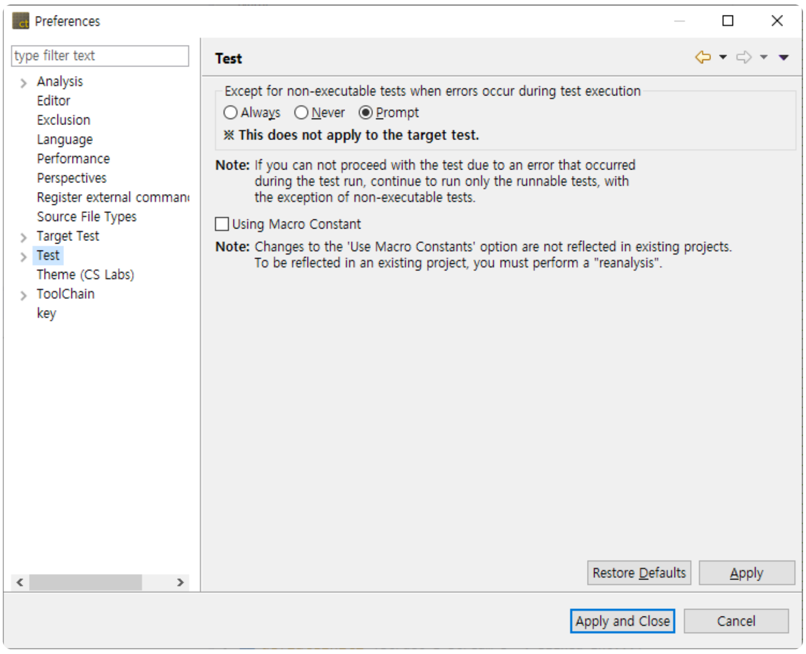
Select one of the four options and click [Apply] to apply the selected theme.
Restart CT 2023.12 for the changes to take effect.



16.7. Test

Provides settings related to editing test and execution.
[Except for non-executable tests when errors occur during test execution] is an option that allows you to execute only executable tests, excluding non-executable tests, when the whole test cannot be performed due to an error that occurs during test execution.
The [Using Macro Constant] option allows you to edit the test using macro constants defined in the source file (ex: using macro constants for input/expected values of array indexes and test cases).

! This setting only applies to converted projects.



Test

Except for non-executable tests when errors occur during test execution
○ Always ○ Never ● Prompt
※ This does not apply to the target test.

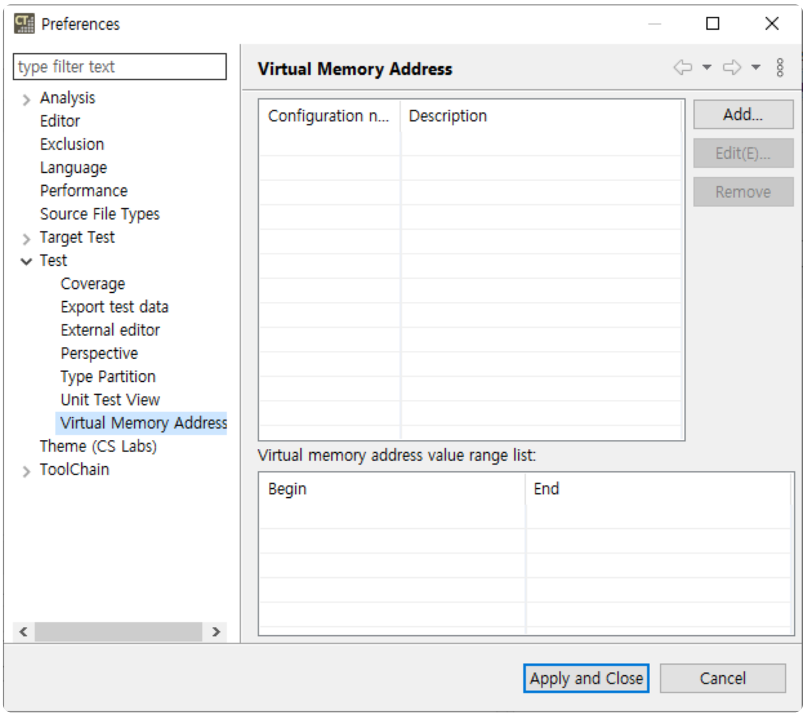
Note: If you can not proceed with the test due to an error that occurred during the test run, continue to run only the runnable tests, with the exception of non-executable tests.

□ Using Macro Constant

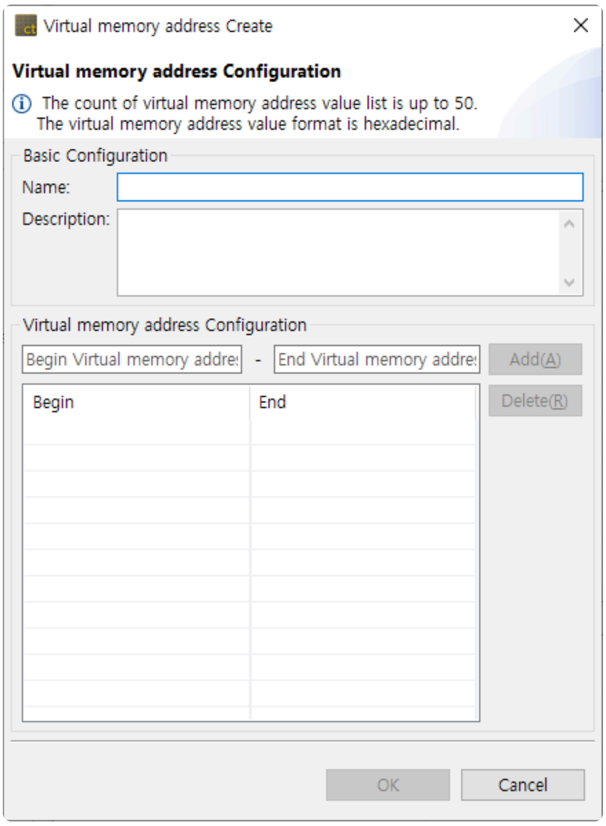
Note: Changes to the 'Use Macro Constants' option are not reflected in existing projects. To be reflected in an existing project, you must perform a "reanalysis".

Virtual Memory Address

It provides the memory settings for the embedded environment test. You can manage the memory address group to be used in the project properties.



In the screen above, you can check the virtual memory address information set. Click [Add…] button to add the virtual memory address.


Virtual memory address Create
Virtual memory address Configuration
Basic Configuration
Name:
Description:
Virtual memory address Configuration
Begin Virtual memory addre
-
End Virtual memory addre
Add(A)
Begin
End
Delete(R)
OK
Cancel

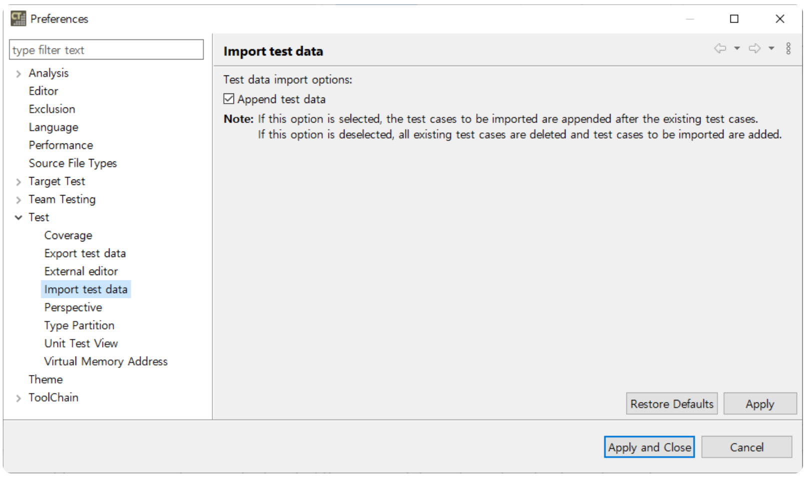
The count of virtual memory address value list is up to 50.
The virtual memory address value format is hexadecimal.

The virtual memory address areas can be specified up to 50 areas and it can be entered in hexadecimal.

Import test data

When you check the [Append test data], the test cases to be imported will be added after the existing

test cases.
If you uncheck this option, all existing test cases will be deleted, and only the test cases to be imported will be added.



Import test data

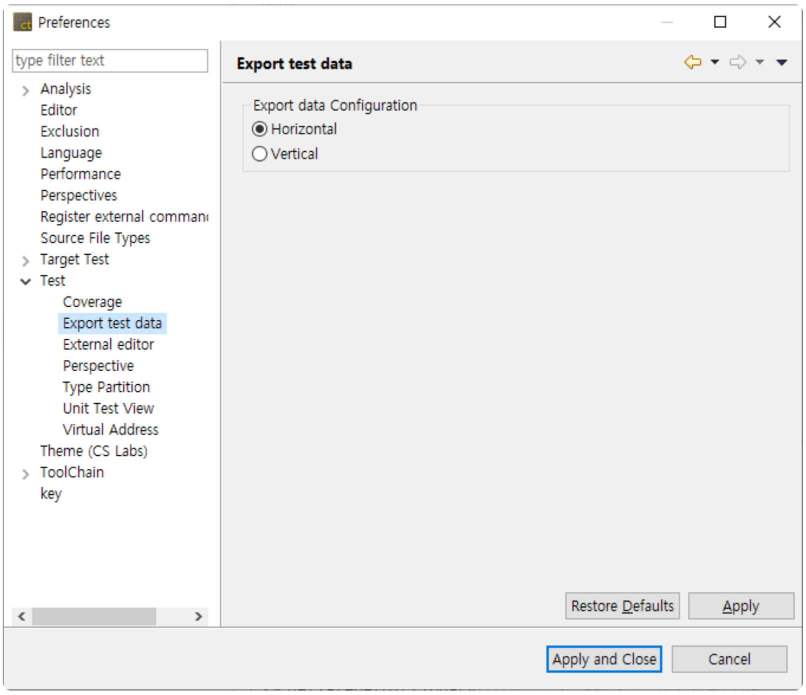
Test data import options:

☑ Append test data

Note: If this option is selected, the test cases to be imported are appended after the existing test cases.
If this option is deselected, all existing test cases are deleted and test cases to be imported are added.

Export test data

When exporting data, you can set the output direction of variables to either horizontal or vertical
Select the output direction of the export variable and click [Apply].



Export test data

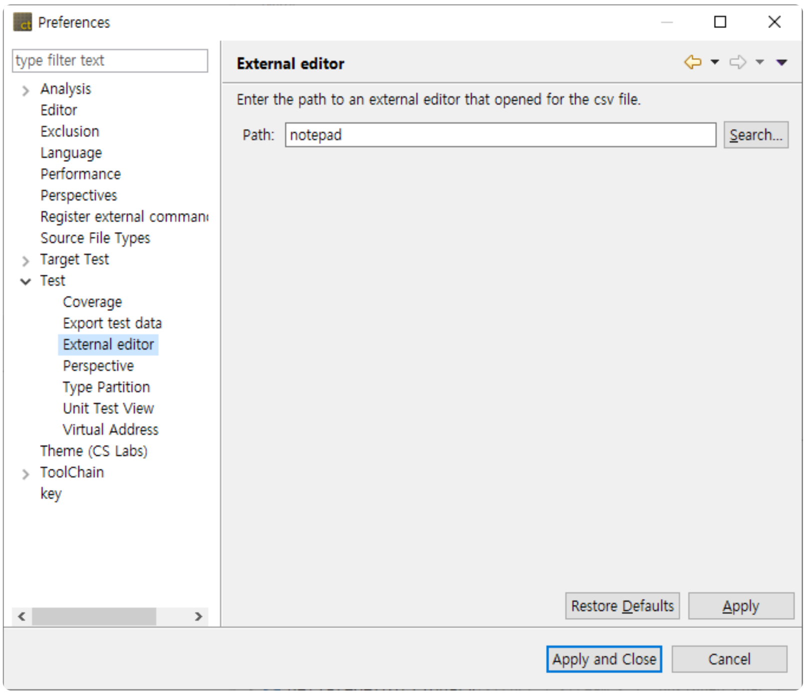
Export data Configuration

● Horizontal

○ Vertical

External Editor

You can set the external editor to open CSV file.
Enter the path of the external editor and click [Apply].



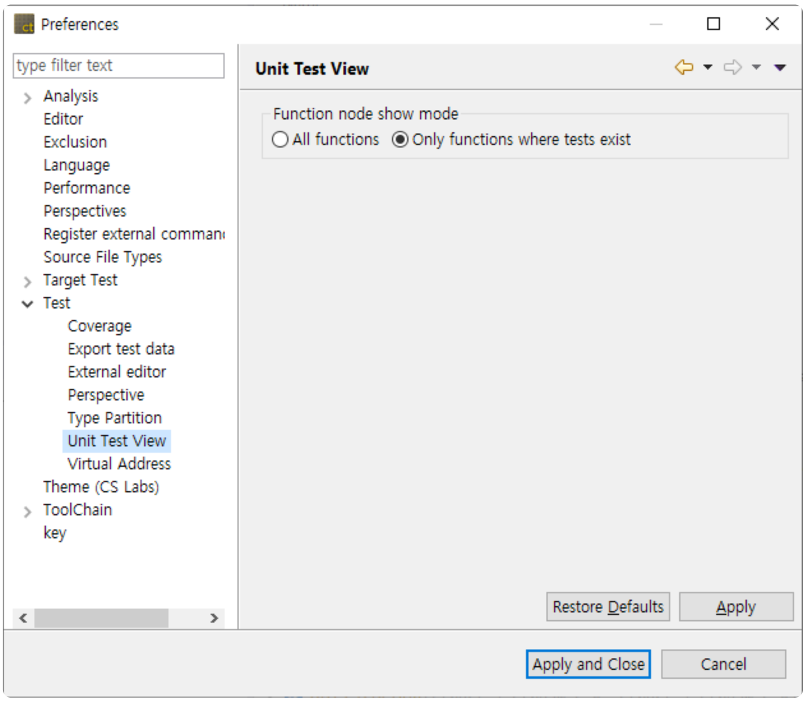
External editor

Enter the path to an external editor that opened for the csv file.

Path: notepad

Unit Test View

You can set the function node display in the Unit Test view included in the test perspective that UI/UX is improved.



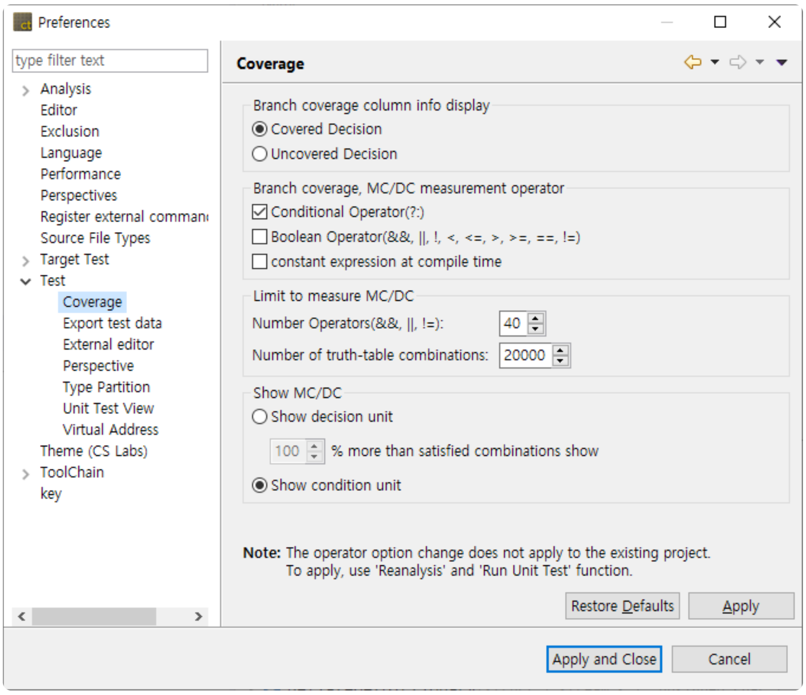
Unit Test View

Function node show mode

○ All functions ● Only functions where tests exist

Coverage

You can set the branch coverage measurement and whether to display the covered/uncovered.



Coverage

Branch coverage column info display
● Covered Decision
○ Uncovered Decision

Branch coverage, MC/DC measurement operator
☑ Conditional Operator(?:)
□ Boolean Operator(&&, ||, !, <, <=, >, >=, ==, !=)
□ constant expression at compile time

Limit to measure MC/DC
Number Operators(&&, ||, !=): 40
Number of truth-table combinations: 20000

Show MC/DC
○ Show decision unit
100 % more than satisfied combinations show
● Show condition unit

Note: The operator option change does not apply to the existing project.
To apply, use 'Reanalysis' and 'Run Unit Test' function.

[Branch coverage Column Info display] radio button allows you to select the information of the marker to be displayed in the left column of the editor.

- T/F marker option is shown in the source code editor.
- Covered Decision: T/F indication of a covered decision
- Uncovered Decision: T/F indication of an uncovered decision

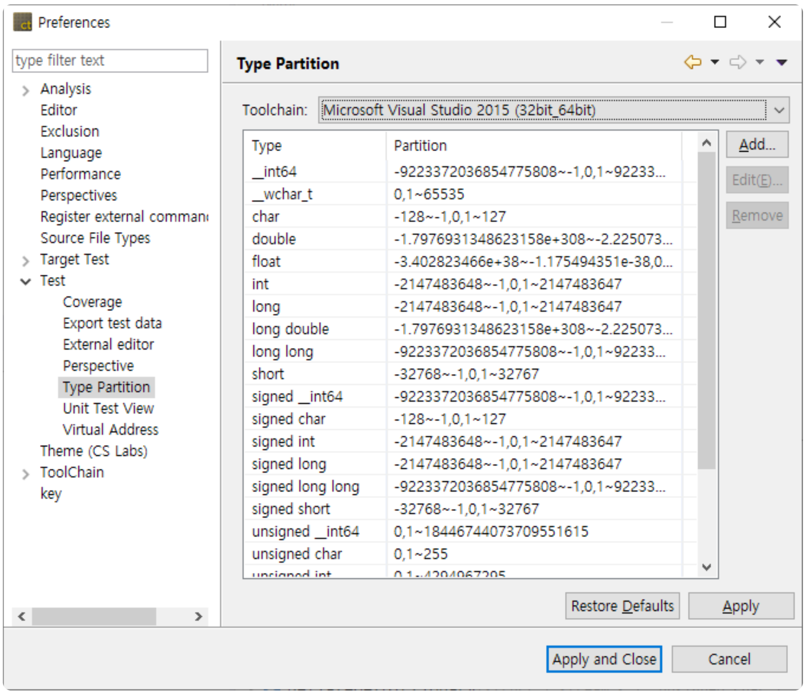
The checkbox [Branch coverage, MC/DC measurement operator] sets the branch coverage measuring target. If it is re-analyzed and executed, the settings are applied.

- Conditional Operator(?:) expression: Measures the branch coverage for ternary operator expression.
- Boolean Operator(&,||,!,<,<=,>,>=,==,!=): Measures the branch coverage for boolean operator expression.
- If unchecked all, measures the branch coverage for ‘if’, ‘for’, ‘while’, ‘do-while’ and ‘switch’ statements only.

! When changing the ‘Conditional Operator(?:)’ setting, the COVER’s [Toolchain] > [Standard] must be set identically to share coverage with COVER. For details, please refer to the Import Coverage by Ternary Operator Settings page in User Guides.

Type Partition

You can edit the basic type partition for each toolchain and restore it into the default value provided. In Toolchain combo box, select the toolchain to be modified, edit the partition and click [Apply].



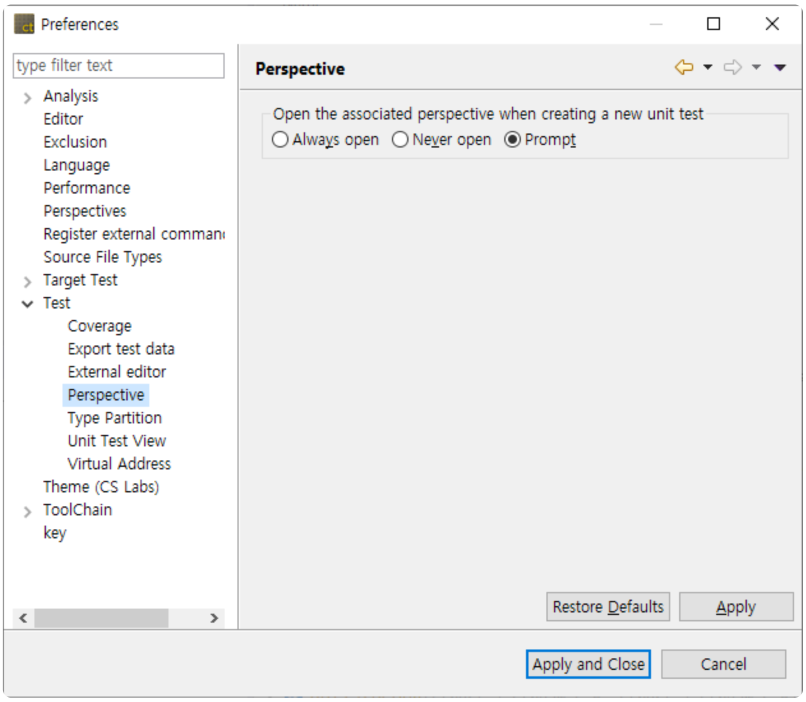
Type Partition

Toolchain: Microsoft Visual Studio 2015 (32bit_64bit)

Type	Partition
__int64	-9223372036854775808~-1,0,1~92233...
__wchar_t	0,1~65535
char	-128~-1,0,1~127
double	-1.7976931348623158e+308~-2.225073...
float	-3.402823466e+38~-1.175494351e-38,0...
int	-2147483648~-1,0,1~2147483647
long	-2147483648~-1,0,1~2147483647
long double	-1.7976931348623158e+308~-2.225073...
long long	-9223372036854775808~-1,0,1~92233...
short	-32768~-1,0,1~32767
signed __int64	-9223372036854775808~-1,0,1~92233...
signed char	-128~-1,0,1~127
signed int	-2147483648~-1,0,1~2147483647
signed long	-2147483648~-1,0,1~2147483647
signed long long	-9223372036854775808~-1,0,1~92233...
signed short	-32768~-1,0,1~32767
unsigned __int64	0,1~18446744073709551615
unsigned char	0,1~255
unsigned int	0,1~4294967295

Perspective

After the test has created, you can set the opening option for the perspective associated. Select one among [Always open], [Never open] and [Prompt] and click [Apply].



Perspective

Open the associated perspective when creating a new unit test

○ Always open ○ Never open ● Prompt

16.8. Toochain

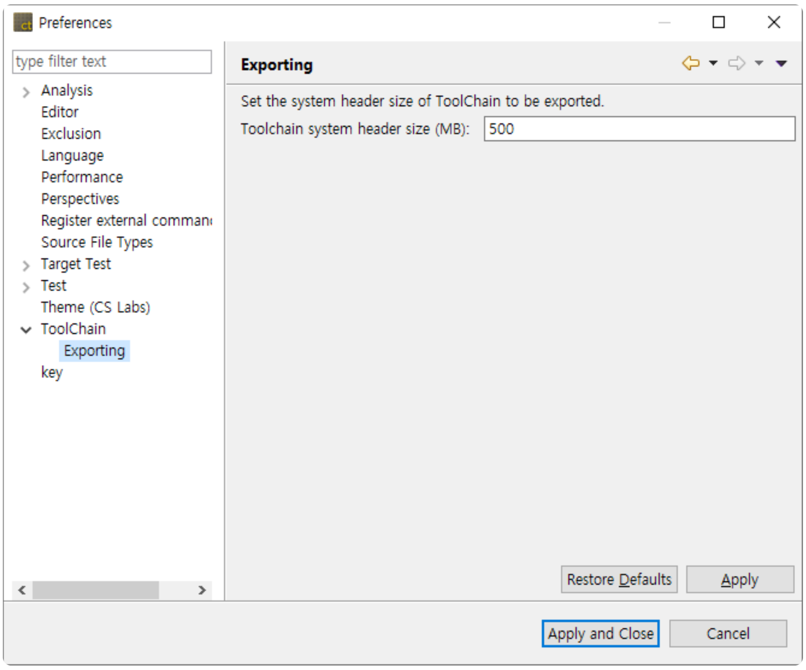
You can set the information for the toolchain to be used in the tool.

You must have a toolchain (compiler information) for the source to be tested in order to create or analyze the project.

The detail description of the toolchain settings can be found in the ‘Set a Toolchain (Analyzer)’.

Export Toolchain

It sets the system header size of the toolchain to be exported. The system headers larger than the size you set cannot be exported.

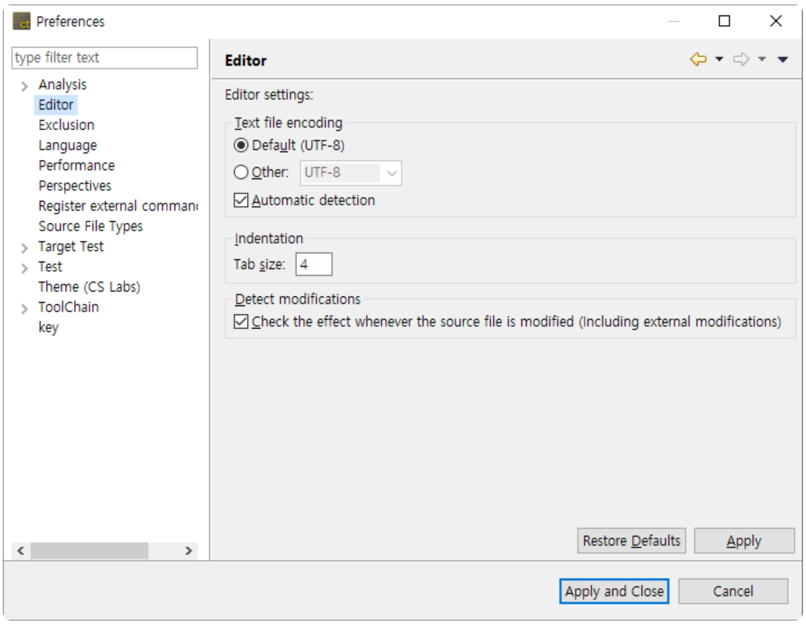


Set the system header size of ToolChain to be exported.

Toolchain system header size (MB): 500

16.9. Editor

You can change the settings related to the editor.



Editor

Editor settings:

Text file encoding

● Default (UTF-8)

○ Other: UTF-8

☑ Automatic detection

Indentation

Tab size: 4

Detect modifications

☑ Check the effect whenever the source file is modified (Including external modifications)

Text file encoding

You can set the encoding to be used when opening a text file in the editor. If the [Automatic detection] option is on, it will automatically detect the encoding of the text file. (If it cannot be detected automatically, it will open with the encoding you set.)

Indentation

If you change the tab size, the tab size shown in the editor is changed too.

Detect modifications

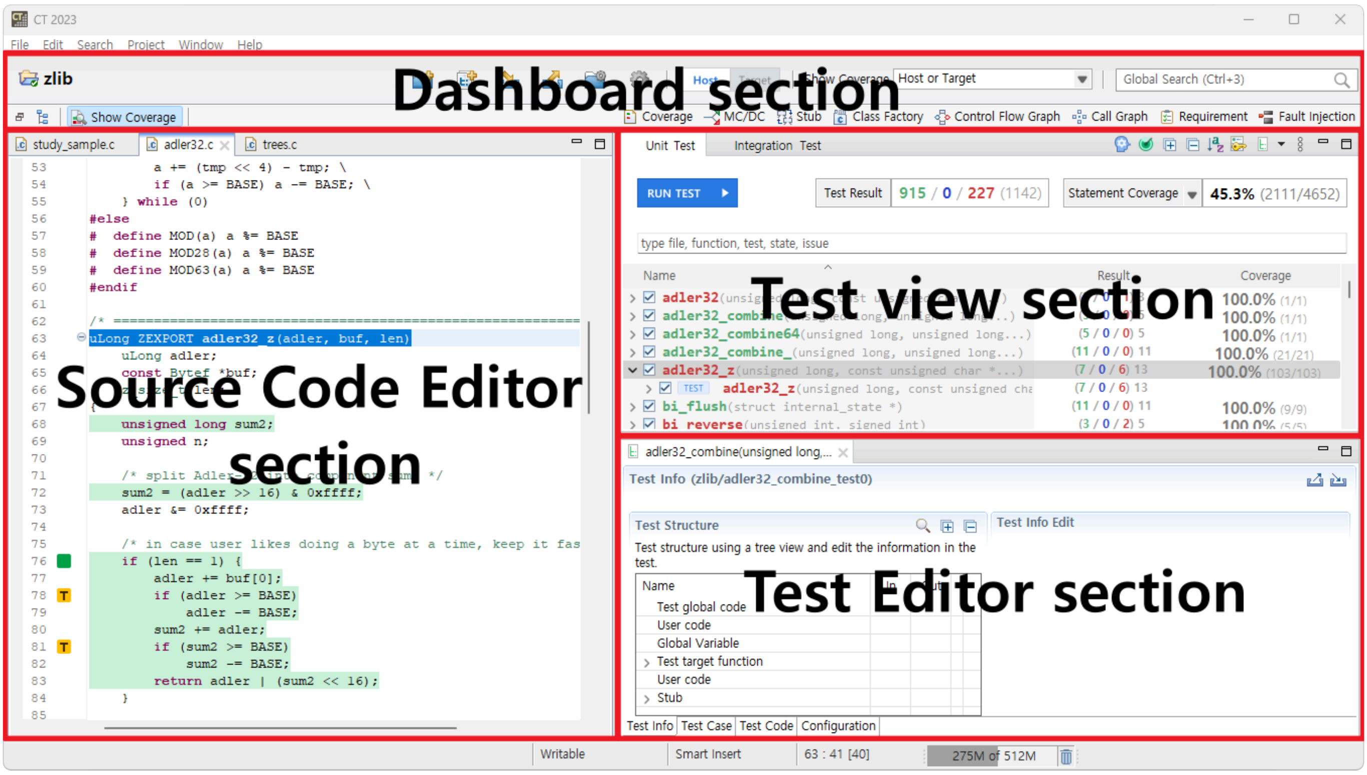
If the [Detect modifications] option is on, it checks the impact of the changes each time the source file is modified.

If the disc speed if slow, deselect this checkbox to improve the performance.

17. Test Perspective

The Test Perspective provides UI for displaying only the necessary information so as to keep the flow of the testing task and focus on the goal.

It provides a high DOF screen with Eclipse RCP. You can set it in the [Window] menu and in each view.


Dashboard section
Source Code Editor section
Test view section
Test Editor section
CT 2023
File Edit Search Project Window Help
zlib
Show Coverage
Host or Target
Global Search (Ctrl+3)
Coverage MC/DC Stub Class Factory Control Flow Graph Call Graph Requirement Fault Injection
study_sample.c adler32.c trees.c
Unit Test Integration Test
RUN TEST
Test Result 915 / 0 / 227 (1142)
Statement Coverage 45.3% (2111/4652)
type file, function, test, state, issue
Name Result Coverage
adler32_combine(unsigned long,...
Test Info (zlib/adler32_combine_test0)
Test Structure
Test Info Edit
Test structure using a tree view and edit the information in the test.
Name
Test global code
User code
Global Variable
Test target function
User code
Stub
Test Info Test Case Test Code Configuration
Writable Smart Insert 63 : 41 [40] 275M of 512M

```
            a += (tmp << 4) - tmp; \
            if (a >= BASE) a -= BASE; \
        } while (0)
#else
#  define MOD(a) a %= BASE
#  define MOD28(a) a %= BASE
#  define MOD63(a) a %= BASE
#endif

/* ==========================================================
uLong ZEXPORT adler32_z(adler, buf, len)
    uLong adler;
    const Bytef *buf;
    z_size_t len;
{
    unsigned long sum2;
    unsigned n;

    /* split Adler-32 into component sums */
    sum2 = (adler >> 16) & 0xffff;
    adler &= 0xffff;

    /* in case user likes doing a byte at a time, keep it fas
    if (len == 1) {
        adler += buf[0];
        if (adler >= BASE)
            adler -= BASE;
        sum2 += adler;
        if (sum2 >= BASE)
            sum2 -= BASE;
        return adler | (sum2 << 16);
    }
```

Name	Result	Coverage
☑ adler32(unsig...		100.0% (1/1)
☑ adler32_combine(unsigned long, unsigned long...)		100.0% (1/1)
☑ adler32_combine64(unsigned long, unsigned long...)	(5 / 0 / 0) 5	100.0% (1/1)
☑ adler32_combine_(unsigned long, unsigned long...)	(11 / 0 / 0) 11	100.0% (21/21)
☑ adler32_z(unsigned long, const unsigned char *...)	(7 / 0 / 6) 13	100.0% (103/103)
☑ TEST adler32_z(unsigned long, const unsigned cha	(7 / 0 / 6) 13	
☑ bi_flush(struct internal_state *)	(11 / 0 / 0) 11	100.0% (9/9)
☑ bi_reverse(unsigned int, signed int)	(3 / 0 / 2) 5	100.0% (5/5)

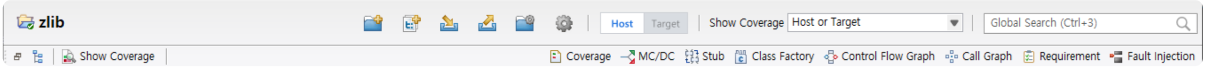
The components that make up the test perspective are:

- Dashboard
- Test Navigator View
- Unit Test View
- Integration Test View
- Coverage View
- MC/DC View
- Stub View
- Class Factory View
- Control Flow Graph View
- Call Graph View
- Error View
- Debug Information View
- Fault Injection View
- Input/output Data Graph View
- Console View
- Requirement View

Views that are not included by default can be opened from [Window]> [Show View]> [Other…] on the top menu.

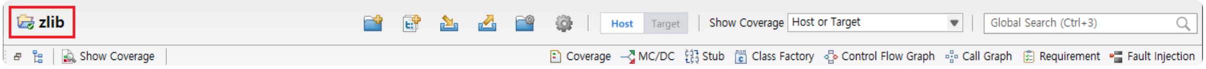
17.1. Dashboard

The dashboard section provides a summary of frequently used functions or tests that are currently in progress.



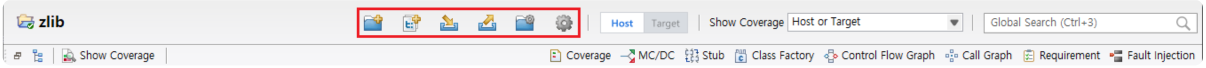
Project name

It shows the name of the project selected in the Test Navigator View.



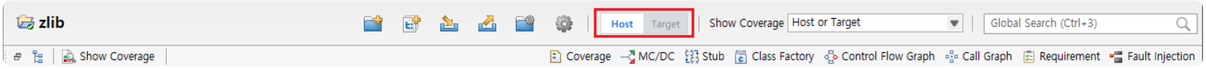
Bookmark menu

You can use the [New Project], [New Test], [Import], [Export], [Properties] and [Preferences] features.



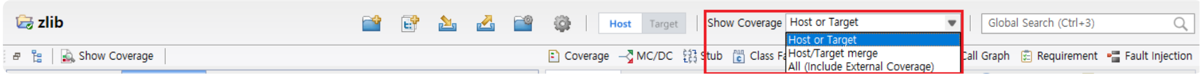
Host/Target setting menu

You can change the test environment to the host or target.



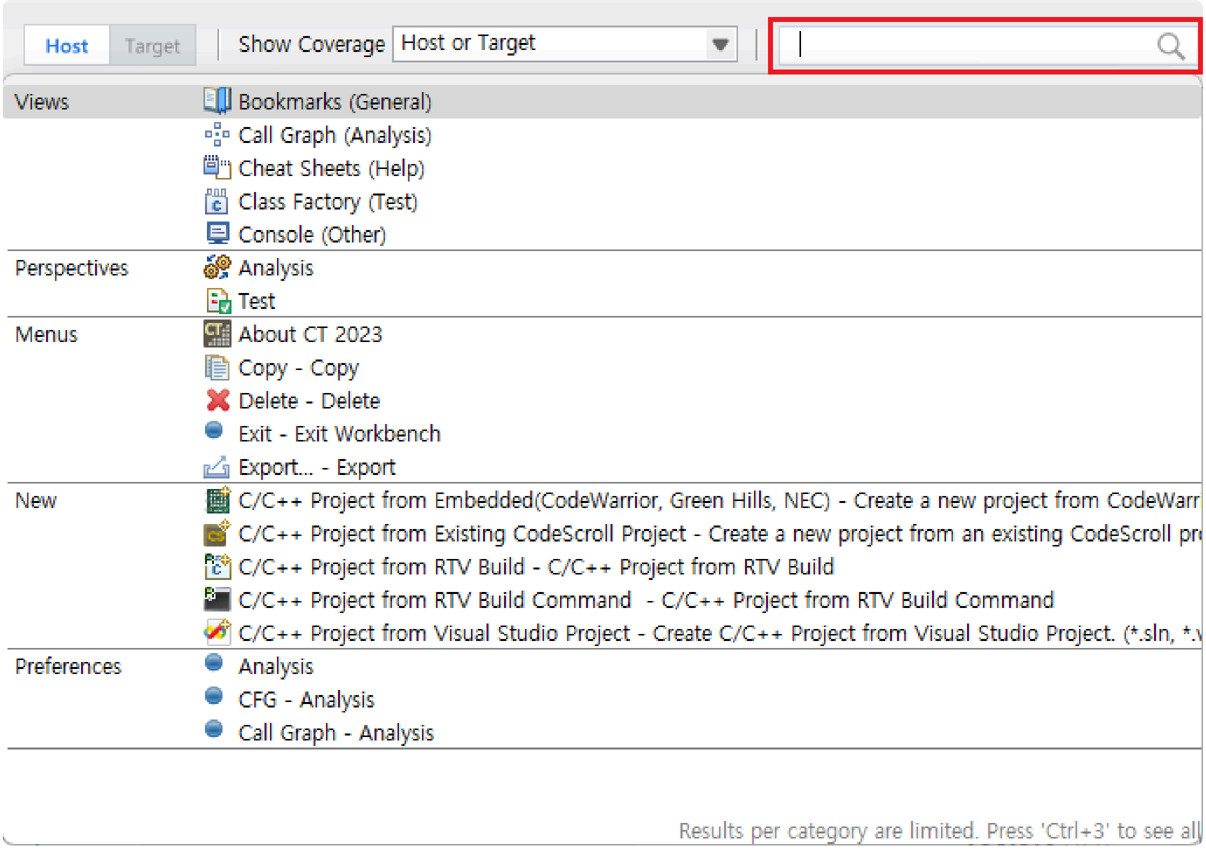
Coverage-related menu

You can use [Show Coverage] feature such as [Host or Target], [Host/Target Merge], and [All (Include External Coverage)].



Global Search

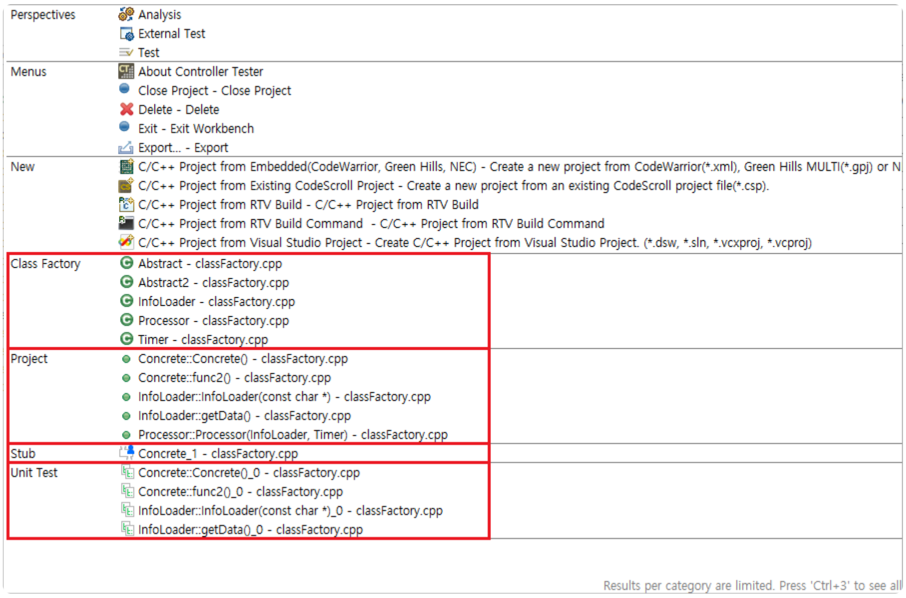
The Global Search allows you to search New, Views, Editor, Menus, Properties, Preferences, Project resource (source file, function), Test, Stub and Class Factory, etc. by keywords. Select the Global Search window or press the shortcut key (`Ctrl` + `3`) to use the Global Search feature.



Views	Bookmarks (General) Call Graph (Analysis) Cheat Sheets (Help) Class Factory (Test) Console (Other)
Perspectives	Analysis Test
Menus	About CT 2023 Copy - Copy Delete - Delete Exit - Exit Workbench Export... - Export
New	C/C++ Project from Embedded(CodeWarrior, Green Hills, NEC) - Create a new project from CodeWarr C/C++ Project from Existing CodeScroll Project - Create a new project from an existing CodeScroll pr C/C++ Project from RTV Build - C/C++ Project from RTV Build C/C++ Project from RTV Build Command - C/C++ Project from RTV Build Command C/C++ Project from Visual Studio Project - Create C/C++ Project from Visual Studio Project. (*.sln, *.v
Preferences	Analysis CFG - Analysis Call Graph - Analysis

Results per category are limited. Press 'Ctrl+3' to see all

> The project resource (source file, function, etc.), test, stub and class factory can be searched by selecting the analyzed project.

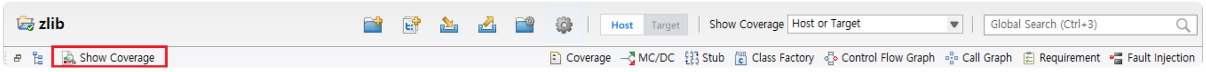


Perspectives	Analysis External Test Test
Menus	About Controller Tester Close Project - Close Project Delete - Delete Exit - Exit Workbench Export... - Export
New	C/C++ Project from Embedded(CodeWarrior, Green Hills, NEC) - Create a new project from CodeWarrior(*.xml), Green Hills MULTI(*.gpj) or N C/C++ Project from Existing CodeScroll Project - Create a new project from an existing CodeScroll project file(*.csp). C/C++ Project from RTV Build - C/C++ Project from RTV Build C/C++ Project from RTV Build Command - C/C++ Project from RTV Build Command C/C++ Project from Visual Studio Project - Create C/C++ Project from Visual Studio Project. (*.dsw, *.sln, *.vcxproj, *.vcproj)
Class Factory	Abstract - classFactory.cpp Abstract2 - classFactory.cpp InfoLoader - classFactory.cpp Processor - classFactory.cpp Timer - classFactory.cpp
Project	Concrete::Concrete() - classFactory.cpp Concrete::func2() - classFactory.cpp InfoLoader::InfoLoader(const char *) - classFactory.cpp InfoLoader::getData() - classFactory.cpp Processor::Processor(InfoLoader, Timer) - classFactory.cpp
Stub	Concrete_1 - classFactory.cpp
Unit Test	Concrete::Concrete()_0 - classFactory.cpp Concrete::func2()_0 - classFactory.cpp InfoLoader::InfoLoader(const char *)_0 - classFactory.cpp InfoLoader::getData()_0 - classFactory.cpp

Results per category are limited. Press 'Ctrl+3' to see all

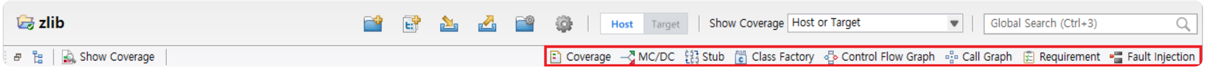
Show Coverage

It allows you to set the covered area in the source code editor is marked or not.



Open/Close the test-related view menu

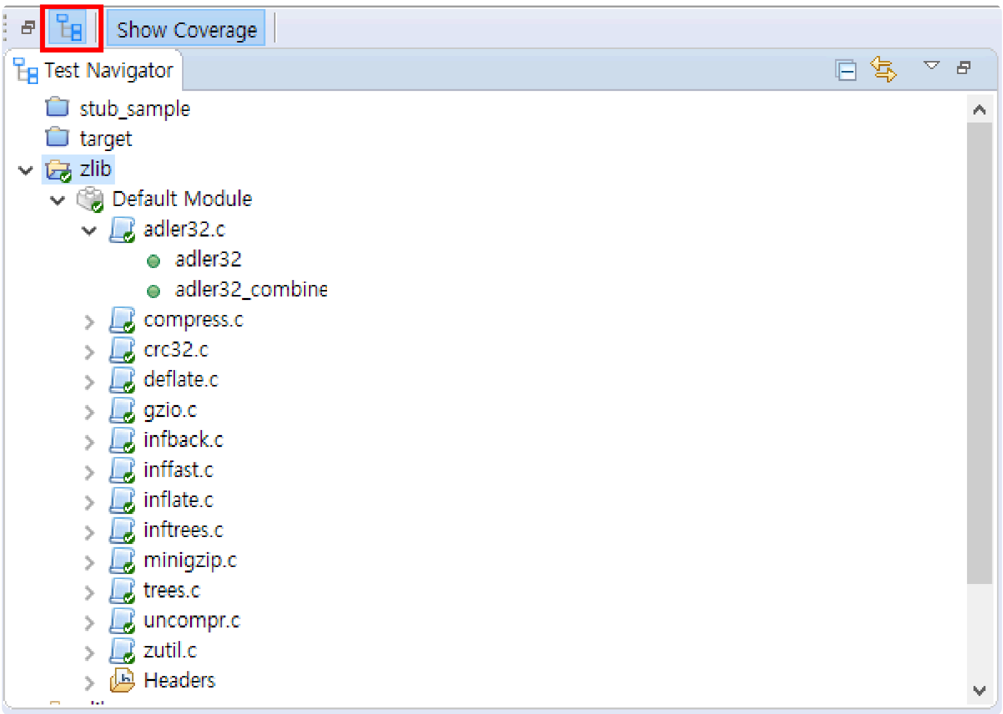
You can open and close the test-related views.



17.2. Test Navigator View

The Test Navigator View shows the hierarchy structure of the projects and the test models under the projects included in the workspace.

The Test Navigator View does not occupy any space but remains the minimized state. If you select [Test Navigator] in the dashboard, the Test Navigator View is located above the Source Code Editor.



Icon

Icon	Description(*: created after analysis)
📂	Open project
📁	Closed project
⬡	Module
📄	Source file
●	*Global variable
●	*Function
📂	*Header folder
📄	*Header file
📄	*System header file

Toolbar menu

Menu	Description
Link with Selection	Highlights the items selected in the other view.
Collapse All	Hides all tree nodes.

Icon overlay

Icon overlay	Description
✓	Analyzed
❗	Changed after analysis

Copy the source file into the other module

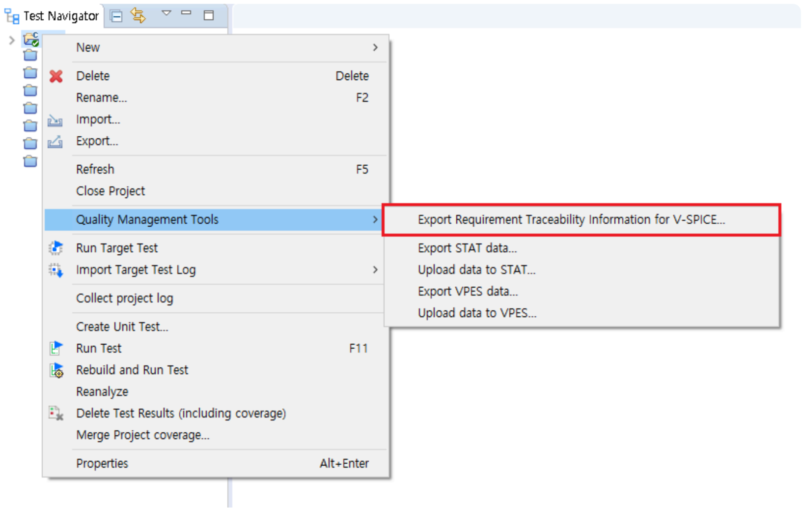
To copy the source file into the other module, with `Ctrl` key pressed, drag and drop the source file to be copied into the target module.
Alternatively, right-click the source file to be copied, select [Copy], right-click the target module and select [Paste]. (Shortcut keys: `Ctrl` + `C` and `Ctrl` + `V`)

Move the source file to the other module

To move the source file to the other module, drag and drop the source file to be moved into the target module.

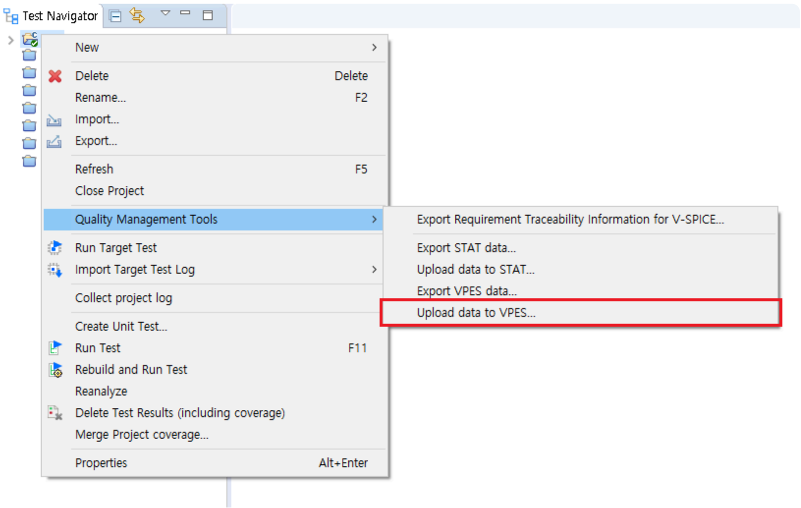
Export Requirement Traceability Information for V-SPICE

Connection information between requirements and tests can be exported to an xml file that conforms to the V-SPICE format.



Select a project and right-click on the menu to select [Quality Management Tools] > [Export Requirements Traceability Information for V-SPICE…] function.

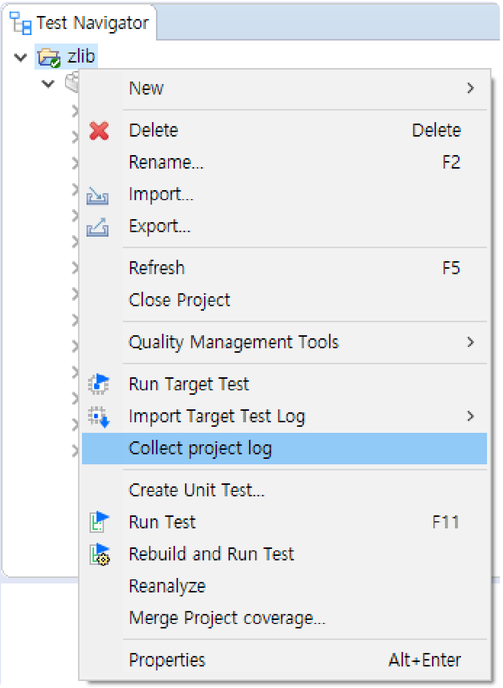
Upload data to VPES



When you select and right-click a project, [Upload data to VPES…] is indicated in the menu. For this feature, please contact Technical support.

Collect Project Log

This feature collects the logs left in use of CT 2023.12 on a project basis in batch and exports them. When you contact Technical support due to an error occurred, please send us the collected compressed file so that we can solve the problem more quickly.



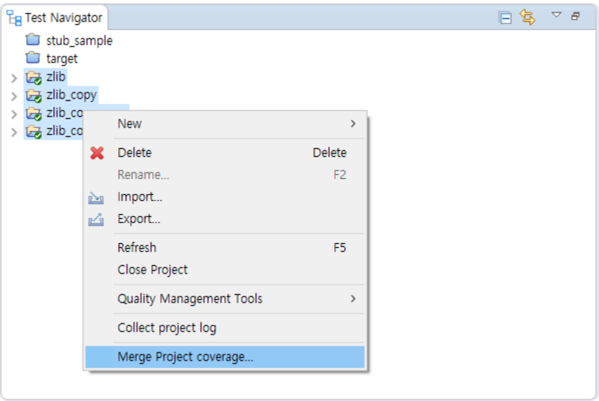
When you select and right-click a project, [Collect project log] item is indicated.

17.2.1. Merge Project Coverages

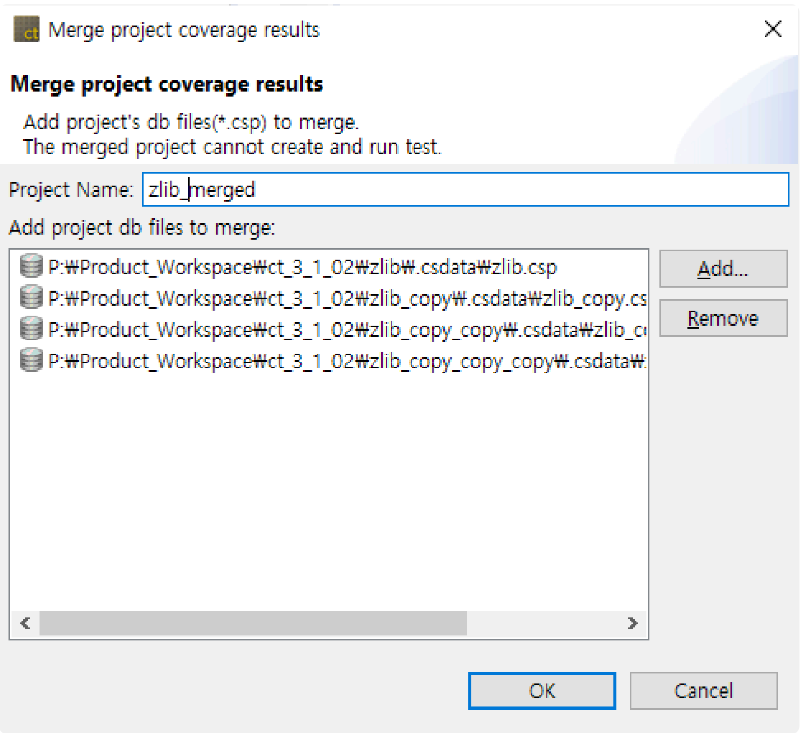
If a project size is too large to run the test at once, you can run the test by dividing it into multiple projects. [Merge Project Coverage] function runs the test by dividing one project into multiple projects and then shows the overall coverage results by merging the result of the test for these projects.

Merge Project Coverage

1. After selecting all the projects that you want to merge the coverage results, right-click it and select [Merge Project Coverage].



2. Select [Merge Project Coverage] menu to open for creating the project name. Enter the project name to be created in [Project Name].



Merge project coverage results

Add project's db files(*.csp) to merge.
The merged project cannot create and run test.

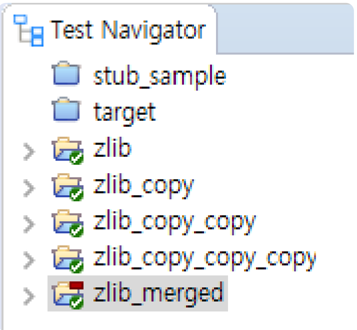
Project Name: zlib_merged

Add project db files to merge:

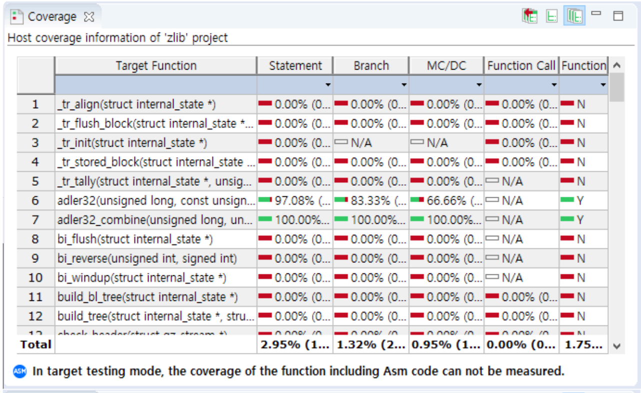
P:₩Product_Workspace₩ct_3_1_02₩zlib₩.csdata₩zlib.csp
P:₩Product_Workspace₩ct_3_1_02₩zlib_copy₩.csdata₩zlib_copy.cs
P:₩Product_Workspace₩ct_3_1_02₩zlib_copy_copy₩.csdata₩zlib_c
P:₩Product_Workspace₩ct_3_1_02₩zlib_copy_copy_copy₩.csdata₩

- By clicking the [Add] button, you can perform a merge coverage function for projects not included in the workspace.

3. Click [OK] to check that a new project that the project results had been merged has created in the Test Navigator view. The merged project is displayed with a red mark on the upper right corner.



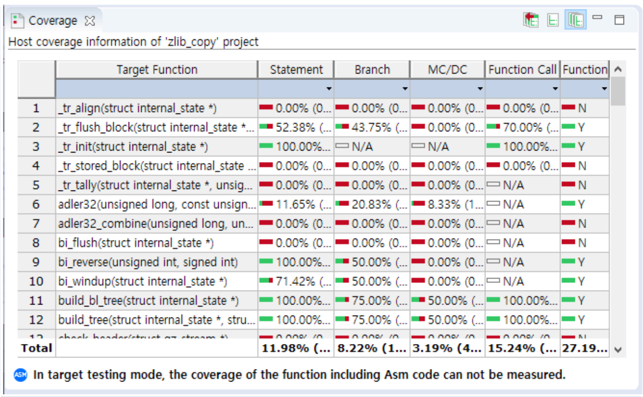
4. Select the project that the results had been merged and check the coverage view to see the overall coverages.



Host coverage information of 'zlib' project

	Target Function	Statement	Branch	MC/DC	Function Call	Function
1	_tr_align(struct internal_state *)	0.00% (0...	0.00% (0...	0.00% (0...	0.00% (0...	N
2	_tr_flush_block(struct internal_state *...	0.00% (0...	0.00% (0...	0.00% (0...	0.00% (0...	N
3	_tr_init(struct internal_state *)	0.00% (0...	N/A	N/A	0.00% (0...	N
4	_tr_stored_block(struct internal_state ...	0.00% (0...	0.00% (0...	0.00% (0...	0.00% (0...	N
5	_tr_tally(struct internal_state *, unsig...	0.00% (0...	0.00% (0...	0.00% (0...	N/A	N
6	adler32(unsigned long, const unsign...	97.08% (...	83.33% (...	66.66% (...	N/A	Y
7	adler32_combine(unsigned long, un...	100.00%...	100.00%...	100.00%...	N/A	Y
8	bi_flush(struct internal_state *)	0.00% (0...	0.00% (0...	0.00% (0...	N/A	N
9	bi_reverse(unsigned int, signed int)	0.00% (0...	0.00% (0...	0.00% (0...	N/A	N
10	bi_windup(struct internal_state *)	0.00% (0...	0.00% (0...	0.00% (0...	N/A	N
11	build_bl_tree(struct internal_state *)	0.00% (0...	0.00% (0...	0.00% (0...	0.00% (0...	N
12	build_tree(struct internal_state *, stru...	0.00% (0...	0.00% (0...	0.00% (0...	0.00% (0...	N
Total		2.95% (1...	1.32% (2...	0.95% (1...	0.00% (0...	1.75...

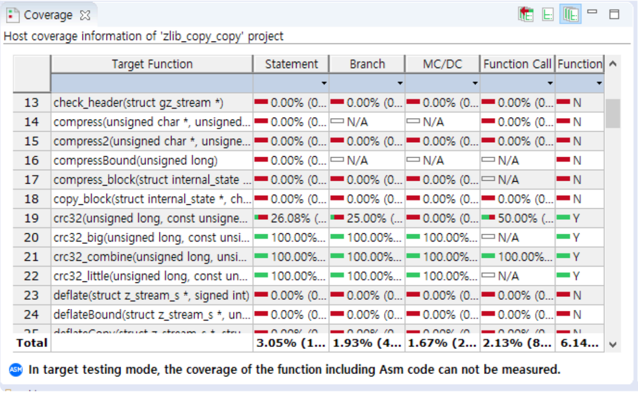
In target testing mode, the coverage of the function including Asm code can not be measured.



Host coverage information of 'zlib_copy' project

	Target Function	Statement	Branch	MC/DC	Function Call	Function
1	_tr_align(struct internal_state *)	0.00% (0...	0.00% (0...	0.00% (0...	0.00% (0...	N
2	_tr_flush_block(struct internal_state *...	52.38% (...	43.75% (...	0.00% (0...	70.00% (...	Y
3	_tr_init(struct internal_state *)	100.00%...	N/A	N/A	100.00%...	Y
4	_tr_stored_block(struct internal_state ...	0.00% (0...	0.00% (0...	0.00% (0...	0.00% (0...	N
5	_tr_tally(struct internal_state *, unsig...	0.00% (0...	0.00% (0...	0.00% (0...	N/A	N
6	adler32(unsigned long, const unsign...	11.65% (...	20.83% (...	8.33% (1...	N/A	Y
7	adler32_combine(unsigned long, un...	0.00% (0...	0.00% (0...	0.00% (0...	N/A	N
8	bi_flush(struct internal_state *)	0.00% (0...	0.00% (0...	0.00% (0...	N/A	N
9	bi_reverse(unsigned int, signed int)	100.00%...	50.00% (...	0.00% (0...	N/A	Y
10	bi_windup(struct internal_state *)	71.42% (...	50.00% (...	0.00% (0...	N/A	Y
11	build_bl_tree(struct internal_state *)	100.00%...	75.00% (...	50.00% (...	100.00%...	Y
12	build_tree(struct internal_state *, stru...	100.00%...	75.00% (...	50.00% (...	100.00%...	Y
Total		11.98% (...	8.22% (1...	3.19% (4...	15.24% (...	27.19...

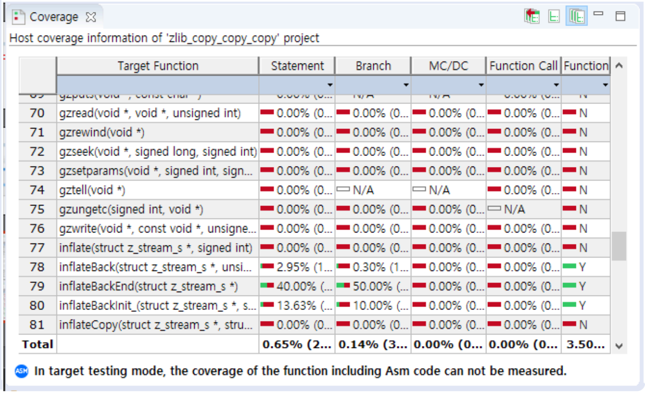
In target testing mode, the coverage of the function including Asm code can not be measured.



Host coverage information of 'zlib_copy_copy' project

	Target Function	Statement	Branch	MC/DC	Function Call	Function
13	check_header(struct gz_stream *)	0.00% (0...	0.00% (0...	0.00% (0...	0.00% (0...	N
14	compress(unsigned char *, unsigned...	0.00% (0...	N/A	N/A	0.00% (0...	N
15	compress2(unsigned char *, unsigne...	0.00% (0...	0.00% (0...	0.00% (0...	0.00% (0...	N
16	compressBound(unsigned long)	0.00% (0...	N/A	N/A	N/A	N
17	compress_block(struct internal_state ...	0.00% (0...	0.00% (0...	0.00% (0...	N/A	N
18	copy_block(struct internal_state *, ch...	0.00% (0...	0.00% (0...	0.00% (0...	0.00% (0...	N
19	crc32(unsigned long, const unsigne...	26.08% (...	25.00% (...	0.00% (0...	50.00% (...	Y
20	crc32_big(unsigned long, const unsi...	100.00%...	100.00%...	100.00%...	N/A	Y
21	crc32_combine(unsigned long, unsi...	100.00%...	100.00%...	100.00%...	100.00%...	Y
22	crc32_little(unsigned long, const un...	100.00%...	100.00%...	100.00%...	N/A	Y
23	deflate(struct z_stream_s *, signed int)	0.00% (0...	0.00% (0...	0.00% (0...	0.00% (0...	N
24	deflateBound(struct z_stream_s *, un...	0.00% (0...	0.00% (0...	0.00% (0...	0.00% (0...	N
Total		3.05% (1...	1.93% (4...	1.67% (2...	2.13% (8...	6.14...

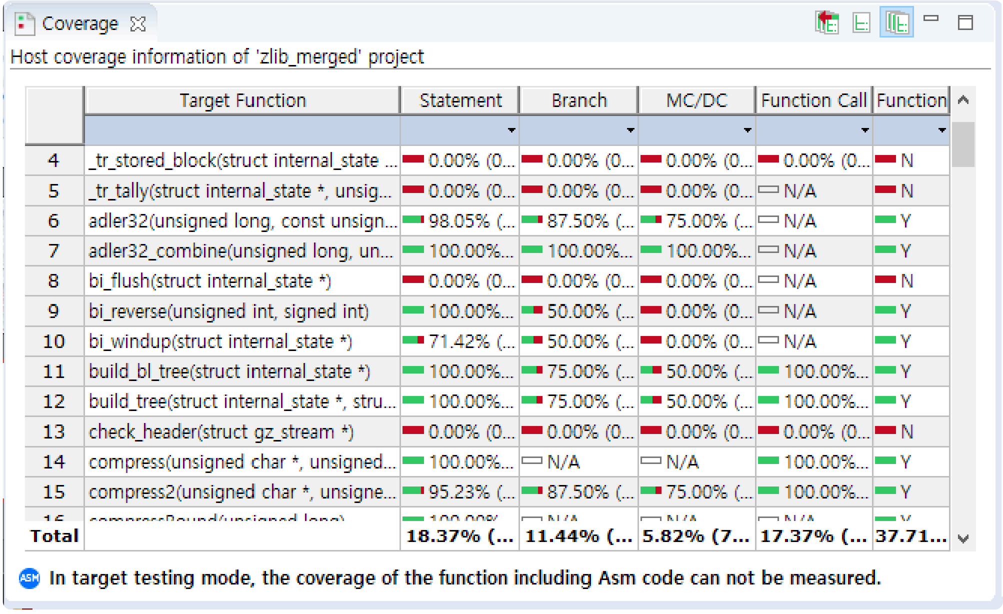
In target testing mode, the coverage of the function including Asm code can not be measured.



Host coverage information of 'zlib_copy_copy_copy' project

	Target Function	Statement	Branch	MC/DC	Function Call	Function
70	gzread(void *, void *, unsigned int)	0.00% (0...	0.00% (0...	0.00% (0...	0.00% (0...	N
71	gzrewind(void *)	0.00% (0...	0.00% (0...	0.00% (0...	0.00% (0...	N
72	gzseek(void *, signed long, signed int)	0.00% (0...	0.00% (0...	0.00% (0...	0.00% (0...	N
73	gzsetparams(void *, signed int, sign...	0.00% (0...	0.00% (0...	0.00% (0...	0.00% (0...	N
74	gztell(void *)	0.00% (0...	N/A	N/A	0.00% (0...	N
75	gzungetc(signed int, void *)	0.00% (0...	0.00% (0...	0.00% (0...	N/A	N
76	gzwrite(void *, const void *, unsigne...	0.00% (0...	0.00% (0...	0.00% (0...	0.00% (0...	N
77	inflate(struct z_stream_s *, signed int)	0.00% (0...	0.00% (0...	0.00% (0...	0.00% (0...	N
78	inflateBack(struct z_stream_s *, unsi...	2.95% (1...	0.30% (1...	0.00% (0...	0.00% (0...	Y
79	inflateBackEnd(struct z_stream_s *)	40.00% (...	50.00% (...	0.00% (0...	0.00% (0...	Y
80	inflateBackInit_(struct z_stream_s *, s...	13.63% (...	10.00% (...	0.00% (0...	0.00% (0...	Y
81	inflateCopy(struct z_stream_s *, stru...	0.00% (0...	0.00% (0...	0.00% (0...	0.00% (0...	N
Total		0.65% (2...	0.14% (3...	0.00% (0...	0.00% (0...	3.50...

In target testing mode, the coverage of the function including Asm code can not be measured.



Host coverage information of 'zlib_merged' project

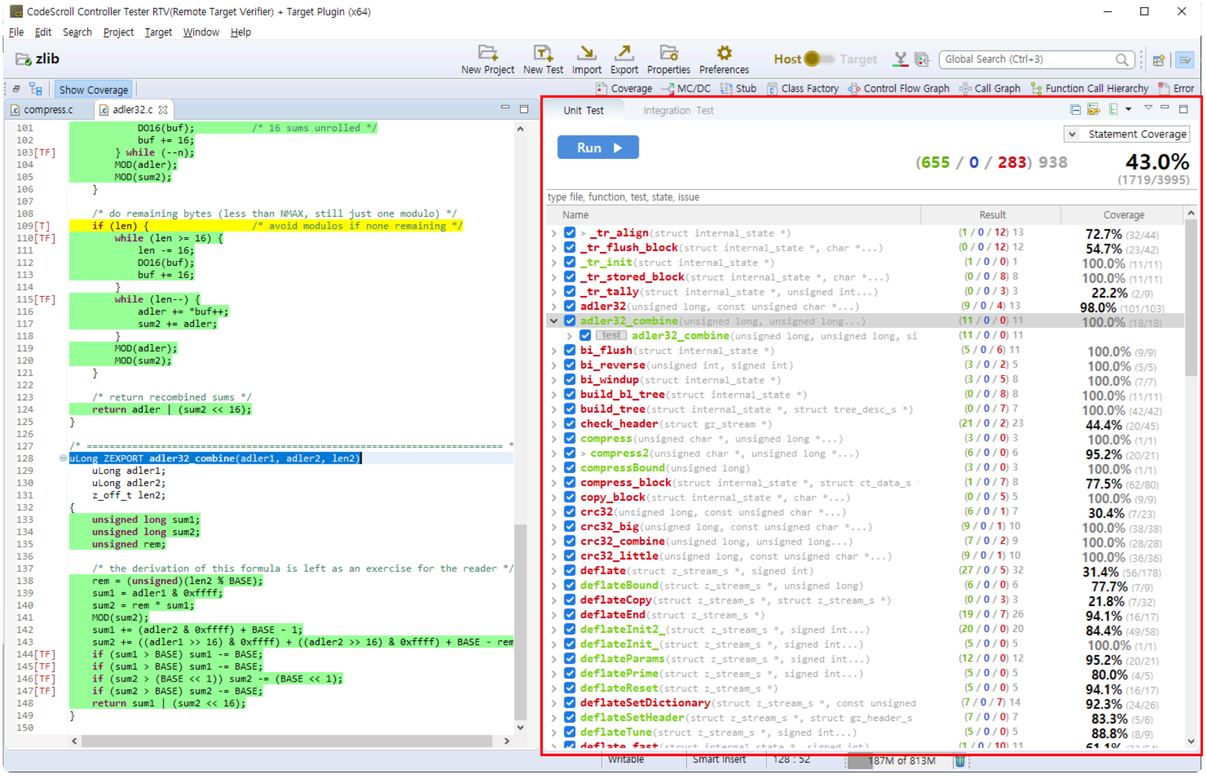
	Target Function	Statement	Branch	MC/DC	Function Call	Function
4	_tr_stored_block(struct internal_state ...	0.00% (0...	0.00% (0...	0.00% (0...	0.00% (0...	N
5	_tr_tally(struct internal_state *, unsig...	0.00% (0...	0.00% (0...	0.00% (0...	N/A	N
6	adler32(unsigned long, const unsign...	98.05% (...	87.50% (...	75.00% (...	N/A	Y
7	adler32_combine(unsigned long, un...	100.00%...	100.00%...	100.00%...	N/A	Y
8	bi_flush(struct internal_state *)	0.00% (0...	0.00% (0...	0.00% (0...	N/A	N
9	bi_reverse(unsigned int, signed int)	100.00%...	50.00% (...	0.00% (0...	N/A	Y
10	bi_windup(struct internal_state *)	71.42% (...	50.00% (...	0.00% (0...	N/A	Y
11	build_bl_tree(struct internal_state *)	100.00%...	75.00% (...	50.00% (...	100.00%...	Y
12	build_tree(struct internal_state *, stru...	100.00%...	75.00% (...	50.00% (...	100.00%...	Y
13	check_header(struct gz_stream *)	0.00% (0...	0.00% (0...	0.00% (0...	0.00% (0...	N
14	compress(unsigned char *, unsigned...	100.00%...	N/A	N/A	100.00%...	Y
15	compress2(unsigned char *, unsigne...	95.23% (...	87.50% (...	75.00% (...	100.00%...	Y
Total		18.37% (...	11.44% (...	5.82% (7...	17.37% (...	37.71...

In target testing mode, the coverage of the function including Asm code can not be measured.

! The [Merge Project Coverage] function may not work properly when two or more different functions in the project to be merged have the same function name.

17.3. Unit Test View

The Unit Test View section is located on the right of the screen. The Unit Test View combines the test and coverage information and provides it in a single view.



CodeScroll Controller Tester RTV(Remote Target Verifier) + Target Plugin (x64)
File Edit Search Project Target Window Help
zlib
New Project New Test Import Export Properties Preferences
Host Target
Global Search (Ctrl+3)
Show Coverage
Coverage MC/DC Stub Class Factory Control Flow Graph Call Graph Function Call Hierarchy Error
compress.c adler32.c
Unit Test Integration Test
Run
Statement Coverage
type file, function, test, state, issue
Writable Smart Insert 128 : 52 187M of 813M

```c
                DO16(buf);          /* 16 sums unrolled */
                buf += 16;
            } while (--n);
            MOD(adler);
            MOD(sum2);
        }

        /* do remaining bytes (less than NMAX, still just one modulo) */
        if (len) {                  /* avoid modulos if none remaining */
            while (len >= 16) {
                len -= 16;
                DO16(buf);
                buf += 16;
            }
            while (len--) {
                adler += *buf++;
                sum2 += adler;
            }
            MOD(adler);
            MOD(sum2);
        }

        /* return recombined sums */
        return adler | (sum2 << 16);
}

/* ========================================================================= *
uLong ZEXPORT adler32_combine(adler1, adler2, len2)
    uLong adler1;
    uLong adler2;
    z_off_t len2;
{
    unsigned long sum1;
    unsigned long sum2;
    unsigned rem;

    /* the derivation of this formula is left as an exercise for the reader */
    rem = (unsigned)(len2 % BASE);
    sum1 = adler1 & 0xffff;
    sum2 = rem * sum1;
    MOD(sum2);
    sum1 += (adler2 & 0xffff) + BASE - 1;
    sum2 += ((adler1 >> 16) & 0xffff) + ((adler2 >> 16) & 0xffff) + BASE - rem
    if (sum1 > BASE) sum1 -= BASE;
    if (sum1 > BASE) sum1 -= BASE;
    if (sum2 > (BASE << 1)) sum2 -= (BASE << 1);
    if (sum2 > BASE) sum2 -= BASE;
    return sum1 | (sum2 << 16);
}
```

(655 / 0 / 283) 938 43.0% (1719/3995)

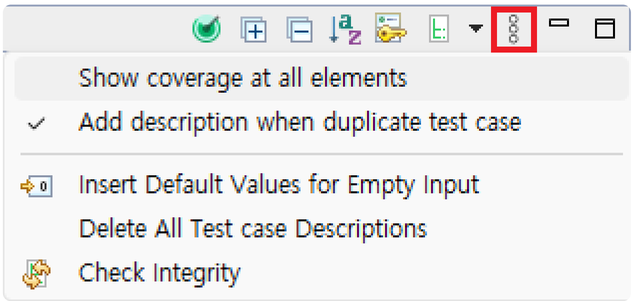
Name	Result	Coverage
☑ > _tr_align(struct internal_state *)	(1 / 0 / 12) 13	72.7% (32/44)
☑ _tr_flush_block(struct internal_state *, char *...)	(0 / 0 / 12) 12	54.7% (23/42)
☑ _tr_init(struct internal_state *)	(1 / 0 / 0) 1	100.0% (11/11)
☑ _tr_stored_block(struct internal_state *, char *...)	(0 / 0 / 8) 8	100.0% (11/11)
☑ _tr_tally(struct internal_state *, unsigned int...)	(0 / 0 / 3) 3	22.2% (2/9)
☑ adler32(unsigned long, const unsigned char *...)	(9 / 0 / 4) 13	98.0% (101/103)
☑ adler32_combine(unsigned long, unsigned long...)	(11 / 0 / 0) 11	100.0% (18/18)
☑ test adler32_combine(unsigned long, unsigned long, si	(11 / 0 / 0) 11	
☑ bi_flush(struct internal_state *)	(5 / 0 / 6) 11	100.0% (9/9)
☑ bi_reverse(unsigned int, signed int)	(3 / 0 / 2) 5	100.0% (5/5)
☑ bi_windup(struct internal_state *)	(3 / 0 / 5) 8	100.0% (7/7)
☑ build_bl_tree(struct internal_state *)	(0 / 0 / 8) 8	100.0% (11/11)
☑ build_tree(struct internal_state *, struct tree_desc_s *)	(0 / 0 / 7) 7	100.0% (42/42)
☑ check_header(struct gz_stream *)	(21 / 0 / 2) 23	44.4% (20/45)
☑ compress(unsigned char *, unsigned long *...)	(3 / 0 / 0) 3	100.0% (1/1)
☑ > compress2(unsigned char *, unsigned long *...)	(6 / 0 / 0) 6	95.2% (20/21)
☑ compressBound(unsigned long)	(3 / 0 / 0) 3	100.0% (1/1)
☑ compress_block(struct internal_state *, struct ct_data_s	(1 / 0 / 7) 8	77.5% (62/80)
☑ copy_block(struct internal_state *, char *...)	(0 / 0 / 5) 5	100.0% (9/9)
☑ crc32(unsigned long, const unsigned char *...)	(6 / 0 / 1) 7	30.4% (7/23)
☑ crc32_big(unsigned long, const unsigned char *...)	(9 / 0 / 1) 10	100.0% (38/38)
☑ crc32_combine(unsigned long, unsigned long...)	(7 / 0 / 2) 9	100.0% (28/28)
☑ crc32_little(unsigned long, const unsigned char *...)	(9 / 0 / 1) 10	100.0% (36/36)
☑ deflate(struct z_stream_s *, signed int)	(27 / 0 / 5) 32	31.4% (56/178)
☑ deflateBound(struct z_stream_s *, unsigned long)	(6 / 0 / 0) 6	77.7% (7/9)
☑ deflateCopy(struct z_stream_s *, struct z_stream_s *)	(0 / 0 / 3) 3	21.8% (7/32)
☑ deflateEnd(struct z_stream_s *)	(19 / 0 / 7) 26	94.1% (16/17)
☑ deflateInit2_(struct z_stream_s *, signed int...)	(20 / 0 / 0) 20	84.4% (49/58)
☑ deflateInit_(struct z_stream_s *, signed int...)	(5 / 0 / 0) 5	100.0% (1/1)
☑ deflateParams(struct z_stream_s *, signed int...)	(12 / 0 / 0) 12	95.2% (20/21)
☑ deflatePrime(struct z_stream_s *, signed int...)	(5 / 0 / 0) 5	80.0% (4/5)
☑ deflateReset(struct z_stream_s *)	(5 / 0 / 0) 5	94.1% (16/17)
☑ deflateSetDictionary(struct z_stream_s *, const unsigned	(7 / 0 / 7) 14	92.3% (24/26)
☑ deflateSetHeader(struct z_stream_s *, struct gz_header_s	(7 / 0 / 0) 7	83.3% (5/6)
☑ deflateTune(struct z_stream_s *, signed int...)	(5 / 0 / 0) 5	88.8% (8/9)
☑ deflate_fast(struct internal_state *, signed int)	(1 / 0 / 10) 11	61.1%

Toolbar menu in the Unit Test View

Toolbar icon	Description
Fault Localization	Identify the location of defects or failures from failed test cases
Expand All	Shows all test view tree.
Collapse All	Hides all test view trees.
Sort by Unique Test Name	Sort by unique test name.
Show as Unique Test Name	Displays by unique test name.
Total	Displays all the tests.
Failure/Error	Displays only the tests that the test result is Failure/Error.
Failure	Displays only the tests that the test result is Failure.
Error	Displays only the tests that the test result is Error.
Success	Displays only the tests that the test result is Success.
Function changed	Displays only the tests that the function to be tested has been changed.
Run not guaranteed	Displays only the tests that the test execution is not ensured.

Host/Target result different	Displays only the test that the host result and the target result are different.

Pull-down menu in the Unit Test View


Show coverage at all elements
✓ Add description when duplicate test case
Insert Default Values for Empty Input
Delete All Test case Descriptions
Check Integrity

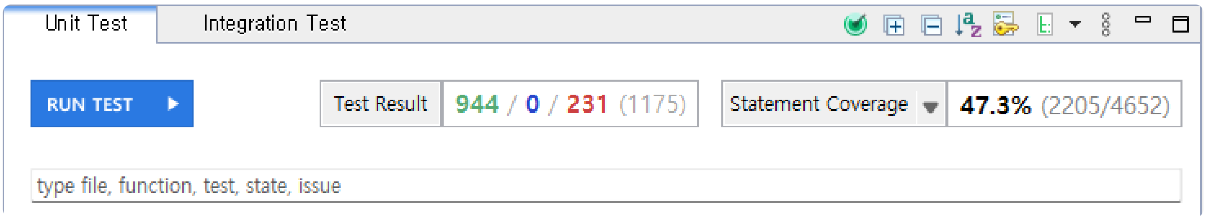
Menu name	Description
Show coverage at all elements	Displays the coverage in all items. (function, test, test case)
Add description when duplicate test case	Adds original test case number on duplicated test case.
Insert Default Values for Empty Input	When input data are empty, inserts default values.
Delete All Test case Descriptions	Delete test case descriptions all together.
Check Integrity	Checks integrity about functions and stubs. Then, reset test if it needs.

- Insert Default Values for Empty Input

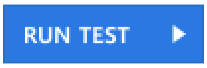
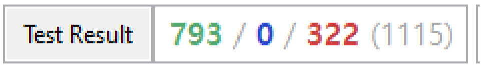
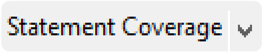
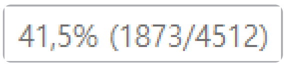
Variable type	Default value
string	*(empty string)*
without string	0

> For [Test reconfiguration], refer to [Source Code Modification and Test Reconfiguration]

Dashboard in the Unit Test View

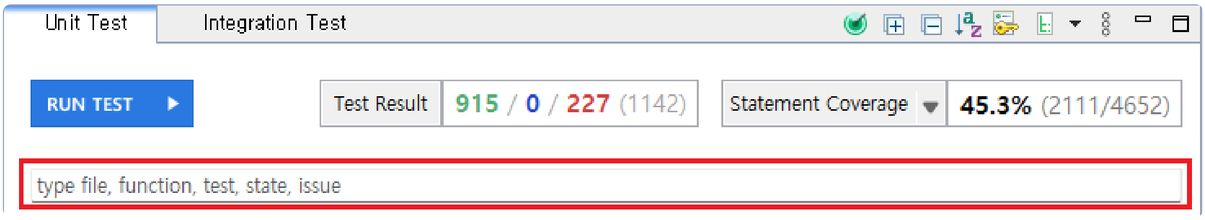


Menu	Description

	Runs unit tests.
 Test Result 793 / 0 / 322 (1115)	Shows success, failure, error and total of test case.
 Statement Coverage	Selects the coverage type to be displayed in the Unit Test View. (statement, branch, MC/DC, function call)
 41,5% (1873/4512)	Shows the selected kind of full coverage.

Search

In the Unit Test View, you can search functions, tests and test cases by file, function, test, status (success, failure, error) and issue name.



Test Result 915 / 0 / 227 (1142)

Statement Coverage 45.3% (2111/4652)

type file, function, test, state, issue

Status search keyword

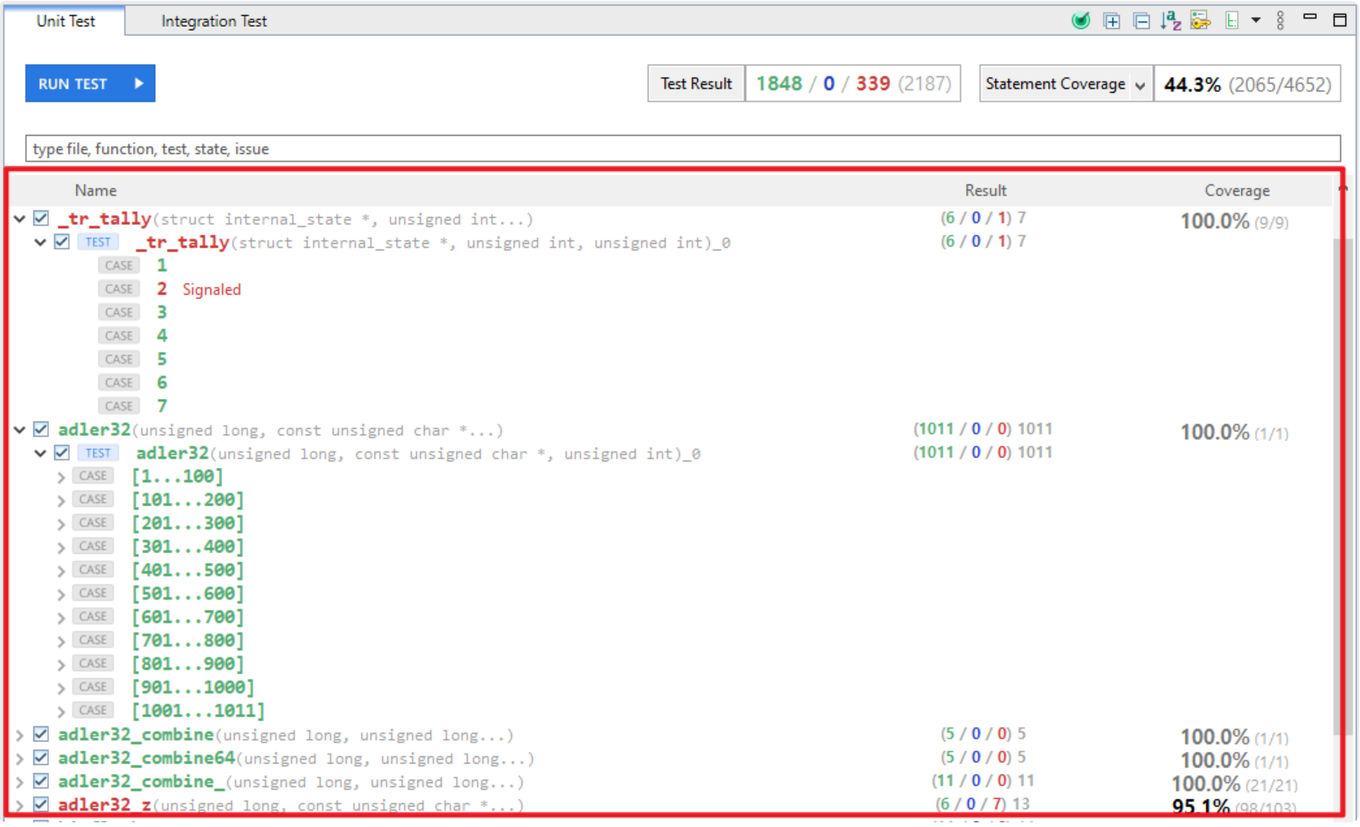
In the Unit Test View, you can filter the tests that are displayed by the status search keyword. It provides searchable keyword recommendation and auto-complete function.

Keyword	Description
`%TEST_SUCCESS%`	Test success
`%TEST_FAILURE% %TEST_ERROR%`	Test failure/error
`%TEST_FAILURE%`	Test failure
`%TEST_ERROR%`	Test error
`%TEST_HAS_NOT_FUNCTION%`	Function changed
`%TEST_NOT_GUARANTEE%`	Run not guaranteed
`%TEST_RESULT_DIFFERENT%`	Host/Target result different

✻ ‘Run not guaranteed’ is a case where test code is generated, but there is no guarantee that it will run normally. This is the case when using a type that is difficult to specify as a parameter or return value.

Structure of the Unit Test View

The Unit Test View presents the hierarchy structure of [Function] > [Test] > [Test case]. If there are more than 100 test cases in a test, they are grouped in groups of 100 to represent a group.



Test Result 1848 / 0 / 339 (2187)

Statement Coverage 44.3% (2065/4652)

type file, function, test, state, issue

Name	Result	Coverage
☑ _tr_tally(struct internal_state *, unsigned int...)	(6 / 0 / 1) 7	100.0% (9/9)
☑ TEST _tr_tally(struct internal_state *, unsigned int, unsigned int)_0	(6 / 0 / 1) 7	
CASE 1		
CASE 2 Signaled		
CASE 3		
CASE 4		
CASE 5		
CASE 6		
CASE 7		
☑ adler32(unsigned long, const unsigned char *...)	(1011 / 0 / 0) 1011	100.0% (1/1)
☑ TEST adler32(unsigned long, const unsigned char *, unsigned int)_0	(1011 / 0 / 0) 1011	
CASE [1...100]		
CASE [101...200]		
CASE [201...300]		
CASE [301...400]		
CASE [401...500]		
CASE [501...600]		
CASE [601...700]		
CASE [701...800]		
CASE [801...900]		
CASE [901...1000]		
CASE [1001...1011]		
☑ adler32_combine(unsigned long, unsigned long...)	(5 / 0 / 0) 5	100.0% (1/1)
☑ adler32_combine64(unsigned long, unsigned long...)	(5 / 0 / 0) 5	100.0% (1/1)
☑ adler32_combine_(unsigned long, unsigned long...)	(11 / 0 / 0) 11	100.0% (21/21)
☑ adler32_z(unsigned long, const unsigned char *...)	(6 / 0 / 7) 13	95.1% (98/103)

Item icons in the Unit Test View

Item icon	Description
None	Function
TEST	Test
TEST ⦿	Scenario test
CASE	Test case, Test case group

Item status color in the Unit Test View

The execution information of functions, tests, and test cases in the Unit Test View is represented by colors.

Color	Description
Green	Function/Test: If the execution result of all the test cases under it is success. Test case: The result of execution is success.
Blue	Function/Test: If only test cases with failure and no test cases with errors exist under it. Test case: The result of execution is failure.

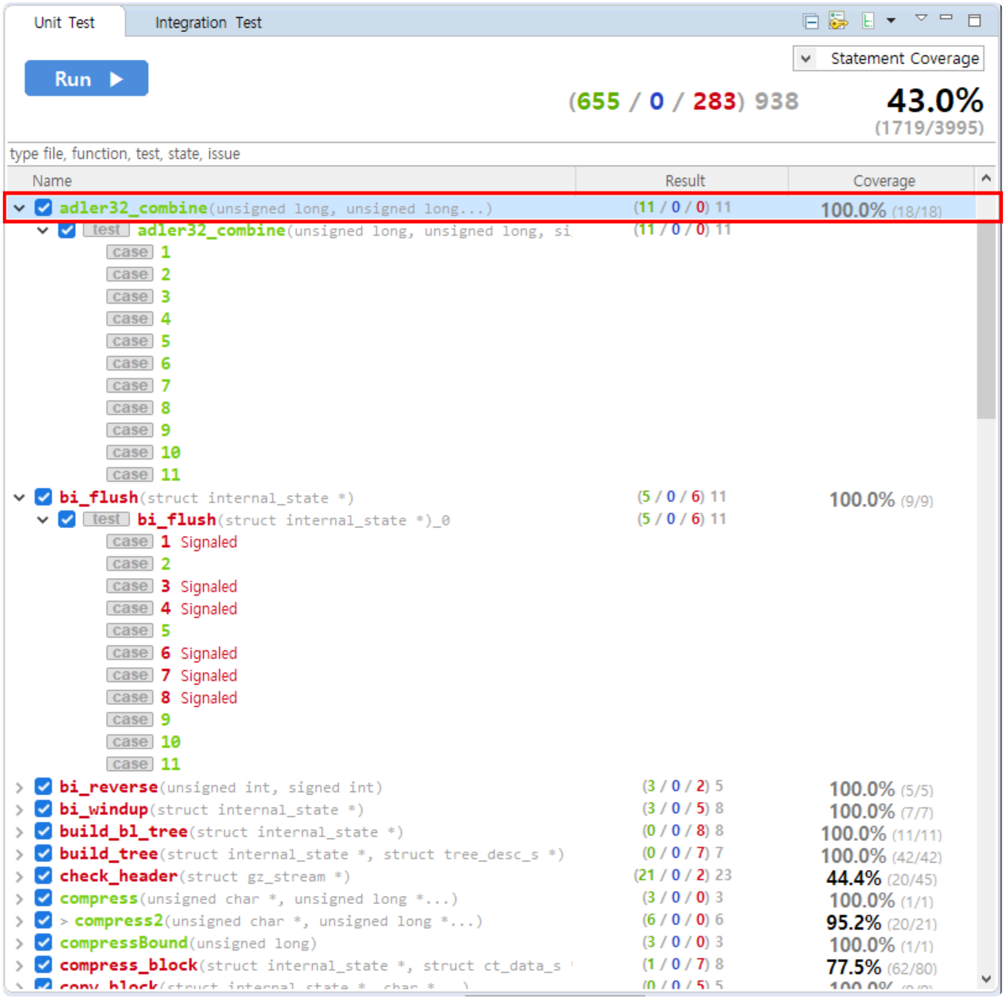
Red	Function/Test: If test cases with error exist under it. Test case: The result of execution is error.
Orange	Function/Test: All test cases have not been executed under it and test cases that are not guaranteed to run exist. Test case: Run not guaranteed.
Black	Function/Test: All test cases under it have not been executed. Test case: Not been executed.

Function

The functions provide the function name, the coverage and the test case execution results (success, failure, error and total).

> ✻ For the coverage for each function, the test execution result of the other function may be applied depending on the call relationship between functions.

Double-click on a function to check the location of the function in the Source Code Editor.

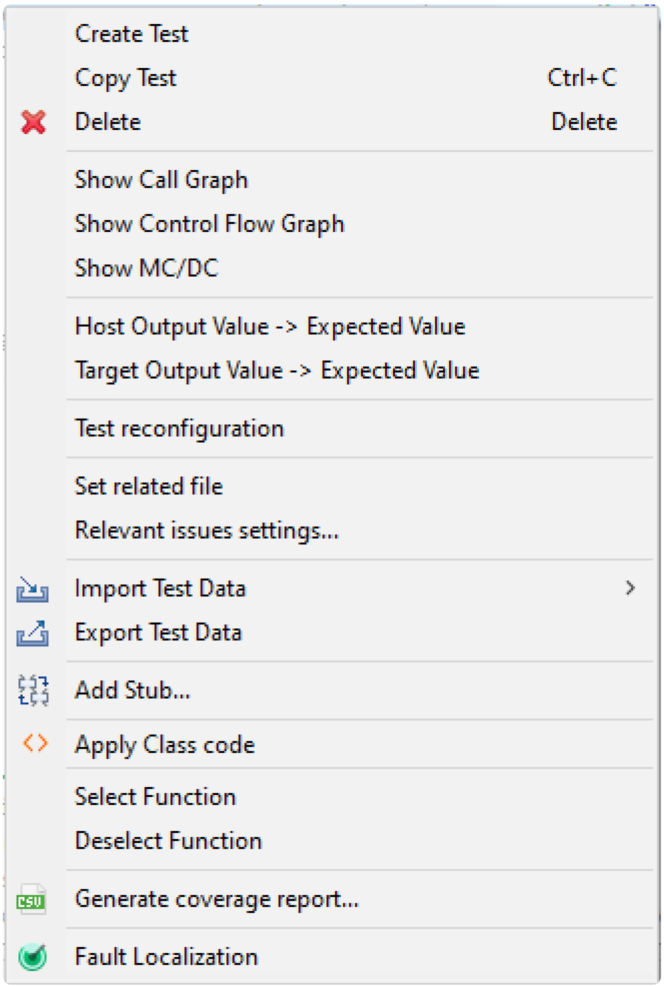


(655 / 0 / 283) 938 43.0% (1719/3995)

type file, function, test, state, issue

Name	Result	Coverage
☑ adler32_combine(unsigned long, unsigned long...)	(11 / 0 / 0) 11	100.0% (18/18)
☑ test adler32_combine(unsigned long, unsigned long, si	(11 / 0 / 0) 11	
case 1		
case 2		
case 3		
case 4		
case 5		
case 6		
case 7		
case 8		
case 9		
case 10		
case 11		
☑ bi_flush(struct internal_state *)	(5 / 0 / 6) 11	100.0% (9/9)
☑ test bi_flush(struct internal_state *)_0	(5 / 0 / 6) 11	
case 1 Signaled		
case 2		
case 3 Signaled		
case 4 Signaled		
case 5		
case 6 Signaled		
case 7 Signaled		
case 8 Signaled		
case 9		
case 10		
case 11		
☑ bi_reverse(unsigned int, signed int)	(3 / 0 / 2) 5	100.0% (5/5)
☑ bi_windup(struct internal_state *)	(3 / 0 / 5) 8	100.0% (7/7)
☑ build_bl_tree(struct internal_state *)	(0 / 0 / 8) 8	100.0% (11/11)
☑ build_tree(struct internal_state *, struct tree_desc_s *)	(0 / 0 / 7) 7	100.0% (42/42)
☑ check_header(struct gz_stream *)	(21 / 0 / 2) 23	44.4% (20/45)
☑ compress(unsigned char *, unsigned long *...)	(3 / 0 / 0) 3	100.0% (1/1)
☑ > compress2(unsigned char *, unsigned long *...)	(6 / 0 / 0) 6	95.2% (20/21)
☑ compressBound(unsigned long)	(3 / 0 / 0) 3	100.0% (1/1)
☑ compress_block(struct internal_state *, struct ct_data_s	(1 / 0 / 7) 8	77.5% (62/80)
☑ copy_block(struct internal_state *, char *, ...)	(0 / 0 / 5) 5	100.0%

Context menu of the function



Context menu	Description
Create Test	Creates a test of the selected function.
Copy Test	Copies tests of the selected function.
Delete	Deletes tests and test cases of the selected function.
Show call graph	Shows the function call graph of the selected function.
Show Control Flow Graph	Shows the control flow graph of the selected function.
Show MC/DC	Shows MC/DC of the selected function.
Host Output Value -> Expected Value	Pastes the host output value to the expected value.
Test reconfiguration	Reconfigure test information.
Set related file	Selects the files containing that test.
Relevant issues settings	Associates the selected test with the issue of the management tool.
Import Test Data	Imports the test data saved in local.
Export Test Data	Exports the test data to local.
Add Stub	Adds the stub to the selected test.
Apply Class Code	Apply the class code generated in the Class Factory View to the

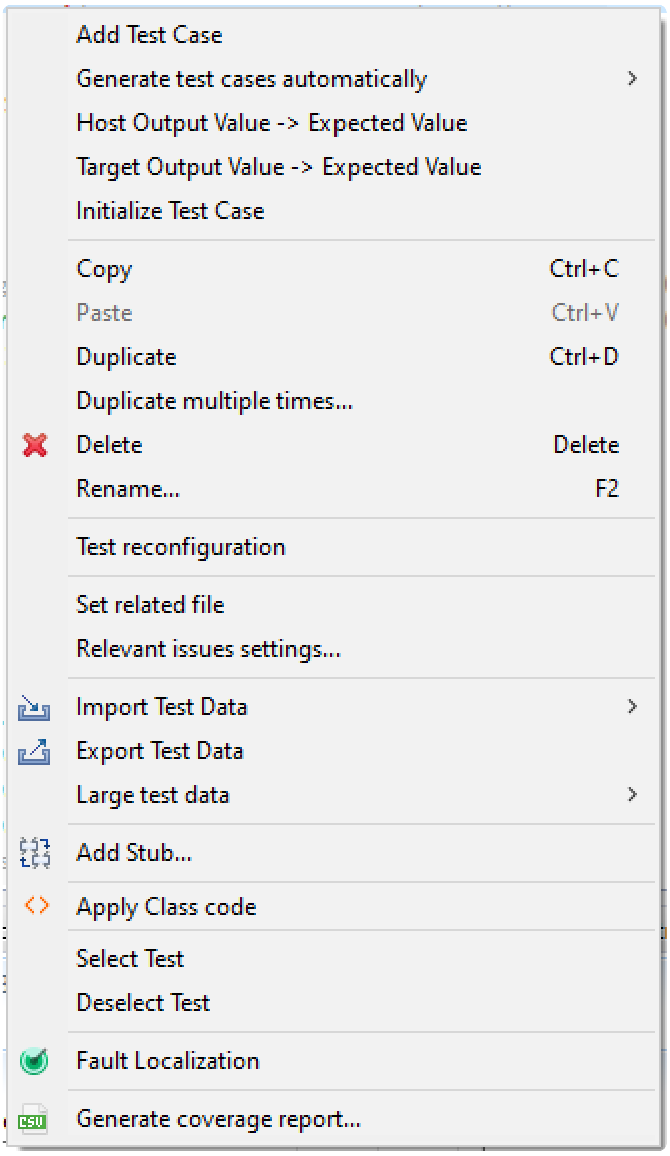
	function.
Select Function	Selects the checkbox of all the functions selected by a mouse.
Deselect Function	Deselects the checkbox of all functions selected by a mouse.
Generate coverage report	Exports the selected test coverage to the selected path.
Fault Localization	Identify the location of defects or failures from failed test cases.

For [Test reconfiguration], refer to [Source Code Modification and Test Reconfiguration]

Test

The test provides coverage, test case execution results(success, failure, error, total).
Double-click on a test to open its Test Editor.

Context menu of the test



Context menu	Description

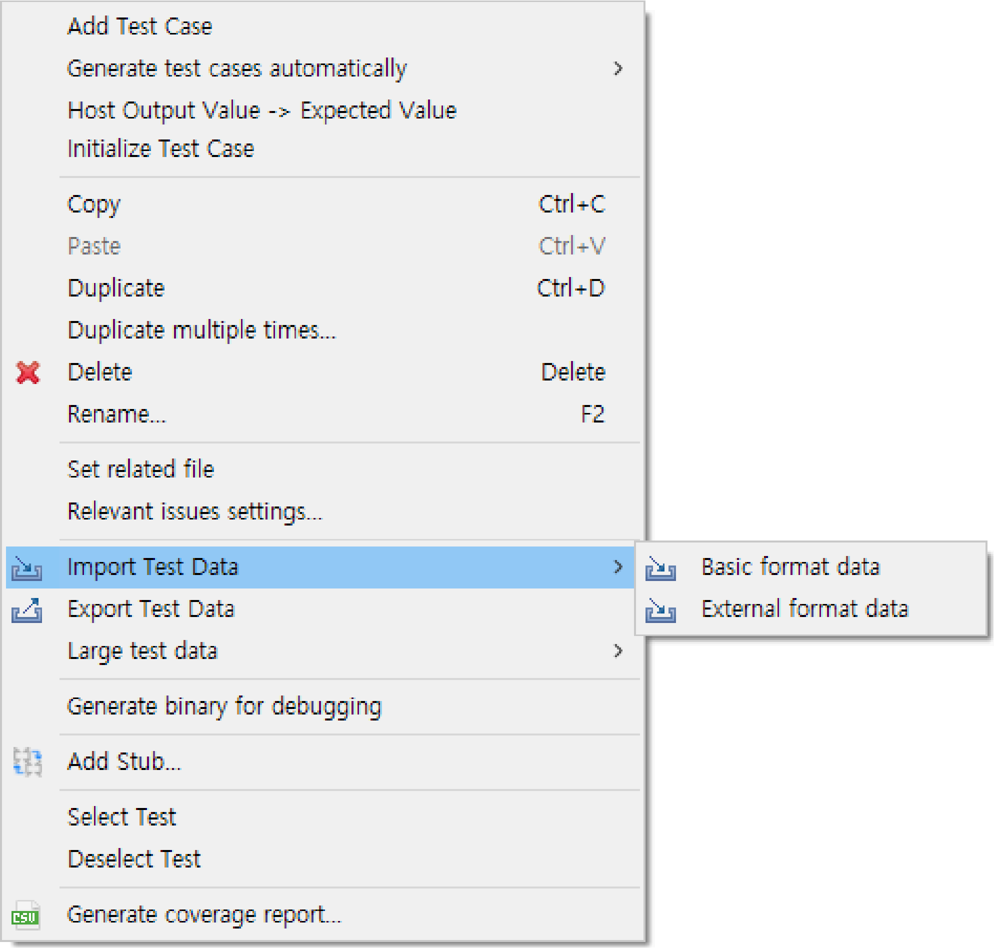
Add Test Case	Adds the test case to the unit test selected.
Generate test cases automatically	Creates the test case in various ways.
Host Output Value -> Expected Value	Pastes the host output value to the expected value.
Initialize Test case	Delete all the test cases.
Copy	Copies the test and test case.
Paste	Pastes the test and test case.
Duplicate	Duplicates the test and test case.
Duplicate multiple times	Duplicates tests and test cases as many as the number entered.
Delete	Deletes the test and test case.
Rename	Modifies the test name.
Test reconfiguration	Reconfigure test information.
Set related file	Selects the files containing that test.
Relevant issues settings	Associates the selected test with the issue of the management tool.
Import Test Data	Imports the test data saved in local.
Export Test Data	Exports the test data in local.
Large test data	Exports it locally or registers the file written by the user to the target test as a test case.
Add Stub	Adds the stub to the selected test.
Apply Class Code	Apply the class code generated in the Class Factory View to the test.
Select Test	Checks all checkbox of the tests selected.
Deselect Test	Checks all checkbox of the tests selected.
Fault Localization	Identify the location of defects or failures from failed test cases.
Generate coverage report	Exports the selected test coverage to the selected path.

- Rule for importing test data
  When importing the test data, if you select multiple test data numbered with the test name, it imports those files by merging them.

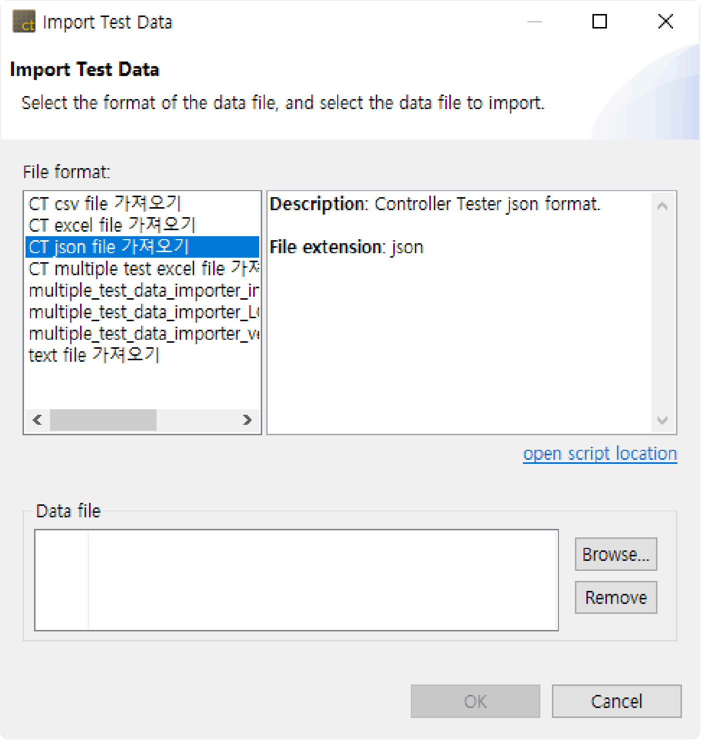
> For [Test reconfiguration], refer to [Source Code Modification and Test Reconfiguration]

Import test data

You can import the test data in various formats (csv, xlsx, txt, json).



1. In the context menu of the Unit Test View, click [Import Test Data] and select either [Basic format data] or [External format data].
2. If you select [Basic format data], the test data with the format (csv) exported from the CT 2023.12 is imported.
3. If you select [External format data], the test data is imported from the files in various formats (csv, xlsx, txt, json).



Import Test Data

Import Test Data

Select the format of the data file, and select the data file to import.

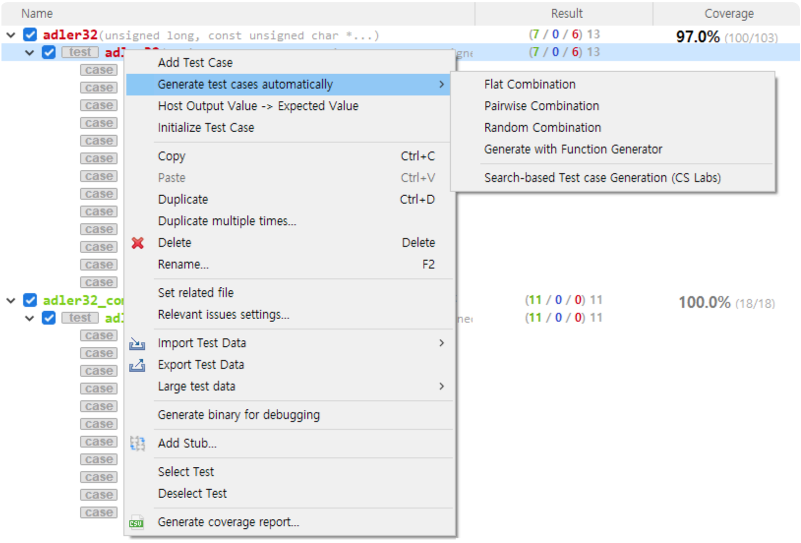
File format:

Description: Controller Tester json format.

File extension: json

Generate test cases automatically

It creates a test case by using [Flat/Pairwise/Random combination], [Generates with Function Generator], and [Search-based Test case Generation (CS Labs)].

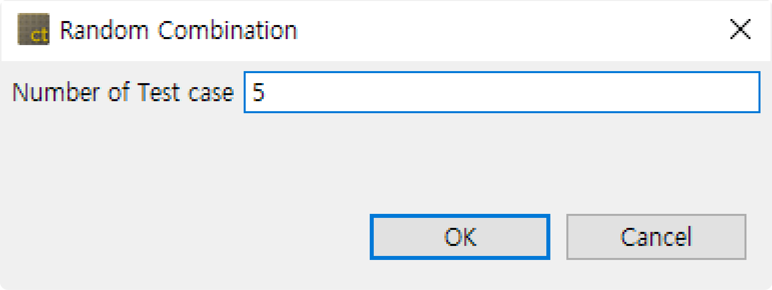


1. In the context menu of the Unit or the Integration Test View, click [Generate test cases automatically] and select one among [Flat Combination], [Pairwise Combination], [Random Combination], [Generate with Function Generator] and [Search-based Test case Generation (CS Labs)].

Method	Description
Flat	Combines simply based on variables having the largest number of test data.
Pairwise	Combines so that each selected parameter data is paired at least once with the

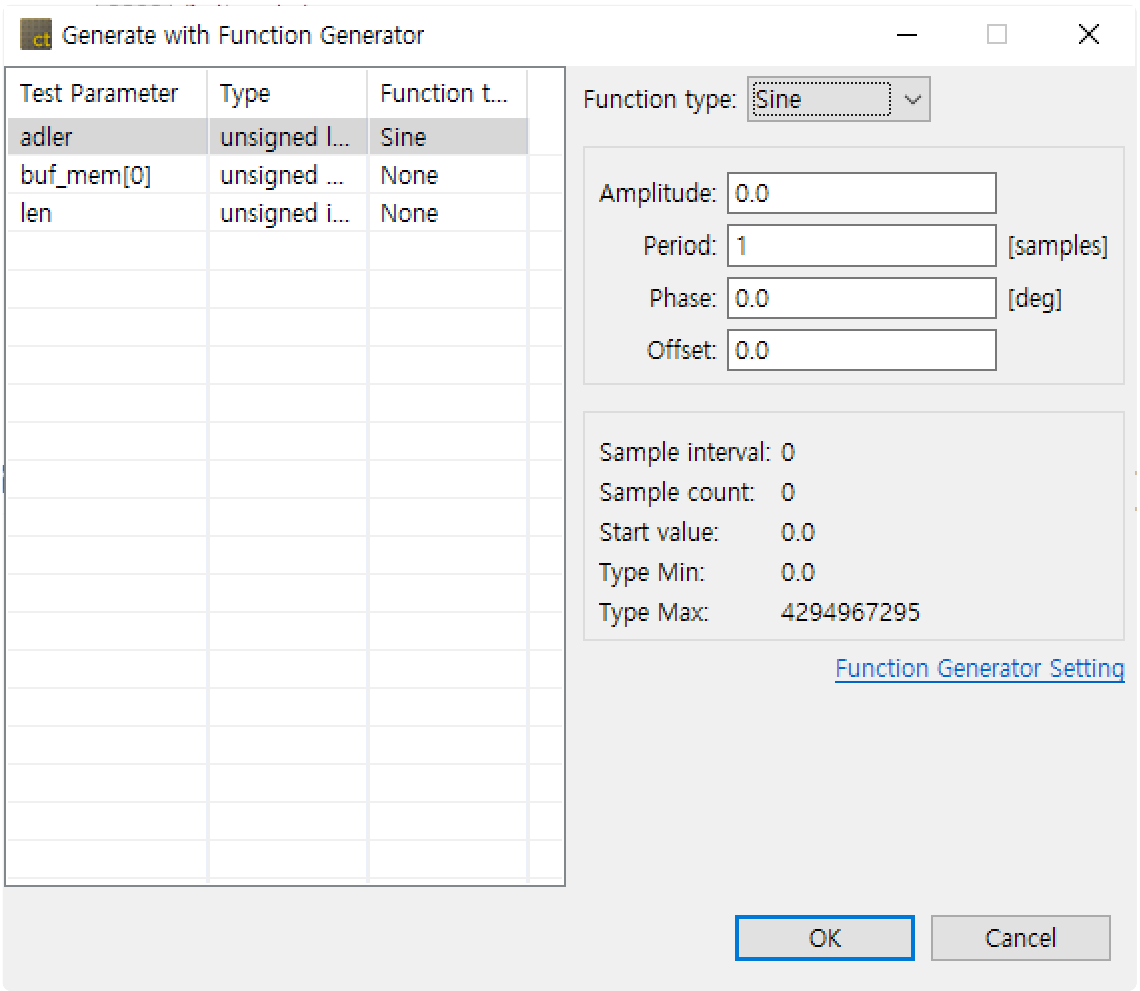
	parameter data other than itself. ※ The number of variable partitions must be more than 2 and less than 52.
Random	Combines the test data as many as the number of test cases that the user defines any value between the minimum value and the maximum value for the variable partition of input parameters.
Generate with Function Generator	Creates a test case by using six function types. (Ramps, Random, Range, Sine, Toggle, and Single Value)
Search-based Test case Generation (CS Labs)	Creates a test case by using AVM, which is a local search algorithm. ※ Currently, only C language is supported.

2. If you select [Random combination], the Random combination window is displayed so that the user can enter the number of test cases.



Number of Test case: 5

3. If you select [Generate with Function generator], you can select the function type (Ramps, Sine, Random, Toggle, Range, Single value and None) and change the settings of the function selected via the settings of the function generator. In the properties window of the project, you can set the function generator information in [Test] > [Generate test cases automatically] > [Function Generator].



Test Parameter	Type	Function t...
adler	unsigned l...	Sine
buf_mem[0]	unsigned ...	None
len	unsigned i...	None

Function type: Sine

Amplitude: 0.0
Period: 1 [samples]
Phase: 0.0 [deg]
Offset: 0.0

Sample interval: 0
Sample count: 0
Start value: 0.0
Type Min: 0.0
Type Max: 4294967295

a. Common settings

You can change the value in [Project] > [Properties] with the setting value common to each function.

Setting	Description
Sample interval	The interval of samples to be sampled from the function.
Number of sample	The number of samples to be sampled from the function(The number of test cases).
Start value	The default value at which the function is started (the values are created based on the start value).
Minimum value of type	The minimum value of variable partition. (If the return value of the function is less than the minimum value of type, the minimum value of type is returned.)
Maximum value of type	The maximum value of variable partition. (If the return value of the function is greater than the maximum value of type, the maximum value of type is returned.)

b. Ramps function

It is a function that creates a pulse by using Pre, Post and Hold values. If the number of samples is greater than the period of the function, the function is called recursively.

Setting	Description
Pre delay	The time to last Pre/Post sample value.
Rise samples	The time to rise from Pre/Post sample value to Hold sample value.
Hold samples	The time to last Hold sample value.
Fall samples	The time to fall from Hold sample value to Pre/Post sample value.
Post delay	The time to last Pre/Post sample value.
Pre/Post delay value	Pre/Post delay sample value.
Hold value	Hold sample value.

c. Random function

It is a function that creates a random value between the minimum value (Min) and the maximum value (Max).

Setting	Description
Min	The minimum value of random range.
Max	The maximum value of random range.

d. Range function

It is a function that creates values that increments or decrements by a certain interval (Step Size) between the minimum value of type and the maximum value of type.

Setting	Description
Step size	The size of increment or decrement value.
Hold	The number of times that the Step size holds.
Rising	The function type that rises by the Step size. Ex) if the step size is 30, 0,30,60……
Falling	The function type that falls by the Step size. Ex) if the step size is 30, 100,70,40……
Alternate	If the result value of function meets the minimum/maximum value of type, the function type that changes to rise or fall. Ex) if the step size is 30 and the maximum/minimum value are 0~100, 0,30,60,90,60,30,0……

e. Sine function

It is a function that creates Sine value. If the number of samples is greater than the period of the function, the function is called recursively.

Setting	Description
Amplitude	The amplitude of Sine function.
Period	The period of Sine function.
Phase	The phase of Sine function.
Offset	The offset of Sine function.

f. Toggle function

It is a function that creates FirstValue and SecondValue repeatedly.

Setting	Description
First value	The first value that is repeated in Toggle function.
Second value	The second value that is repeated in Toggle function.

g. SingleValue function

It is a function that returns only a constant single value.

Setting	Description
Value	The value to be created.

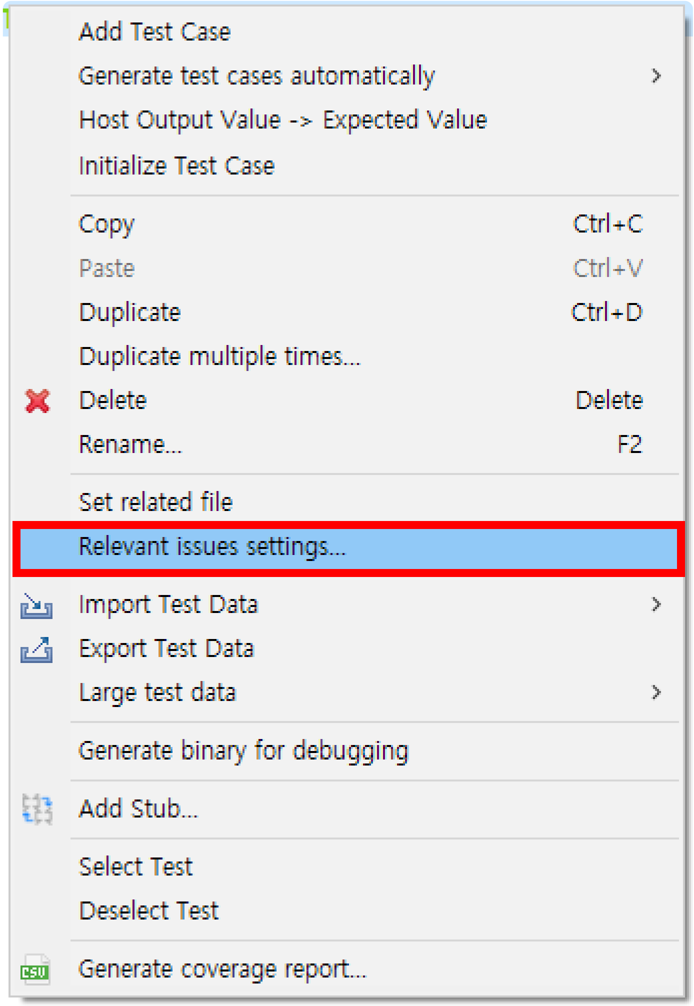
h. None

It does not create a function.

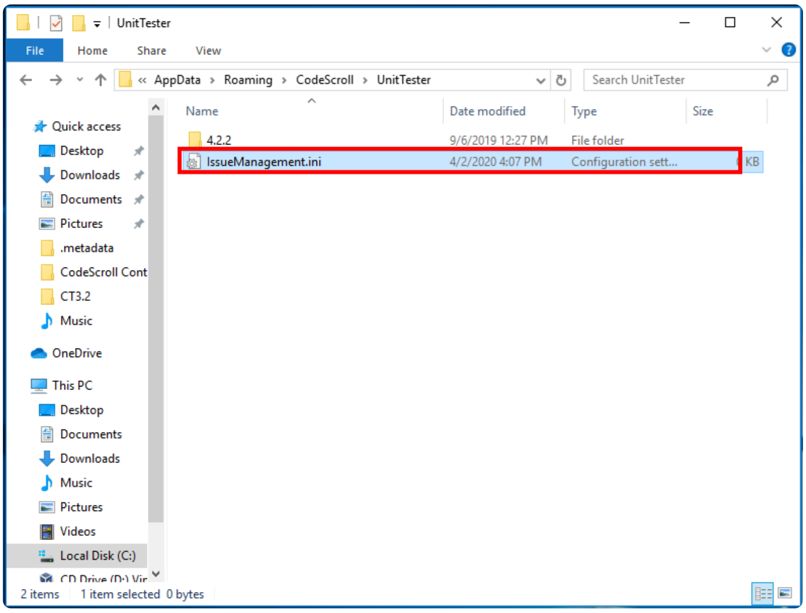
Relevant issues settings

It associates the selected test with the issue in the issue management tool registered. The CT 2023.12 supports the following issue management tools: JIRA, Trac, Redmine, Mantis, Bugzilla.

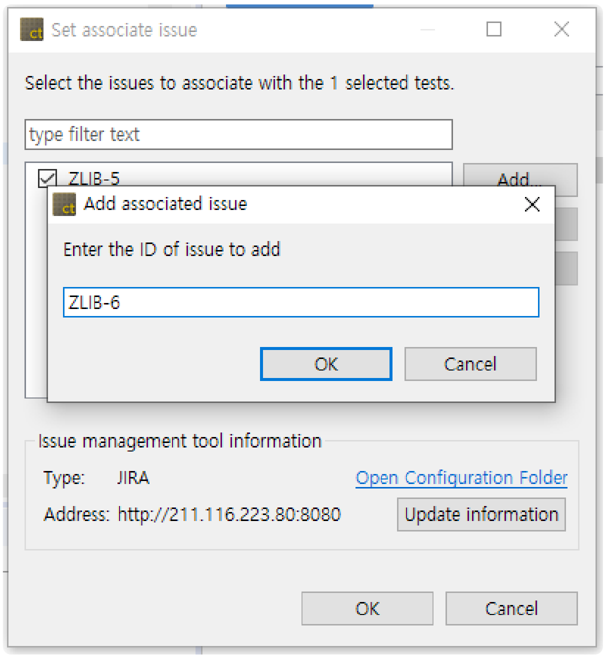
1. In the context menu of Unit Test View, click [Relevant issues settings…].



2. Enter the information of the issue management tool in the configuration file (IssueManagement.ini).



3. Add the issues to be associated with the test.



Set associate issue

Select the issues to associate with the 1 selected tests.

type filter text

☑ ZLIB-5

Add associated issue

Enter the ID of issue to add

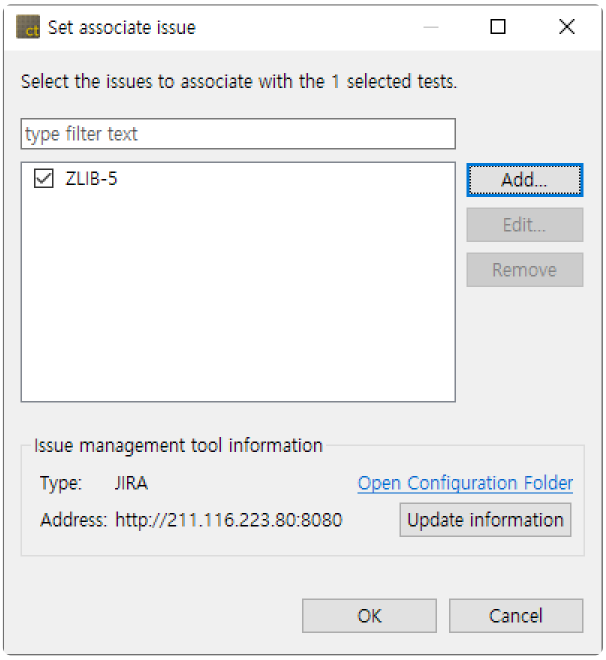
ZLIB-6

Issue management tool information

Type: JIRA

Address: http://211.116.223.80:8080

4. Check the checked issue list and click [OK].



Set associate issue

Select the issues to associate with the 1 selected tests.

type filter text

☑ ZLIB-5

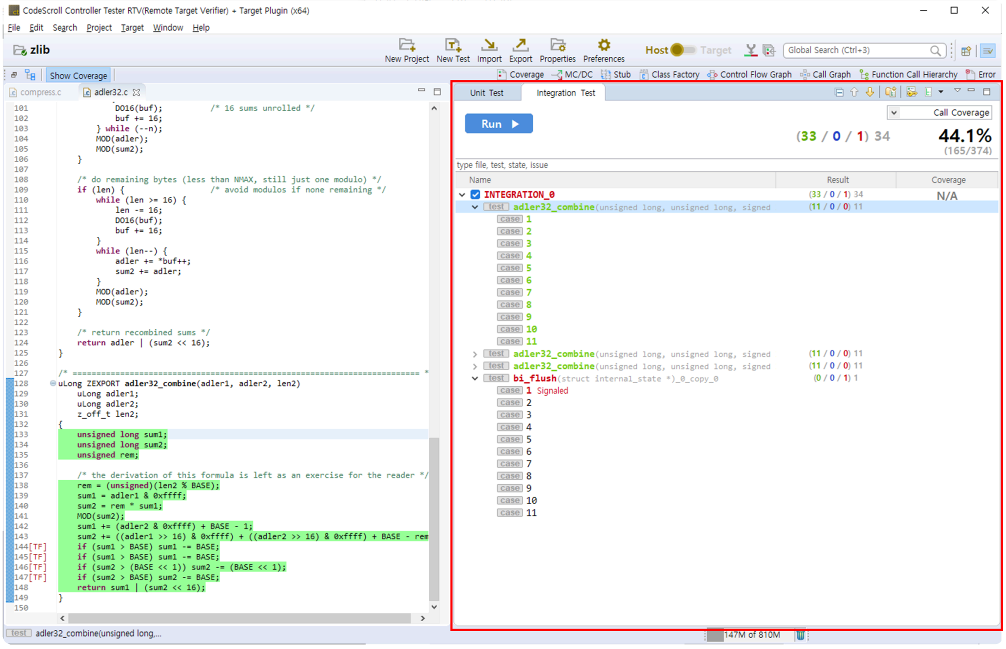
Issue management tool information

Type: JIRA

Address: http://211.116.223.80:8080

17.4. Integration Test View

The Integration Test View provides the integration test unit that can group the unit tests. The unit tests under the integration test run in order with the context maintained.



```
            DO16(buf);          /* 16 sums unrolled */
            buf += 16;
        } while (--n);
        MOD(adler);
        MOD(sum2);
    }

    /* do remaining bytes (less than NMAX, still just one modulo) */
    if (len) {                  /* avoid modulos if none remaining */
        while (len >= 16) {
            len -= 16;
            DO16(buf);
            buf += 16;
        }
        while (len--) {
            adler += *buf++;
            sum2 += adler;
        }
        MOD(adler);
        MOD(sum2);
    }

    /* return recombined sums */
    return adler | (sum2 << 16);
}

/* ========================================================================= *
uLong ZEXPORT adler32_combine(adler1, adler2, len2)
    uLong adler1;
    uLong adler2;
    z_off_t len2;
{
    unsigned long sum1;
    unsigned long sum2;
    unsigned rem;

    /* the derivation of this formula is left as an exercise for the reader */
    rem = (unsigned)(len2 % BASE);
    sum1 = adler1 & 0xffff;
    sum2 = rem * sum1;
    MOD(sum2);
    sum1 += (adler2 & 0xffff) + BASE - 1;
    sum2 += ((adler1 >> 16) & 0xffff) + ((adler2 >> 16) & 0xffff) + BASE - rem
    if (sum1 > BASE) sum1 -= BASE;
    if (sum1 > BASE) sum1 -= BASE;
    if (sum2 > (BASE << 1)) sum2 -= (BASE << 1);
    if (sum2 > BASE) sum2 -= BASE;
    return sum1 | (sum2 << 16);
}
```

test adler32_combine(unsigned long,...

(33 / 0 / 1) 34 44.1% (165/374)

type file, test, state, issue

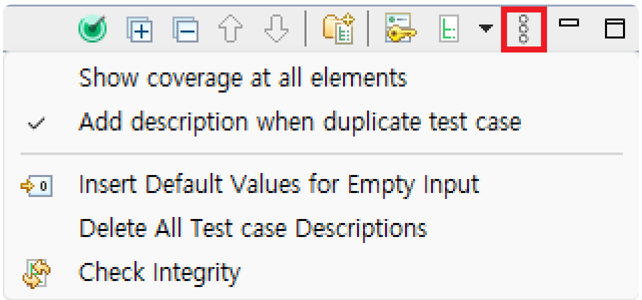
```
Name                                                          Result            Coverage
INTEGRATION_0                                                 (33 / 0 / 1) 34   N/A
  test adler32_combine(unsigned long, unsigned long, signed   (11 / 0 / 0) 11
    case 1
    case 2
    case 3
    case 4
    case 5
    case 6
    case 7
    case 8
    case 9
    case 10
    case 11
  test adler32_combine(unsigned long, unsigned long, signed   (11 / 0 / 0) 11
  test adler32_combine(unsigned long, unsigned long, signed   (11 / 0 / 0) 11
  test bi_flush(struct internal_state *)_0_copy_0              (0 / 0 / 1) 1
    case 1 Signaled
    case 2
    case 3
    case 4
    case 5
    case 6
    case 7
    case 8
    case 9
    case 10
    case 11
```

Toolbar menu in the Integration Test View

Toolbar icon	Description
Fault Localization	Identify the location of defects or failures from failed test cases
Expand All	Shows all test view tree nodes.
Collapse All	Hides all test view tree nodes.
Move Up Test	Moves the selected test up.
Move Down Test	Moves the selected test down.
Create	Creates an integration test.
Shows as Unique Test Name	Displays with unique test name.
Total	Displays all the tests.
Failure/Error	Displays only the tests that the test result is Failure/Error.
Failure	Displays only the tests that the test result is Failure.
Error	Displays only the tests that the test result is Error.
Success	Displays only the tests that the test result is Success.
Function changed	Displays only the tests that the function to be tested has been changed.

Run not guaranteed	Displays only the tests that the test execution is not ensured.
Host/Target result different	Displays only the test that the host result and the target result are different.

Pull-down menu in the Integration Test View


Show coverage at all elements
✓ Add description when duplicate test case
Insert Default Values for Empty Input
Delete All Test case Descriptions
Check Integrity

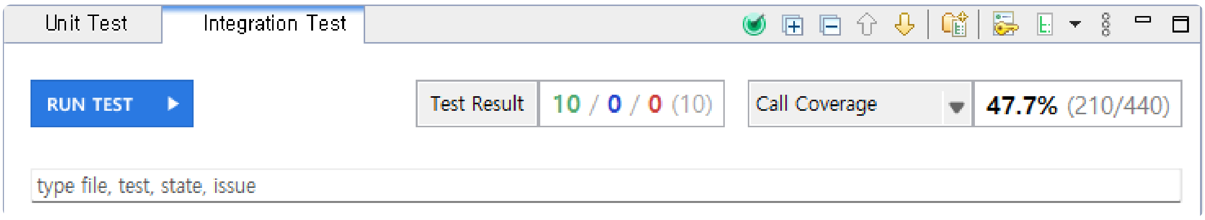
Menu name	Description
Show coverage at all elements	Displays the coverage in all items.(integration test, test, test case)
Add description when duplicate test case	Adds original test case number on duplicated test case.
Insert Default Values for Empty Input	When input data are empty, inserts default values.
Delete All Test case Descriptions	Delete test case descriptions all together.
Check Integrity	Checks integrity about functions and stubs. Then, reset test if it needs.

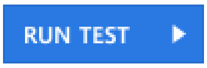
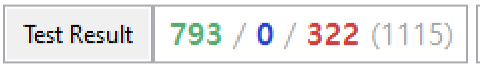
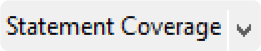
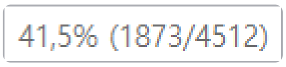
- Insert Default Values for Empty Input

Variable type	Default value
string	(empty string)
without string	0

For [Test reconfiguration], refer to [Source Code Modification and Test Reconfiguration]

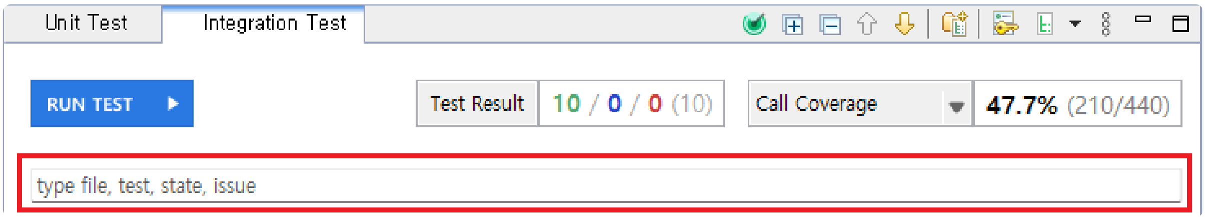
Dashboard in the Integration Test View



Menu	Description
	Runs integration tests.
	Shows success, failure, error and total of test case.
	Selects the coverage type to be displayed in the Integration Test View. (statement, branch, MC/DC, function call)
	Shows the selected kind of full coverage.

Search

In the Integration Test View, you can search the integration tests, tests and test cases by file, function, test, status (success, failure, error) and issue name.



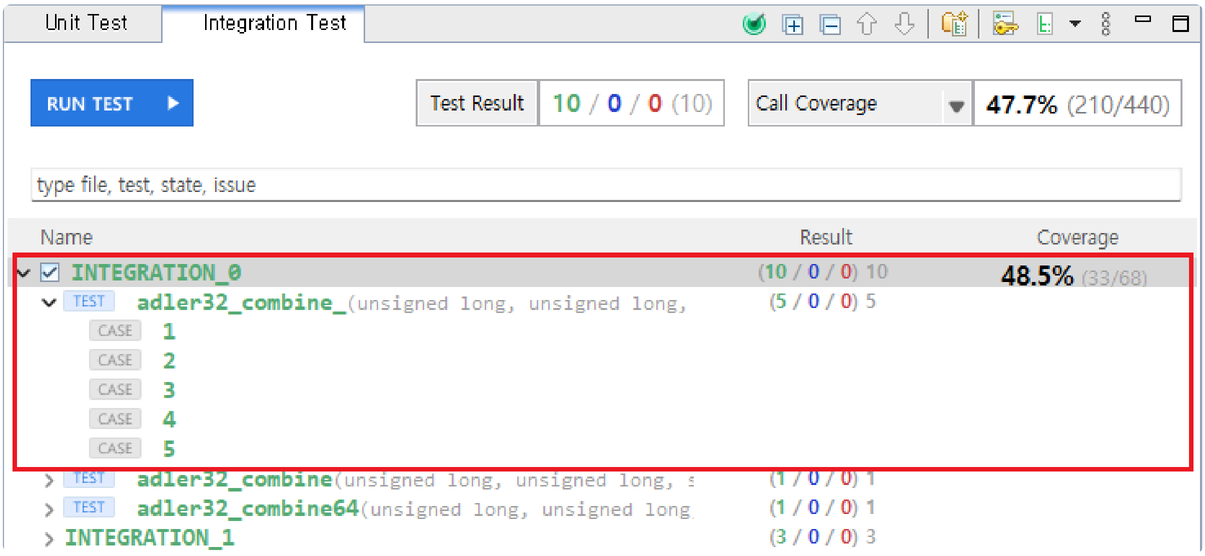
Status search keyword

In the Integration Test View, you can filter the tests displayed by the status search keyword. It provides searchable keyword recommendation and auto-complete function.

Keyword	Description
`%TEST_SUCCESS%`	Test success
`%TEST_FAILURE% %TEST_ERROR%`	Test failure/error
`%TEST_FAILURE%`	Test failure
`%TEST_ERROR%`	Test error
`%TEST_HAS_NOT_FUNCTION%`	Function changed
`%TEST_NOT_GUARANTEE%`	Run not guaranted
`%TEST_RESULT_DIFFERENT%`	Host/Target result different

Structure of the Integration Test View

The Integration Test View presents the hierarchy structure of [Integartion tes] > [Test] > [Test case].



```
☑ INTEGRATION_0                                          (10 / 0 / 0) 10    48.5% (33/68)
   TEST  adler32_combine_(unsigned long, unsigned long,   (5 / 0 / 0) 5
      CASE  1
      CASE  2
      CASE  3
      CASE  4
      CASE  5
   TEST  adler32_combine(unsigned long, unsigned long, s  (1 / 0 / 0) 1
   TEST  adler32_combine64(unsigned long, unsigned long   (1 / 0 / 0) 1
 INTEGRATION_1                                            (3 / 0 / 0) 3
```

Item icons in the Integration Test View

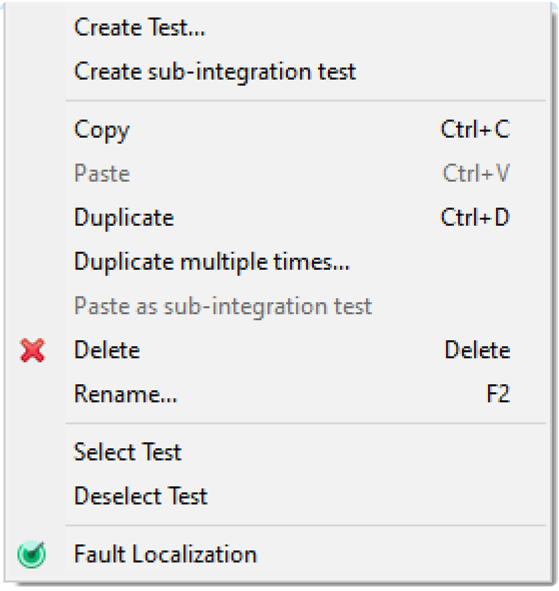
Item icon	Description
None	Integration Test
TEST	Test
TEST ⊙	Scenario test
TEST ●	Global variable test
CASE	Test case, Test case group

Item status color in the Integration Test View

The execution information of functions, tests, and test cases in the Integration Test View is represented by colors.

Color	Description
Green	Integration Test/Test: If the execution result of all the test cases under it is success. Test case: If the result of execution is success.
Blue	Function/Test: If only test cases with failure and no test cases with errors exist under it. Test case: If the result of execution is failure.
Red	Function/Test: If test cases with error exist under it. Test case: If the result of execution is error.
Orange	Function/Test: All test cases have not been executed under it and test cases that are not guaranteed to run exist. Test case: Run not guaranteed
Black	Function/Test: All test cases under it have not been executed. Test case: Not been executed

Context menu in the Integration Test View

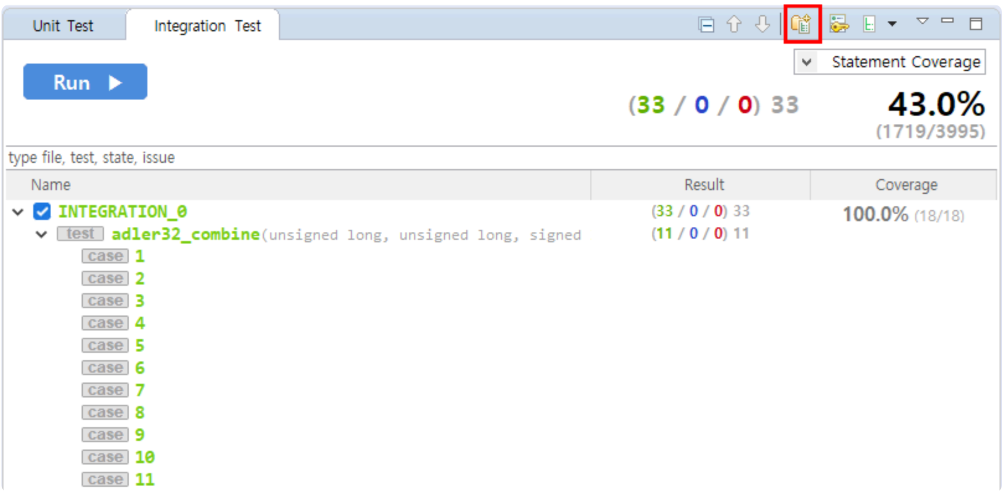


Context menu	Description
Create Test	Creates the dialog for creating a test
Create sub-integration test	Creates a sub-integration test
Copy	Copies the test and test case
Paste	Pastes the test and test case
Duplicate	Duplicates the test and test case
Duplicate multiple times	Duplicates tests and test cases as many as the number entered
Paste as sub-integration test	Pastes the integration test copied into the integration test selected as a sub-integration test
Delete	Deletes the test and test case
Rename	Modifies the test name
Select tests	Checks all checkbox of the tests selected
Deselect tests	Checks all checkbox of the tests selected
Fault Localization	Identify the location of defects or failures from failed test cases

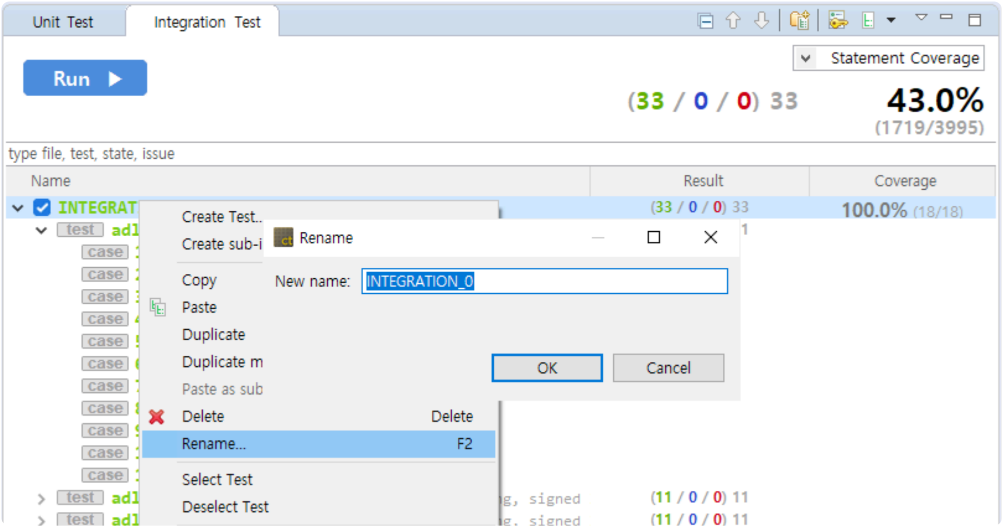
Create Integration test and Rename

The integration test can be created in the toolbar menu. The name of the integration test is assigned automatically and can be changed by using [Rename] context menu.

- Create

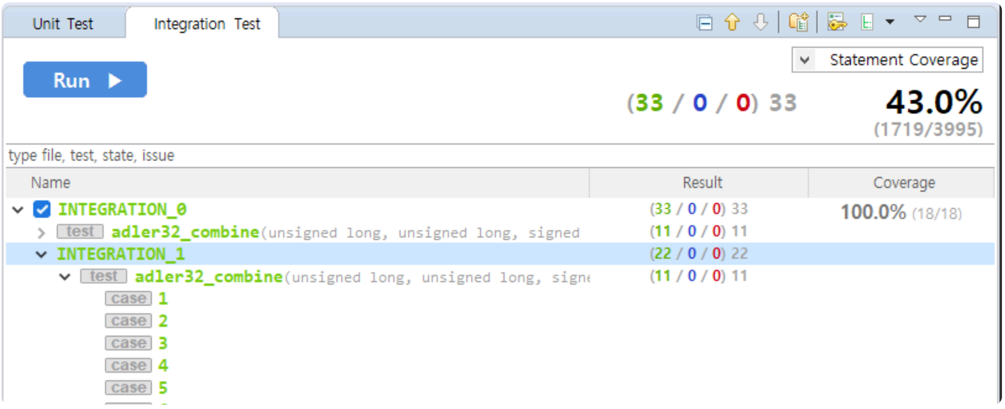


- Rename



Sub-integration test

You can create a sub-integration test under the integration test by using [Create sub-integration test] context menu or pasting an existing integration test into other integration test using [Paste as sub-integration test] context menu.



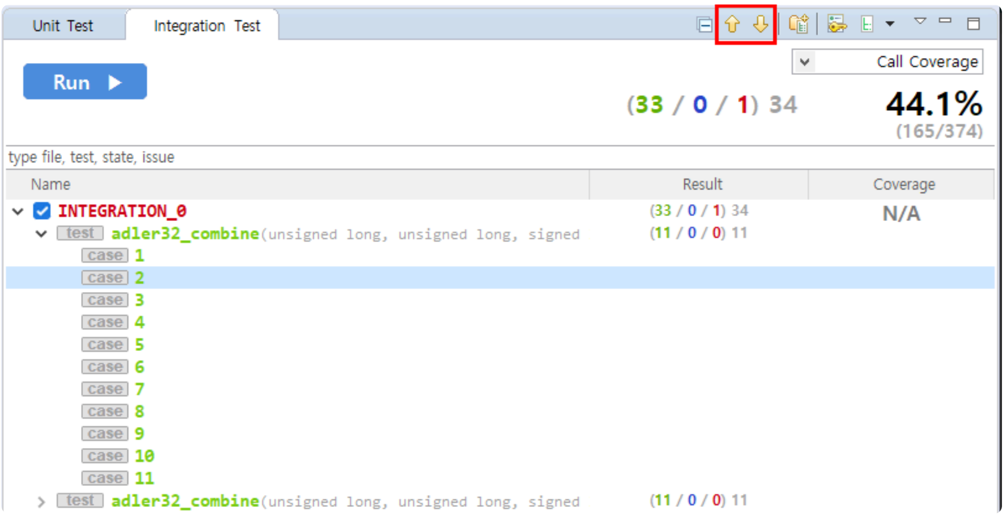
Add a test and change the order of run

There are four ways to add tests to the integration test.

1. You can select an integration test and create it by using [Create Test…] context menu.
2. You can add by dragging and dropping the test in the Unit Test View to the integration test.
3. You can select the test of the Integration Test View and copy/paste it by using the context menu.
4. You can select the test in the Unit Test View and copy/paste it by using the context menu.

There are two ways to change the execution sequence for the test.

1. You can select a test or test case and change it by moving with a mouse.
2. You can select a test or test case and change it by selecting either [Move Up Test] or [Move Down Test] in the toolbar.



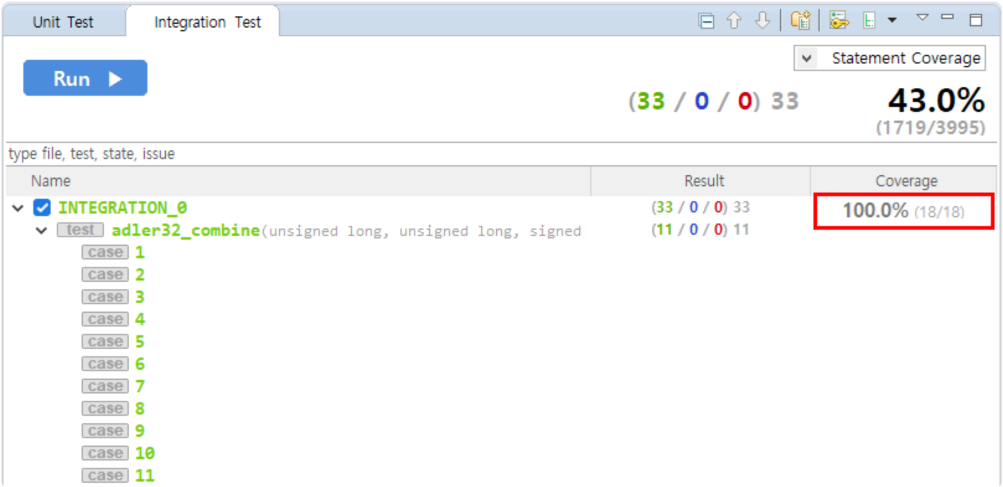
Call Coverage

(33 / 0 / 1) 34 44.1% (165/374)

Name	Result	Coverage
☑ INTEGRATION_0	(33 / 0 / 1) 34	N/A
test adler32_combine(unsigned long, unsigned long, signed	(11 / 0 / 0) 11	
case 1		
case 2		
case 3		
case 4		
case 5		
case 6		
case 7		
case 8		
case 9		
case 10		
case 11		
test adler32_combine(unsigned long, unsigned long, signed	(11 / 0 / 0) 11	

The coverage result of integration test

If you select the integration test, the result can be checked in the Coverage.



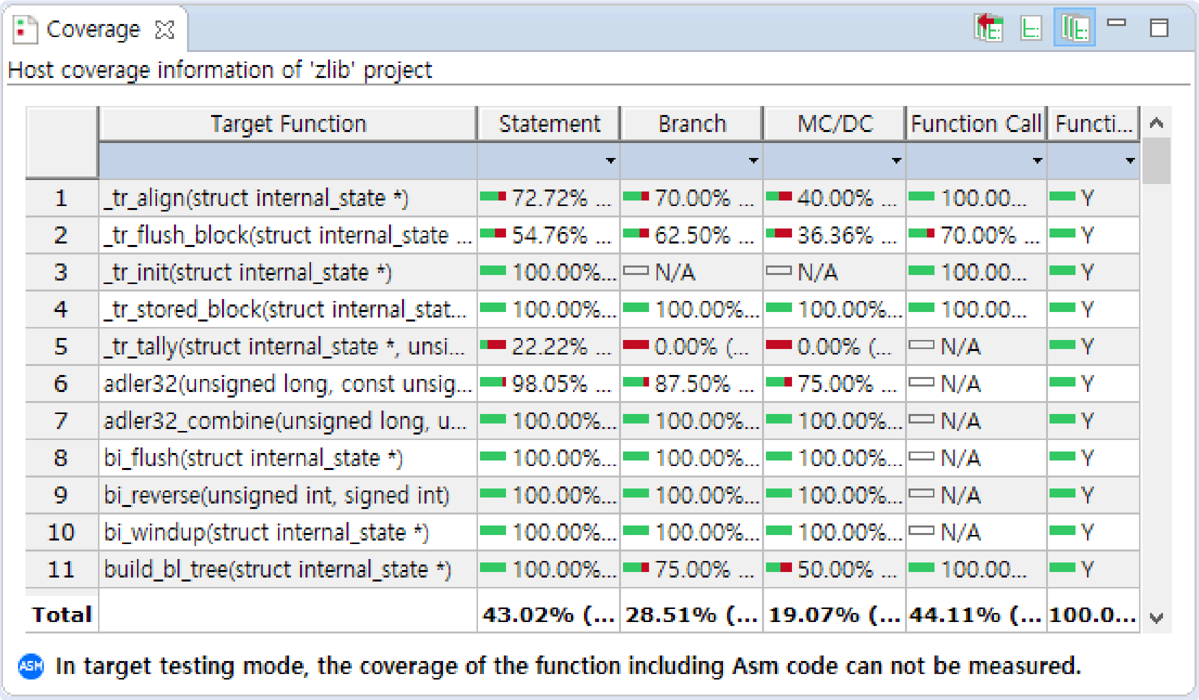
Statement Coverage

(33 / 0 / 0) 33 43.0% (1719/3995)

Name	Result	Coverage
☑ INTEGRATION_0	(33 / 0 / 0) 33	100.0% (18/18)
test adler32_combine(unsigned long, unsigned long, signed	(11 / 0 / 0) 11	
case 1		
case 2		
case 3		
case 4		
case 5		
case 6		
case 7		
case 8		
case 9		
case 10		
case 11		

17.5. Coverage View

It shows the coverage of the function to be tested after test has been run as a percentage.



Host coverage information of 'zlib' project

	Target Function	Statement	Branch	MC/DC	Function Call	Functi...
1	_tr_align(struct internal_state *)	72.72% ...	70.00% ...	40.00% ...	100.00...	Y
2	_tr_flush_block(struct internal_state ...	54.76% ...	62.50% ...	36.36% ...	70.00% ...	Y
3	_tr_init(struct internal_state *)	100.00%...	N/A	N/A	100.00...	Y
4	_tr_stored_block(struct internal_stat...	100.00%...	100.00%...	100.00%...	100.00...	Y
5	_tr_tally(struct internal_state *, unsi...	22.22% ...	0.00% (...	0.00% (...	N/A	Y
6	adler32(unsigned long, const unsig...	98.05% ...	87.50% ...	75.00% ...	N/A	Y
7	adler32_combine(unsigned long, u...	100.00%...	100.00%...	100.00%...	N/A	Y
8	bi_flush(struct internal_state *)	100.00%...	100.00%...	100.00%...	N/A	Y
9	bi_reverse(unsigned int, signed int)	100.00%...	100.00%...	100.00%...	N/A	Y
10	bi_windup(struct internal_state *)	100.00%...	100.00%...	100.00%...	N/A	Y
11	build_bl_tree(struct internal_state *)	100.00%...	75.00% ...	50.00% ...	100.00...	Y
Total		**43.02% (...**	**28.51% (...**	**19.07% (...**	**44.11% (...**	**100.0...**

In target testing mode, the coverage of the function including Asm code can not be measured.

Coverage type provided in CT 2023.12

Coverage	Description
Statement	Percentage of source code statement executed by the test.
Branch	Percentage of branch executed by the test. 100% branch coverage includes 100% decision coverage and 100% statement coverage.
MC/DC	Coverage considering the condition coverage and the decision coverage complexly(described in MC/DC view).
Function call	Percentage of the function called by the test among all the functions.
Function	Percentage of functions that have been called at least once in all functions.

Label icon in the Coverage View

Icon	Description
⚠	Function changed.
A	Function containing Asm code.

Toolbar menu in the Coverage View

Toolbar icon	Description
	Shows coverage for each test.
	Shows full coverage.
	Shows full coverage(including the external coverage).

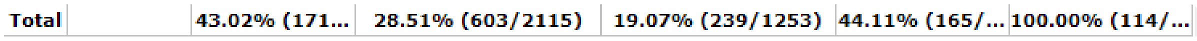
Show Coverage

You can check the coverage of the tests in the Coverage View or in the Source Code Editor.

Show coverage in the Coverage View

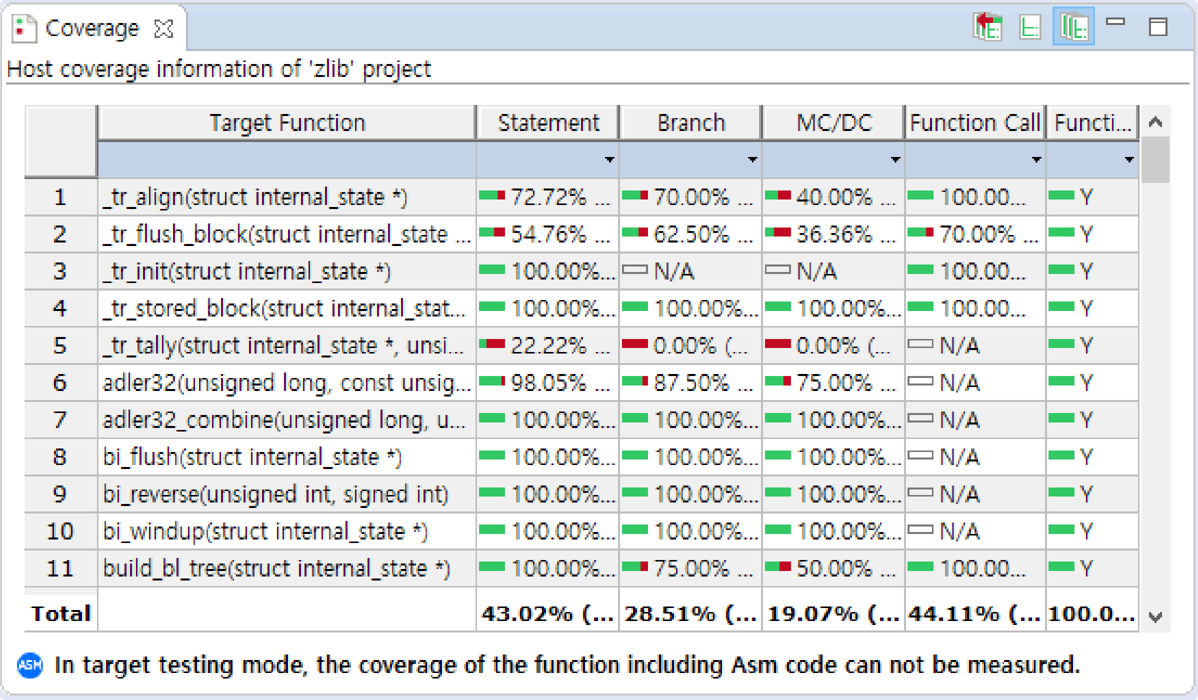
The Coverage View shows the coverage information of the test or test case selected in the Unit Test View and Integration Test View. If you click [Show full coverage], the coverage information for all tests can be checked by merging them. And if you click [Show full coverage (Include External Coverage)], it shows also the coverage imported externally by merging them.

The coverage for the items selected in the tree is displayed at the bottom of the Coverage View.



Total		43.02% (171...	28.51% (603/2115)	19.07% (239/1253)	44.11% (165/...	100.00% (114/...

In the Coverage View, the coverage for each function is displayed for the items selected in the Unit or Integration Test View.

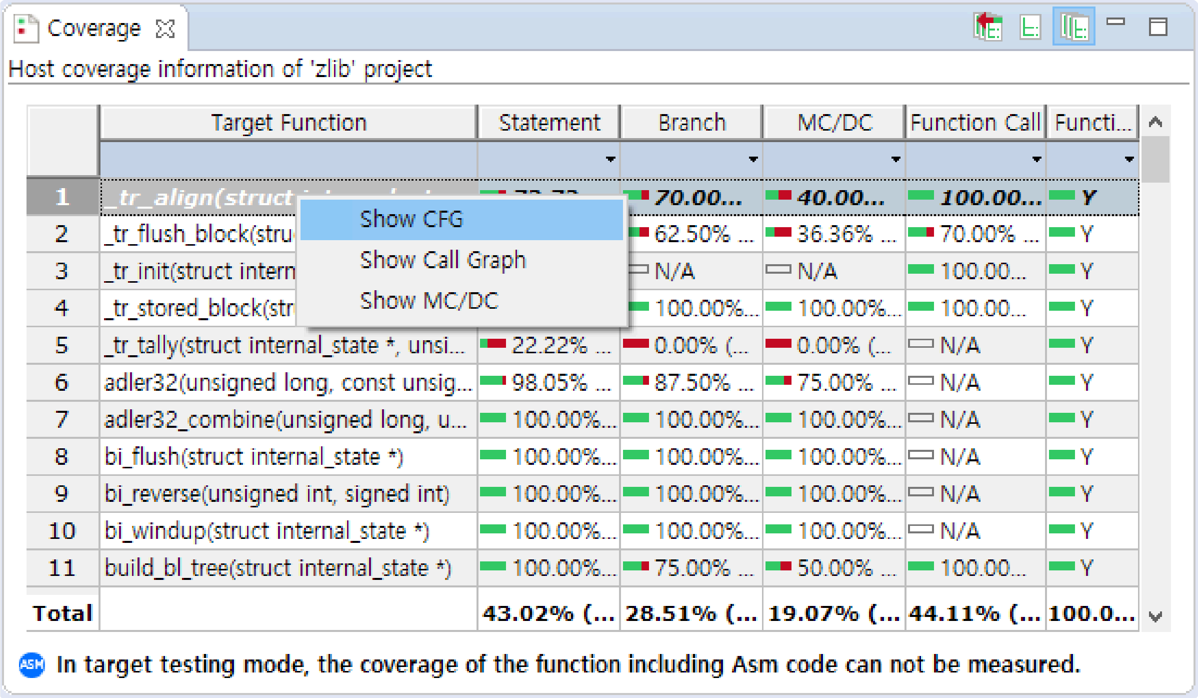


Host coverage information of 'zlib' project

	Target Function	Statement	Branch	MC/DC	Function Call	Functi...
1	_tr_align(struct internal_state *)	72.72% ...	70.00% ...	40.00% ...	100.00...	Y
2	_tr_flush_block(struct internal_state ...	54.76% ...	62.50% ...	36.36% ...	70.00% ...	Y
3	_tr_init(struct internal_state *)	100.00%...	N/A	N/A	100.00...	Y
4	_tr_stored_block(struct internal_stat...	100.00%...	100.00%...	100.00%...	100.00...	Y
5	_tr_tally(struct internal_state *, unsi...	22.22% ...	0.00% (...	0.00% (...	N/A	Y
6	adler32(unsigned long, const unsig...	98.05% ...	87.50% ...	75.00% ...	N/A	Y
7	adler32_combine(unsigned long, u...	100.00%...	100.00%...	100.00%...	N/A	Y
8	bi_flush(struct internal_state *)	100.00%...	100.00%...	100.00%...	N/A	Y
9	bi_reverse(unsigned int, signed int)	100.00%...	100.00%...	100.00%...	N/A	Y
10	bi_windup(struct internal_state *)	100.00%...	100.00%...	100.00%...	N/A	Y
11	build_bl_tree(struct internal_state *)	100.00%...	75.00% ...	50.00% ...	100.00...	Y
Total		43.02% (...	28.51% (...	19.07% (...	44.11% (...	100.0...

In target testing mode, the coverage of the function including Asm code can not be measured.

In the Coverage View table, you can the control flow graph, the function call graph and MC/DC for each function via the context menu.



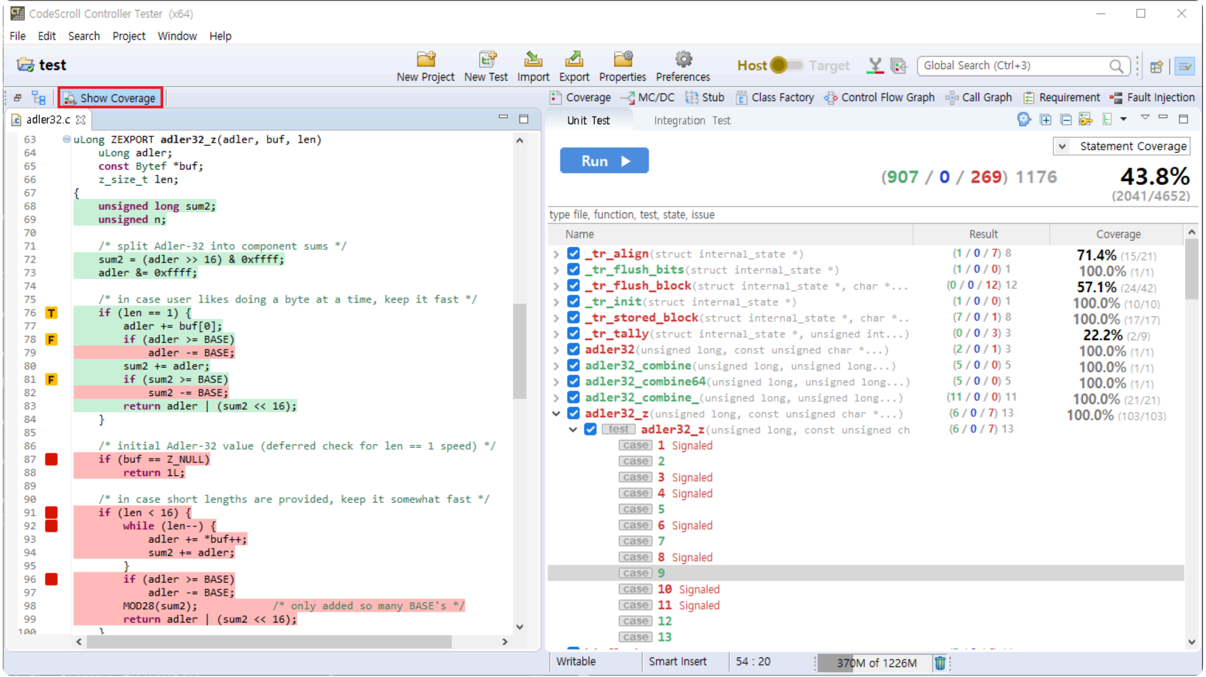
Host coverage information of 'zlib' project

	Target Function	Statement	Branch	MC/DC	Function Call	Functi...
1	_tr_align(struct [illegible]	[illegible]	70.00...	40.00...	100.00...	Y
2	_tr_flush_block(stru		62.50% ...	36.36% ...	70.00% ...	Y
3	_tr_init(struct intern		N/A	N/A	100.00...	Y
4	_tr_stored_block(str		100.00%...	100.00%...	100.00...	Y
5	_tr_tally(struct internal_state *, unsi...	22.22% ...	0.00% (...	0.00% (...	N/A	Y
6	adler32(unsigned long, const unsig...	98.05% ...	87.50% ...	75.00% ...	N/A	Y
7	adler32_combine(unsigned long, u...	100.00%...	100.00%...	100.00%...	N/A	Y
8	bi_flush(struct internal_state *)	100.00%...	100.00%...	100.00%...	N/A	Y
9	bi_reverse(unsigned int, signed int)	100.00%...	100.00%...	100.00%...	N/A	Y
10	bi_windup(struct internal_state *)	100.00%...	100.00%...	100.00%...	N/A	Y
11	build_bl_tree(struct internal_state *)	100.00%...	75.00% ...	50.00% ...	100.00...	Y
Total		43.02% (...	28.51% (...	19.07% (...	44.11% (...	100.0...

In target testing mode, the coverage of the function including Asm code can not be measured.

Show coverage in the Source Code Editor

If you enable [Show Coverage] icon in the main toolbar and click the wanted fucntion/test/test case in the Unit/Integration Test View, it shows which part of the source code is covered by using the color information. The green color indicates that the code is covered, the red color indicates that the code is not covered, and yellow color indicates that the portion of the code is covered only.



```
uLong ZEXPORT adler32_z(adler, buf, len)
    uLong adler;
    const Bytef *buf;
    z_size_t len;
{
    unsigned long sum2;
    unsigned n;

    /* split Adler-32 into component sums */
    sum2 = (adler >> 16) & 0xffff;
    adler &= 0xffff;

    /* in case user likes doing a byte at a time, keep it fast */
T   if (len == 1) {
        adler += buf[0];
F       if (adler >= BASE)
            adler -= BASE;
        sum2 += adler;
F       if (sum2 >= BASE)
            sum2 -= BASE;
        return adler | (sum2 << 16);
    }

    /* initial Adler-32 value (deferred check for len == 1 speed) */
    if (buf == Z_NULL)
        return 1L;

    /* in case short lengths are provided, keep it somewhat fast */
    if (len < 16) {
        while (len--) {
            adler += *buf++;
            sum2 += adler;
        }
        if (adler >= BASE)
            adler -= BASE;
        MOD28(sum2);             /* only added so many BASE's */
        return adler | (sum2 << 16);
```

(907 / 0 / 269) 1176 43.8% (2041/4652)

Name	Result	Coverage
_tr_align(struct internal_state *)	(1 / 0 / 7) 8	71.4% (15/21)
_tr_flush_bits(struct internal_state *)	(1 / 0 / 0) 1	100.0% (1/1)
_tr_flush_block(struct internal_state *, char *...	(0 / 0 / 12) 12	57.1% (24/42)
_tr_init(struct internal_state *)	(1 / 0 / 0) 1	100.0% (10/10)
_tr_stored_block(struct internal_state *, char *..	(7 / 0 / 1) 8	100.0% (17/17)
_tr_tally(struct internal_state *, unsigned int...)	(0 / 0 / 3) 3	22.2% (2/9)
adler32(unsigned long, const unsigned char *...)	(2 / 0 / 1) 3	100.0% (1/1)
adler32_combine(unsigned long, unsigned long...)	(5 / 0 / 0) 5	100.0% (1/1)
adler32_combine64(unsigned long, unsigned long...)	(5 / 0 / 0) 5	100.0% (1/1)
adler32_combine_(unsigned long, unsigned long...)	(11 / 0 / 0) 11	100.0% (21/21)
adler32_z(unsigned long, const unsigned char *...)	(6 / 0 / 7) 13	100.0% (103/103)
test adler32_z(unsigned long, const unsigned ch	(6 / 0 / 7) 13	
case 1 Signaled		
case 2		
case 3 Signaled		
case 4 Signaled		
case 5		
case 6 Signaled		
case 7		
case 8 Signaled		
case 9		
case 10 Signaled		
case 11 Signaled		
case 12		
case 13		

In the vertical column on the left of the Source Code Editor, the marker indicate whether the branch statement is true or false.

Marker	Description
T	The branch is only covered as true.
F	The branch is only covered as false.

🟩	The branches are all covered.
🟥	The branch is not covered.
🟨	A line with multiple branches partially covered.

17.6. MC/DC View

The [MC/DC] view shows the information of MC/DC coverage(Modified Condition/Decision Coverage).

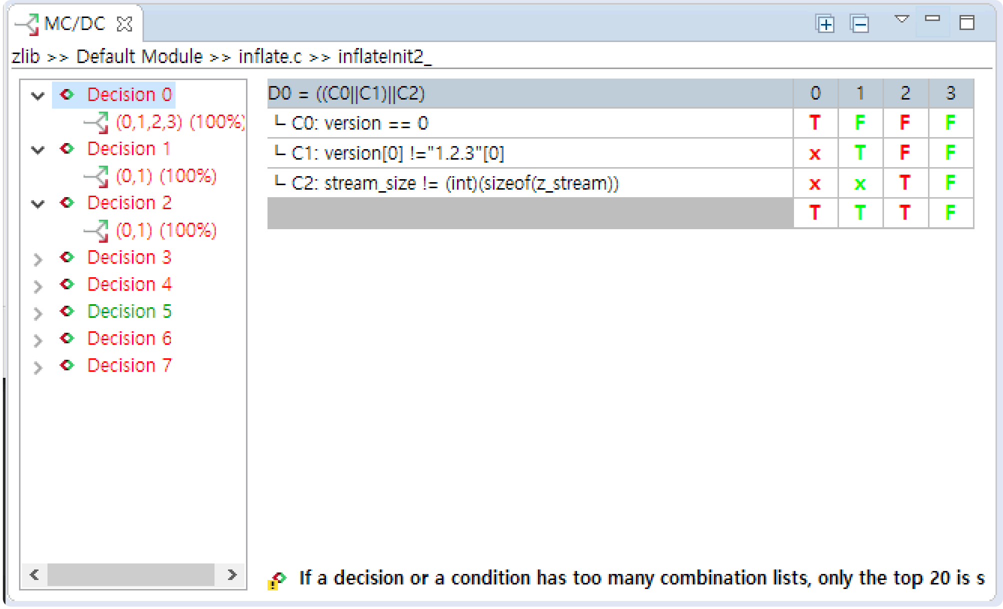
MC/DC coverage

MC/DC is the improved condition/decision coverage allowing each individual conditional expression to independently affect the result of the whole conditional expression without being affected by the other individual conditional expressions and it is stronger than the conditional/decision coverage.
If there is no change in the other conditions and it affects the result when the own state has changed, the state can be said to satisfy MC/DC, and the conditions for creating the truth table are as follows.

- The state of decision(decision statement) must satisfy at least once all possible results(true, false).
- All individual conditional expressions belonging to the decision must satisfy at least once all possible results(true, false).
- Each conditional expression belonging to the decision affects independently the result value of decision it belongs to without being affected by the other individual conditional expressions.

MC/DC view table

- View combination lists satisfying the target coverage
  The following figure is a view that can identify easily the combinations which need to be covered to achieve the target coverage.
  The left section shows the list of Decisions for the selected functions, below which the list of combinations satisfying the target coverage are displayed.
  The right section shows the truth table of the selected Decision or combinations and whether or not it is covered. The covered combination is displayed in green and the uncovered combination is displayed in red.
  In the Preferences page, you can change the target coverage rate and the screen view mode. And you can select all for the truth table and use ‘Ctrl + C’ or Copy clipboard function from the context menu.



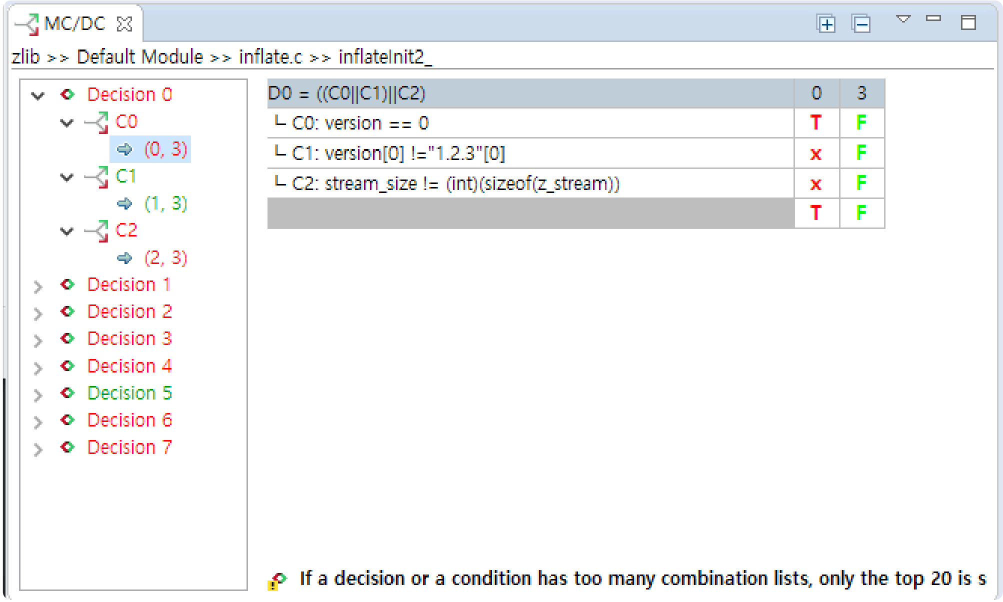
zlib >> Default Module >> inflate.c >> inflateInit2_

- Decision 0
  - (0,1,2,3) (100%)
- Decision 1
  - (0,1) (100%)
- Decision 2
  - (0,1) (100%)
- Decision 3
- Decision 4
- Decision 5
- Decision 6
- Decision 7

D0 = ((C0||C1)||C2)	0	1	2	3
└ C0: version == 0	T	F	F	F
└ C1: version[0] !="1.2.3"[0]	x	T	F	F
└ C2: stream_size != (int)(sizeof(z_stream))	x	x	T	F
	T	T	T	F

If a decision or a condition has too many combination lists, only the top 20 is s

- View combination lists satisfying the coverage for each condition
  The following figure is a view that can identify a one-pair combination satisfying one condition. The left section shows the list of combinations that satisfies the coverage for each condition. The right section shows the truth table for the selected combinations and whether or not it is covered.



zlib >> Default Module >> inflate.c >> inflateInit2_

D0 = ((C0||C1)||C2)	0	3
└ C0: version == 0	T	F
└ C1: version[0] !="1.2.3"[0]	x	F
└ C2: stream_size != (int)(sizeof(z_stream))	x	F
	T	F

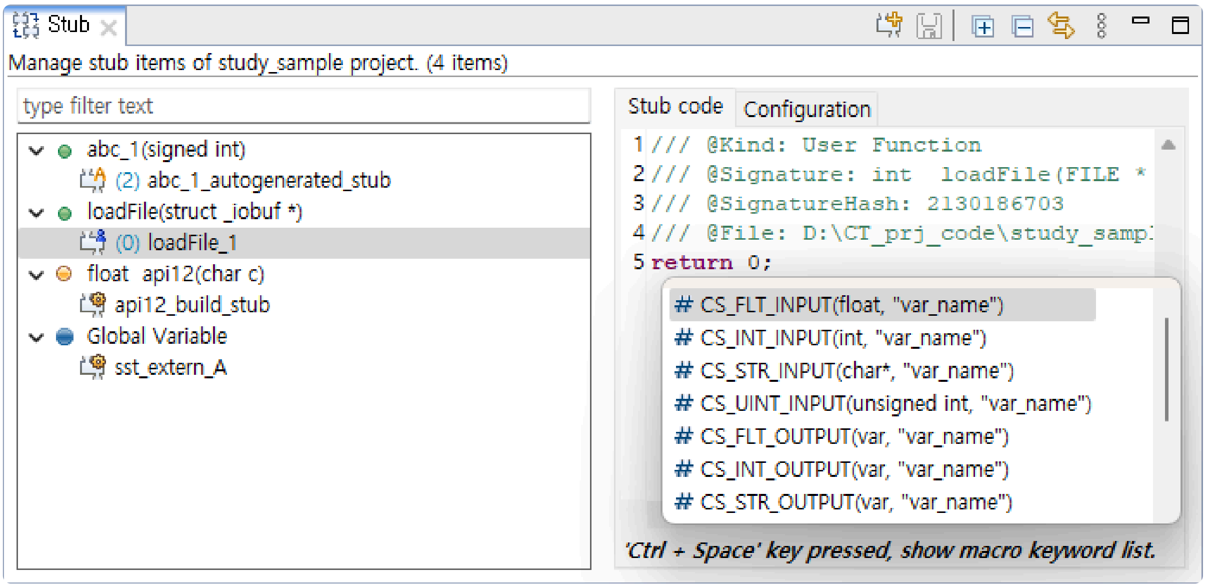
If a decision or a condition has too many combination lists, only the top 20 is s

17.7. Stub View

In CT 2023.12, if there are no libraries used in the target function when executing a test, if the libraries are not yet developed, or if the variables not declared are used, it creates automatically the stubs instead. The stubs are created when running the test and the body is not implemented.

You can add stubs directly in addition to the stubs created in CT 2023.12. Multiple stubs can be created for the same function and the stubs created can be linked to each test.

You can control the behavior of each stub by using user macro within the stub. The value used in the user-entered macro can be controlled in Edit a test case tab for the test linked.



Manage stub items of study_sample project. (4 items)

- abc_1(signed int)
  - (2) abc_1_autogenerated_stub
- loadFile(struct _iobuf *)
  - (0) loadFile_1
- float api12(char c)
  - api12_build_stub
- Global Variable
  - sst_extern_A

```
/// @Kind: User Function
/// @Signature: int  loadFile(FILE *
/// @SignatureHash: 2130186703
/// @File: D:\CT_prj_code\study_sampl
return 0;
```

```
# CS_FLT_INPUT(float, "var_name")
# CS_INT_INPUT(int, "var_name")
# CS_STR_INPUT(char*, "var_name")
# CS_UINT_INPUT(unsigned int, "var_name")
# CS_FLT_OUTPUT(var, "var_name")
# CS_INT_OUTPUT(var, "var_name")
# CS_STR_OUTPUT(var, "var_name")
```

'Ctrl + Space' key pressed, show macro keyword list.

Function type

Type	Description
🟠 Function	Function without deficition
🟢 Function	Function with definition
🔵 Variable	Global variable

Stub type

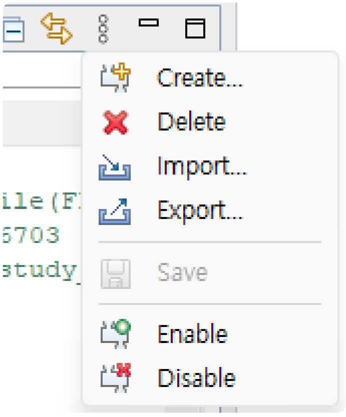
Type	Description
User stub	User-defined stub
Build stub	Auto-created stub
Old version stub	Stub with 2.3 or less version
isolated stub	Stub to isolate the function under test

Menu

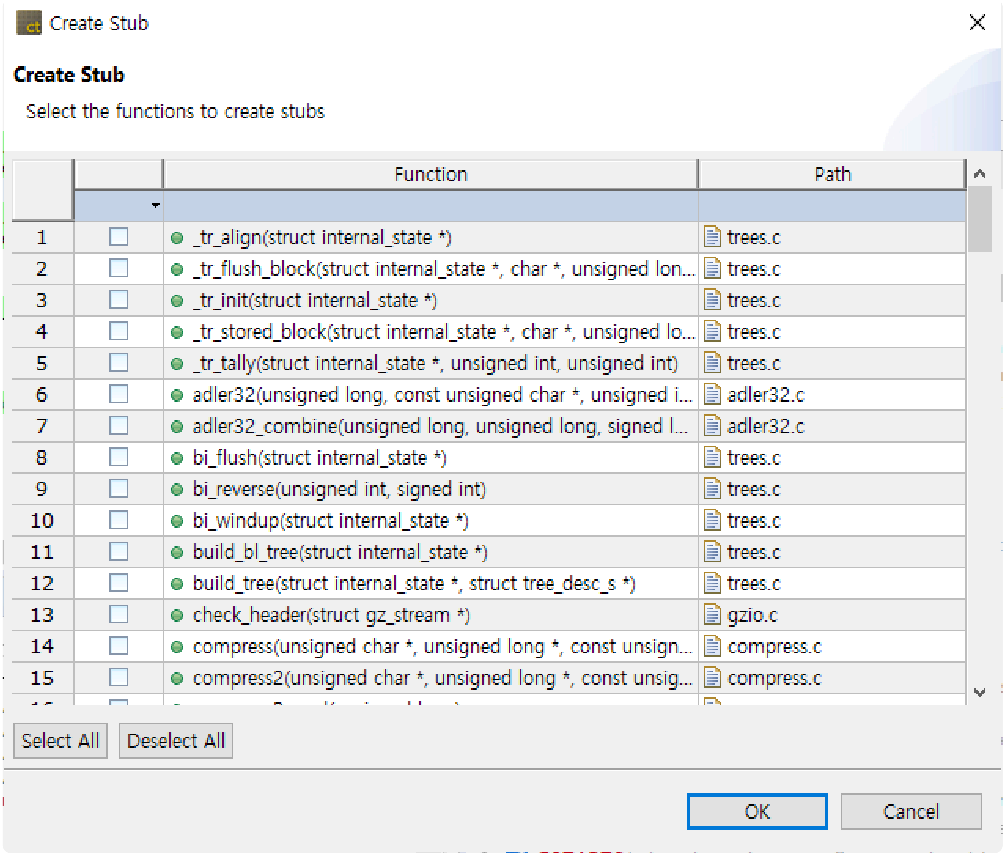
Menu	Description
Create	Creates stubs.
✖ Delete	Deletes stubs.
Import	Imports the stub file exported.
Export	Exports a stub file.
Save	Saves the change stub information.
Enable	Enables stubs.
Disable	Disables stubs.

Create stubs

- Create stubs in Stub view
  1. Click the pull-down menu in Stub view and click [Create] menu.



  2. Check the functions to be created as stubs and select [OK].

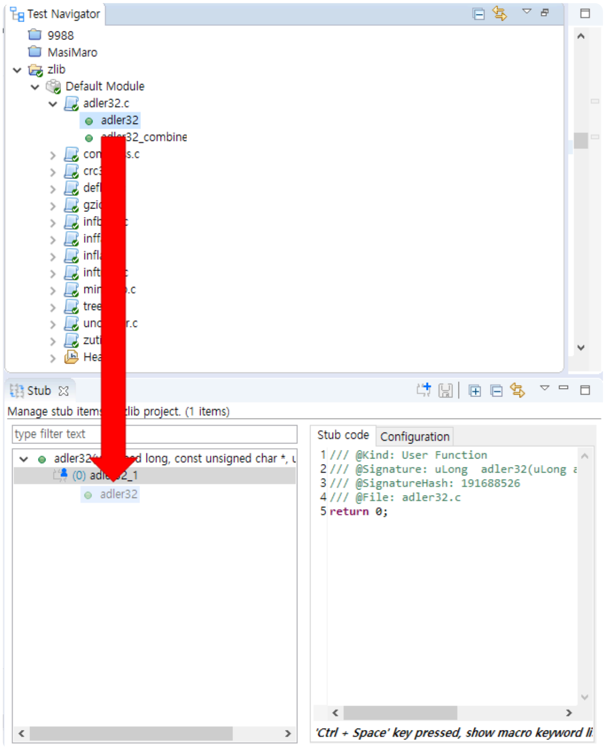


Create Stub

Select the functions to create stubs

		Function	Path
1	□	_tr_align(struct internal_state *)	trees.c
2	□	_tr_flush_block(struct internal_state *, char *, unsigned lon...	trees.c
3	□	_tr_init(struct internal_state *)	trees.c
4	□	_tr_stored_block(struct internal_state *, char *, unsigned lo...	trees.c
5	□	_tr_tally(struct internal_state *, unsigned int, unsigned int)	trees.c
6	□	adler32(unsigned long, const unsigned char *, unsigned i...	adler32.c
7	□	adler32_combine(unsigned long, unsigned long, signed l...	adler32.c
8	□	bi_flush(struct internal_state *)	trees.c
9	□	bi_reverse(unsigned int, signed int)	trees.c
10	□	bi_windup(struct internal_state *)	trees.c
11	□	build_bl_tree(struct internal_state *)	trees.c
12	□	build_tree(struct internal_state *, struct tree_desc_s *)	trees.c
13	□	check_header(struct gz_stream *)	gzio.c
14	□	compress(unsigned char *, unsigned long *, const unsign...	compress.c
15	□	compress2(unsigned char *, unsigned long *, const unsig...	compress.c

- Create stubs by drag-and-drop from Test Navigator view to Stub view.



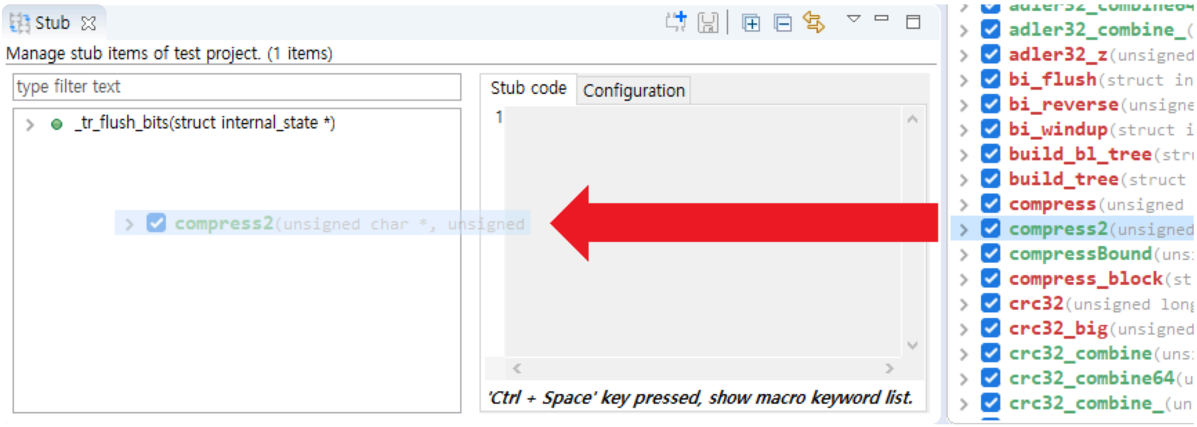
Manage stub items zlib project. (1 items)

adler32(d long, const unsigned char *, u

```
/// @Kind: User Function
/// @Signature: uLong  adler32(uLong a
/// @SignatureHash: 191688526
/// @File: adler32.c
return 0;
```

'Ctrl + Space' key pressed, show macro keyword li

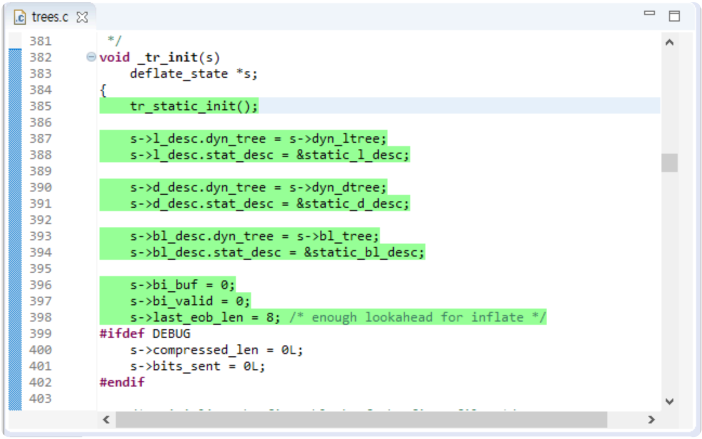
- Create stubs by drag-and-drop from Unit Test view to Stub view.



Manage stub items of test project. (1 items)

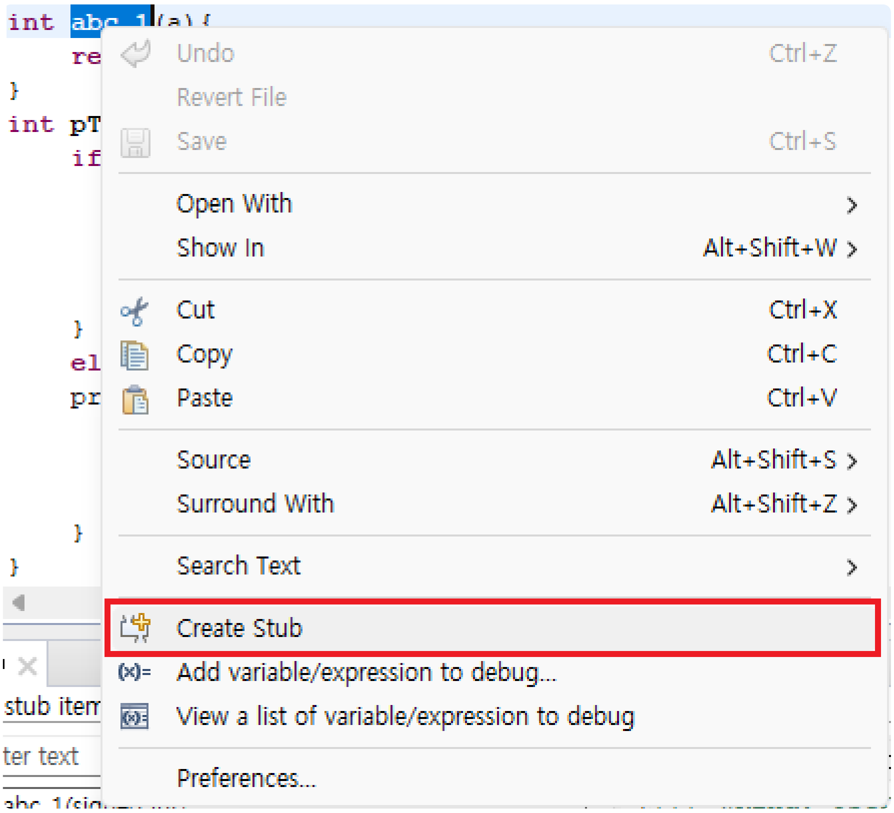
'Ctrl + Space' key pressed, show macro keyword list.

- Create stubs in source code editor
  1. Select the functions to be created as stubs.



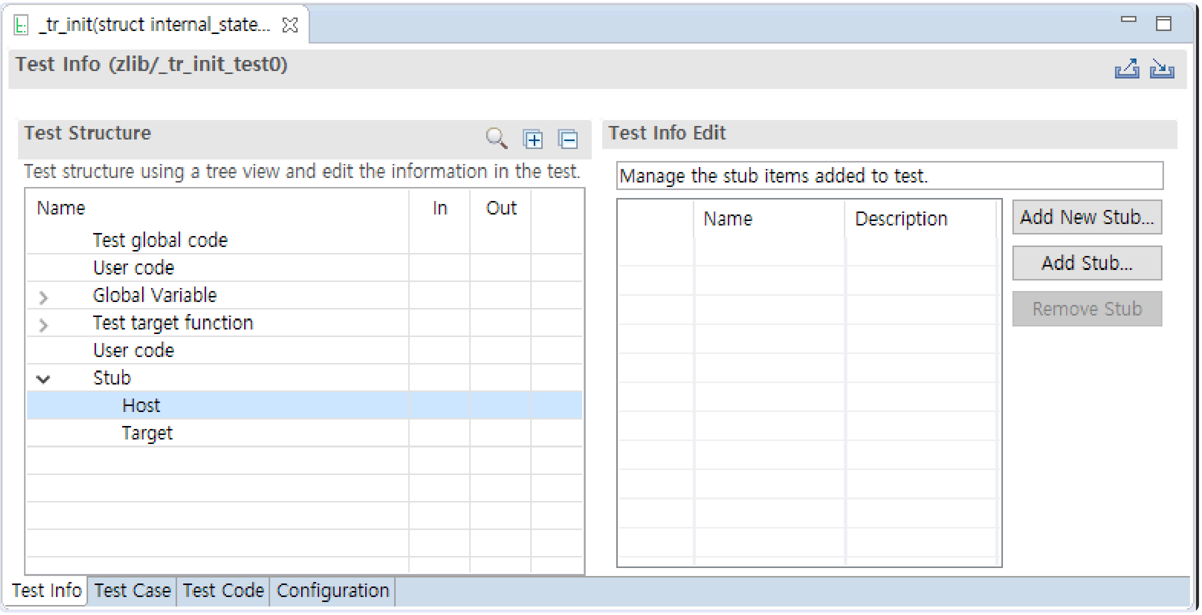
```
 */
void _tr_init(s)
    deflate_state *s;
{
    tr_static_init();

    s->l_desc.dyn_tree = s->dyn_ltree;
    s->l_desc.stat_desc = &static_l_desc;

    s->d_desc.dyn_tree = s->dyn_dtree;
    s->d_desc.stat_desc = &static_d_desc;

    s->bl_desc.dyn_tree = s->bl_tree;
    s->bl_desc.stat_desc = &static_bl_desc;

    s->bi_buf = 0;
    s->bi_valid = 0;
    s->last_eob_len = 8; /* enough lookahead for inflate */
#ifdef DEBUG
    s->compressed_len = 0L;
    s->bits_sent = 0L;
#endif
```

  2. Right-click it and select [Create Stub] context menu.



- Create and Link in Test Editor
  1. In the test structure of Test Editor, select the stubs or sub nodes.

2. Select [Add New Stub…] button on the right section.



Test Info (zlib/_tr_init_test0)

Test Structure

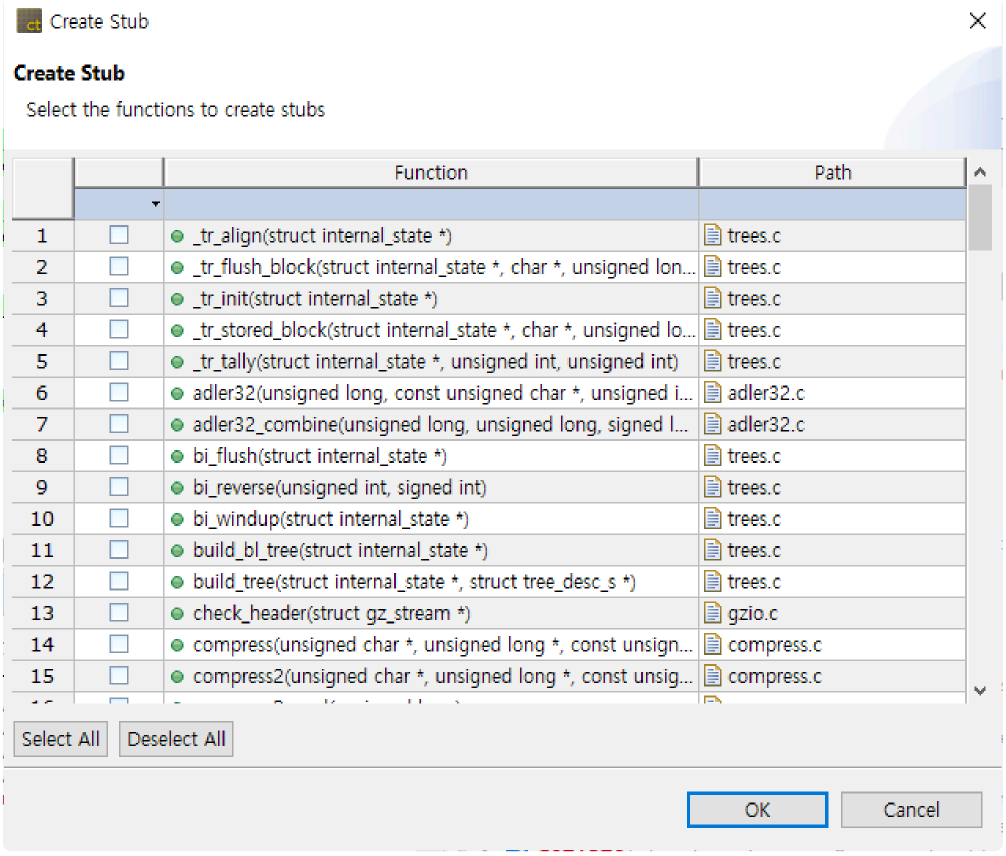
Test structure using a tree view and edit the information in the test.

Name	In	Out
Test global code		
User code		
› Global Variable		
› Test target function		
User code		
⌄ Stub		
Host		
Target		

Manage the stub items added to test.

Name	Description

3. Check the functions to be created as stubs and select [OK].



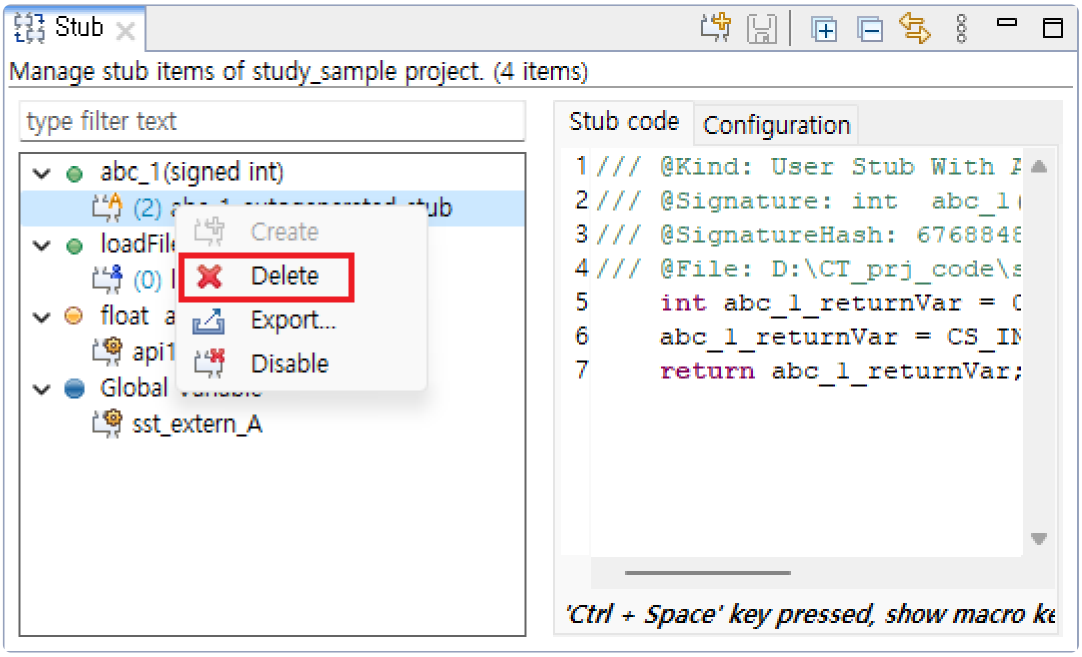
Create Stub

Select the functions to create stubs

		Function	Path
1	□	_tr_align(struct internal_state *)	trees.c
2	□	_tr_flush_block(struct internal_state *, char *, unsigned lon...	trees.c
3	□	_tr_init(struct internal_state *)	trees.c
4	□	_tr_stored_block(struct internal_state *, char *, unsigned lo...	trees.c
5	□	_tr_tally(struct internal_state *, unsigned int, unsigned int)	trees.c
6	□	adler32(unsigned long, const unsigned char *, unsigned i...	adler32.c
7	□	adler32_combine(unsigned long, unsigned long, signed l...	adler32.c
8	□	bi_flush(struct internal_state *)	trees.c
9	□	bi_reverse(unsigned int, signed int)	trees.c
10	□	bi_windup(struct internal_state *)	trees.c
11	□	build_bl_tree(struct internal_state *)	trees.c
12	□	build_tree(struct internal_state *, struct tree_desc_s *)	trees.c
13	□	check_header(struct gz_stream *)	gzio.c
14	□	compress(unsigned char *, unsigned long *, const unsign...	compress.c
15	□	compress2(unsigned char *, unsigned long *, const unsig...	compress.c

Delete stubs

- Select and right-click unnecessary stubs and select [Delete] menu.



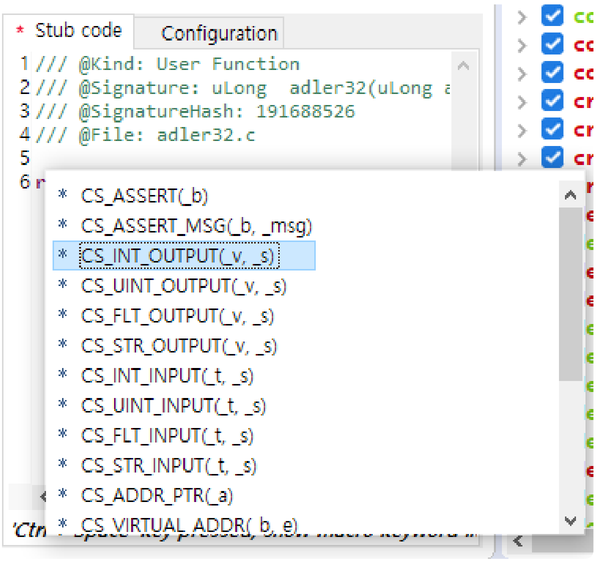
Manage stub items of study_sample project. (4 items)

```
/// @Kind: User Stub With A
/// @Signature: int  abc_1(
/// @SignatureHash: 6768848
/// @File: D:\CT_prj_code\s
    int abc_1_returnVar = 0
    abc_1_returnVar = CS_IN
    return abc_1_returnVar;
```

'Ctrl + Space' key pressed, show macro ke

Edit stubs

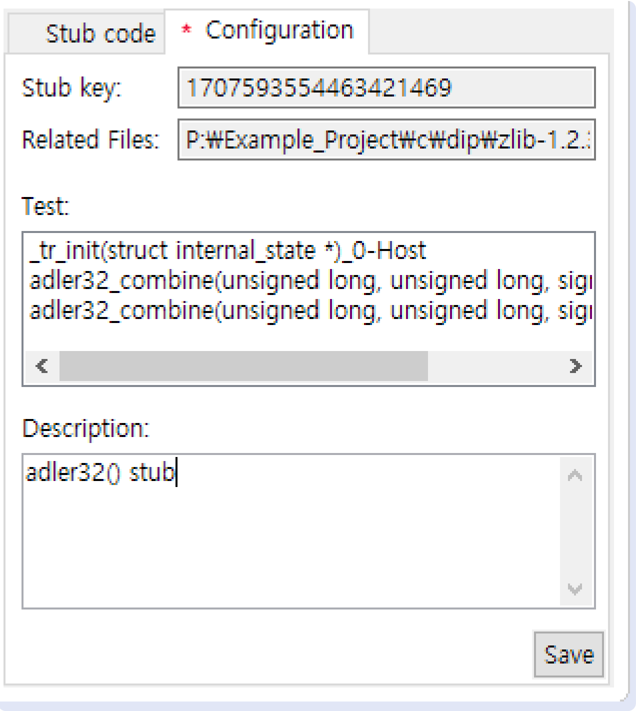
- You can check the macro information by pressing ‘ `Ctrl` + `Space`’ in the Stub Code screen. After editing the stub code, press ‘ `Ctrl` + `S`’ or [Save] button in the toolbar to save it.



```
/// @Kind: User Function
/// @Signature: uLong  adler32(uLong a
/// @SignatureHash: 191688526
/// @File: adler32.c

r
```

'Ctrl + Space' key pressed, show macro keyword ...

- In the stub setting screen, the description can be edited.



Stub key: 1707593554463421469

Related Files: P:₩Example_Project₩c₩dip₩zlib-1.2.:

Test:

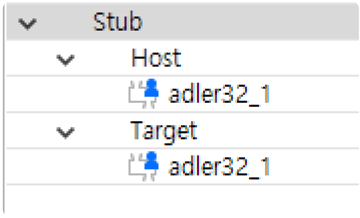
```
_tr_init(struct internal_state *)_0-Host
adler32_combine(unsigned long, unsigned long, sigı
adler32_combine(unsigned long, unsigned long, sigı
```

Description:

adler32() stub

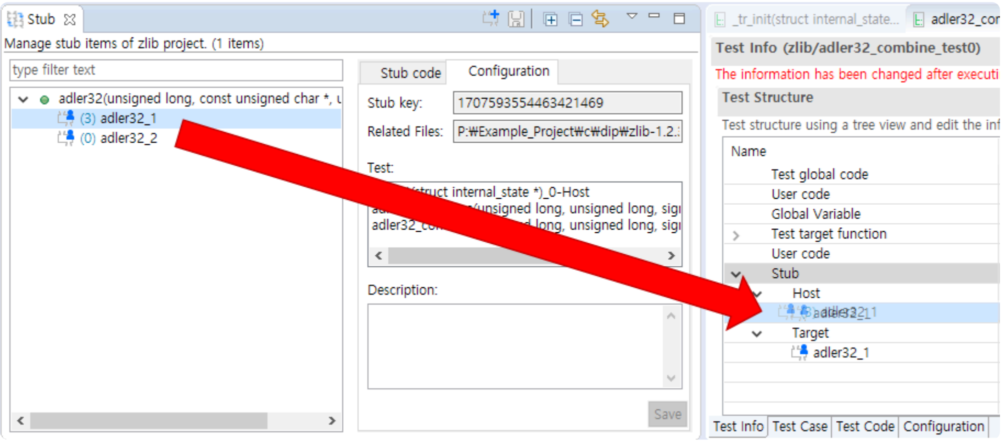
Link between stubs and tests

Each stub can be linked to the host/target test.
If you select “Stub” in the test structure editor, you can edit all the stubs included in the host and the target.



If you select “Host” or “Target”, you can only edit the stubs in the selected test environment.

- Dragging and dropping into the test editor in Stub view


Stub
Manage stub items of zlib project. (1 items)
type filter text
adler32(unsigned long, const unsigned char *, u
(3) adler32_1
(0) adler32_2
Stub code
Configuration
Save
_tr_init(struct internal_state...
adler32_cor
Test Info (zlib/adler32_combine_test0)
The information has been changed after executi
Test Structure
Test structure using a tree view and edit the inf
Name
Test global code
User code
Global Variable
Test target function
User code
Stub
Host
adler32_1
Target
adler32_1
Test Info
Test Case
Test Code
Configuration

Stub key: 1707593554463421469

Related Files: P:₩Example_Project₩c₩dip₩zlib-1.2.:

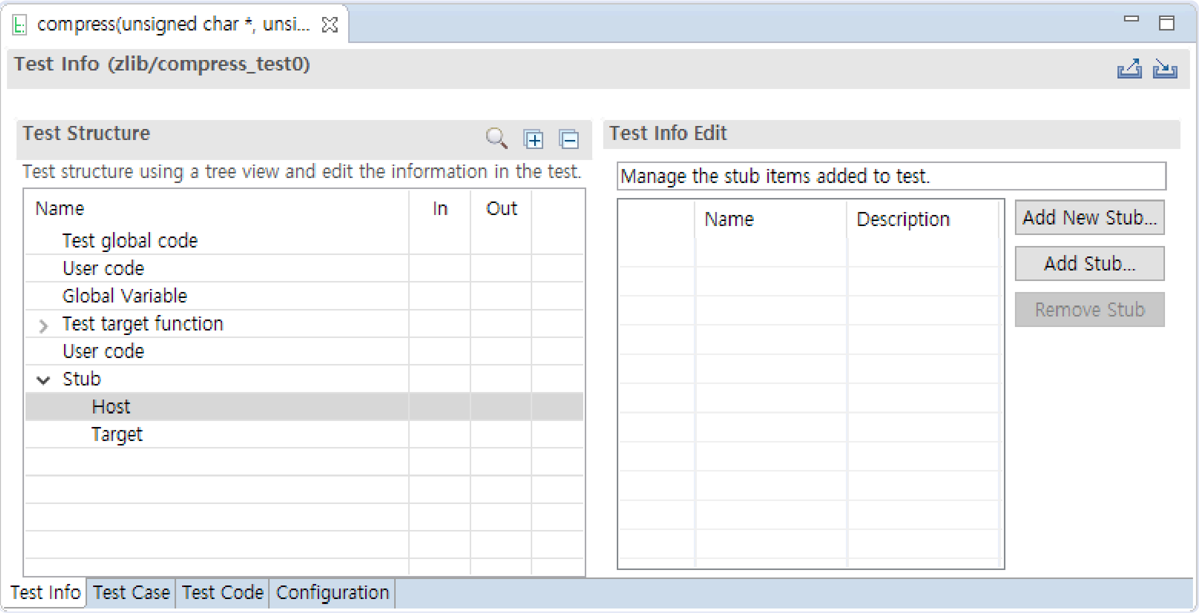
Test:

```
_tr_init(struct internal_state *)_0-Host
adler32_combine(unsigned long, unsigned long, sigı
adler32_combine(unsigned long, unsigned long, sigı
```

Description:

If linked by drag & drop, it is linked to all the targets and all the hosts.

- Link with [Add Stub…] button in Test Editor.
  1. Select stubs from the test structure in Test Editor.
  2. Select [Add Stub…] button on the right section.



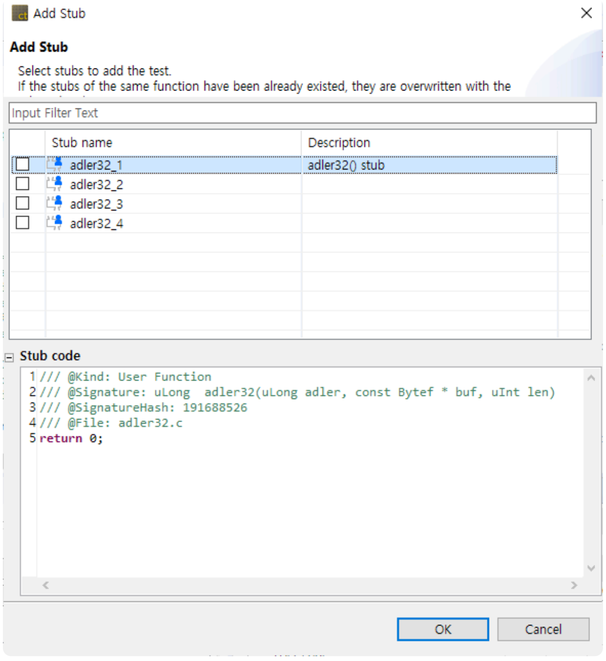
Test structure using a tree view and edit the information in the test.

Name	In	Out
Test global code		
User code		
Global Variable		
› Test target function		
User code		
⌄ Stub		
Host		
Target		

Manage the stub items added to test.

	Name	Description

  3. Among the existing stub list, check the stubs to be linked and select [OK].



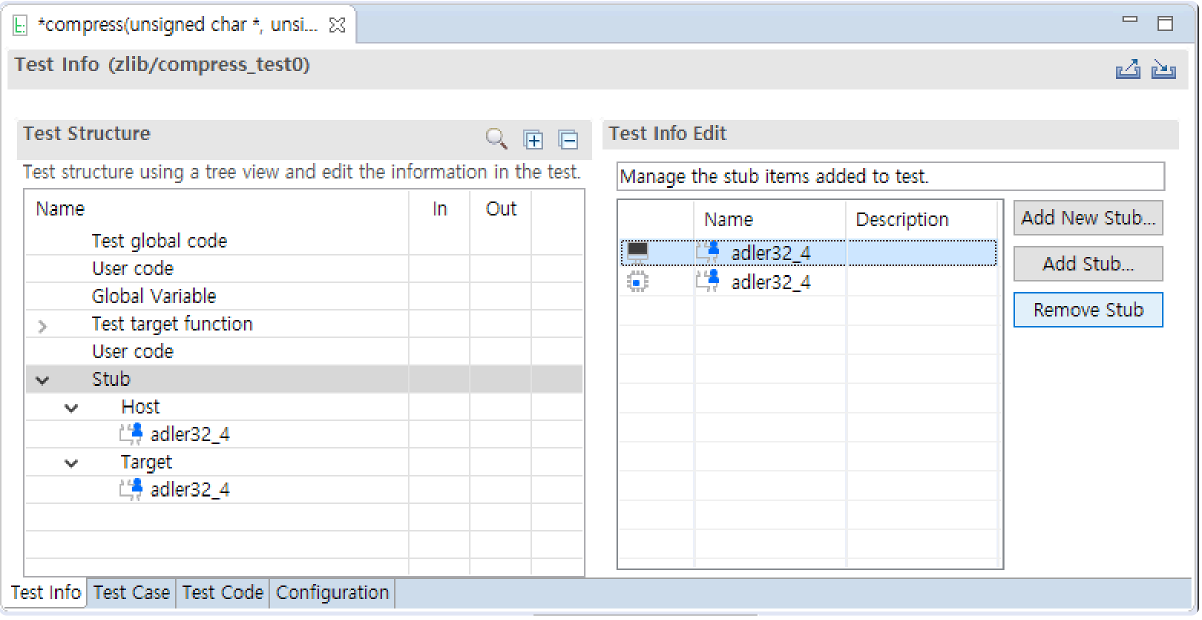
Select stubs to add the test.
If the stubs of the same function have been already existed, they are overwritten with the

	Stub name	Description
□	adler32_1	adler32() stub
□	adler32_2	
□	adler32_3	
□	adler32_4	

```
/// @Kind: User Function
/// @Signature: uLong  adler32(uLong adler, const Bytef * buf, uInt len)
/// @SignatureHash: 191688526
/// @File: adler32.c
return 0;
```

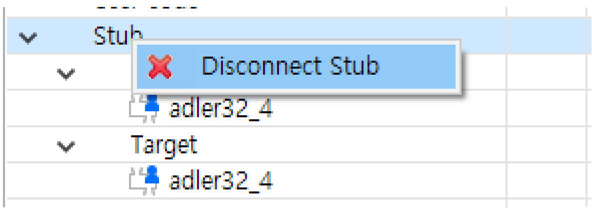
Unlink between stubs and tests

Select the stubs linked in the Test editor and select [Remove Stub] button or select the stubs in the test structure tree and right-click it to unlink them.



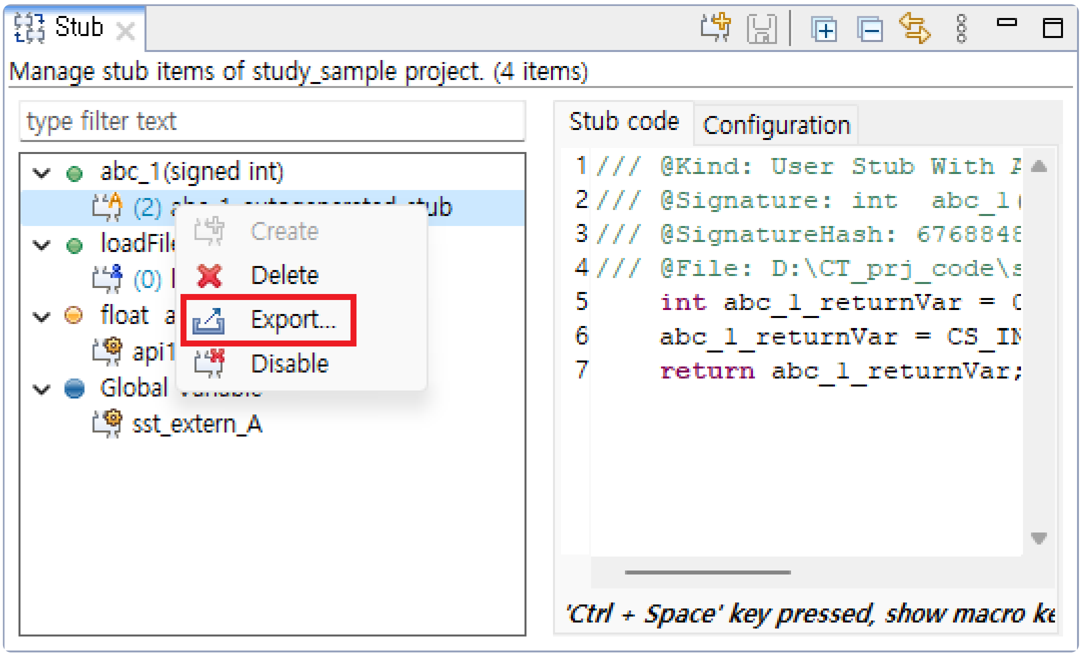
Test structure using a tree view and edit the information in the test.

Manage the stub items added to test.



Export stubs

1. Select and the stubs to be exported and right-click and select [Export...] menu.

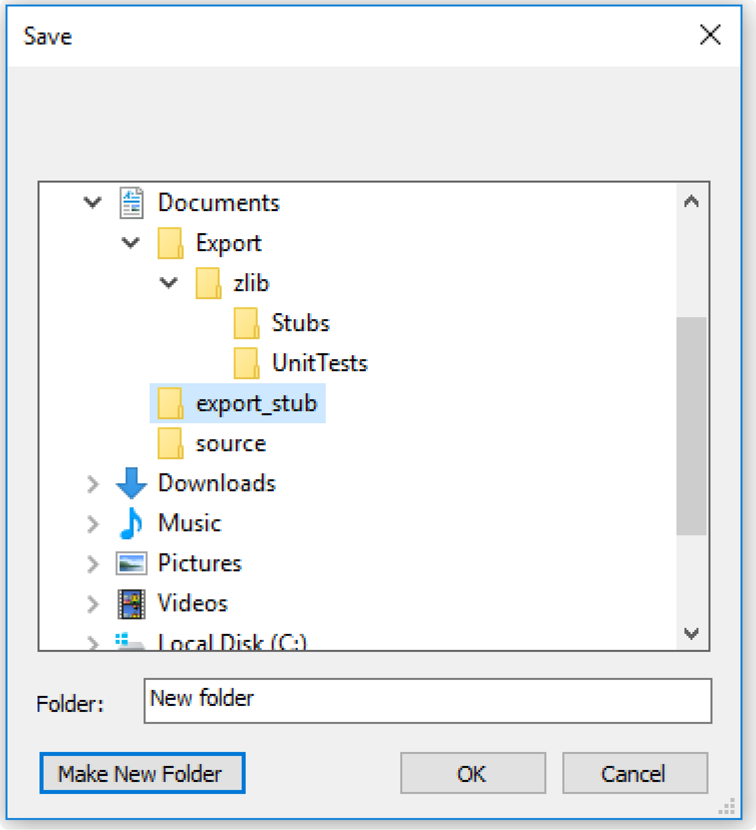


Manage stub items of study_sample project. (4 items)

```
/// @Kind: User Stub With A
/// @Signature: int  abc_1(
/// @SignatureHash: 6768848
/// @File: D:\CT_prj_code\s
    int abc_1_returnVar = (
    abc_1_returnVar = CS_IN
    return abc_1_returnVar;
```

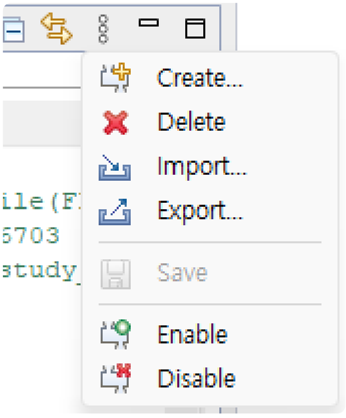
'Ctrl + Space' key pressed, show macro ke

2. Specify the saving location of the stub file in the directory dialog and select [OK].

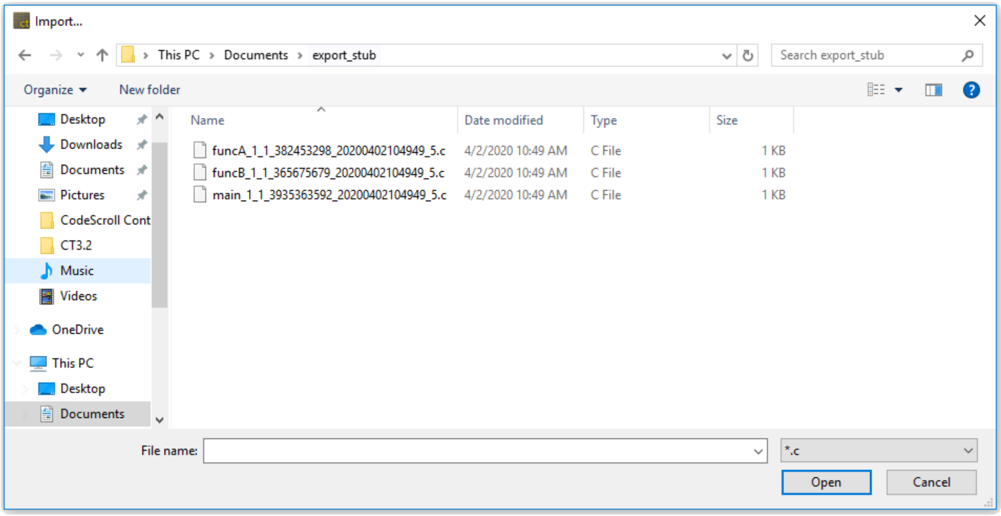


Import stubs

1. Select [Import…] menu from the pull-down menu in Stub view.

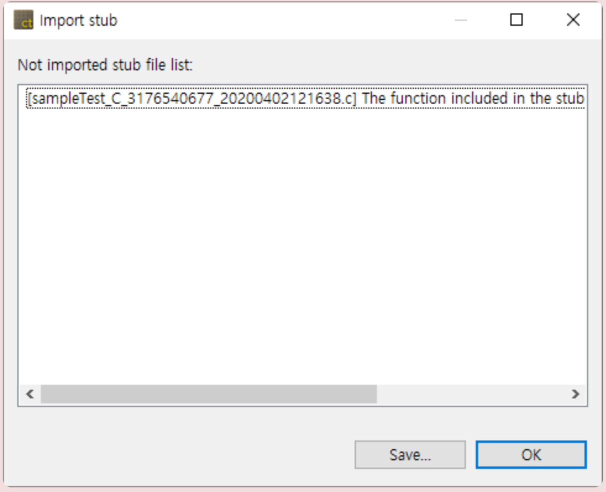


2. Select the stub file to be imported and select the [Open] button.



Name	Date modified	Type	Size
funcA_1_1_382453298_20200402104949_5.c	4/2/2020 10:49 AM	C File	1 KB
funcB_1_1_365675679_20200402104949_5.c	4/2/2020 10:49 AM	C File	1 KB
main_1_1_3935363592_20200402104949_5.c	4/2/2020 10:49 AM	C File	1 KB

The old version stubs or the stubs that are the same as build stubs existed in the project cannot be imported.



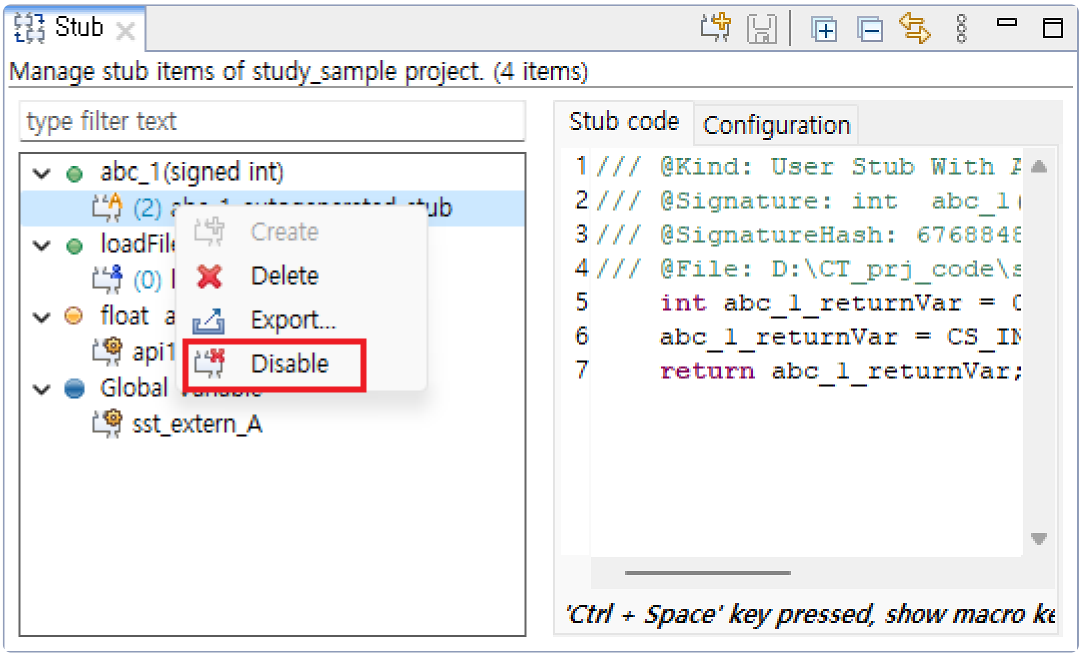
Not imported stub file list:

[sampleTest_C_3176540677_20200402121638.c] The function included in the stub

Use/Not use stubs

You can set whether to use the created stubs.

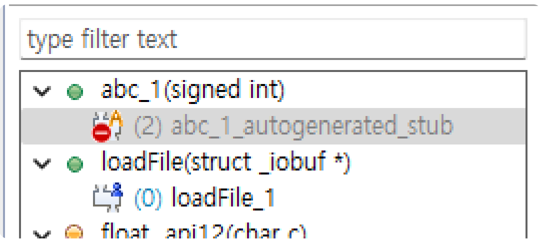
1. Select the stubs and right-click and select [Disable] menu.



```
/// @Kind: User Stub With A
/// @Signature: int  abc_1(
/// @SignatureHash: 6768848
/// @File: D:\CT_prj_code\s
    int abc_1_returnVar = (
    abc_1_returnVar = CS_IN
    return abc_1_returnVar;
```

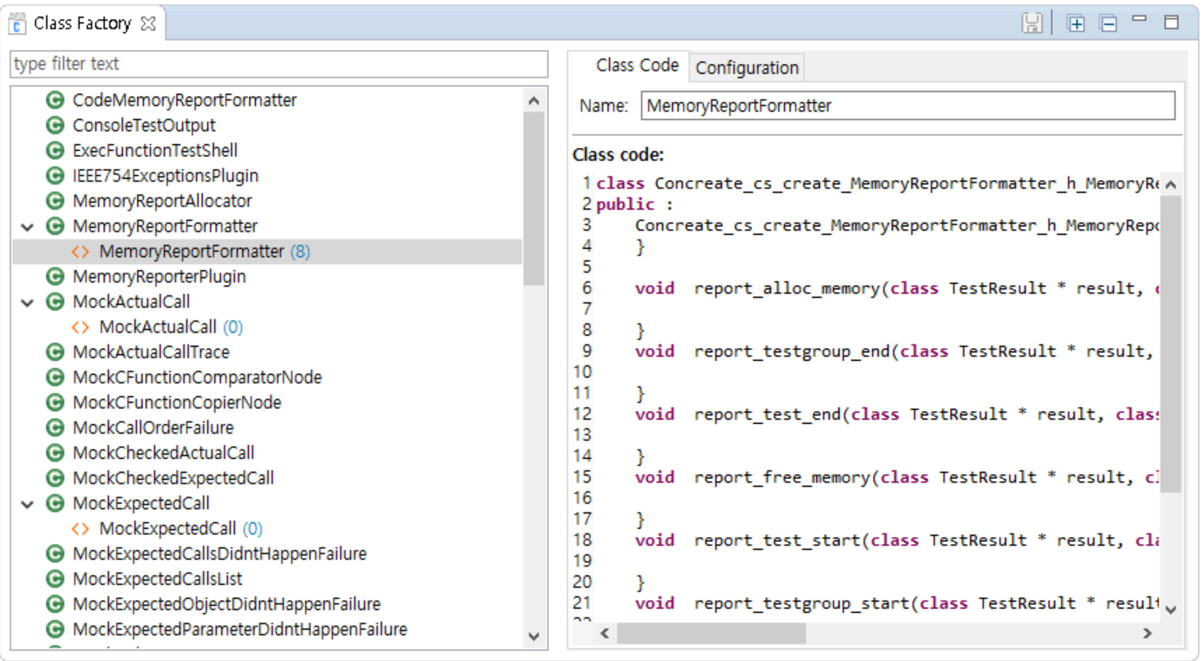
'Ctrl + Space' key pressed, show macro ke

2. The stub image decorator is added and the color of the stub name changes to gray as shown in figure below.



17.8. Class Factory View

When testing C++ source code, you can use class code to create class objects. Since abstract classes cannot be instantiated, CT 2023.12 automatically generates instantiable class code.



Name: MemoryReportFormatter

Class code:

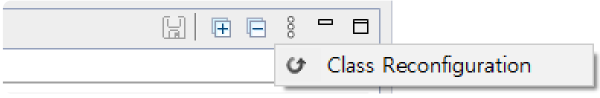
```
class Concreate_cs_create_MemoryReportFormatter_h_MemoryRe
public :
    Concreate_cs_create_MemoryReportFormatter_h_MemoryRepo
    }

    void  report_alloc_memory(class TestResult * result, 

    }
    void  report_testgroup_end(class TestResult * result,

    }
    void  report_test_end(class TestResult * result, clas

    }
    void  report_free_memory(class TestResult * result, cl

    }
    void  report_test_start(class TestResult * result, cla

    }
    void  report_testgroup_start(class TestResult * resul
```

- On the left side of the [Class Factory view], you can see the classes included in the project and the class code for instantiating the class in a tree structure.
- On the right side of the [Class Factory View], you can edit the class code and name in the [Class code] tab, and see the connected tests in the [Configuration] tab.

Toolbar menu of Class Factory view

Item	Description
Save	Save modification of the class code.
Expand All	Expand all class tree in Class Factory view.
Collapse All	Collapse all class tree in Class Factory view

Pulldown menu of Class Factory view



Item	Description
Class Reconfiguration	Reconfigure the class when the target class of the class code has changed

✻ For detailed information on [Class Reconfiguration], please refer to [Source Code Modification and Test Reconfiguration] in the the User Guide 2023.12.

Icon of Class Factory view

Icon	Description
Class	Class included in the project.
Abstract class	Abstract class included in the project.
Mock object	Mock object used in test.
<> Class code	Class code that create class objects to use in tests.

Context menu of class

Item	Description
Create	Create a class code of the selected class.

Context menu of class code

Item	Description
✖ Delete	Delete selected class codes.

Using class factory

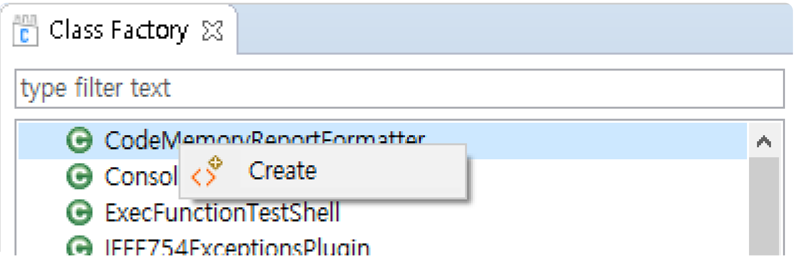
You can use the class factory in two ways.

- Using class codes
- Using mock objects

17.8.1. Using class codes

Create a class code

When analyze the project, a list of all class included in source codes appears in Class Factory view. CT 2023.12 automatically generates class codes of abstract classes. You can also manually create class code from the context menu of class.

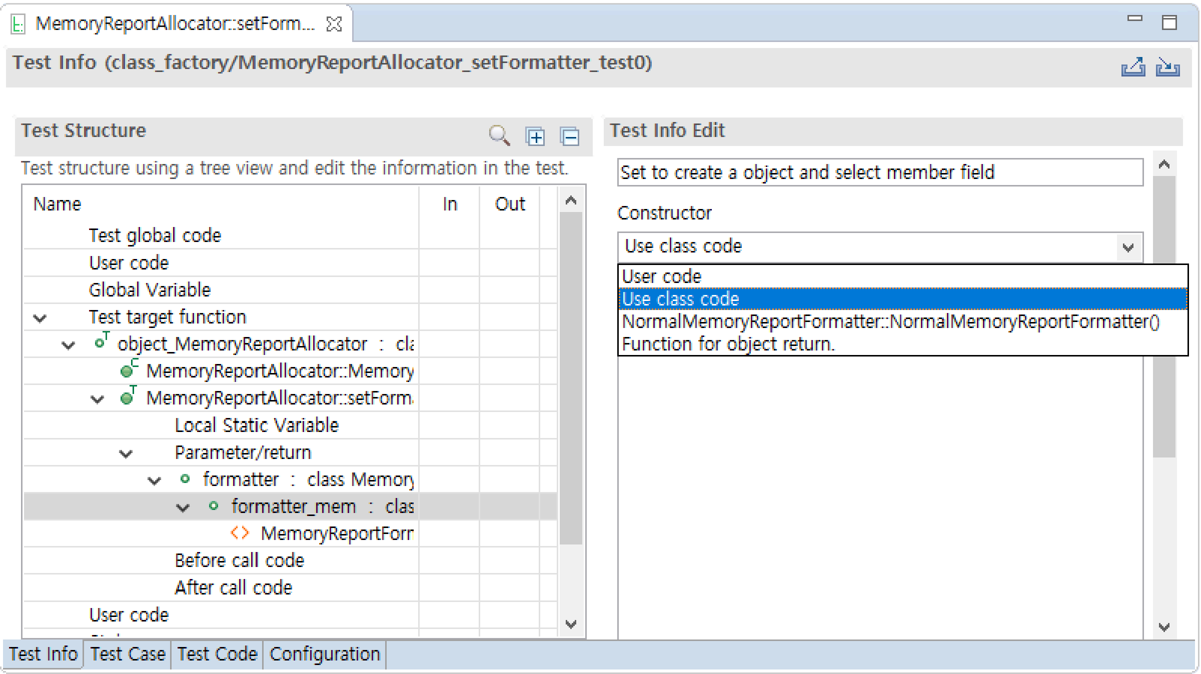


Apply class code

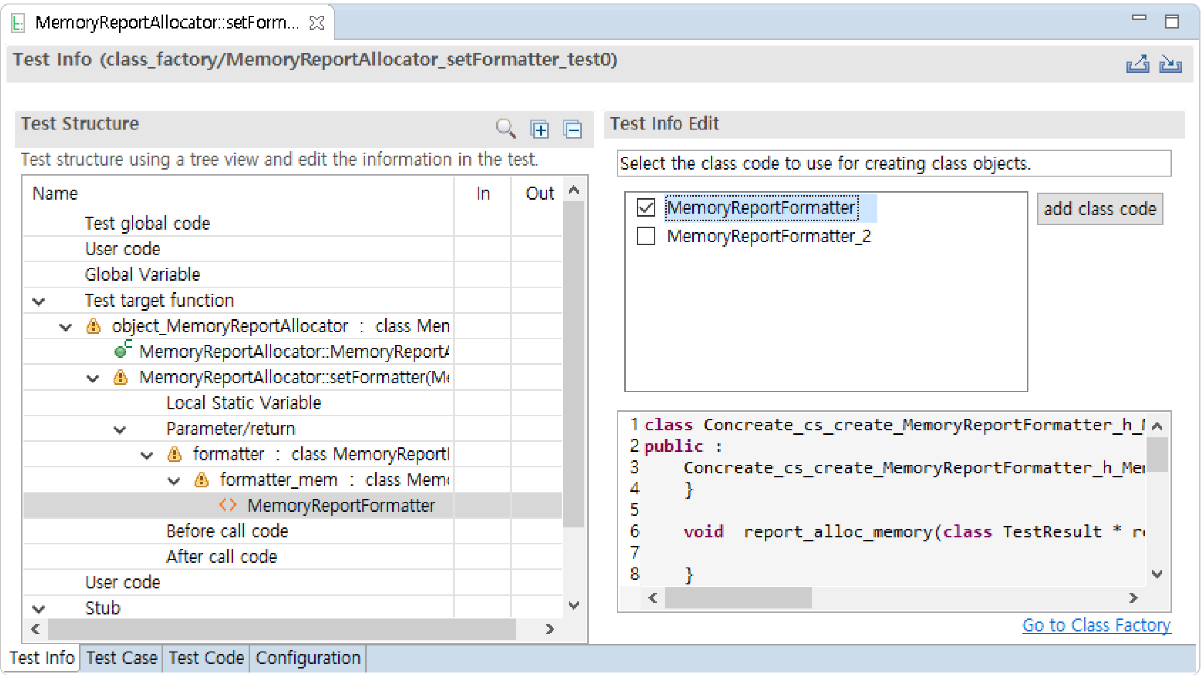
There are three ways to apply the class code to test.

Apply in Test Editor

1. Open the test editor by double-clicking on the test that you want to apply the class code. In the [Test Info] tab, expand the test structure, select the object to which the class code is to be applied, and select [Use class code] in [Test Info Edit] – [Constructor] on the right.


MemoryReportAllocator::setForm...
Test Info (class_factory/MemoryReportAllocator_setFormatter_test0)
Test Structure
Test structure using a tree view and edit the information in the test.
Name
In
Out
Test global code
User code
Global Variable
Test target function
object_MemoryReportAllocator : cla
MemoryReportAllocator::Memory
MemoryReportAllocator::setForm
Local Static Variable
Parameter/return
formatter : class Memory
formatter_mem : clas
MemoryReportForr
Before call code
After call code
User code
Test Info Edit
Set to create a object and select member field
Constructor
Use class code
User code
Use class code
NormalMemoryReportFormatter::NormalMemoryReportFormatter()
Function for object return.
Test Info
Test Case
Test Code
Configuration

2. Select class code in [Test Structure]. In [Test Info Edit], check the class code to be applied and save. Select the class code to see the code.



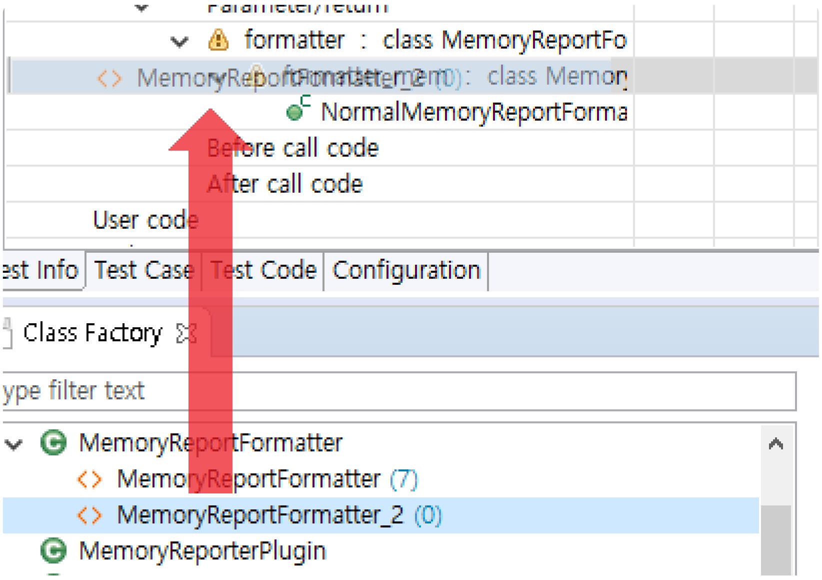
MemoryReportAllocator::setForm...
Test Info (class_factory/MemoryReportAllocator_setFormatter_test0)
Test Structure
Test structure using a tree view and edit the information in the test.
Name
In
Out
Test global code
User code
Global Variable
Test target function
object_MemoryReportAllocator : class Men
MemoryReportAllocator::MemoryReportA
MemoryReportAllocator::setFormatter(M
Local Static Variable
Parameter/return
formatter : class MemoryReportl
formatter_mem : class Mem
MemoryReportFormatter
Before call code
After call code
User code
Stub
Test Info Edit
Select the class code to use for creating class objects.
☑ MemoryReportFormatter
□ MemoryReportFormatter_2
add class code
Go to Class Factory
Test Info
Test Case
Test Code
Configuration

```
class Concreate_cs_create_MemoryReportFormatter_h_I
public :
    Concreate_cs_create_MemoryReportFormatter_h_Me
    }

    void  report_alloc_memory(class TestResult * r

    }
```

- Select [Go to Class Factory] to open the class code in Class Factory view.
- Click [Add Class code] to add new class code.

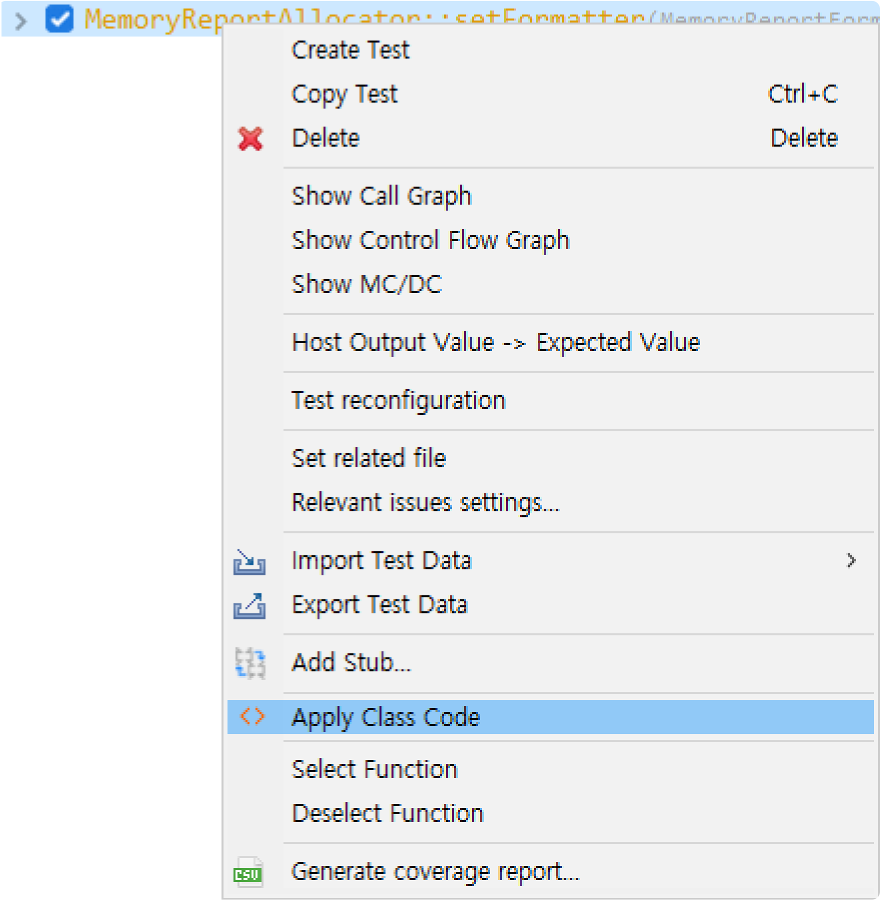
Apply by drag-and-drop

You can apply the class code by dragging and dropping the class code to be applied from Class Factory view to the class object in Test Editor.

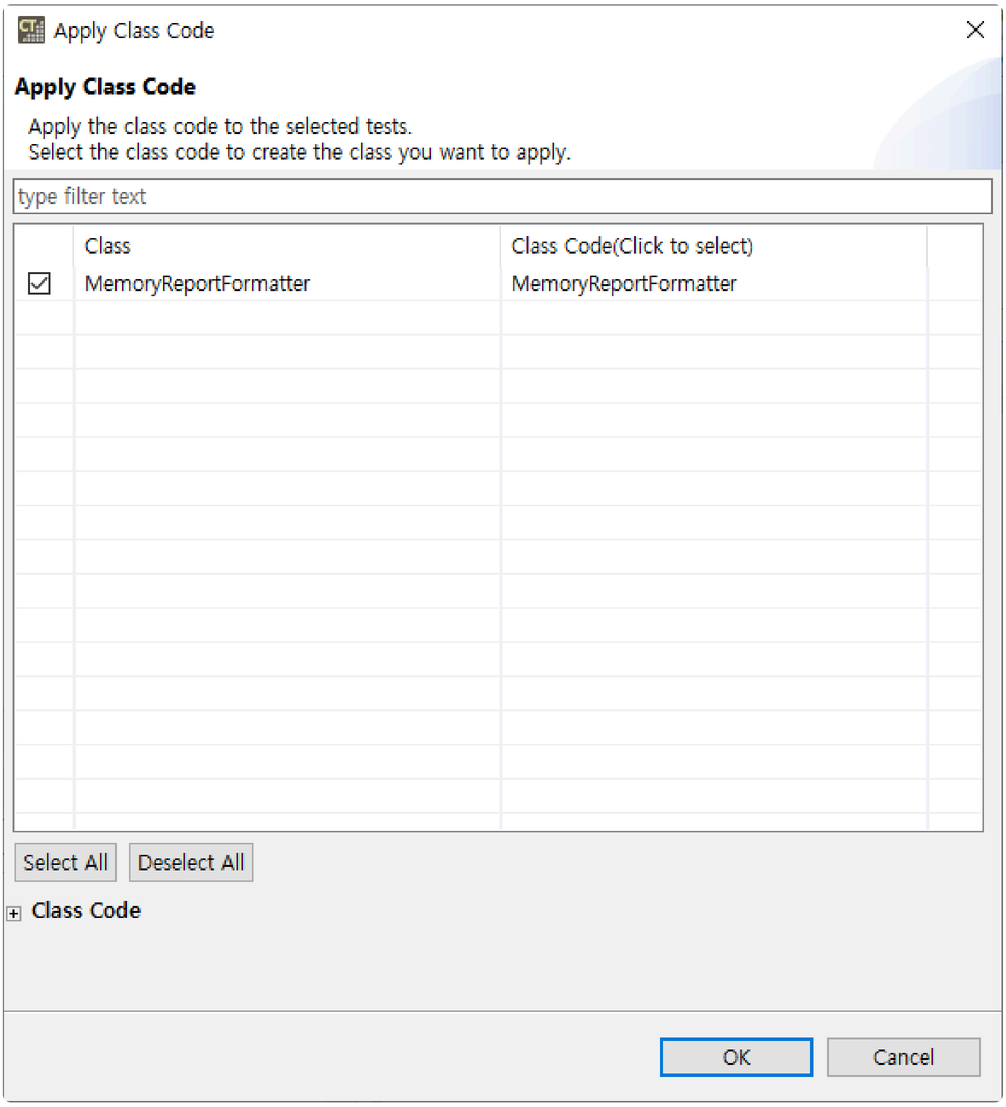


Apply using context menu in Test view

1. In Test view, select [Apply Class code] in context menu of functions or tests.



2. In [Apply Class code] dialog, select the class code to apply to selected tests and click [Ok]. Expand [Class code] at bottom to see the selected class code.



Apply Class Code

Apply Class Code

Apply the class code to the selected tests.
Select the class code to create the class you want to apply.

type filter text

	Class	Class Code(Click to select)
☑	MemoryReportFormatter	MemoryReportFormatter

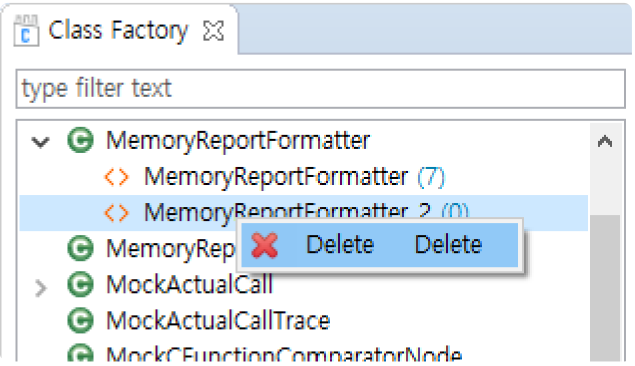
With [Apply Class code] feature, the same class code is applied wherever the class code can be applied.

Modify class code

You can modify the class code on [Class code] tab of Class Factory view. The modified class code is reflected in all connected tests.

Delete class code

You can delete class code in context menu of Class Factory view.



! It is impossible to delete the class code while it is connected to the test. Before deleting the class code, all connections with the test must be disconnected.

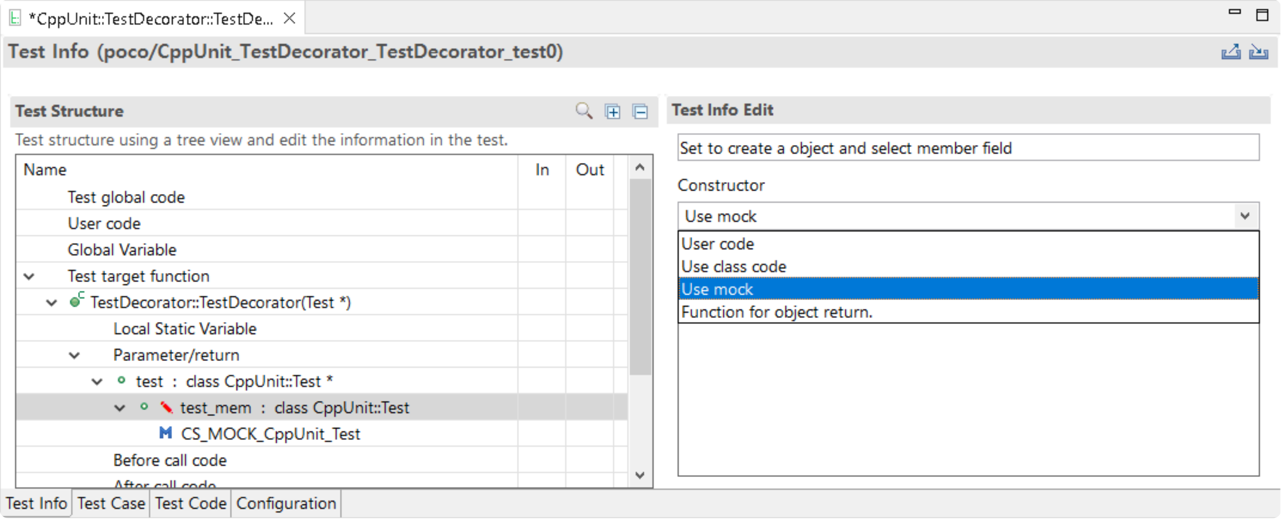
17.8.2. Using mock objects

The following toolchain is available for use with mock objects:

- GCC 6.0 or later
- Visual Studio 2015 or later

Creating and Using mock objects

1. Open [Test Editor] by double-clicking a test you want to create a mock object for.
2. In the Test Info Tab, expand the test structure tree and select the object to create a mock object. Select [Use mock] at the constructor in the Test Info Edit area on the right.



*CppUnit::TestDecorator::TestDe...

Test Info (poco/CppUnit_TestDecorator_TestDecorator_test0)

Test Structure

Test structure using a tree view and edit the information in the test.

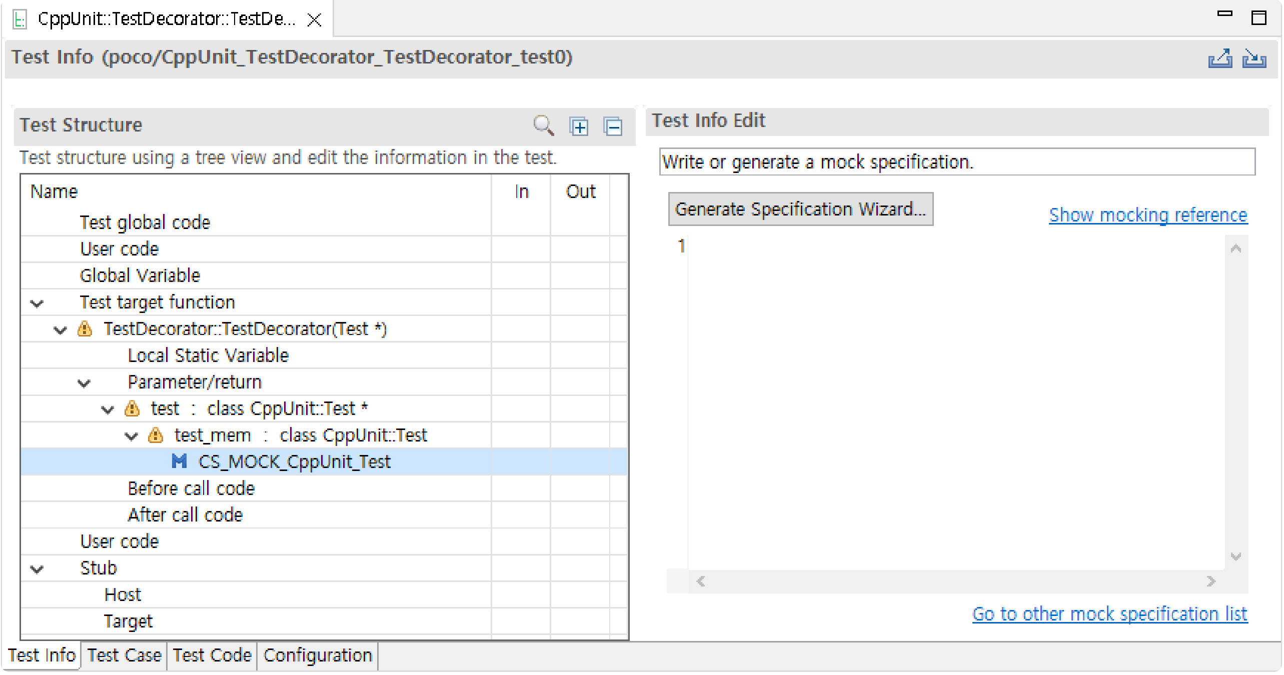
Test Info Edit

Set to create a object and select member field

Constructor: Use mock

   - Selecting [Use mock], the class code of the mock object is generated in the Class Factory View.

3. Click the created mock object in the Test Info Tab.



CppUnit::TestDecorator::TestDe...

Test Info (poco/CppUnit_TestDecorator_TestDecorator_test0)

Test Structure

Test structure using a tree view and edit the information in the test.

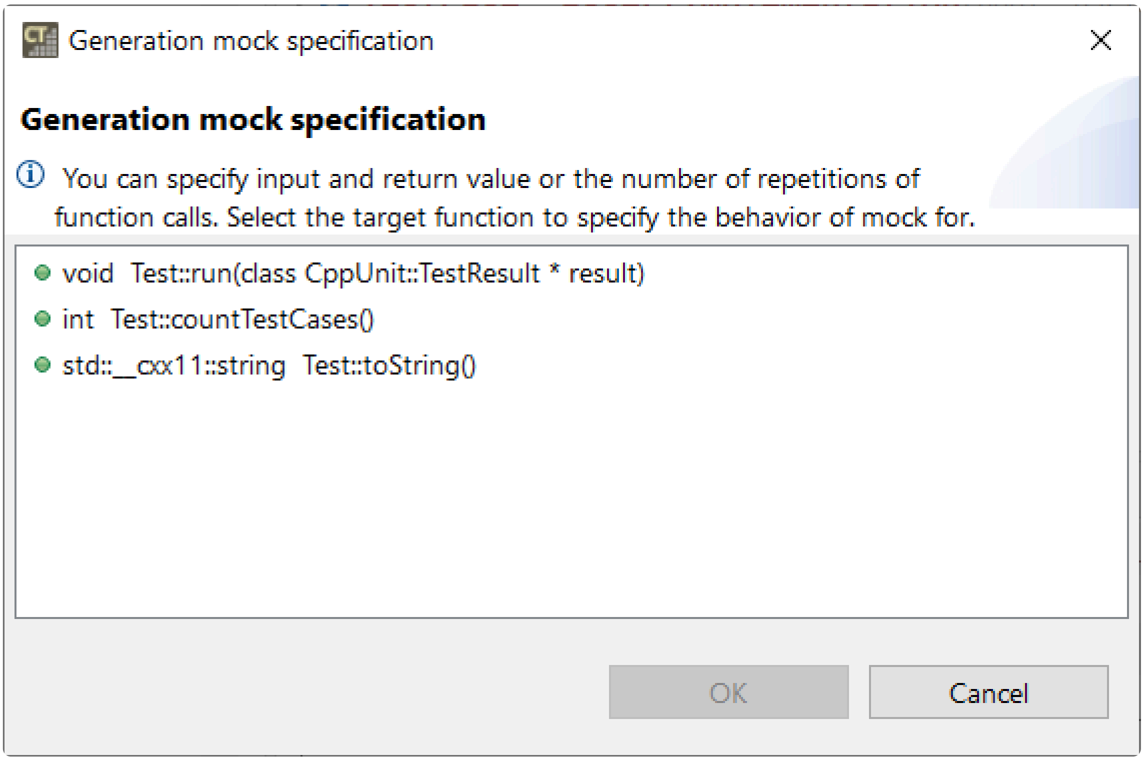
Test Info Edit

Write or generate a mock specification.

Generate Specification Wizard...
Show mocking reference
1
Go to other mock specification list

   - [Show mocking reference]: You can see the description about specifications of mock objects.

4. You can generate mock specification in the wizard, by clicking [Generate Specification Wizard…] button in the Test Info Edit area.



Generation mock specification

Generation mock specification

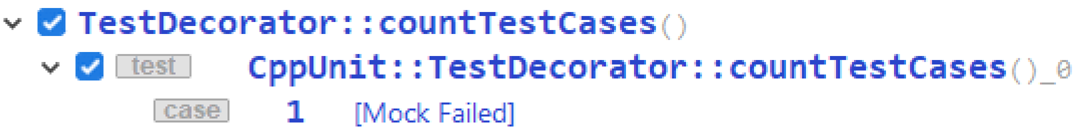
ⓘ You can specify input and return value or the number of repetitions of function calls. Select the target function to specify the behavior of mock for.

- ● void Test::run(class CppUnit::TestResult * result)
- ● int Test::countTestCases()
- ● std::__cxx11::string Test::toString()

For details, refer to the Using Mock Objects in C++ Tests page of User Guides.

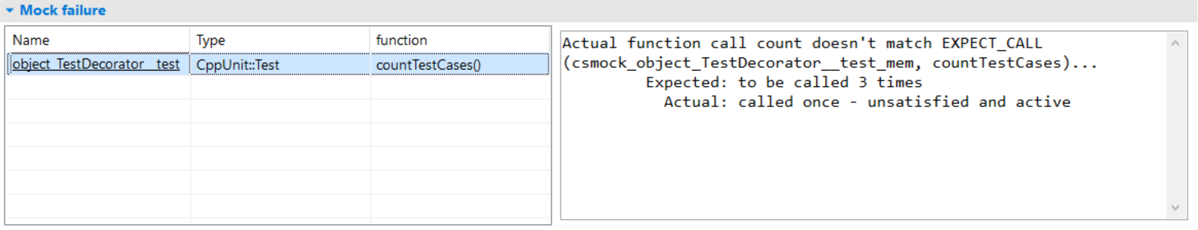
Check the result of mock objects.

1. Click the Run button in the Test View.
2. If a mock object does not match the specifications, the test fails and displays the message [Mock Failed] next to the testcase.



☑ TestDecorator::countTestCases()
☑ test CppUnit::TestDecorator::countTestCases()_0
case 1 [Mock Failed]

3. You can check the failure information in [Test Editor] > [Test Case Tab].
   - Expand [▶ Mock failure] and check why the mock object failed.



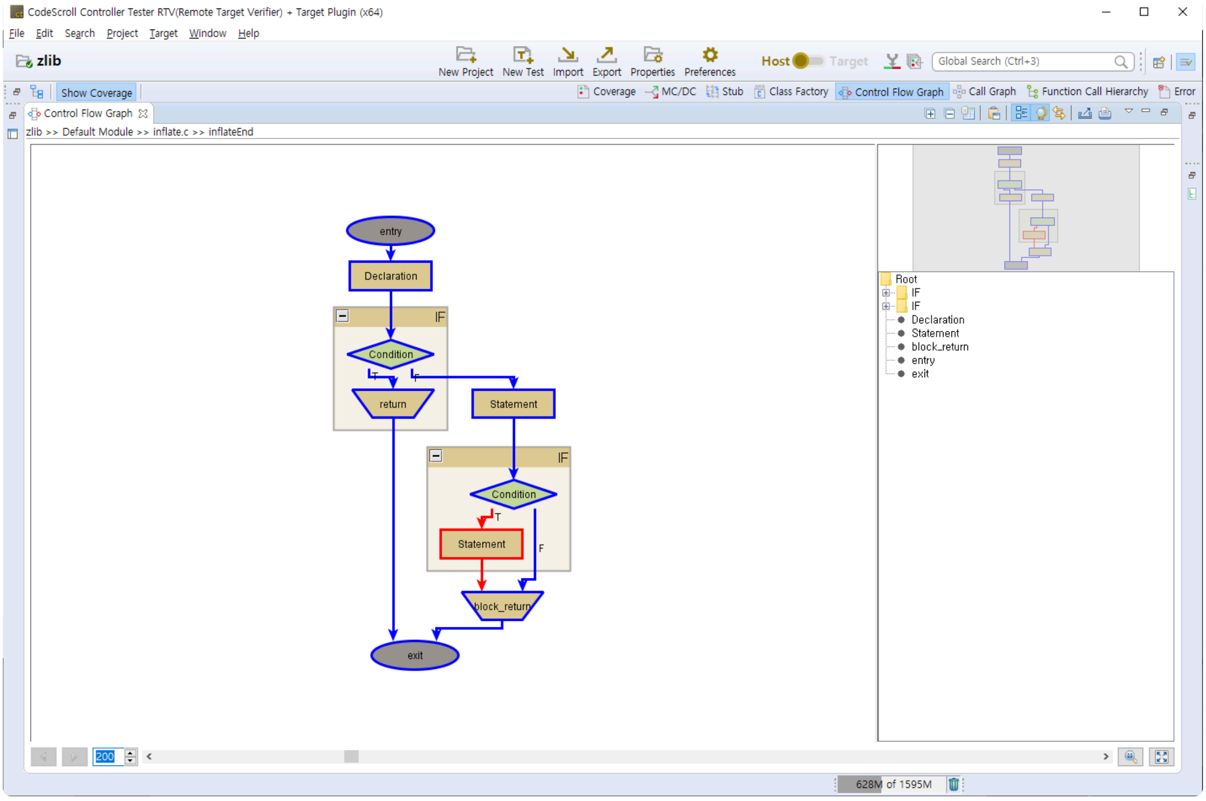
Mock failure

Name	Type	function
object_TestDecorator__test	CppUnit::Test	countTestCases()

```
Actual function call count doesn't match EXPECT_CALL
(csmock_object_TestDecorator__test_mem, countTestCases)...
         Expected: to be called 3 times
           Actual: called once - unsatisfied and active
```

17.9. Control Flow Graph View

The [Control Flow Graph] view shows the control flow information for the function selected in graph format.
If you click [Show Coverage] button in the main toolbar, the covered section is displayed in blue color and the uncovered section is displayed in red color.


CodeScroll Controller Tester RTV(Remote Target Verifier) + Target Plugin (x64)
File Edit Search Project Target Window Help
zlib
New Project New Test Import Export Properties Preferences
Host Target
Global Search (Ctrl+3)
Show Coverage
Coverage MC/DC Stub Class Factory Control Flow Graph Call Graph Function Call Hierarchy Error
Control Flow Graph
zlib >> Default Module >> inflate.c >> inflateEnd
entry
Declaration
IF
Condition
T
F
return
Statement
IF
Condition
T
Statement
F
block_return
exit
Root
IF
IF
Declaration
Statement
block_return
entry
exit
200
628M of 1595M

Toolbar menu

Menu	Description
Unfold All	Shows all group nodes.
Fold All	Hide all group nodes.
Show Legend	Shows the legend(the node type in the currently displayed graph).
Copy to System Clipboard	Copies the currently displayed graph into clipboard.
Show Outline	Displays the graphs in a tree format.
Show Overview	Shows the overview of a graph.
Link with Editor	Shows the selected items in the graph in the editor by one-click.
Export View Content	Exports the contents of view in a report.
Print View Content	Prints the contents of view.

Pull-down menu

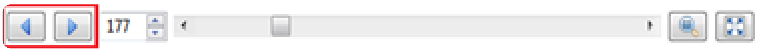
Menu	Description
Unfold All	Shows all group nodes.
Fold All	Hides all group nodes.
Show Call Graph	Shows the function call graph for the function selected in the current view.
Show Legend	Shows the legend(the node type in the currently displayed graph).
Show Outline	Displays the graphs in a tree format.
Show Overview	Shows the overview of a graph.
Link with Editor	Shows the selected items in the graph in the editor by one-click.
Save as Graph Format	Creates the graph model file for the graph displayed on the current screen. Four kinds of formats supported: • Graph Modeling Language XML (*.xgml) • Graph Modeling Language(*.gml) • yWorks Binary Graph Format(.ygf) • Trivial Graph Format(*.tgf)
Save as Image Format	Saves the currently displayed graph as an image format file(jpg, gif).
Copy to System Clipboard	Copies the currently displayed graph into clipboard.
Preferences	Opens the preferences.

Node Pop-up menu

Menu	Description
Show Call Graph	Shows the function call graph for the function selected in the current view.

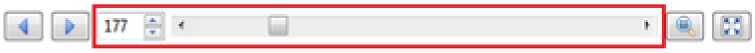
History function

The node that had been selected in the current graph can be seen again by using the arrow button(Go back, Go forward) in the lower-left corner of the view.



Zoom out/in function

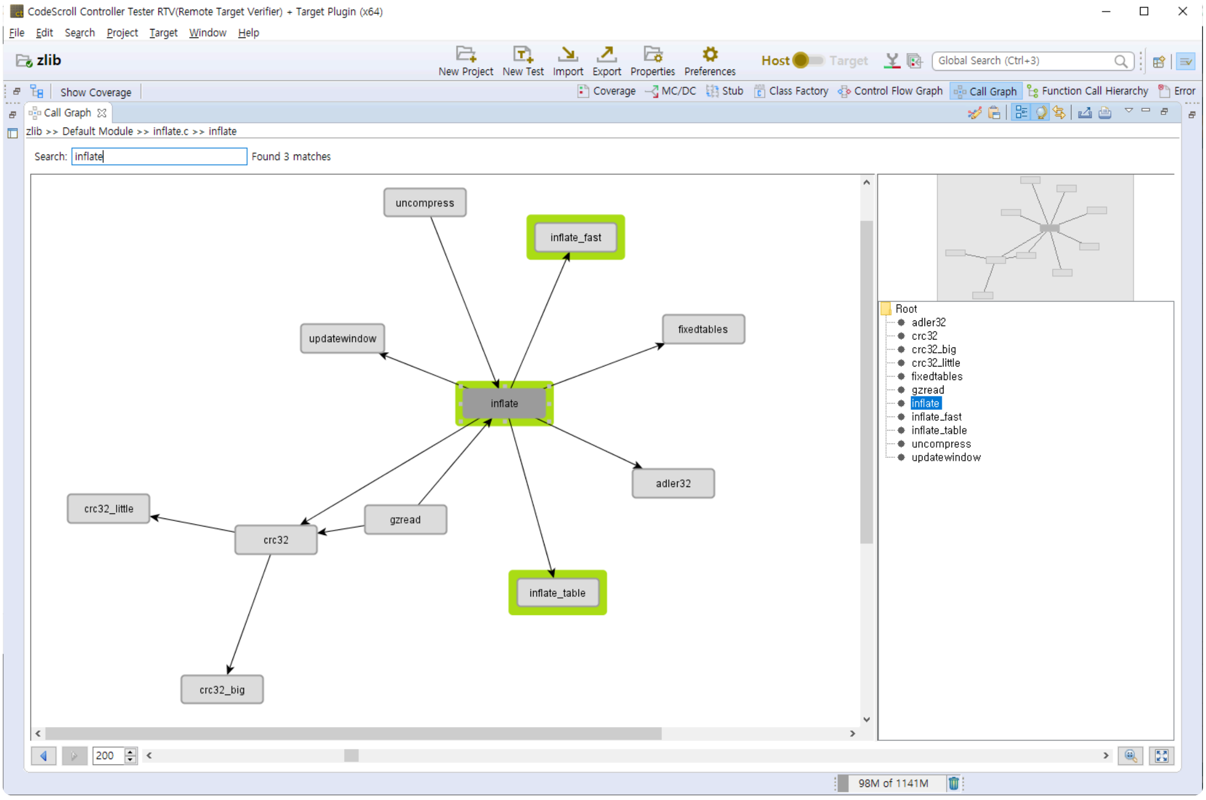
You can change the zoom out/in ratio by entering a number at the bottom of the view or by adjusting the slider.



You can reset the zoom out/in ratio by using [Initialize zoom out/in ratio] button at the lower right corner of the view, and change the zoom out/in ratio accordingly to the view size by using [Fit to view size] button.

17.10. Call Graph View

The [Call Graph] view shows the function call information for the selected function in a report format. (Ex: When calling function ‘B’ from function ‘A’, it is expressed ‘edge from node ‘A’ to node ‘B’, and it is represented as one edge even if called multiple times.
If you select the node (function), it shows the function call information for that node.


CodeScroll Controller Tester RTV(Remote Target Verifier) + Target Plugin (x64)
File Edit Search Project Target Window Help
zlib
New Project New Test Import Export Properties Preferences
Host Target
Global Search (Ctrl+3)
Show Coverage
Coverage MC/DC Stub Class Factory Control Flow Graph Call Graph Function Call Hierarchy Error
Call Graph
zlib >> Default Module >> inflate.c >> inflate
uncompress
inflate_fast
updatewindow
fixedtables
inflate
adler32
crc32_little
gzread
crc32
inflate_table
crc32_big
Root
adler32
crc32
crc32_big
crc32_little
fixedtables
gzread
inflate
inflate_fast
inflate_table
uncompress
updatewindow
200
98M of 1141M

Search: inflate Found 3 matches

Toolbar menu

Menu	Description
Edit Layout	Changes to make the node position of graph modifiable(it cannot be automatically edited when the graph is updated).
Copy to System Clipboard	Copies the currently displayed graph into clipboard.
Show Outline	Displays the graphs in a tree format.
Show Overview	Shows the overview of a graph.
Link with Editor	Shows the selected items in the graph in the editor by one-click.
Export View Content	Exports the contents of view in a report.
Print View Content	Prints the contents of view.

Pull-down menu

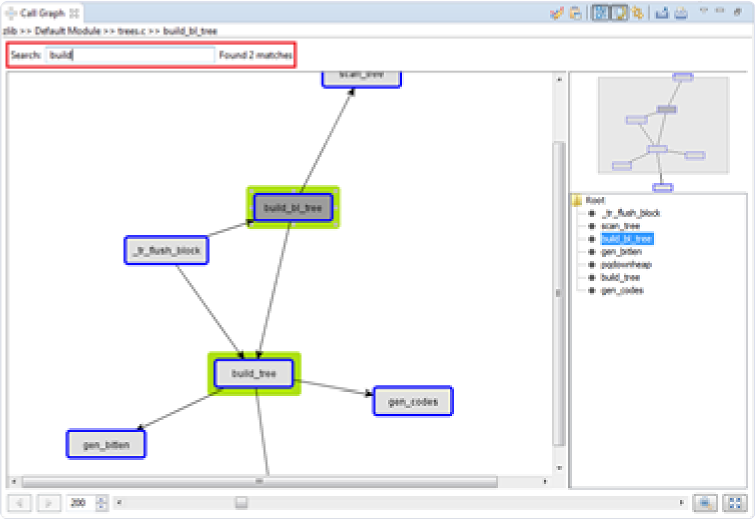
Menu	Description
Show CFG	Shows the control flow graph for the function selected in the current view.
Show Outline	Displays the graphs in a tree format.
Show Overview	Shows the overview of a graph.
Link with Editor	Shows the selected items in the graph in the editor by one-click.
Save as Graph Format	Creates the graph model file for the graph displayed in the current screen. Four kinds of formats supported: • Graph Modeling Language XML (*.xgml) • Graph Modeling Language(*.gml) • yWorks Binary Graph Format(.ygf) • Trivial Graph Format(*.tgf)
Save as Image Format	Saves the currently displayed graph as an image format file(jpg, gif).
Copy to System Clipboard	Copies the currently displayed graph into clipboard.
Preferences	Opens the preferences.

Node Pop-up menu

Menu	Description
Show CFG	Shows the control flow graph for the function node selected.
Expand	Shows the call relationship after the selected function one more step.
Collapse	Hides the call relationship after the selected function.
Set to Start Node	Specifies the start function for checking the call path for two functions.
Set to End Node	Specifies the end function for checking the call path for two functions. Shows all paths possible in the current graph.

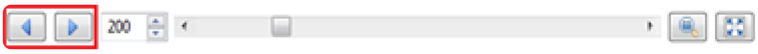
Search function

When you enter a search word in the top of the view, the functions with the name containing the entered search word are highlighted.



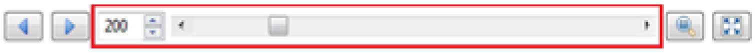
History function

The node that had been selected in the current graph can be seen again by using the arrow button(Go back, Go forward) in the lower-left corner of the view.



Zoom out/in function

You can change the zoom out/in ratio by entering a number at the bottom of the view or by adjusting the slider.



You can reset the zoom out/in ratio by using [Initialize zoom out/in ratio] button at the lower right corner of the view, and change the zoom out/in ratio accordingly to the view size by using [Fit to view size] button.

Show/Hide function

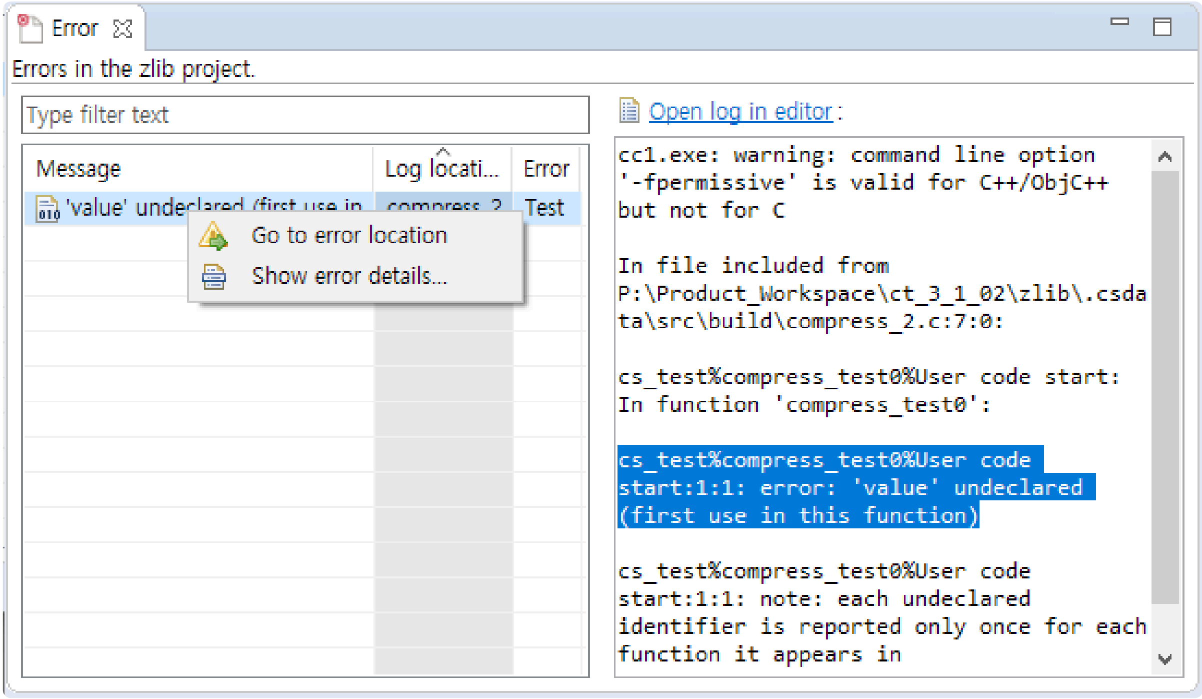
By using the menu displayed when right-clicking a node, you can show or hide the edge out from that node. If you select [Hide], it hides the call relationship for all functions called by the function corresponding to the selected node. The Hide menu of the node having no function call information is disabled. If you select [Show], it shows the functions called by the function corresponding to the selected node one more step. Likewise, if there are no call relationships, the Show menu is disabled.

Highlight Path between Nodes function

By selecting the start node and end node, it highlights all paths exited between two nodes so that you can see easily the interesting section in the complex function call relationship.

17.11. Error View

You can check the analysis error information of the project in detail.



```
cc1.exe: warning: command line option
'-fpermissive' is valid for C++/ObjC++
but not for C

In file included from
P:\Product_Workspace\ct_3_1_02\zlib\.csda
ta\src\build\compress_2.c:7:0:

cs_test%compress_test0%User code start:
In function 'compress_test0':

cs_test%compress_test0%User code
start:1:1: error: 'value' undeclared
(first use in this function)

cs_test%compress_test0%User code
start:1:1: note: each undeclared
identifier is reported only once for each
function it appears in
```

Log type

Type	Description
Build	Errors occurred during build
Statement analysis	Errors occurred during statement analysis
Link	Errors occurred during linking
Pre-processing	Errors occurred during pre-processing

Error type

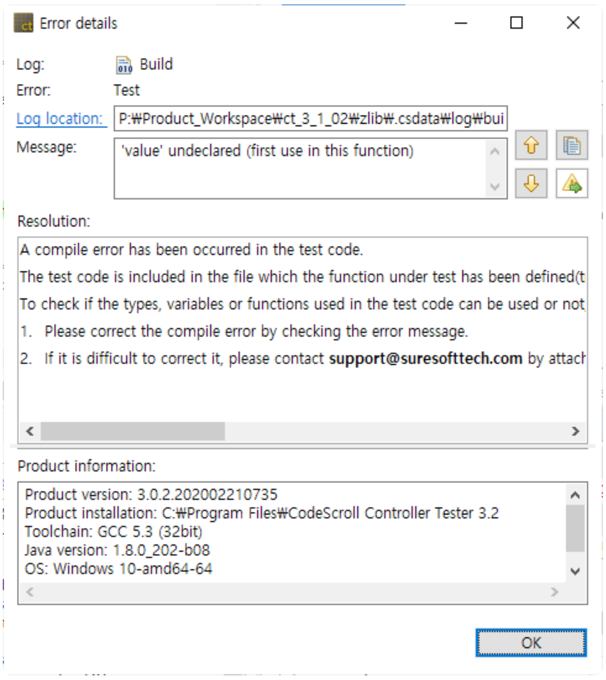
Type	Description
Source	Errors occurred int the source file
Stub	Errors occurred in the stub file
Test	Errors occurred in the test editor

Go to the error location

In the context menu, select [Go to error location] to go to the location where the error has occurred so as to correct the error easily.

Show error details

Double-click the error information or select [Show error details…] in the context menu to check the detail information for the error.



Log: Build

Error: Test

Log location: P:₩Product_Workspace₩ct_3_1_02₩zlib₩.csdata₩log₩bui

Message: 'value' undeclared (first use in this function)

Resolution:

A compile error has been occurred in the test code.
The test code is included in the file which the function under test has been defined(t
To check if the types, variables or functions used in the test code can be used or not
1. Please correct the compile error by checking the error message.
2. If it is difficult to correct it, please contact **support@suresofttech.com** by attacl

Product information:

```
Product version: 3.0.2.202002210735
Product installation: C:₩Program Files₩CodeScroll Controller Tester 3.2
Toolchain: GCC 5.3 (32bit)
Java version: 1.8.0_202-b08
OS: Windows 10-amd64-64
```

Buttons

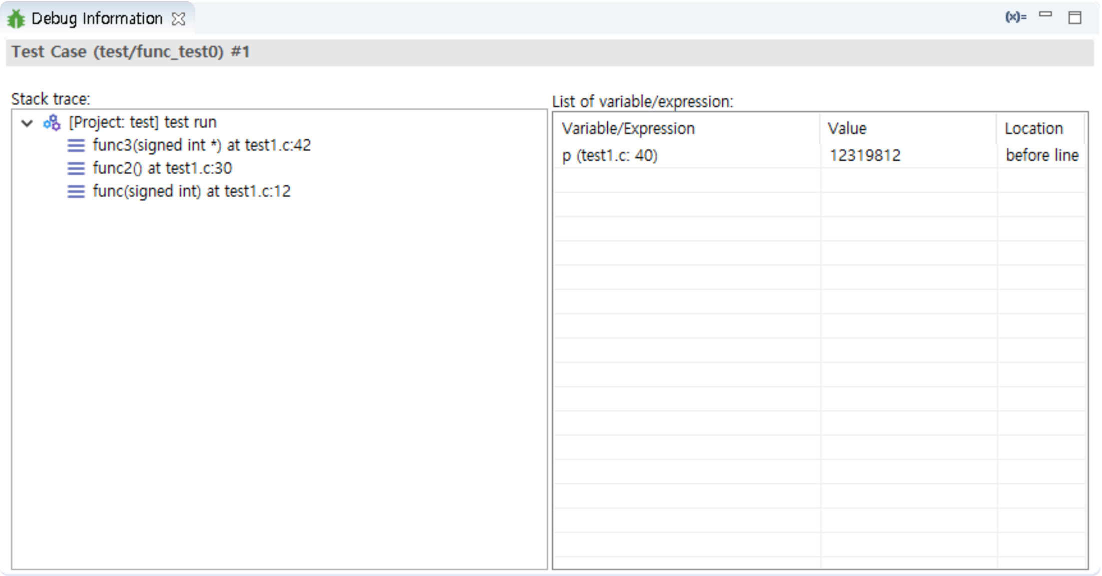
Button	Description
⇧ Previous	Shows the previous error information.
⇩ Next	Shows the next error information.
Copy	Copies the error information.
Go to Error	Points to the location of the error.

17.12. Debug Information View

The debug information view shows information to help you determine the cause of an error in a test case.

- Trace function calls in test cases with errors
- Actual value of variable/expression added to inspect debug information

If you select a test case that has [Inspect Debug Info] in the unit test view, debug information is displayed in the Debug Information view.



Test Case (test/func_test0) #1

Stack trace:

```
[Project: test] test run
    func3(signed int *) at test1.c:42
    func2() at test1.c:30
    func(signed int) at test1.c:12
```

List of variable/expression:

Variable/Expression	Value	Location
p (test1.c: 40)	12319812	before line

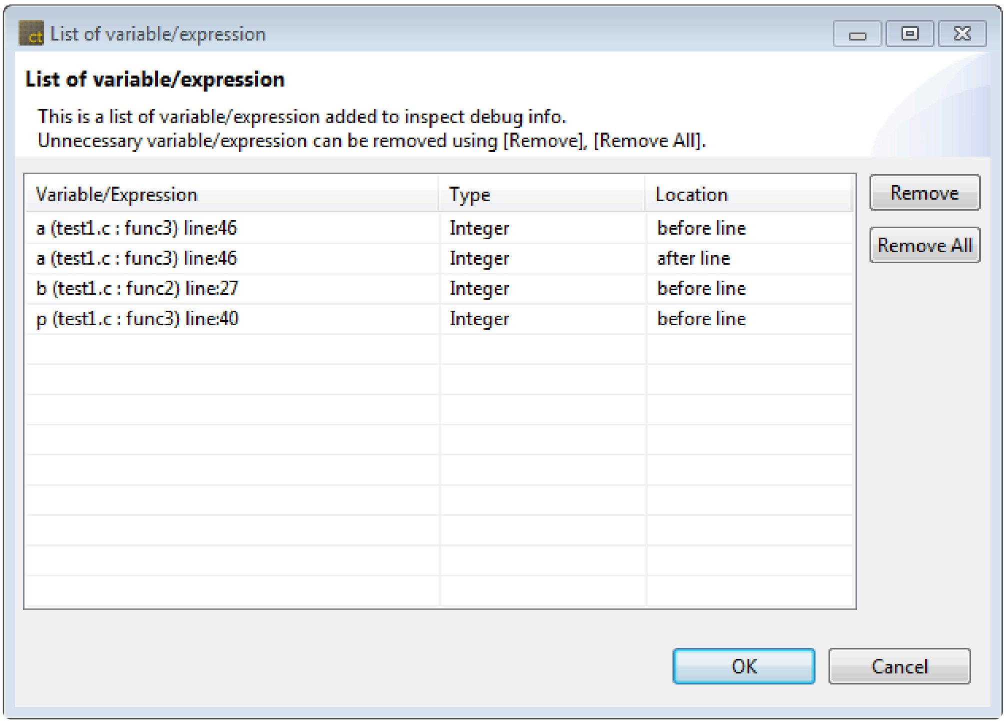
- The Stack trace shows the function call trace when the test case in error was executed. The location where the error occurred is displayed at the top.
- The variable/expression list shows the actual value of the variable/expression added to inspect the debug information.

> ! If the actual value of the added variable/expression is not displayed:
> - When [Inspect Debug Info] of the test case is not executed after adding a new variable/expression
> - When the line where the variable/expression was added was not executed when the test case was executed (it was not executed depending on the condition or an error occurred before execution)

Debug Information View toolbar menu

icon	description
(x)=	List of variable/expression to debug

In the list of debug variable/expression, you can check and remove variable/expression.



List of variable/expression

List of variable/expression

This is a list of variable/expression added to inspect debug info.
Unnecessary variable/expression can be removed using [Remove], [Remove All].

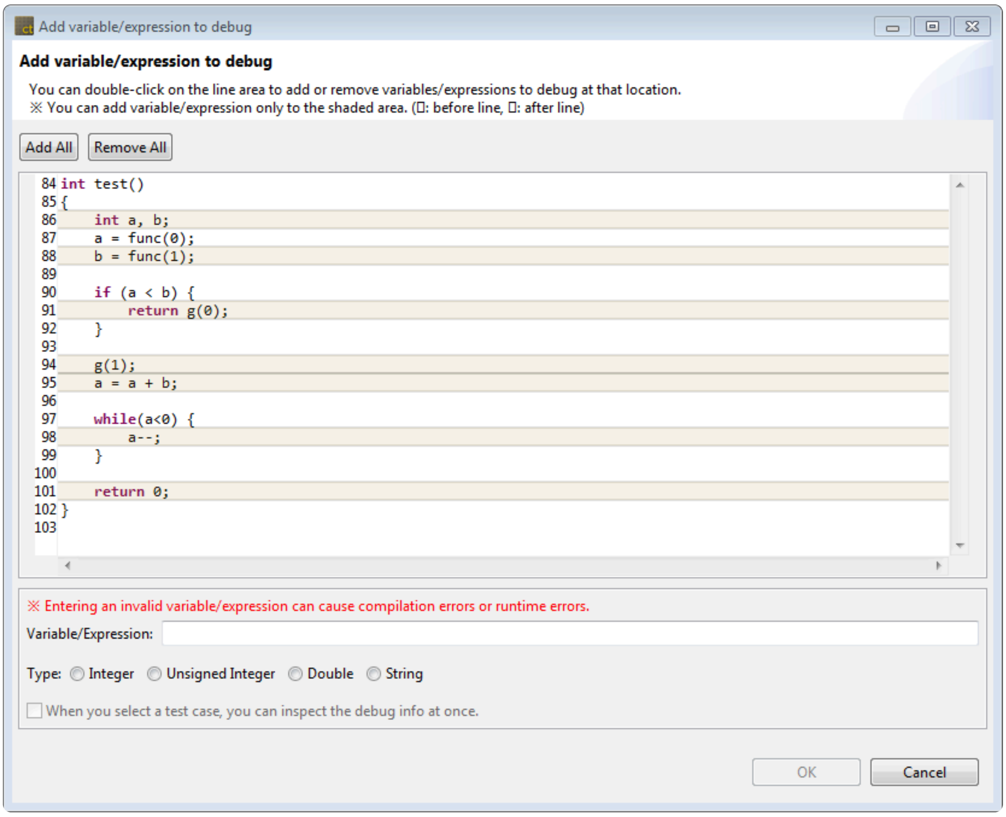
Variable/Expression	Type	Location
a (test1.c : func3) line:46	Integer	before line
a (test1.c : func3) line:46	Integer	after line
b (test1.c : func2) line:27	Integer	before line
p (test1.c : func3) line:40	Integer	before line

Adding variable/expression to debug

You can add variable/expression to debug in the following ways.

1. Double-click the line area in the source code editor
2. Select [Add Variable/expression to debug…] from the line area context menu in the source code editor
3. After specifying a variable or expression in the source code editor, select [Add Variable/expression to debug…] from the context menu.

When the above operation is performed, the [Add variable/expression to debug] window appears.



Add variable/expression to debug

You can double-click on the line area to add or remove variables/expressions to debug at that location.
※ You can add variable/expression only to the shaded area. (□: before line, □: after line)

```
int test()
{
    int a, b;
    a = func(0);
    b = func(1);

    if (a < b) {
        return g(0);
    }

    g(1);
    a = a + b;

    while(a<0) {
        a--;
    }

    return 0;
}

```

※ Entering an invalid variable/expression can cause compilation errors or runtime errors.

Variable/Expression:

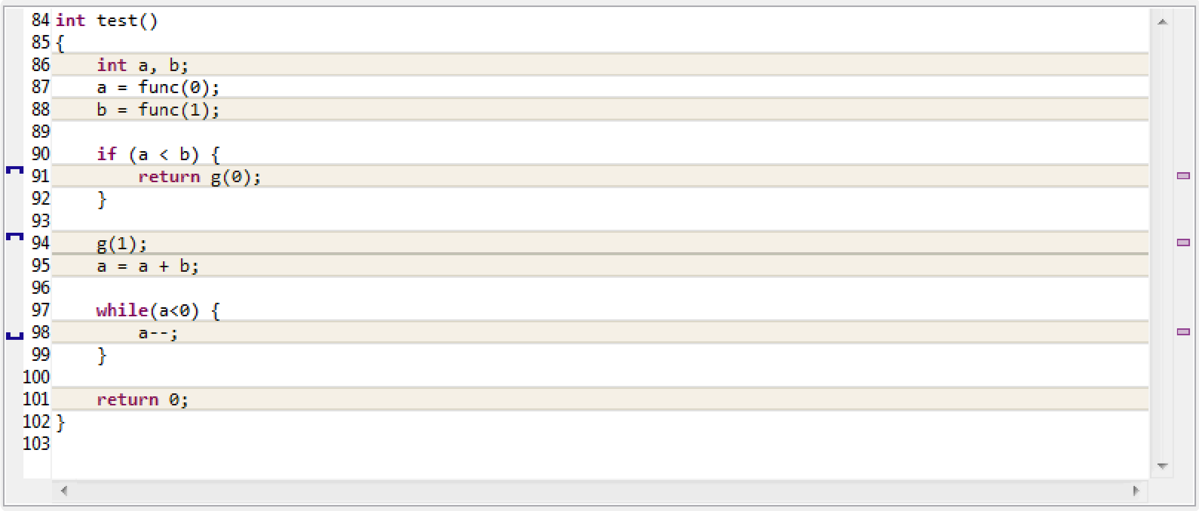
Type: ○ Integer ○ Unsigned Integer ○ Double ○ String

□ When you select a test case, you can inspect the debug info at once.

You can double-click on the line area to add or remove variable/expression to debug at that location.

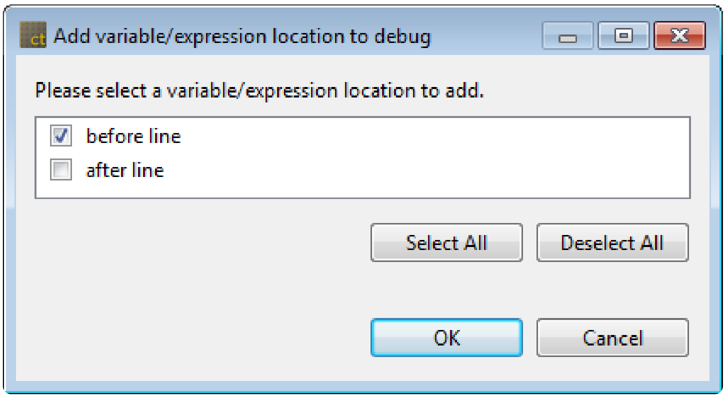
marker	description
⊓	Variable/expression added before the line
⊔	Variable/expression added after the line

You can add markers only in the shaded area.



```
int test()
{
    int a, b;
    a = func(0);
    b = func(1);

    if (a < b) {
        return g(0);
    }

    g(1);
    a = a + b;

    while(a<0) {
        a--;
    }

    return 0;
}

```

If you can add a variable/expression to debug both before and after the line in the shaded area, a dialog will pop up asking where to add it.



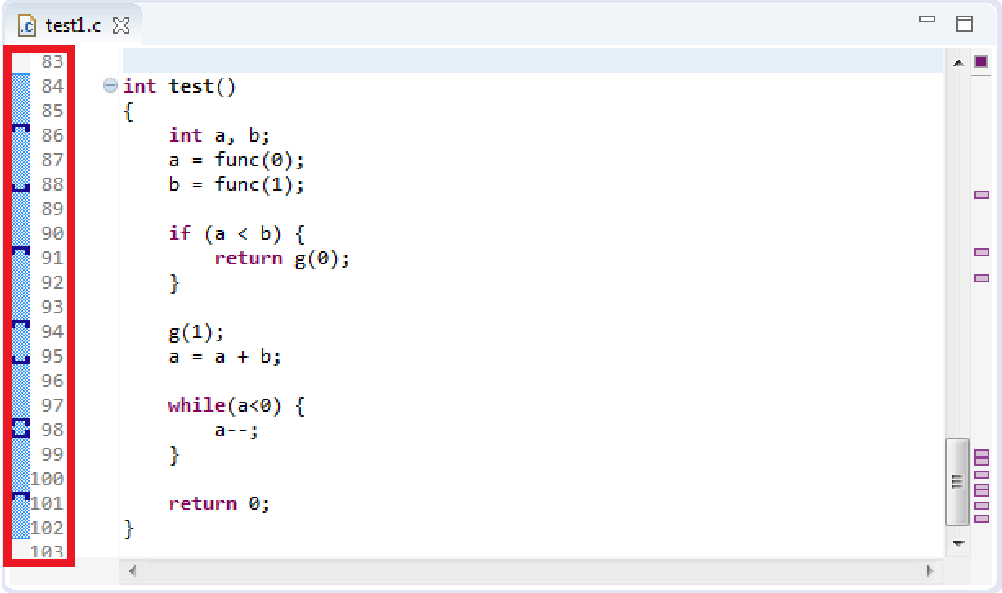
Add variable/expression location to debug

Please select a variable/expression location to add.

☑ before line

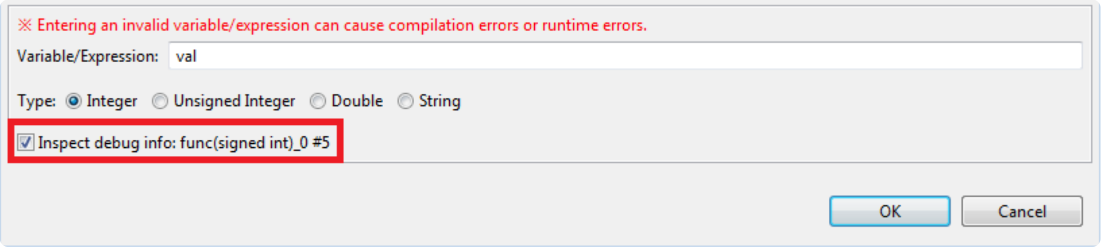
□ after line

You can add or remove variables/expressions anywhere you can add to the target function through the [Add All], [Remove All] buttons at the top of the source viewer.
After specifying the variable/expression and type and clicking the [OK] button, you can see that the marker has been added to the source code editor.



```
int test()
{
    int a, b;
    a = func(0);
    b = func(1);

    if (a < b) {
        return g(0);
    }

    g(1);
    a = a + b;

    while(a<0) {
        a--;
    }

    return 0;
}
```

If the test case is selected in [Unit Test View], you can immediately perform [Inspect Debug Info] while adding a variable/expression to be debug.



※ Entering an invalid variable/expression can cause compilation errors or runtime errors.

Variable/Expression: val

Type: ● Integer ○ Unsigned Integer ○ Double ○ String

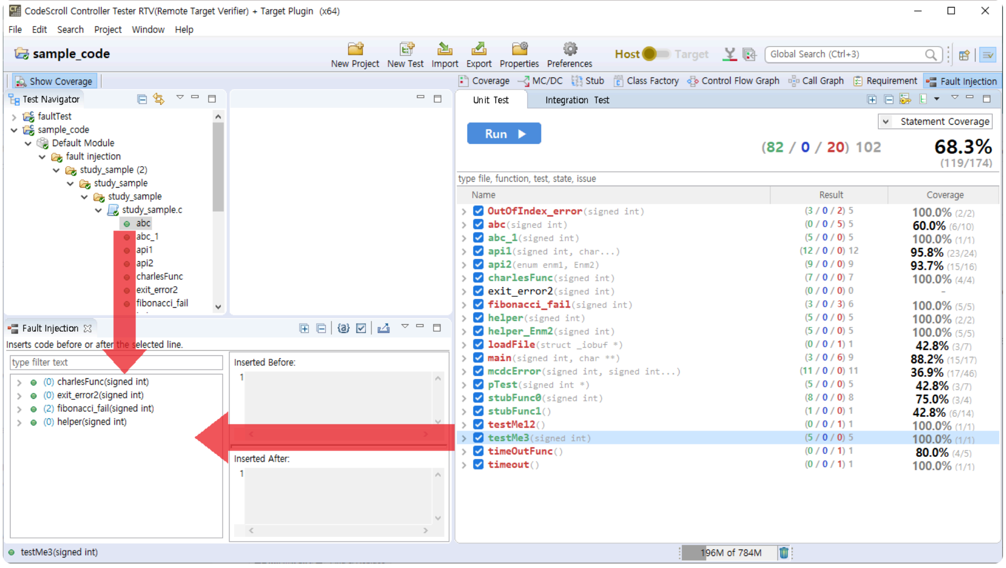
☑ Inspect debug info: func(signed int)_0 #5

! If you enter an invalid variable/expression, a compilation error or a runtime error may occur when performing [Inspect Debug Info].

17.13. Fault Injection View

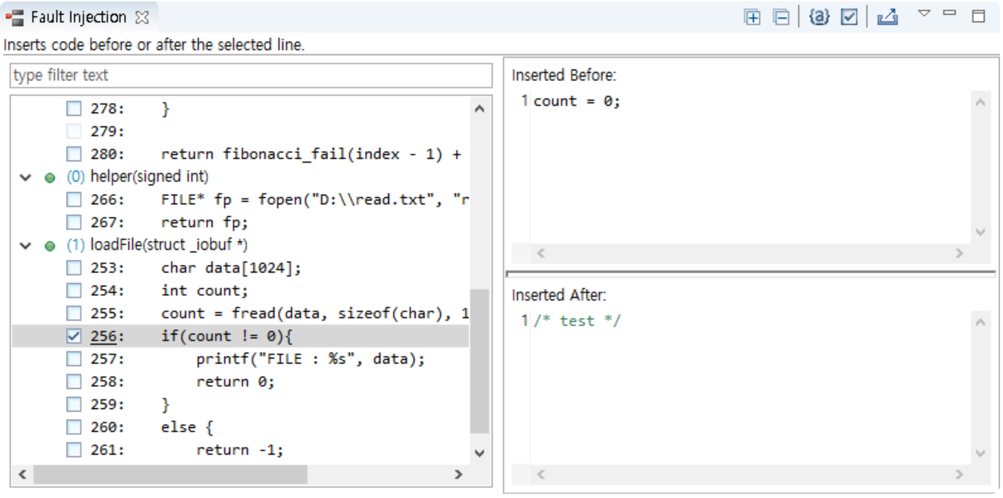
The Fault Injection View provides the feature for inserting the code needed to test additionally into the specific area of the function to be tested.

1. Drag and drop the function that you want to inject a fault from the Test Navigator View or the Unit Test View to the Fault Injection View.


CodeScroll Controller Tester RTV(Remote Target Verifier) + Target Plugin (x64)
File Edit Search Project Window Help
sample_code
New Project New Test Import Export Properties Preferences
Host Target
Global Search (Ctrl+3)
Show Coverage
Coverage MC/DC Stub Class Factory Control Flow Graph Call Graph Requirement Fault Injection
Test Navigator
faultTest
sample_code
Default Module
fault injection
study_sample (2)
study_sample
study_sample
study_sample.c
abc
abc_1
api1
api2
charlesFunc
exit_error2
fibonacci_fail
Fault Injection
Inserts code before or after the selected line.
type filter text
(0) charlesFunc(signed int)
(0) exit_error2(signed int)
(2) fibonacci_fail(signed int)
(0) helper(signed int)
Inserted Before:
Inserted After:
Unit Test
Integration Test
Run
Statement Coverage
(82 / 0 / 20) 102
68.3%
(119/174)
type file, function, test, state, issue
testMe3(signed int)
196M of 784M

Name	Result	Coverage
☑ OutOfIndex_error(signed int)	(3 / 0 / 2) 5	100.0% (2/2)
☑ abc(signed int)	(0 / 0 / 5) 5	60.0% (6/10)
☑ abc_1(signed int)	(5 / 0 / 0) 5	100.0% (1/1)
☑ api1(signed int, char...)	(12 / 0 / 0) 12	95.8% (23/24)
☑ api2(enum enm1, Enm2)	(9 / 0 / 0) 9	93.7% (15/16)
☑ charlesFunc(signed int)	(7 / 0 / 0) 7	100.0% (4/4)
☑ exit_error2(signed int)	(0 / 0 / 0) 0	-
☑ fibonacci_fail(signed int)	(3 / 0 / 3) 6	100.0% (5/5)
☑ helper(signed int)	(5 / 0 / 0) 5	100.0% (2/2)
☑ helper_Enm2(signed int)	(5 / 0 / 0) 5	100.0% (5/5)
☑ loadFile(struct _iobuf *)	(0 / 0 / 1) 1	42.8% (3/7)
☑ main(signed int, char **)	(3 / 0 / 6) 9	88.2% (15/17)
☑ mcdcError(signed int, signed int...)	(11 / 0 / 0) 11	36.9% (17/46)
☑ pTest(signed int *)	(5 / 0 / 0) 5	42.8% (3/7)
☑ stubFunc0(signed int)	(8 / 0 / 0) 8	75.0% (3/4)
☑ stubFunc1()	(1 / 0 / 0) 1	42.8% (6/14)
☑ testMe12()	(0 / 0 / 1) 1	100.0% (1/1)
☑ testMe3(signed int)	(5 / 0 / 0) 5	100.0% (1/1)
☑ timeOutFunc()	(0 / 0 / 1) 1	80.0% (4/5)
☑ timeout()	(0 / 0 / 1) 1	100.0% (1/1)

2. In the tree structure on the left of the view, click the line that you want to inject a fault and, on the right of the view, enter the user code to insert before/after the line. The number of the line where user code is written is underlined.



```
☐ 278:    }
  279:
☐ 280:    return fibonacci_fail(index - 1) +
(0) helper(signed int)
☐ 266:    FILE* fp = fopen("D:\\read.txt", "r
☐ 267:    return fp;
(1) loadFile(struct _iobuf *)
☐ 253:    char data[1024];
☐ 254:    int count;
☐ 255:    count = fread(data, sizeof(char), 1
☑ 256:    if(count != 0){
☐ 257:        printf("FILE : %s", data);
☐ 258:        return 0;
☐ 259:    }
☐ 260:    else {
☐ 261:        return -1;
```

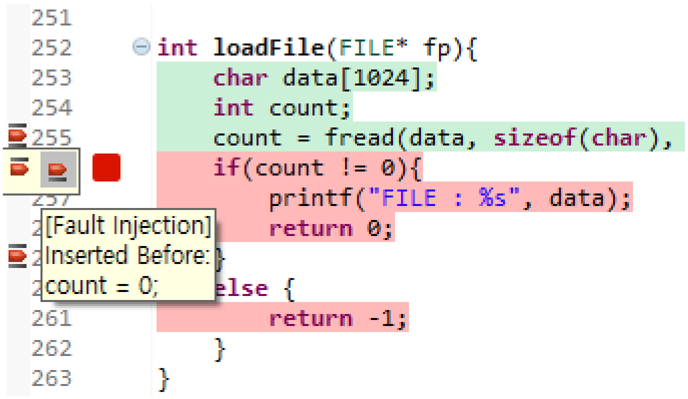
Inserted Before:

```
count = 0;
```

Inserted After:

```
/* test */
```

- When check checkboxes of lines to insert, the user codes are applied. In the source code editor, (before the line), (after the line) markers appear at that lines. When mouse is on the markers, the tooltip about fault injection information and written code appears.



```
int loadFile(FILE* fp){
    char data[1024];
    int count;
    count = fread(data, sizeof(char),
    if(count != 0){
        printf("FILE : %s", data);
        return 0;
    }
    else {
        return -1;
    }
}
```

[Fault Injection]
Inserted Before:
count = 0;

! Single-line comments (//) and input/output user macros cannot be used.

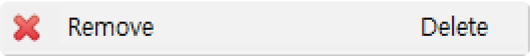
Toolbar menu in the Fault Injection view

Toolbar icon	Description
Expand All	Expand all function trees in Fault Injection view.
Collapse All	Collapse all function trees in Fault Injection view.
Show Only Non-empty Fault Injections	View only the line where the fault injection code is written among the fault injection lines.
Show Only Enable Fault Injections	View only active lines among fault injection lines.
Import Fault Injections	Import fault injection information with .xls format.
Export Fault Injections	Export fault injection information with .xls format.

Context menu in the Fault Injection view

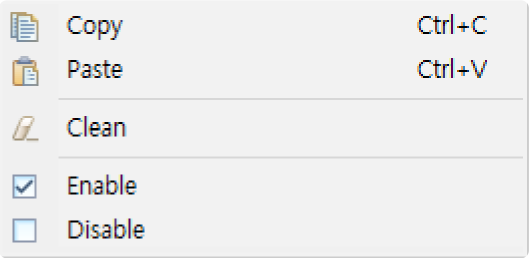
Function nodes and lines can be multi-selected to bring up the context menu.

Context menu of function nodes



Menu	Description
Remove	Remove the function inserted by users.

Context menu of lines



Menu	Description
Copy	Copy the information inserted by user before/after the line.
Paste	Paste the information inserted by user before/after the line.
Clean	Uncheck the checkboxes of the selected lines and remove inserted code.
☑ Enable	Check the checkboxes of the selected lines and activate fault injection.
□ Disable	Uncheck the checkboxes of the selected lines and deactivate fault injection.

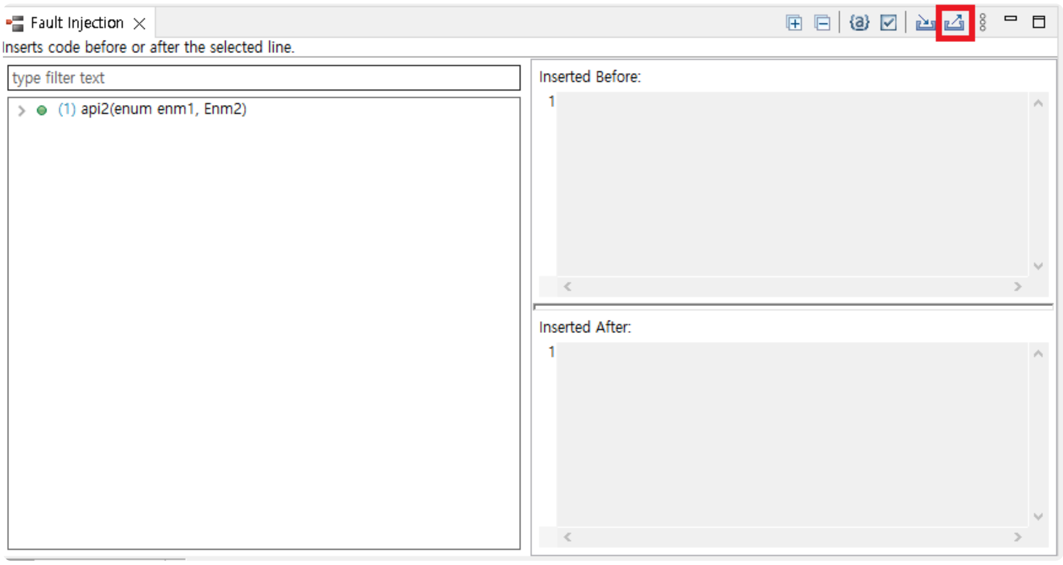
Pull-down menu

Menu	Description
Reconfiguring Fault Injection	Note the Reconfiguring Fault Injection

✻ When modifying the source code, contents of the fault injection may not be properly reflected. In case of modification, contents of the fault injection must be rewritten.

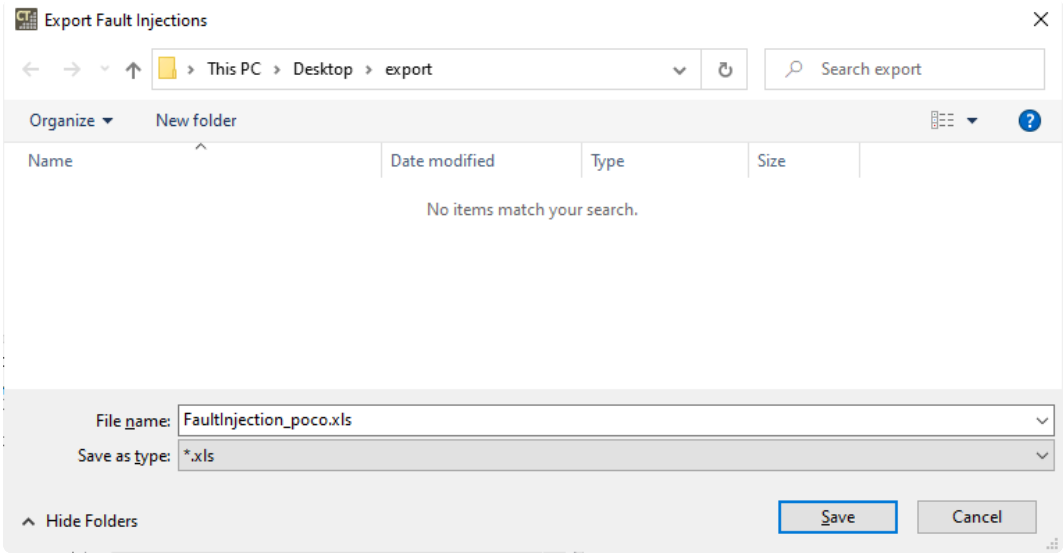
Export Fault Injections

1. Select the [Export Fault Injections] icon from the toolbar menu.



Inserts code before or after the selected line.

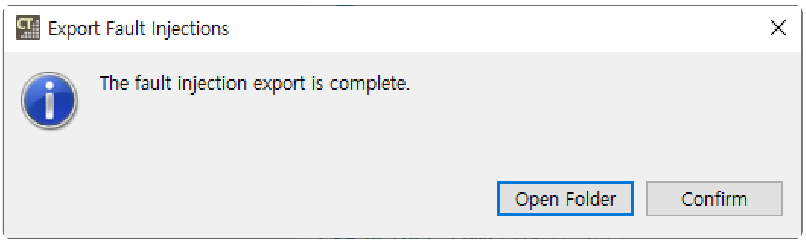
2. In the directory dialog, specify the save location for the fault injection file (.xls) and then select the [Save] button.



File name: FaultInjection_poco.xls

Save as type: *.xls

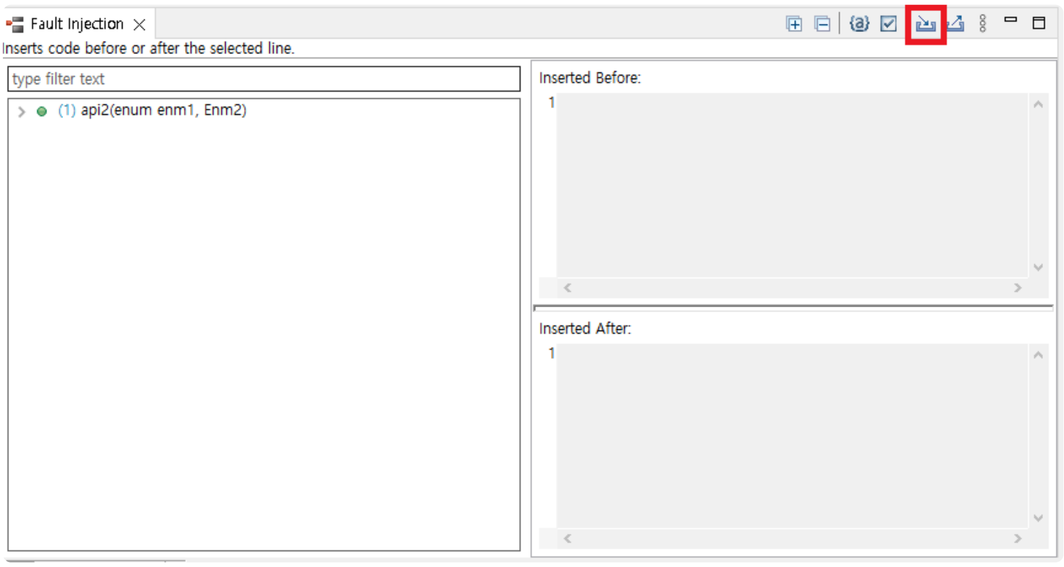
3. If the export is successful, you can go directly to that path location.



The fault injection export is complete.

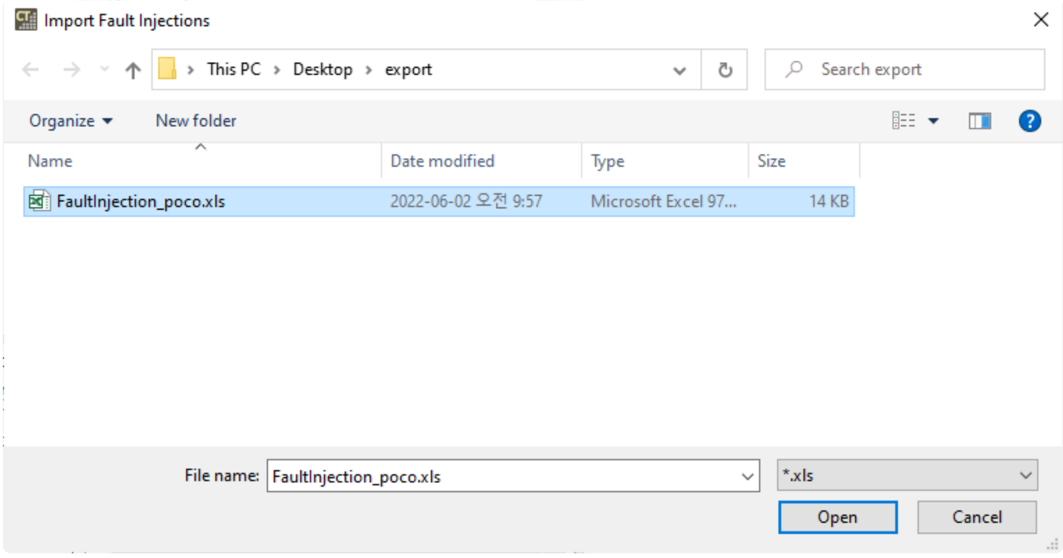
Import Fault Injections

1. Select the [Import Fault Injections] icon from the toolbar menu.



Inserts code before or after the selected line.

2. Select the fault injection file to import.



Import Fault Injections

This PC › Desktop › export

Search export

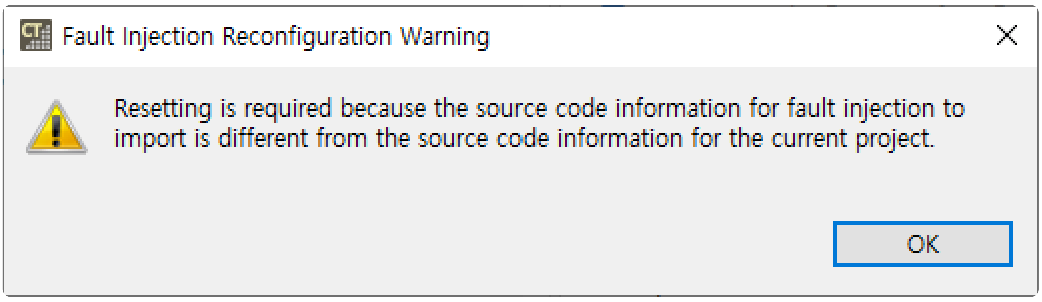
Organize ▾ New folder

Name	Date modified	Type	Size
FaultInjection_poco.xls	2022-06-02 오전 9:57	Microsoft Excel 97...	14 KB

File name: FaultInjection_poco.xls

*.xls

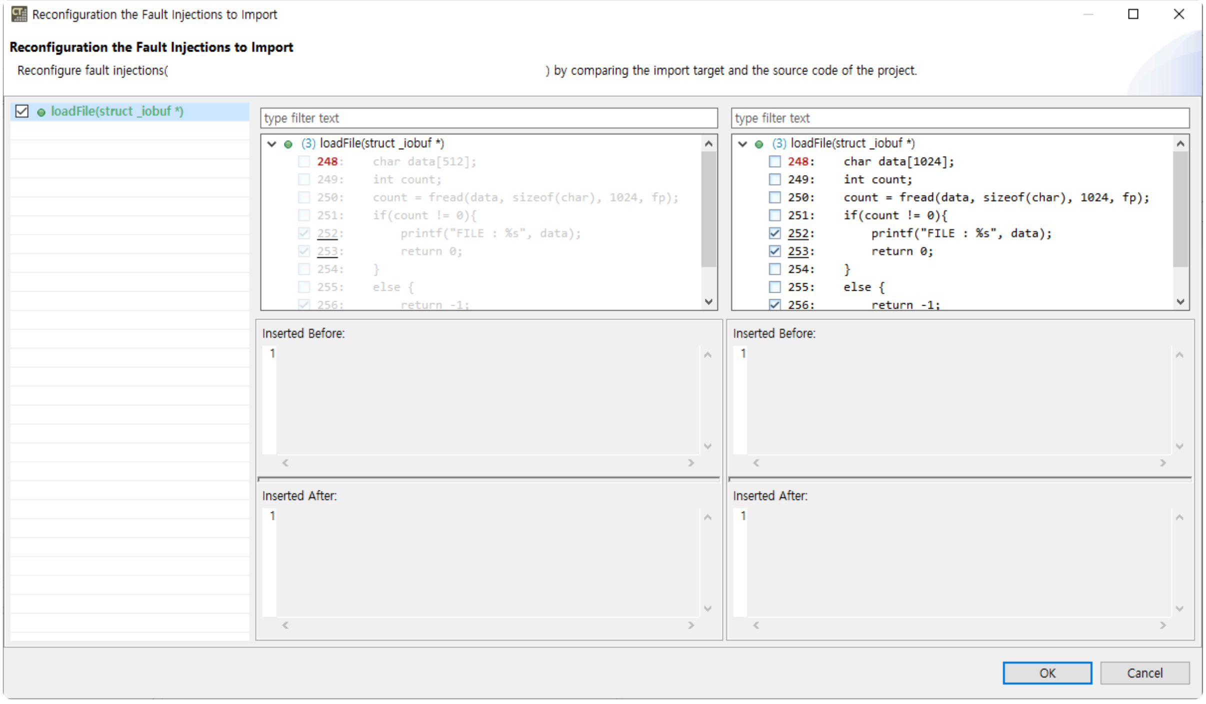
3. If the source code of the fault injection information you want to import is different from the source code of the CT 2023.12 project, fault injection can be reused to match the changed source code using [Reconfiguration the fault injection to import] feature.
   a. If the source code shape is different when performing defect injection import, the following dialog will appear.



Fault Injection Reconfiguration Warning

Resetting is required because the source code information for fault injection to import is different from the source code information for the current project.

   b. You can reconfigure the import of fault injection by clicking the [OK] button.



Reconfiguration the Fault Injections to Import

Reconfiguration the Fault Injections to Import

Reconfigure fault injections( ) by comparing the import target and the source code of the project.

☑ ● loadFile(struct _iobuf *)

type filter text

```
● (3) loadFile(struct _iobuf *)
  □ 248:  char data[512];
  □ 249:  int count;
  □ 250:  count = fread(data, sizeof(char), 1024, fp);
  □ 251:  if(count != 0){
  ☑ 252:      printf("FILE : %s", data);
  ☑ 253:      return 0;
  □ 254:  }
  □ 255:  else {
  ☑ 256:      return -1;
```

type filter text

```
● (3) loadFile(struct _iobuf *)
  □ 248:  char data[1024];
  □ 249:  int count;
  □ 250:  count = fread(data, sizeof(char), 1024, fp);
  □ 251:  if(count != 0){
  ☑ 252:      printf("FILE : %s", data);
  ☑ 253:      return 0;
  □ 254:  }
  □ 255:  else {
  ☑ 256:      return -1;
```

Inserted Before:

1

Inserted After:

1

Inserted Before:

1

Inserted After:

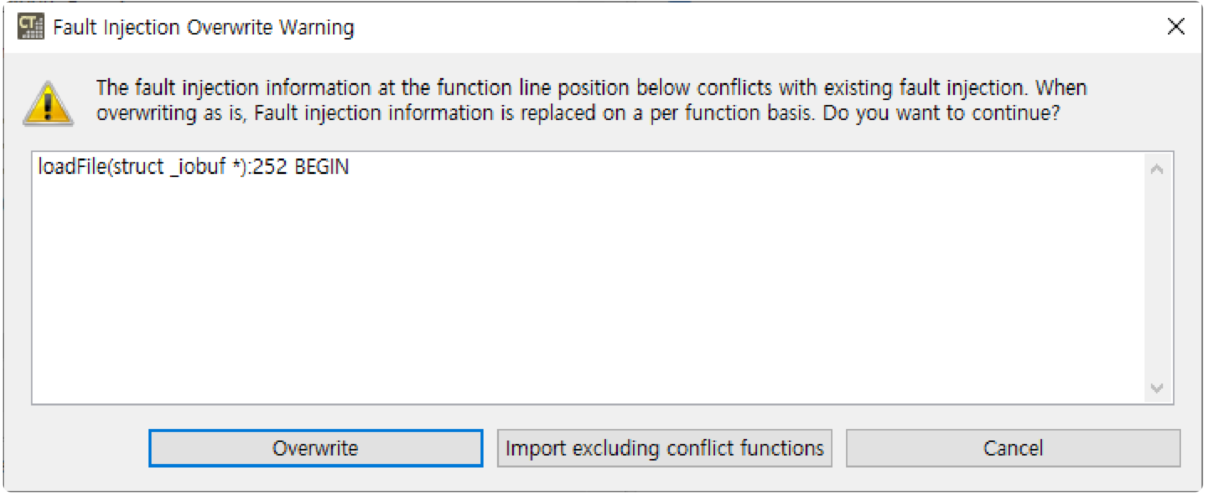
1

- On the left, the source code of the fault injection information you want to import is displayed.
- On the right, the source code of the current project is displayed.

c. If you click the [OK] button in the [Reconfiguration the Fault Injections to Import] window, you can import the reconfigured fault injection information.

✻ If the file and function information of the fault injection information you want to import are different from the project, reconfigure the function is performed first.

4. If you have fault injections already created in the same location as the fault injection information you want to import into your project, you need to decide whether to overwrite the fault injection.
   a. When importing fault injection, if there is fault injection information in the existing location, the following dialog will appear.



Fault Injection Overwrite Warning

The fault injection information at the function line position below conflicts with existing fault injection. When overwriting as is, Fault injection information is replaced on a per function basis. Do you want to continue?

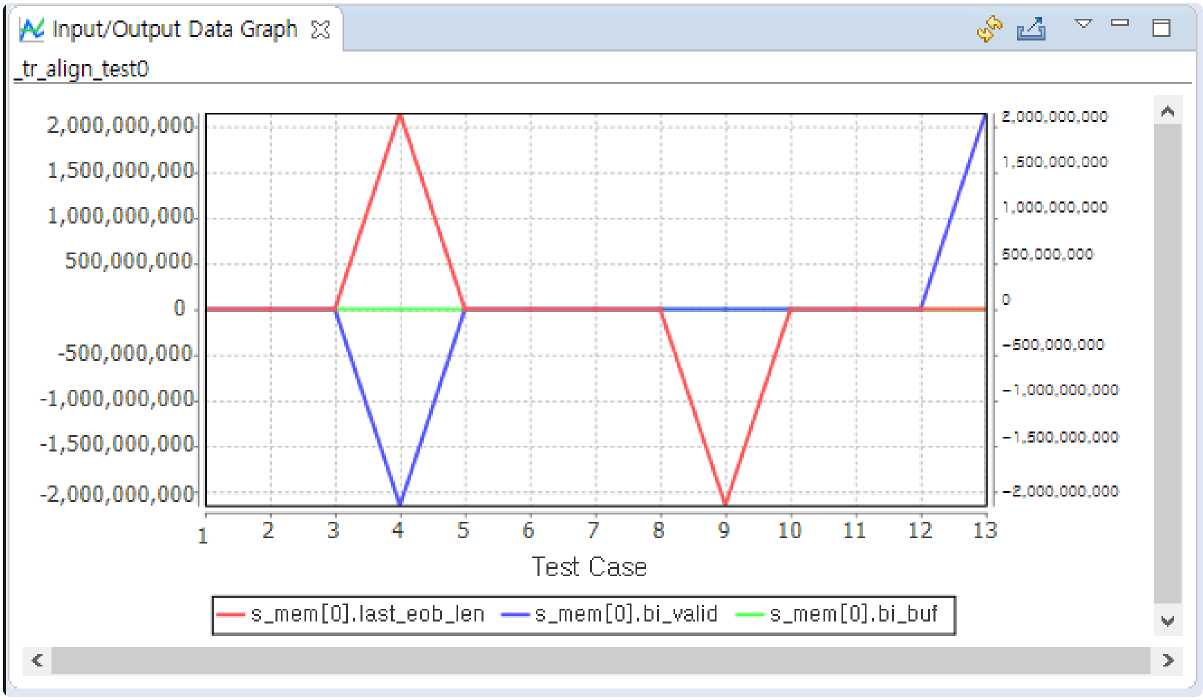
```
loadFile(struct _iobuf *):252 BEGIN
```

- The [Fault Injection Overwrite Warning] dialog shows the function, line, and location of the fault injection that does not match the existing information.
- If you select [Overwrite], the existing fault injection information will be overwritten with the fault injection information you want to import.
- If [Import excluding conflict functions] is selected, only fault injection information for functions except for conflict functions is imported.
- Clicking the [Cancel] button cancels the import of fault injections.

✻ Before Controller Tester 3.7, only lines with fault injection code are imported as enabled, as the exported fault injection file did not include enabled or disabled.

17.14. Input/output Data Graph View

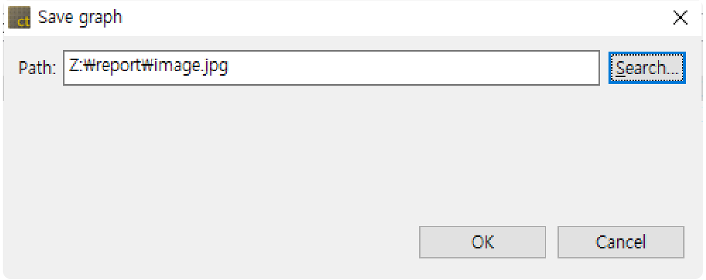
The CT 2023.12 provides the data for input value/expected value/output value in graph format.
The horizontal axis of the graph indicates the number of the test case and the vertical axis indicates the data of the test case.



Toolbar icon in Input/output Data Graph view

Toolbar icon	Description
Refresh	Refreshes the input/output data.
Save graph	Saves the input/output data.

Click [Save graph] to display the notification window that can enter the path for saving the graph. Enter the path to save, the file name and the file format and click [OK] to save the graph.

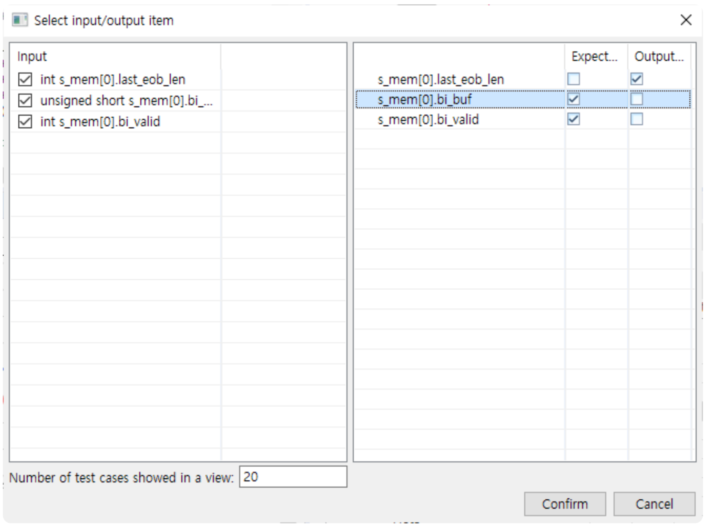

Save graph

Path: Z:₩report₩image.jpg

Graph settings

Select [Select input/output item] in the pull-down menu to display the Graph settings window.

- For the items selected in the checkbox, the [Input], [Output value] and [Expected value] are displayed in the Input/output Data Graph. However, if the expected values are specified as ~, &, | and ! etc., the expected value is not applied to the Input/output Data Graph view.
- [Number of test cases showed in a view] allows you to specify the number of test cases to be displayed on one screen.



Input
☑ int s_mem[0].last_eob_len
☑ unsigned short s_mem[0].bi_...
☑ int s_mem[0].bi_valid

	Expect...	Output...
s_mem[0].last_eob_len	□	☑
s_mem[0].bi_buf	☑	□
s_mem[0].bi_valid	☑	□

Number of test cases showed in a view: 20

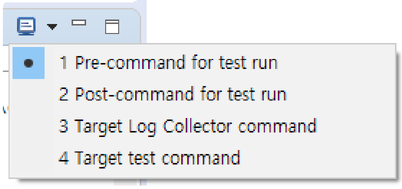
17.15. Console View

Enter the instruction or batch file in [Pre-command for test run] and [Post-command for test run] of [Project] -> [Properties] -> [Test] -> [External Command] and execute the unit test to display the execution result for the external instructions before and after the test execution in the [Console] view.

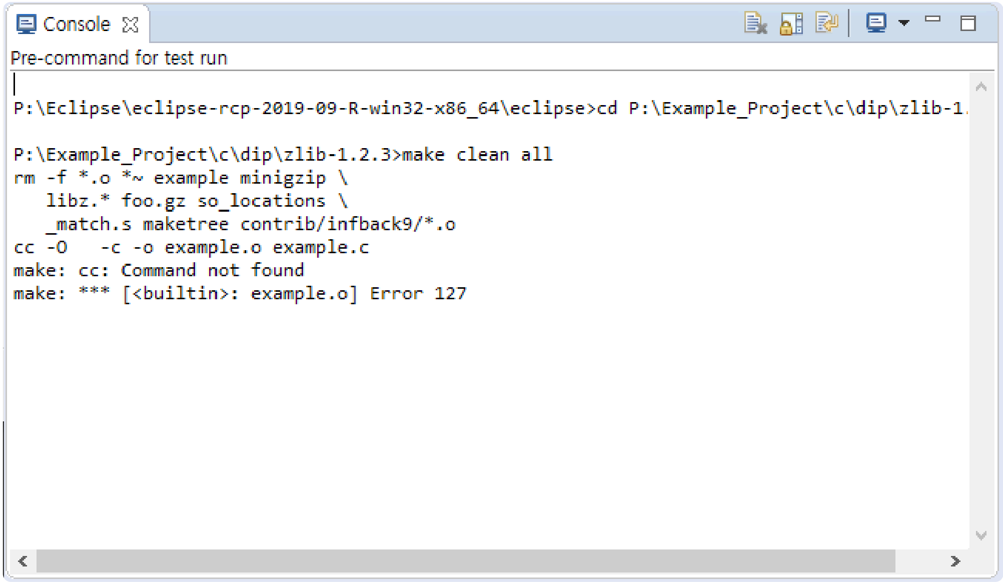
Toolbar icon in the [Console] view

Toolbar icon	Description
Clear Console	Clears the console contents.
Scroll Lock	Locks the scrolling of the [Console] view screen.
Display Selected Console	Shows the selected console.

If [Display Selected Console] is selected, the following two menus are displayed: [Pre-command for test run] and [Post-command for test run].


● 1 Pre-command for test run
2 Post-command for test run
3 Target Log Collector command
4 Target test command

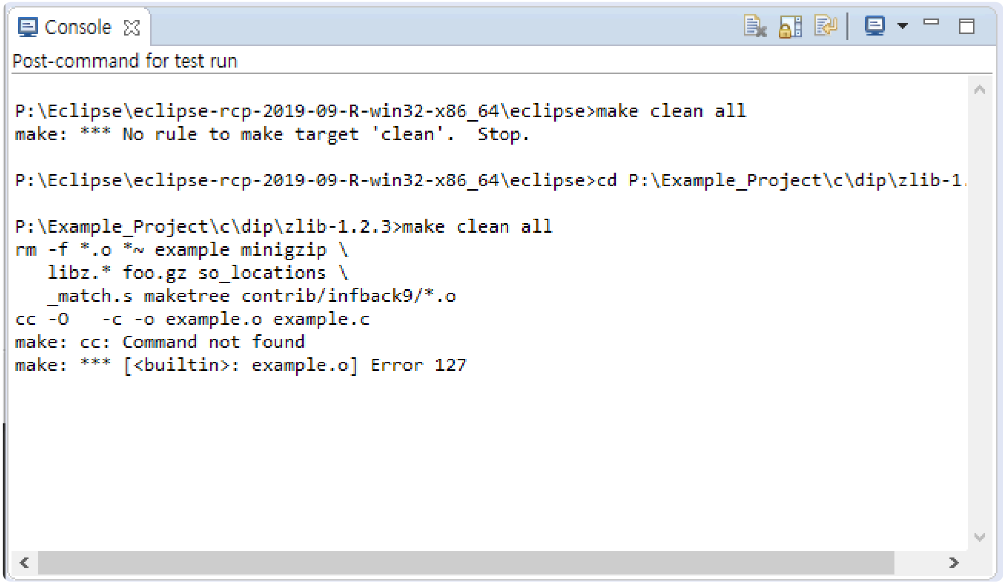
If you select [Pre-command for test run], the execution result for the external command before running the test is displayed in the Console view.



Pre-command for test run

```
P:\Eclipse\eclipse-rcp-2019-09-R-win32-x86_64\eclipse>cd P:\Example_Project\c\dip\zlib-1.

P:\Example_Project\c\dip\zlib-1.2.3>make clean all
rm -f *.o *~ example minigzip \
   libz.* foo.gz so_locations \
   _match.s maketree contrib/infback9/*.o
cc -O   -c -o example.o example.c
make: cc: Command not found
make: *** [<builtin>: example.o] Error 127
```

If you select [Post-command for test run], the execution result for the external instructions after the test execution is displayed in the Console view.

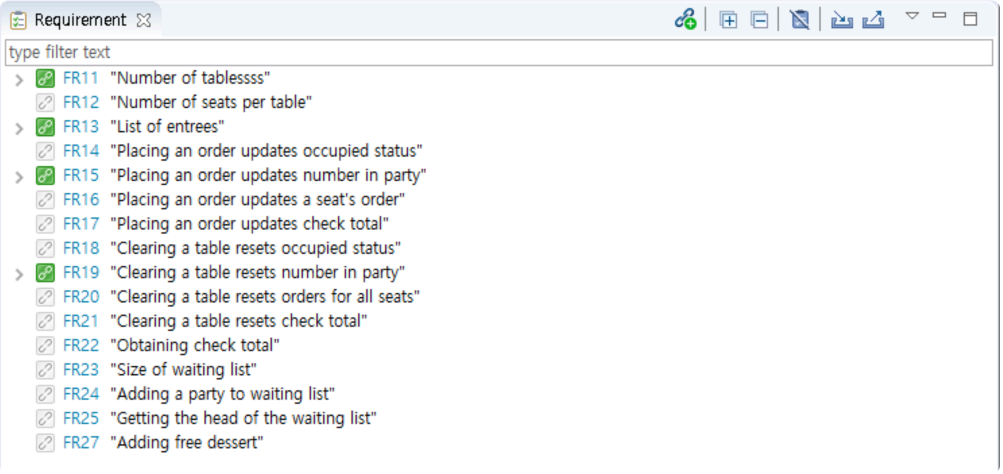


Post-command for test run

```
P:\Eclipse\eclipse-rcp-2019-09-R-win32-x86_64\eclipse>make clean all
make: *** No rule to make target 'clean'.  Stop.

P:\Eclipse\eclipse-rcp-2019-09-R-win32-x86_64\eclipse>cd P:\Example_Project\c\dip\zlib-1.

P:\Example_Project\c\dip\zlib-1.2.3>make clean all
rm -f *.o *~ example minigzip \
   libz.* foo.gz so_locations \
   _match.s maketree contrib/infback9/*.o
cc -O   -c -o example.o example.c
make: cc: Command not found
make: *** [<builtin>: example.o] Error 127
```

17.16. Requirement View

You can import requirements from a requirements management tool or a CSV file into CT 2023.12. You can connect imported requirements with tests and export the connected information.



Requirement

type filter text

FR11 "Number of tablessss"
FR12 "Number of seats per table"
FR13 "List of entrees"
FR14 "Placing an order updates occupied status"
FR15 "Placing an order updates number in party"
FR16 "Placing an order updates a seat's order"
FR17 "Placing an order updates check total"
FR18 "Clearing a table resets occupied status"
FR19 "Clearing a table resets number in party"
FR20 "Clearing a table resets orders for all seats"
FR21 "Clearing a table resets check total"
FR22 "Obtaining check total"
FR23 "Size of waiting list"
FR24 "Adding a party to waiting list"
FR25 "Getting the head of the waiting list"
FR27 "Adding free dessert"

Requirement status

Status	Description
Not connected	A requirement without connected tests
Connected	A requirement with connected tests
Needs Review	A requirement that need to be reviewed

Toolbar Menu in Requirement View

Icon	Description
Connect requirements and tests	Open the [Connect requirements and tests] dialog box.
Expand All	Expand all requirements
Collapse All	Collapse all requirements
Hide unconnected requirements	Hide unconnected requirements.
Import	Importing requirements created with a CSV file or a requirements management tool.
Export	Export requirements to a requirements test coverage report or requirements management tool.

For more information, please refer to the pages Export, Import.

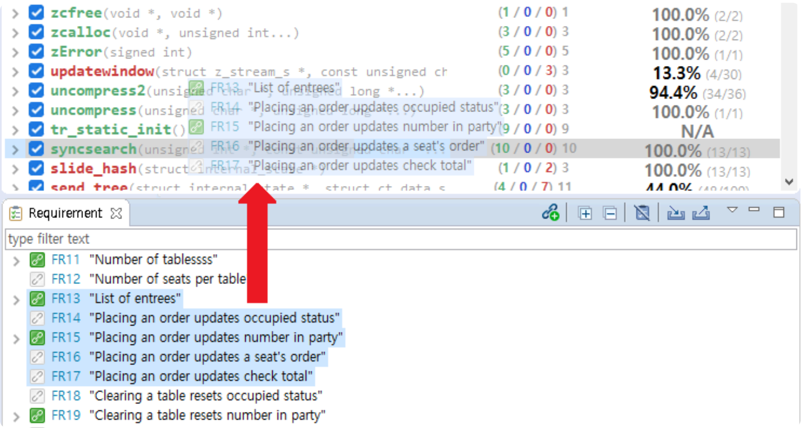
pull-down menu in Requirement View

Icon	Description
Export requirements traceability (csv)…	Exporting connection information between requirements and tests.
Export requirements traceability [Including all test cases] (csv)…	Export connection information between requirements and tests, including all test cases.
Import requirements traceability	Importing connection information between requirements and tests.
Export Requirements Traceability Information for V-SPICE	Export connection information between requirements and tests in V-SPICE's xml file format.

Connect tests and requirements

Requirements can be connect to test/test case/integration test.

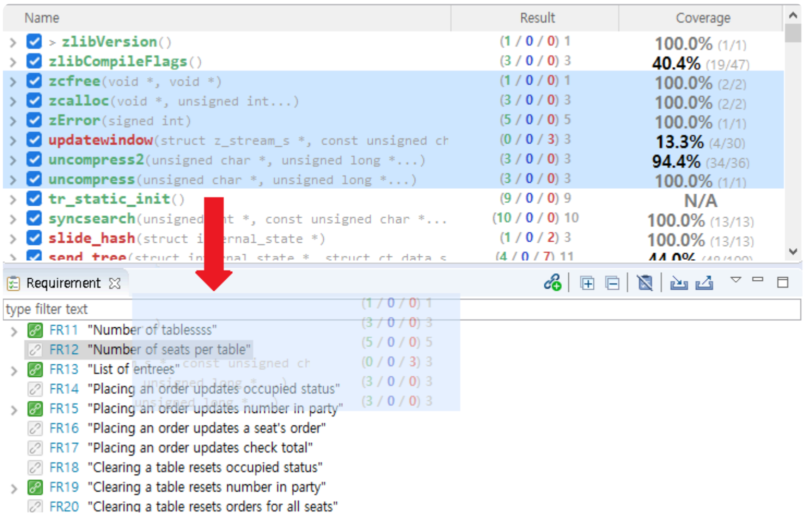
- Drag a requirement from the Requirements View and drop it on the target you want to connect to in the Test View.



```
> ☑ zcfree(void *, void *)                          (1 / 0 / 0) 1    100.0% (2/2)
> ☑ zcalloc(void *, unsigned int...)                (3 / 0 / 0) 3    100.0% (2/2)
> ☑ zError(signed int)                              (5 / 0 / 0) 5    100.0% (1/1)
> ☑ updatewindow(struct z_stream_s *, const unsigned ch  (0 / 0 / 3) 3    13.3% (4/30)
> ☑ uncompress2(unsig   FR13 "List of entrees"   long *...)   (3 / 0 / 0) 3    94.4% (34/36)
> ☑ uncompress(unsign   FR14 "Placing an order updates occupied status"   (3 / 0 / 0) 3    100.0% (1/1)
> ☑ tr_static_init()    FR15 "Placing an order updates number in party"   (9 / 0 / 0) 9    N/A
> ☑ syncsearch(unsign   FR16 "Placing an order updates a seat's order"   (10 / 0 / 0) 10    100.0% (13/13)
> ☑ slide_hash(struct   FR17 "Placing an order updates check total"   (1 / 0 / 2) 3    100.0% (13/13)
> ☑ send_tree(struct internal_state *, struct ct_data_s   (4 / 0 / 7) 11    44.0% (48/109)
```

```
> FR11 "Number of tablessss"
  FR12 "Number of seats per table
> FR13 "List of entrees"
  FR14 "Placing an order updates occupied status"
> FR15 "Placing an order updates number in party"
  FR16 "Placing an order updates a seat's order"
  FR17 "Placing an order updates check total"
  FR18 "Clearing a table resets occupied status"
> FR19 "Clearing a table resets number in party"
```

- Drag an item from the test view and drop it on the target you want to connect to in the Requirements View.

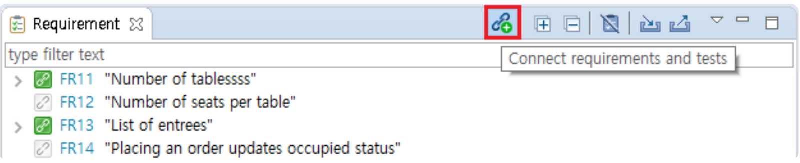


Name	Result	Coverage
> zlibVersion()	(1 / 0 / 0) 1	100.0% (1/1)
zlibCompileFlags()	(3 / 0 / 0) 3	40.4% (19/47)
zcfree(void *, void *)	(1 / 0 / 0) 1	100.0% (2/2)
zcalloc(void *, unsigned int...)	(3 / 0 / 0) 3	100.0% (2/2)
zError(signed int)	(5 / 0 / 0) 5	100.0% (1/1)
updatewindow(struct z_stream_s *, const unsigned ch	(0 / 0 / 3) 3	13.3% (4/30)
uncompress2(unsigned char *, unsigned long *...)	(3 / 0 / 0) 3	94.4% (34/36)
uncompress(unsigned char *, unsigned long *...)	(3 / 0 / 0) 3	100.0% (1/1)
tr_static_init()	(9 / 0 / 0) 9	N/A
syncsearch(unsigned int *, const unsigned char *...	(10 / 0 / 0) 10	100.0% (13/13)
slide_hash(struct internal_state *)	(1 / 0 / 2) 3	100.0% (13/13)
send_tree(struct internal_state *, struct ct_data_s	(4 / 0 / 7) 11	44.0%

type filter text

- FR11 "Number of tablessss"
- FR12 "Number of seats per table"
- FR13 "List of entrees"
- FR14 "Placing an order updates occupied status"
- FR15 "Placing an order updates number in party"
- FR16 "Placing an order updates a seat's order"
- FR17 "Placing an order updates check total"
- FR18 "Clearing a table resets occupied status"
- FR19 "Clearing a table resets number in party"
- FR20 "Clearing a table resets orders for all seats"

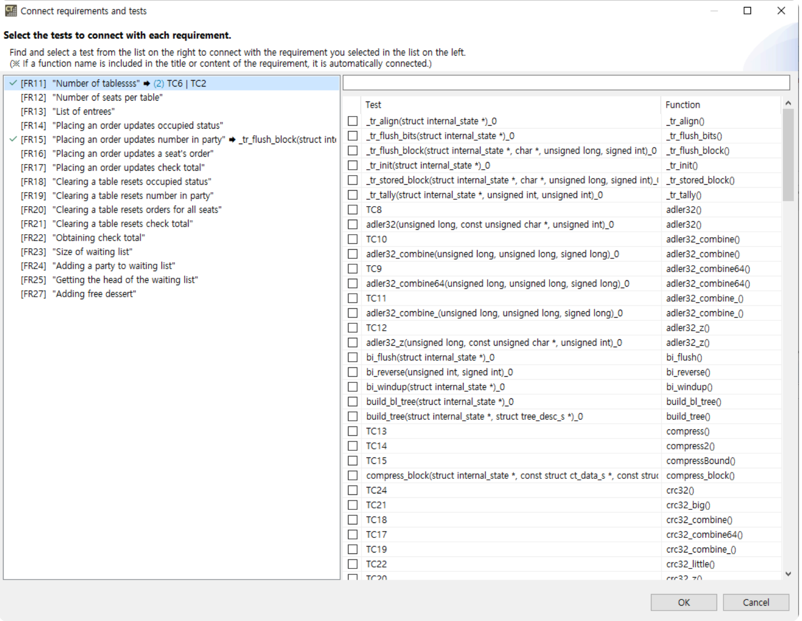
- Connecting via the Connect requirements and tests dialog
  1. Select [Connect requirements and tests] from the toolbar menu.



type filter text

- FR11 "Number of tablessss"
- FR12 "Number of seats per table"
- FR13 "List of entrees"
- FR14 "Placing an order updates occupied status"

  2. You can connect requirements and tests through the [Connect requirements and tests] dialog.



Connect requirements and tests

Select the tests to connect with each requirement.

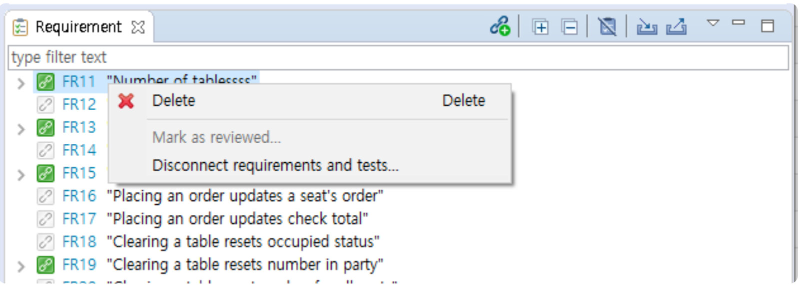
Find and select a test from the list on the right to connect with the requirement you selected in the list on the left.
(※ If a function name is included in the title or content of the requirement, it is automatically connected.)

- ✓ [FR11] "Number of tablessss" ➡ (2) TC6 | TC2
- [FR12] "Number of seats per table"
- [FR13] "List of entrees"
- [FR14] "Placing an order updates occupied status"
- ✓ [FR15] "Placing an order updates number in party" ➡ _tr_flush_block(struct int
- [FR16] "Placing an order updates a seat's order"
- [FR17] "Placing an order updates check total"
- [FR18] "Clearing a table resets occupied status"
- [FR19] "Clearing a table resets number in party"
- [FR20] "Clearing a table resets orders for all seats"
- [FR21] "Clearing a table resets check total"
- [FR22] "Obtaining check total"
- [FR23] "Size of waiting list"
- [FR24] "Adding a party to waiting list"
- [FR25] "Getting the head of the waiting list"
- [FR27] "Adding free dessert"

	Test	Function
□	_tr_align(struct internal_state *)_0	_tr_align()
□	_tr_flush_bits(struct internal_state *)_0	_tr_flush_bits()
□	_tr_flush_block(struct internal_state *, char *, unsigned long, signed int)_0	_tr_flush_block()
□	_tr_init(struct internal_state *)_0	_tr_init()
□	_tr_stored_block(struct internal_state *, char *, unsigned long, signed int)_(	_tr_stored_block()
□	_tr_tally(struct internal_state *, unsigned int, unsigned int)_0	_tr_tally()
□	TC8	adler32()
□	adler32(unsigned long, const unsigned char *, unsigned int)_0	adler32()
□	TC10	adler32_combine()
□	adler32_combine(unsigned long, unsigned long, signed long)_0	adler32_combine()
□	TC9	adler32_combine64()
□	adler32_combine64(unsigned long, unsigned long, signed long)_0	adler32_combine64()
□	TC11	adler32_combine_()
□	adler32_combine_(unsigned long, unsigned long, signed long)_0	adler32_combine_()
□	TC12	adler32_z()
□	adler32_z(unsigned long, const unsigned char *, unsigned int)_0	adler32_z()
□	bi_flush(struct internal_state *)_0	bi_flush()
□	bi_reverse(unsigned int, signed int)_0	bi_reverse()
□	bi_windup(struct internal_state *)_0	bi_windup()
□	build_bl_tree(struct internal_state *)_0	build_bl_tree()
□	build_tree(struct internal_state *, struct tree_desc_s *)_0	build_tree()
□	TC13	compress()
□	TC14	compress2()
□	TC15	compressBound()
□	compress_block(struct internal_state *, const struct ct_data_s *, const struc	compress_block()
□	TC24	crc32()
□	TC21	crc32_big()
□	TC18	crc32_combine()
□	TC17	crc32_combine64()
□	TC19	crc32_combine_()
□	TC22	crc32_little()
□	TC20	crc32_z()

Disconnect requirements and tests

You can disconnect requirements and tests from the context menu in the Requirements View.

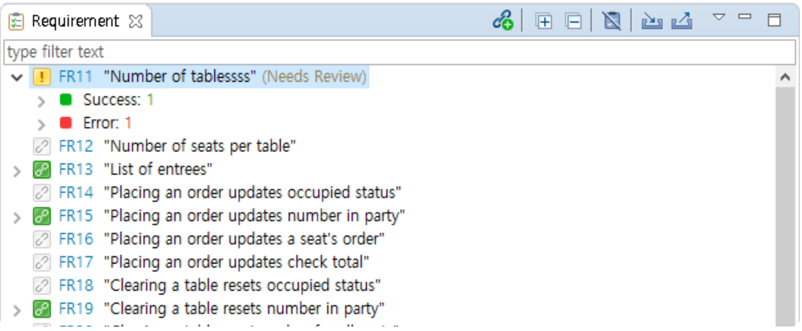


type filter text

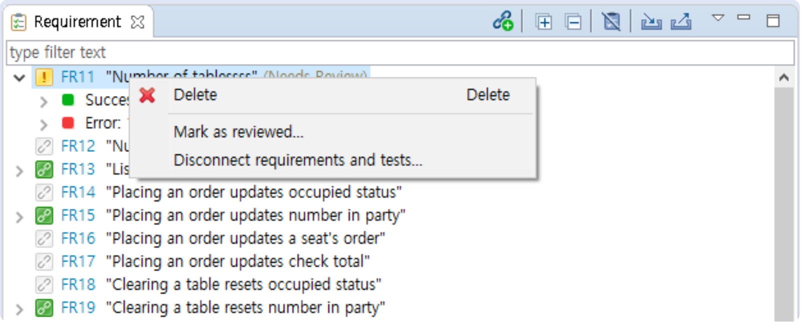
- FR11 "Number of tablessss"
- FR12
- FR13
- FR14
- FR15
- FR16 "Placing an order updates a seat's order"
- FR17 "Placing an order updates check total"
- FR18 "Clearing a table resets occupied status"
- FR19 "Clearing a table resets number in party"

Review of tests connected to requirements

1. When a requirement is re-imported, it will be marked as [Needs Review] if the title or description has changed.

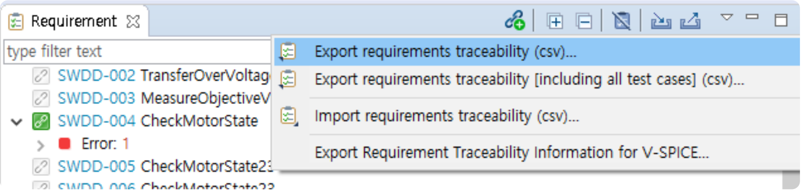

Requirement
type filter text
FR11 "Number of tablessss" (Needs Review)
Success: 1
Error: 1
FR12 "Number of seats per table"
FR13 "List of entrees"
FR14 "Placing an order updates occupied status"
FR15 "Placing an order updates number in party"
FR16 "Placing an order updates a seat's order"
FR17 "Placing an order updates check total"
FR18 "Clearing a table resets occupied status"
FR19 "Clearing a table resets number in party"

2. After reviewing the requirements and connected tests that need to be reviewed, you can mark them as reviewed with the context menu.


Requirement
type filter text
FR11 "Number of tablessss" (Needs Review)
Success
Error:
FR12 "Nu
FR13 "Lis
Delete Delete
Mark as reviewed...
Disconnect requirements and tests...
FR14 "Placing an order updates occupied status"
FR15 "Placing an order updates number in party"
FR16 "Placing an order updates a seat's order"
FR17 "Placing an order updates check total"
FR18 "Clearing a table resets occupied status"
FR19 "Clearing a table resets number in party"

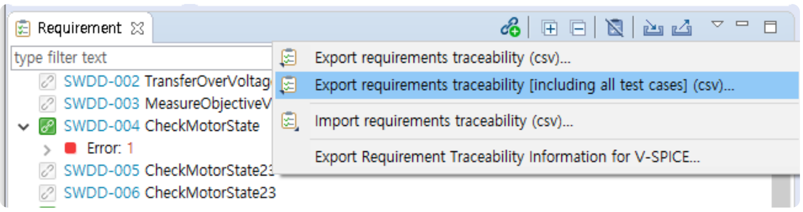
Export requirements traceability

You can export the connection information between requirements and tests to a CSV file.


Requirement
type filter text
SWDD-002 TransferOverVoltag
SWDD-003 MeasureObjectiveV
SWDD-004 CheckMotorState
Error: 1
SWDD-005 CheckMotorState23
Export requirements traceability (csv)...
Export requirements traceability [including all test cases] (csv)...
Import requirements traceability (csv)...
Export Requirement Traceability Information for V-SPICE...

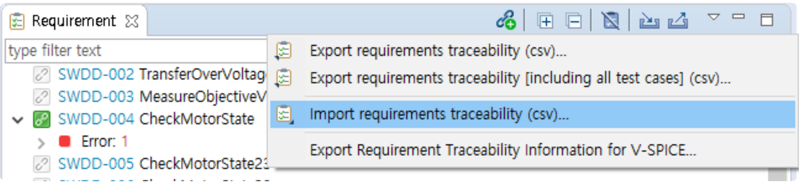
Export requirements traceability [Including all test case]

You can export the connection information between requirements and tests to a CSV file, including all test cases.


Requirement
type filter text
SWDD-002 TransferOverVoltag
SWDD-003 MeasureObjectiveV
SWDD-004 CheckMotorState
Error: 1
SWDD-005 CheckMotorState23
SWDD-006 CheckMotorState23
Export requirements traceability (csv)...
Export requirements traceability [including all test cases] (csv)...
Import requirements traceability (csv)...
Export Requirement Traceability Information for V-SPICE...

Import requirements traceability

After entering traceability information in the CSV file created by [Export requirements traceability], you can import it through the [Import requirements traceability] menu.


Requirement
type filter text
SWDD-002 TransferOverVoltag
SWDD-003 MeasureObjectiveV
SWDD-004 CheckMotorState
Error: 1
SWDD-005 CheckMotorState23
Export requirements traceability (csv)...
Export requirements traceability [including all test cases] (csv)...
Import requirements traceability (csv)...
Export Requirement Traceability Information for V-SPICE...

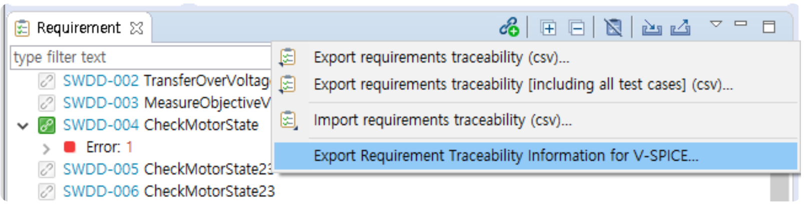
- Requirements traceability file description

Row	Description
TEST_TYPE	Test: 0 Integration Test: 1 Test Case: 2
TEST_NAME	Integration Test: Name Test or Test case: a unique name for the test
TESTCASE_NO	Test case: number Non Test case: 0
REQ_KEY	The key of the requirement to be connected or connected to the test
TEST_ID	Integration Test: Name Test: The name displayed in the test view Test case: The name displayed next to the number in the test view

> ✻ The unique name of the test can be found by selecting ‘Show as Unique Test Name’ from the toolbar menu of the test view or by searching.

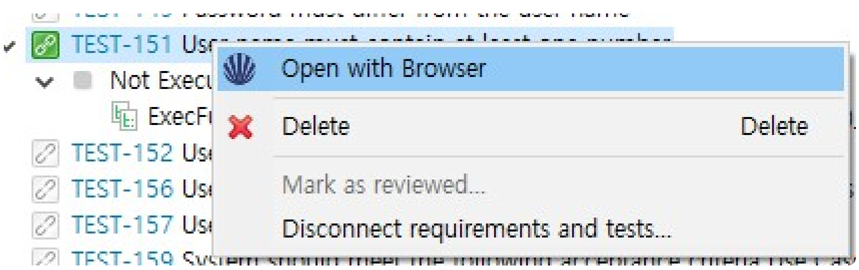
Export requirement traceability information for V-SPICE

Connection information between requirements and tests can be exported to an xml file conforming to the V-SPICE format.


Requirement
type filter text
SWDD-002 TransferOverVoltag
SWDD-003 MeasureObjectiveV
SWDD-004 CheckMotorState
Error: 1
SWDD-005 CheckMotorState23
SWDD-006 CheckMotorState23
Export requirements traceability (csv)...
Export requirements traceability [including all test cases] (csv)...
Import requirements traceability (csv)...
Export Requirement Traceability Information for V-SPICE...

Open in Requirements Management Tool

Requirements imported from the requirements management tool or tests exported to the requirements management tool can be viewed in the requirements management tool through the [Open with Browser] context menu.



18. Analysis Perspective

The Analysis Perspective provides a UI for analysis information that can be confirmed from the test results.

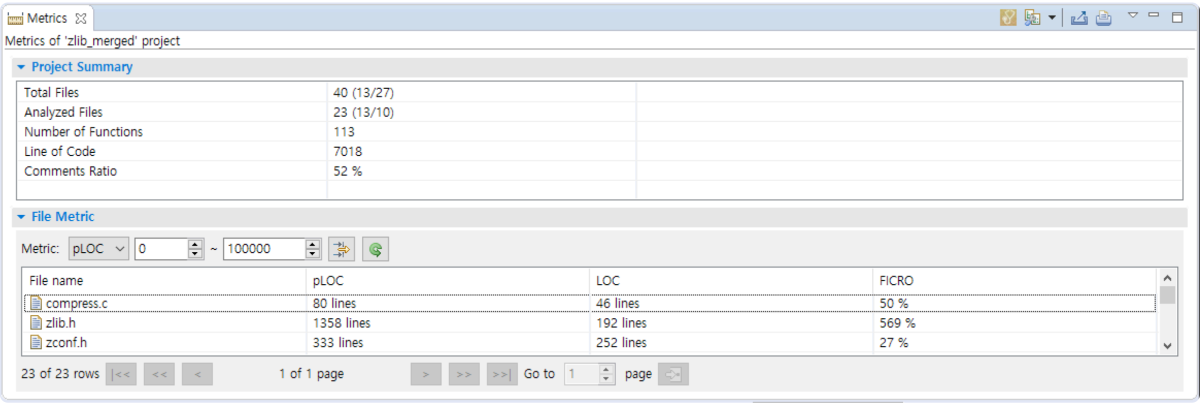
The components that make up the analysis perspective are:

- Metrics View
- Metrics Chart View
- Metrics Top Chart View
- Metrics Bar Chart View
- Metrics Diagnosis Chart View
- Unused Function View
- Source-Header Relation View
- Global Variable Relation View
- Function Call Hierarchy View
- Source Code Editor section

Views that are not included by default can be opened from [Window]> [Show View]> [Other…] on the top menu.

18.1. Metrics View

The Metrics view shows the result that measures the metric for the project. It shows the summary information for the overall metric and the metric information for each items included in the project (module, file, class, function).



Metrics of 'zlib_merged' project

Project Summary

Total Files	40 (13/27)
Analyzed Files	23 (13/10)
Number of Functions	113
Line of Code	7018
Comments Ratio	52 %

File Metric

Metric: pLOC 0 ~ 100000

File name	pLOC	LOC	FICRO
compress.c	80 lines	46 lines	50 %
zlib.h	1358 lines	192 lines	569 %
zconf.h	333 lines	252 lines	27 %

23 of 23 rows 1 of 1 page Go to 1 page

Icons

Icon	Description
▢	Module (a logical portion that divides the project for each function)
🗎	File (Source file and header file belonging to the project)
Ⓒ	Class
●	Function

Toolbar menu

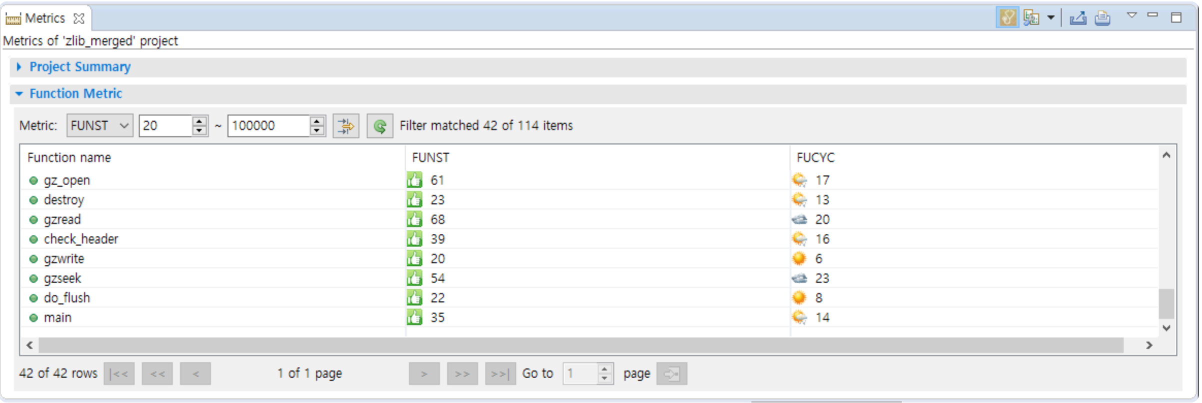
Menu	Description
Show Diagnosis	Displays a diagnostic image of the value in the left of the metric value.
Change Mode	Changes the view mode (module, file, class, function).
Export View Content	Exports the contents of view as a report.
Print View Content	Prints the contents of view.

Pull-down menu

Menu	Description
Sort by	Sorts based on the selected item (even if clicking the column name in the table, it is sorted equally).
Columns	Changes the order and width of the columns (allows you to change the order by dragging

	and dropping the table's column name).
Configure diagnosis	Opens the diagnostics preferences page (allows you to set the diagnostic step and the ranges or images for each metric).
Set to Hide/ Show metric	Sets whether to hide or show the metrics.
Metric View Option	Sets the number of lines per page in the Metric view.

Filtering



Metrics of 'zlib_merged' project

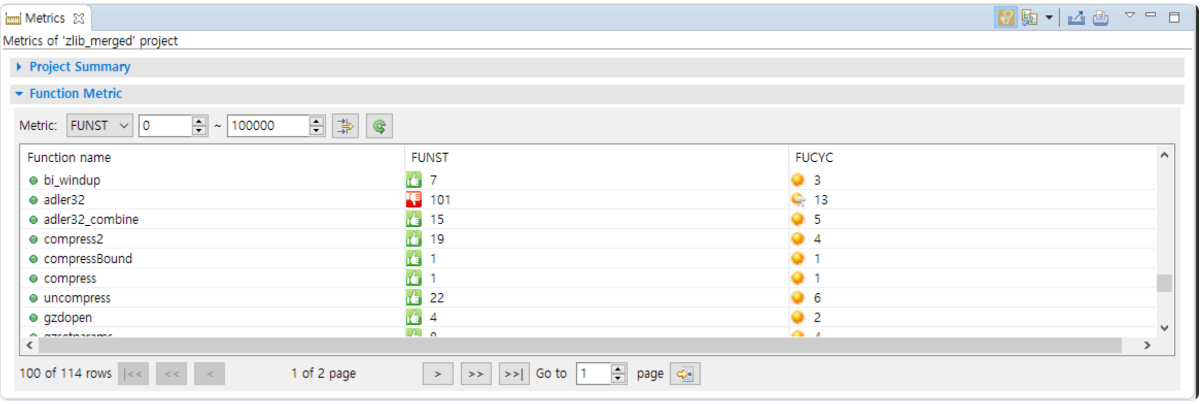
Metric: FUNST 20 ~ 100000 Filter matched 42 of 114 items

Function name	FUNST	FUCYC
gz_open	61	17
destroy	23	13
gzread	68	20
check_header	39	16
gzwrite	20	6
gzseek	54	23
do_flush	22	8
main	35	14

42 of 42 rows 1 of 1 page Go to 1 page

The filtering allows you to view only those items within the desired range for the specific metric.
Select a metric, enter the range value and click [Filtering] button in the right section to see those values corresponding to the entered information.
If you want to return to the status before filtering, click [Initialize the Filtering Criteria] button on the right side of [Filtering] button.

Paging



Metrics of 'zlib_merged' project

Metric: FUNST 0 ~ 100000

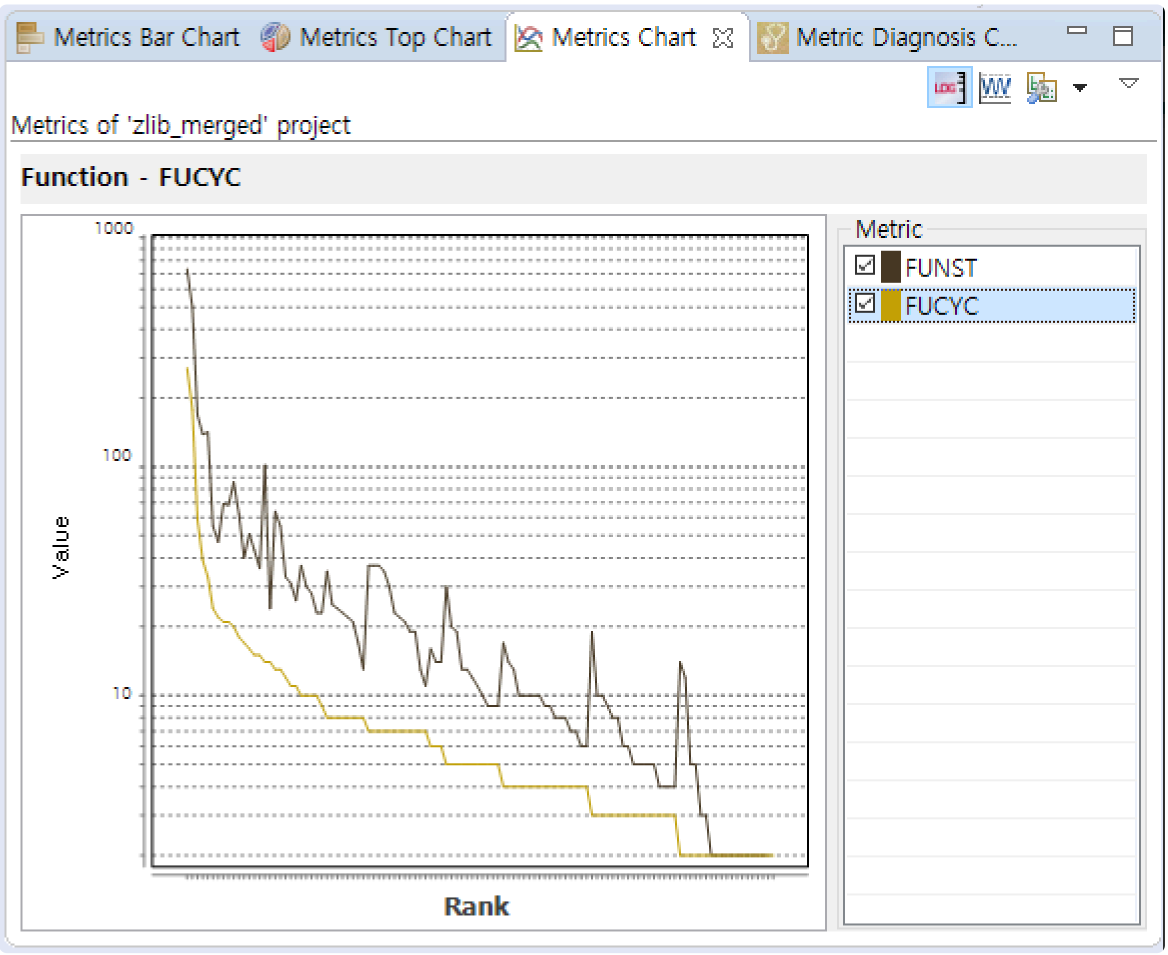
Function name	FUNST	FUCYC
bi_windup	7	3
adler32	101	13
adler32_combine	15	5
compress2	19	4
compressBound	1	1
compress	1	1
uncompress	22	6
gzdopen	4	2

100 of 114 rows 1 of 2 page Go to 1 page

The Paging allows you to view many items conveniently.

18.2. Metrics Chart View

The Metrics Chart shows the metric view in a line chart. The x-axis is each item, and the y-axis is the metric value of the item. You can compare the distribution of values between different metrics each other in the project.



Toolbar menu

Menu	Description
Show Log Scale	Changes the y-axis of chart to log units.
Show Normalized Metric	Shows the standardized metric value.
Change Mode	Changes the view mode (module, file, class, function).

Pull-down menu

Menu	Description
Sort by	Sorts based on the selected item (even if clicking the column name in the table, it is sorted equally).
Set to Hide/Show	Sets whether to hide or show the metrics.

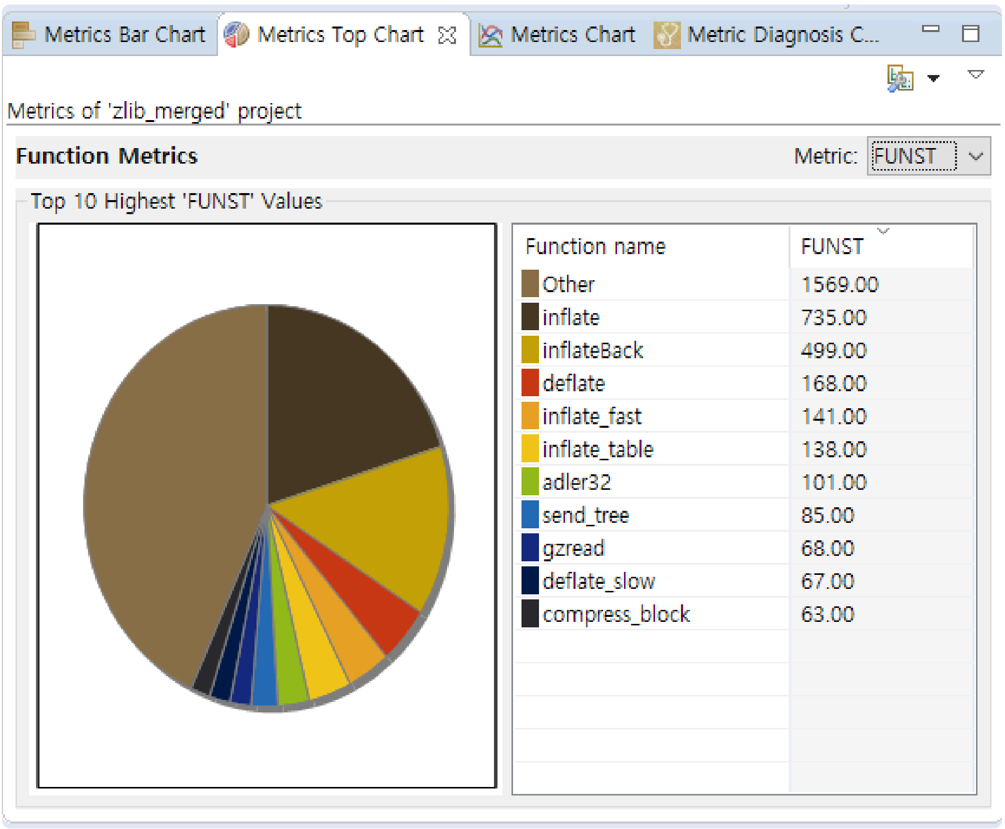
metric	
Metrics View Options	Sets the connection function with Metric view.

Select Metric

If you select the checkbox left to the metric name in the right table, the checked metrics are displayed in the chart. If you click the metric name in the checked metric, the items are sorted based on that metric value.

18.3. Metrics Top Chart View

The Metrics Top Chart view shows the top items of the metric value in a pie chart. You can see the ratio of the top items in the total.



Metrics of 'zlib_merged' project

Function Metrics

Metric: FUNST

Top 10 Highest 'FUNST' Values

Function name	FUNST
🟫 Other	1569.00
🟫 inflate	735.00
🟨 inflateBack	499.00
🟥 deflate	168.00
🟧 inflate_fast	141.00
🟨 inflate_table	138.00
🟩 adler32	101.00
🟦 send_tree	85.00
🟦 gzread	68.00
🟦 deflate_slow	67.00
⬛ compress_block	63.00

Menu	Description
Change Mode	Changes the view mode (module, file, class, function).

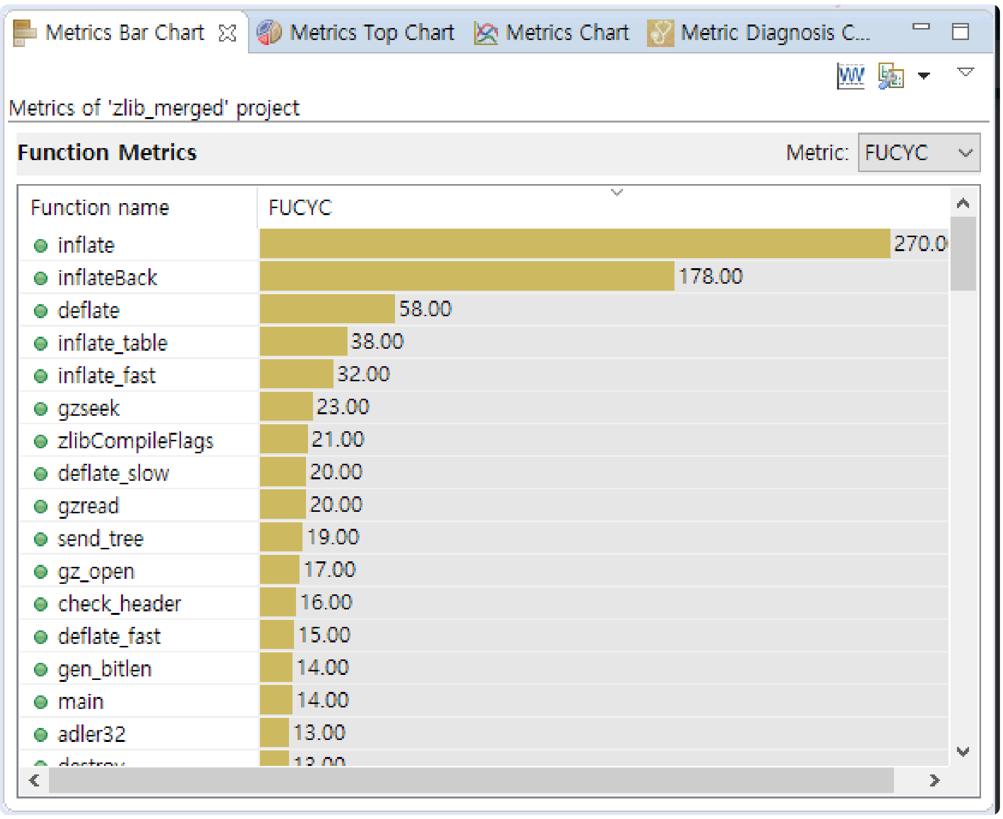
Pull-down menu

Menu	Description
Metrics Hide/Show Setting	Sets whether to hide or show the metrics.
Metrics View Options	Sets the number of top items to be displayed and sets whether to show the sum of the resting items.

The selection of the pie chart and the selected item in the table are connected together.

18.4. Metrics Bar Chart View

The Metrics Bar Chart view shows the metric values in a bar chart. You can check the value size for each item in the bar chart.



Metrics of 'zlib_merged' project

Function Metrics

Metric: FUCYC

Function name	FUCYC
● inflate	270.0
● inflateBack	178.00
● deflate	58.00
● inflate_table	38.00
● inflate_fast	32.00
● gzseek	23.00
● zlibCompileFlags	21.00
● deflate_slow	20.00
● gzread	20.00
● send_tree	19.00
● gz_open	17.00
● check_header	16.00
● deflate_fast	15.00
● gen_bitlen	14.00
● main	14.00
● adler32	13.00
● destroy	13.00

Icons

Icon	Description
▣	Module (a logical portion that divides the project for each function)
🗎	File (Source file and header file belonging to the project)
Ⓒ	Class
●	Function

Toolbar menu

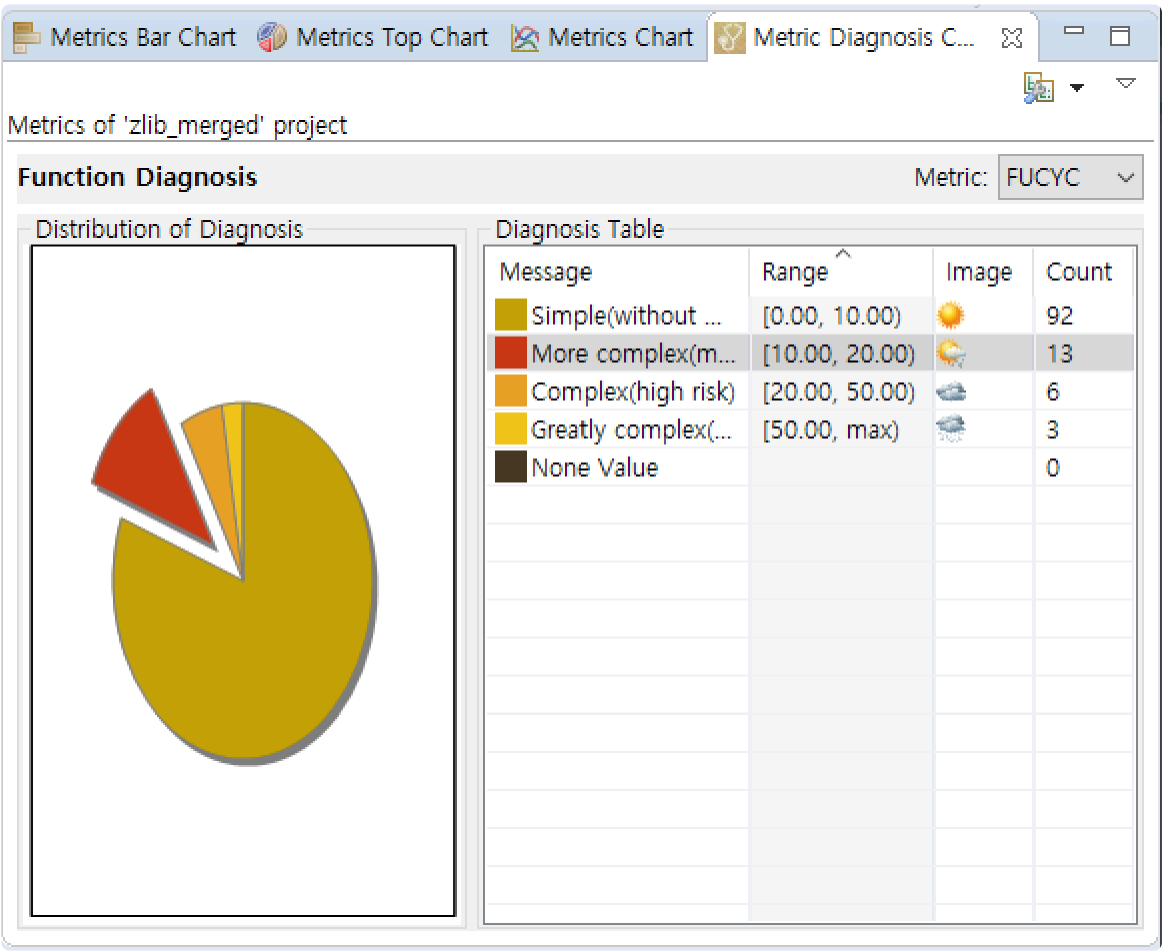
Icon	Description
Show Normalized Metric	Shows the standardized metric value.
Change Mode	Changes the view mode (▣ module, 🗎 file, Ⓒ class, ● function).

Pull-down menu

Icon	Description
Metrics Hide/Show Setting	Sets whether to hide or show the metrics.
Metric View Options	Sets the number of items to be displayed.

18.5. Metrics Diagnosis Chart View

The Metric Diagnosis Chart view shows the number of items included in the diagnostic range in a pie chart. You can check the number of items within each diagnostic range in the project.



Metrics of 'zlib_merged' project

Function Diagnosis Metric: FUCYC

Distribution of Diagnosis

Diagnosis Table

Message	Range	Image	Count
🟨 Simple(without ...	[0.00, 10.00)	☀	92
🟥 More complex(m...	[10.00, 20.00)	⛅	13
🟧 Complex(high risk)	[20.00, 50.00)	☁	6
🟨 Greatly complex(...	[50.00, max)	⛈	3
🟫 None Value			0

Toolbar menu

Menu	Description
Change Mode	Changes the view mode (module, file, class, function).

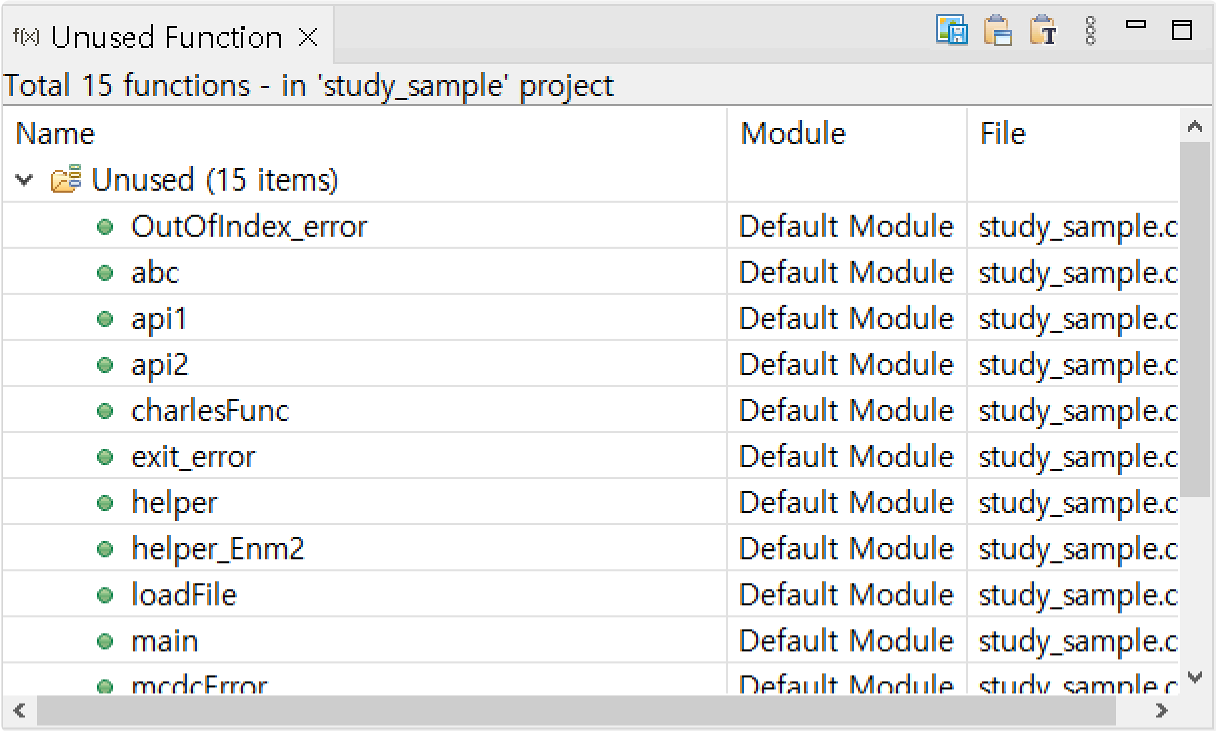
Pull-down menu

Menu	Description
Configure Diagnosis	Opens the diagnostics preferences page (allows you to set the diagnostic step and the ranges or images for each metric).
Metrics Hide/ Show	Sets whether to hide or show the metrics.
Metric View Options	Sets whether to display the items having no diagnostic value.

The selection of the pie chart and the selected item in the table are connected together.

18.6. Unused Function View

The Unused Function view shows the functions included in the selected project by classifying them according to the specified criteria. It shows the currently unused functions and the criteria for classifying can be added.



Total 15 functions - in 'study_sample' project

Name	Module	File
Unused (15 items)		
OutOfIndex_error	Default Module	study_sample.c
abc	Default Module	study_sample.c
api1	Default Module	study_sample.c
api2	Default Module	study_sample.c
charlesFunc	Default Module	study_sample.c
exit_error	Default Module	study_sample.c
helper	Default Module	study_sample.c
helper_Enm2	Default Module	study_sample.c
loadFile	Default Module	study_sample.c
main	Default Module	study_sample.c
mcdcError	Default Module	study_sample.c

Menu	Description
Save as PNG	Save unused function view as image.
Copy to System clipboard	Copy unused function view image to system clipboard.
Copy Text to System clipboard	Copy unused function view content to system clipboard.

Icons

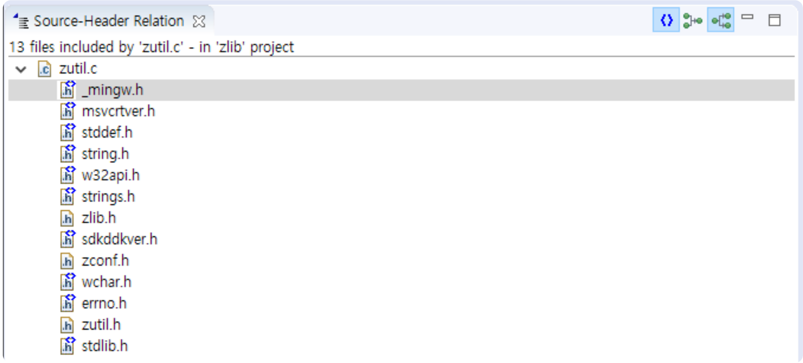
Icon	Description
🗂	Classification criteria
📂	Function group
●	Function

Pull-down menu

Menu	Description
Function View Options	Sets the number of functions to be displayed for each group.

18.7. Source-Header Relation View

Source-Header Relation view shows `<include>` and `#include` relations between the source file and the header file



Source-Header Relation

13 files included by 'zutil.c' - in 'zlib' project

```
zutil.c
    _mingw.h
    msvcrtver.h
    stddef.h
    string.h
    w32api.h
    strings.h
    zlib.h
    sdkddkver.h
    zconf.h
    wchar.h
    errno.h
    zutil.h
    stdlib.h
```

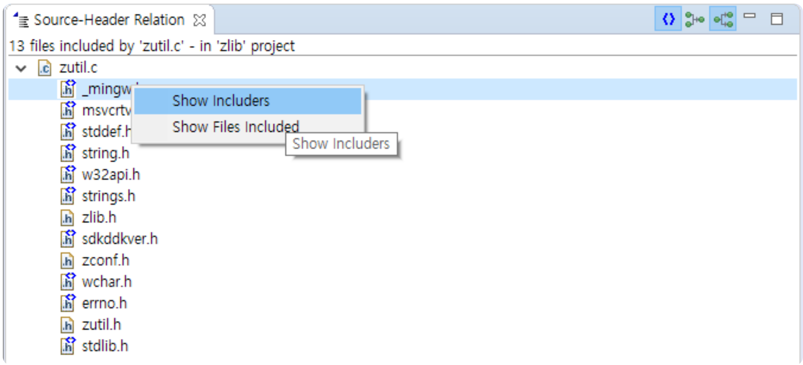
Icons

Icon	Description
.c	Source file
.h	Header file
.h	System header file

Toolbar menu

Menu	Description
Show System Header	Shows the system header.
Show Includers	Shows the files that includes the selected file.
Show Files Included	Shows the file included in the selected file.

Show Includers, Show Files Included
You can display the files that includes the selected file or the files that the selected file is included by using the menu displayed when right-clicking a file in the view.



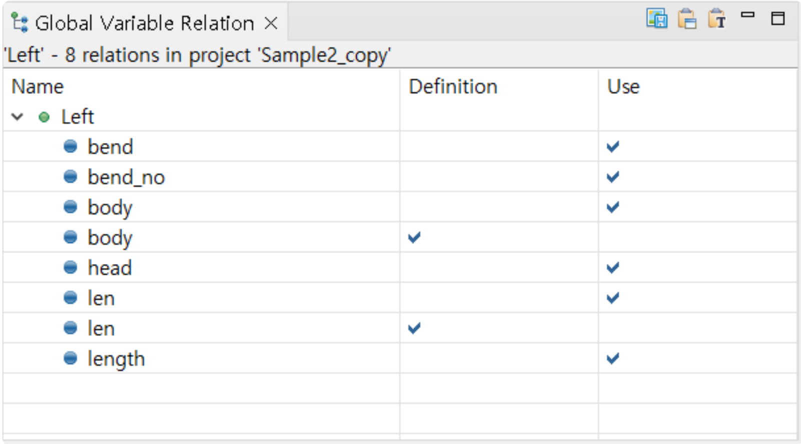
Source-Header Relation

13 files included by 'zutil.c' - in 'zlib' project

```
zutil.c
    _mingw
    msvcrtv
    stddef.h
    string.h
    w32api.h
    strings.h
    zlib.h
    sdkddkver.h
    zconf.h
    wchar.h
    errno.h
    zutil.h
    stdlib.h
```

18.8. Global Variable Relation View

The Global Variable Relation view shows the function where the global variable is defined and used. If a function is selected, it shows the global variables defined or used in the function, and if a global variable is selected, it shows the functions where the global variable is defined or used.



'Left' - 8 relations in project 'Sample2_copy'

Name	Definition	Use
Left		
bend		✓
bend_no		✓
body		✓
body	✓	
head		✓
len		✓
len	✓	
length		✓

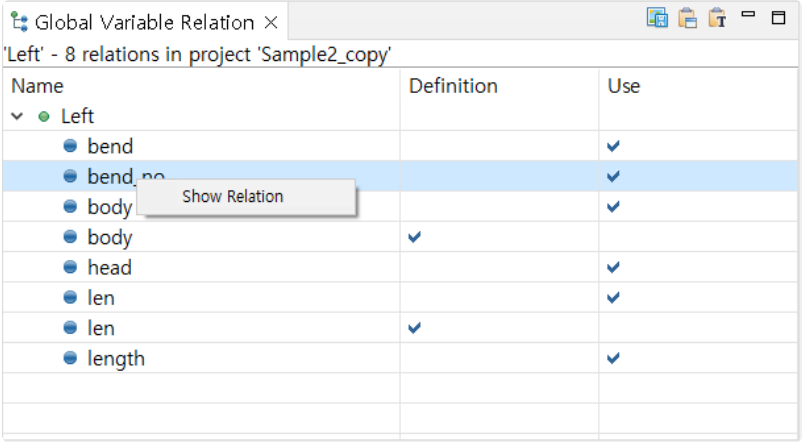
Menu	Description
Save as PNG	Save global variable relation view as image.
Copy to System clipboard	Copy global variable relation view image to system clipboard.
Copy Text to System clipboard	Copy global variable relation view content to system clipboard.

Icons

Icon	Description
●	Function
●	Global Variable

Show Relation

You can view the relation for the selected items again by using the menu displayed when right-clicking the related item in the view.

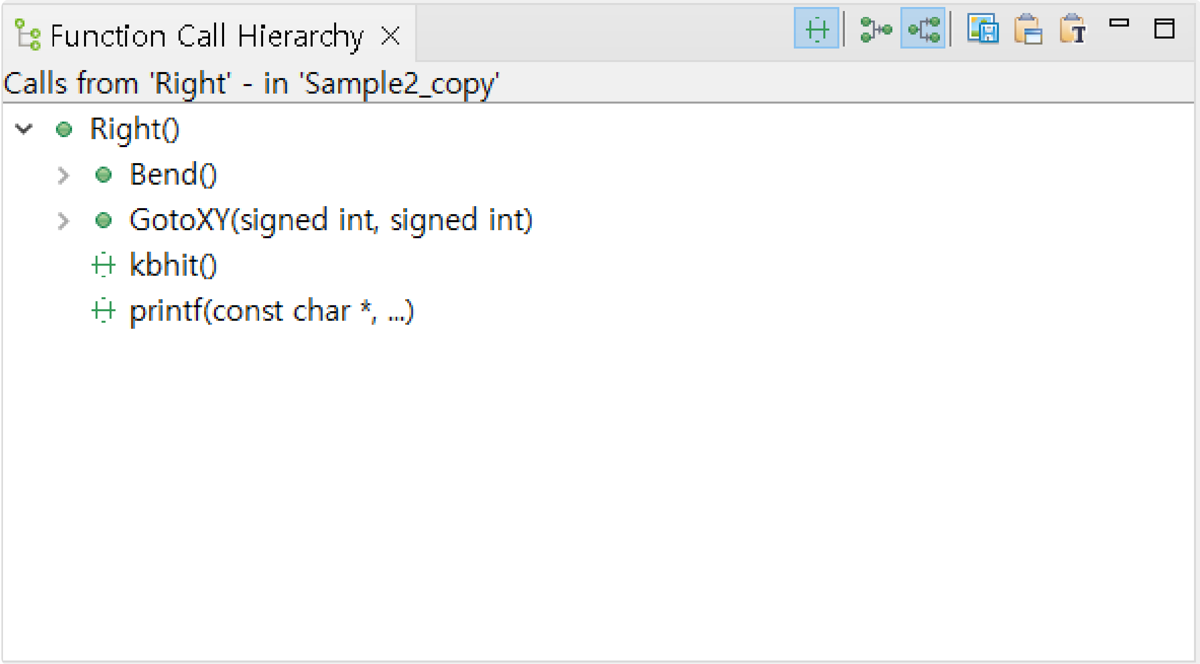


'Left' - 8 relations in project 'Sample2_copy'

Name	Definition	Use
Left		
bend		✓
bend_no		✓
body		✓
body	✓	
head		✓
len		✓
len	✓	
length		✓

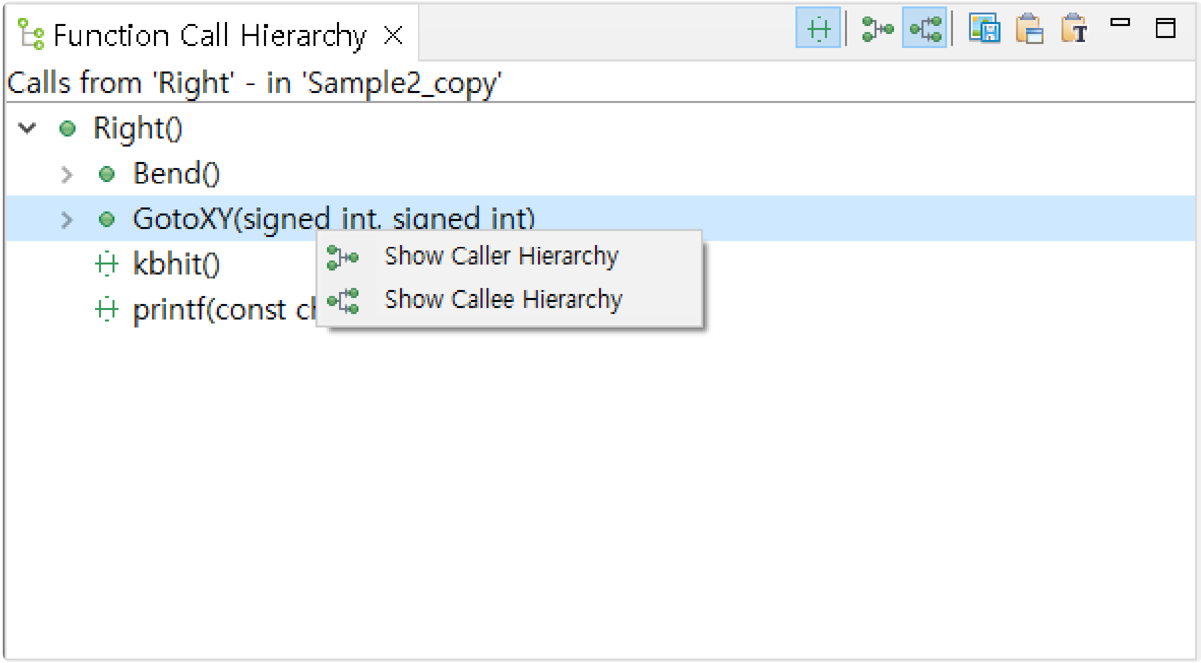
18.9. Function Call Hierarchy View

The Function Call Hierarchy View shows the information for the function called by the selected function or the called function in the hierarchy structure.
You can change the call information for the selected function by using the context menu that appears when selecting and right-clicking the function displayed in the hierarchy structure and double-click it to open the editor for the source file that the function is defined and to go to the location of the selected function. (However, not included if it is a system function)



Calls from 'Right' - in 'Sample2_copy'

- Right()
  - Bend()
  - GotoXY(signed int, signed int)
  - kbhit()
  - printf(const char *, ...)



Calls from 'Right' - in 'Sample2_copy'

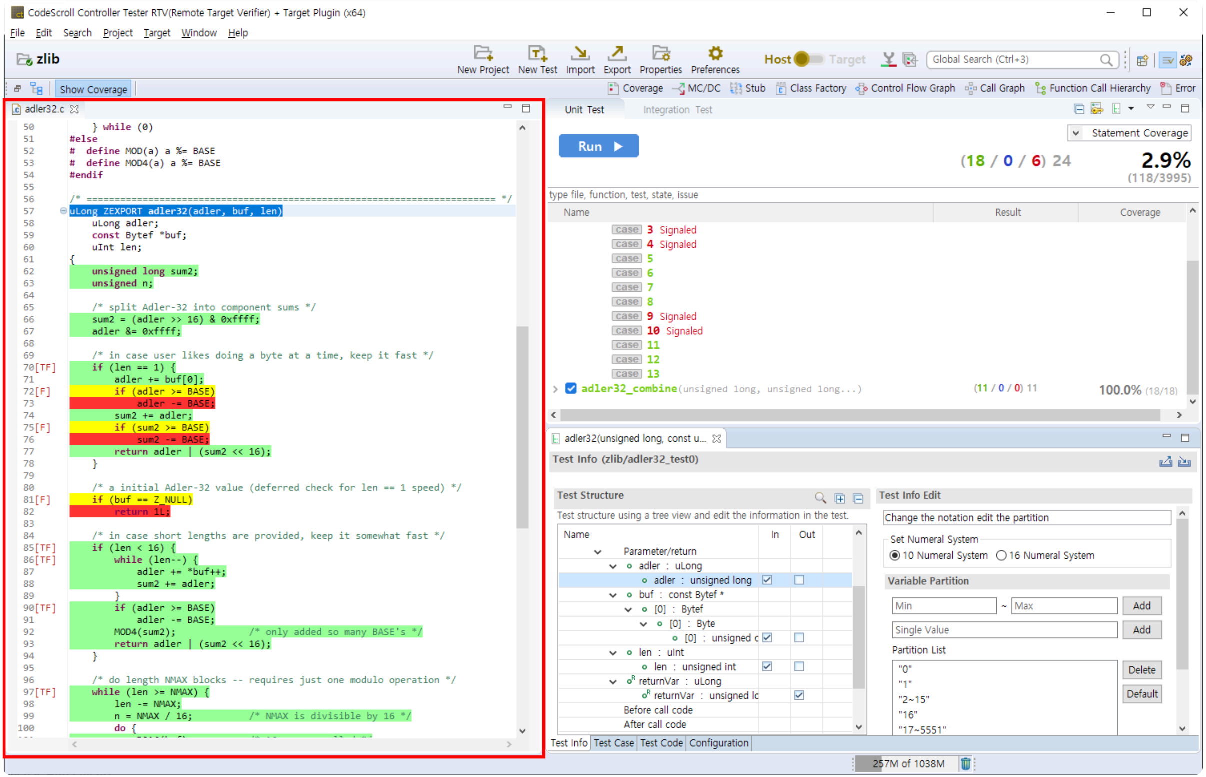
- Right()
  - Bend()
  - GotoXY(signed int, signed int)
  - kbhit()
  - printf(const c

Menu	Description
Show System Function	Sets whether to indicate the call information for the system function in a hierarchical structure.

Show Caller Hierarchy	Shows the functions that call the selected functions in a hierarchical structure.
Show Callee Hierarchy	Shows the functions called by the selected function in a hierarchical structure.
Save as PNG	Save function call hierarchy layer view as image.
Copy to System clipboard	Copy function call hierarchy view image to system clipboard.
Copy Text to System clipboard	Copy the Function Call Hierarchy View contents to system clipboard as text

18.10. Source Code Editor section

The source code editor section is a pre-reserved area, located on the left of the screen.



```
    } while (0)
#else
#  define MOD(a) a %= BASE
#  define MOD4(a) a %= BASE
#endif

/* ========================================================================= */
uLong ZEXPORT adler32(adler, buf, len)
    uLong adler;
    const Bytef *buf;
    uInt len;
{
    unsigned long sum2;
    unsigned n;

    /* split Adler-32 into component sums */
    sum2 = (adler >> 16) & 0xffff;
    adler &= 0xffff;

    /* in case user likes doing a byte at a time, keep it fast */
    if (len == 1) {
        adler += buf[0];
        if (adler >= BASE)
            adler -= BASE;
        sum2 += adler;
        if (sum2 >= BASE)
            sum2 -= BASE;
        return adler | (sum2 << 16);
    }

    /* a initial Adler-32 value (deferred check for len == 1 speed) */
    if (buf == Z_NULL)
        return 1L;

    /* in case short lengths are provided, keep it somewhat fast */
    if (len < 16) {
        while (len--) {
            adler += *buf++;
            sum2 += adler;
        }
        if (adler >= BASE)
            adler -= BASE;
        MOD4(sum2);             /* only added so many BASE's */
        return adler | (sum2 << 16);
    }

    /* do length NMAX blocks -- requires just one modulo operation */
    while (len >= NMAX) {
        len -= NMAX;
        n = NMAX / 16;          /* NMAX is divisible by 16 */
        do {
```

(18 / 0 / 6) 24 2.9% (118/3995)

Name	Result	Coverage
case 3 Signaled		
case 4 Signaled		
case 5		
case 6		
case 7		
case 8		
case 9 Signaled		
case 10 Signaled		
case 11		
case 12		
case 13		
☑ adler32_combine(unsigned long, unsigned long...)	(11 / 0 / 0) 11	100.0% (18/18)

Test Info (zlib/adler32_test0)

Test Structure

Test structure using a tree view and edit the information in the test.

Name	In	Out
Parameter/return		
adler : uLong		
adler : unsigned long	☑	□
buf : const Bytef *		
[0] : Bytef		
[0] : Byte		
[0] : unsigned c	☑	□
len : uInt		
len : unsigned int	☑	□
returnVar : uLong		
returnVar : unsigned lc		☑
Before call code		
After call code		

Test Info Edit

Change the notation edit the partition

Set Numeral System
● 10 Numeral System ○ 16 Numeral System

Variable Partition

Min ~ Max Add

Single Value Add

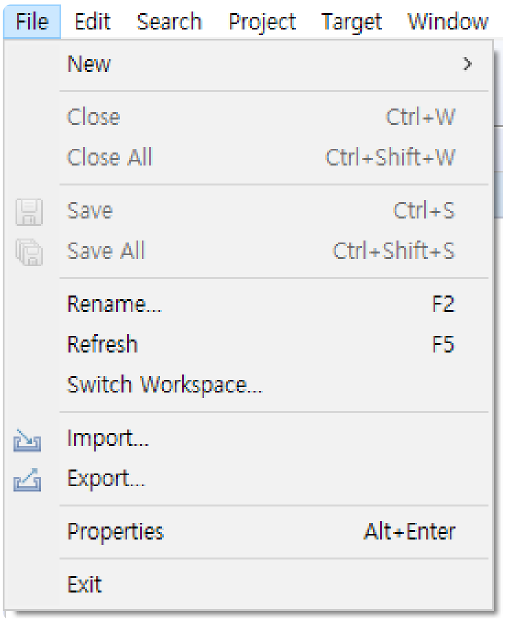
Partition List

"0"
"1"
"2~15"
"16"
"17~5551"

Delete Default

19. File Menu

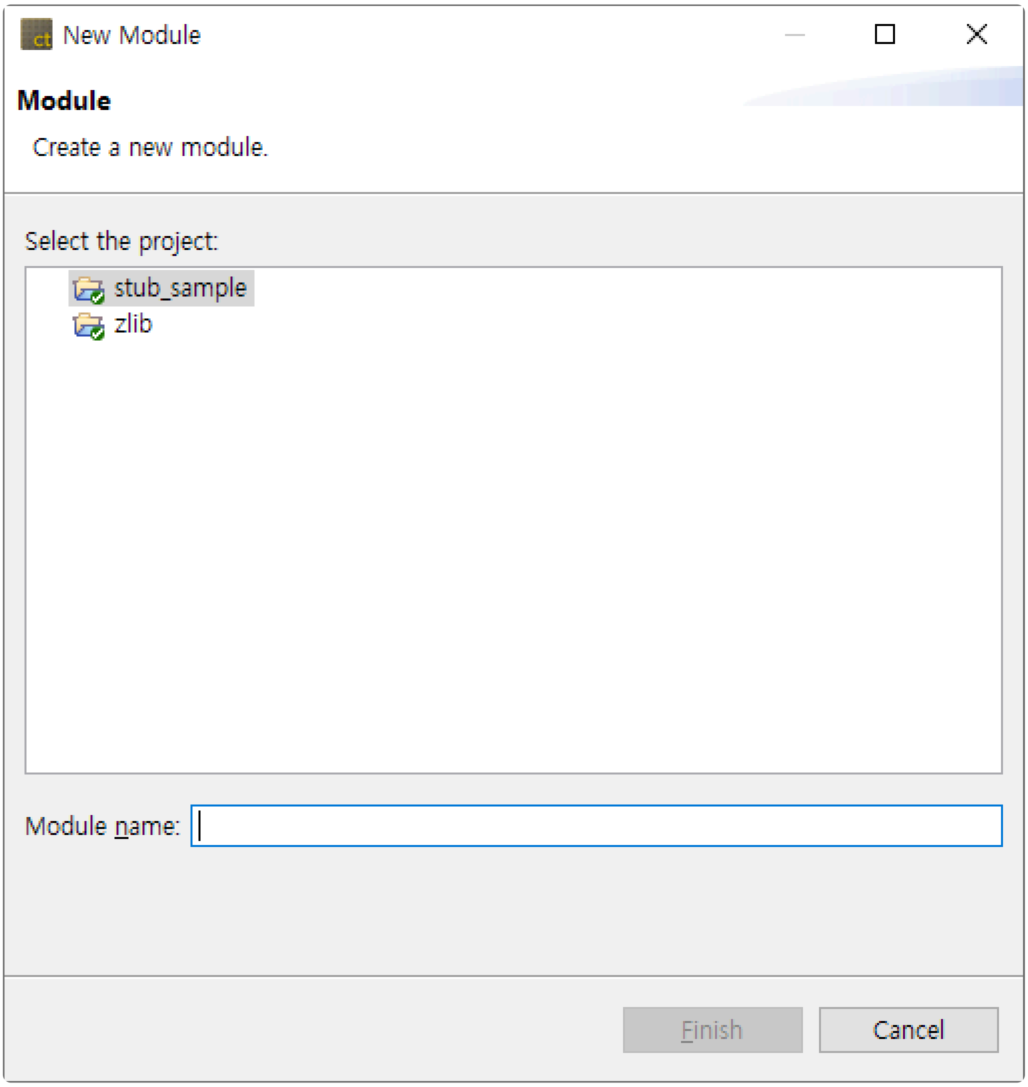
In File menu, Create a new project or module, Editor-related operation, Refresh, Change Workspace, Import and Export, View Properties of the selected item and Exit Tool etc. can be carried out.



- New:
    - Create a project
    - Create a module
- Close/Close all/Save/Save all: Editor-related menu
- Rename: You can modify the name of project or module.
- Switch workspace
- Import
- Export
- Exit: Exit tool.

19.1. Create a Module

You can create a new module in the project. The information other than the module name is created the same as the modules already existed in the target project.

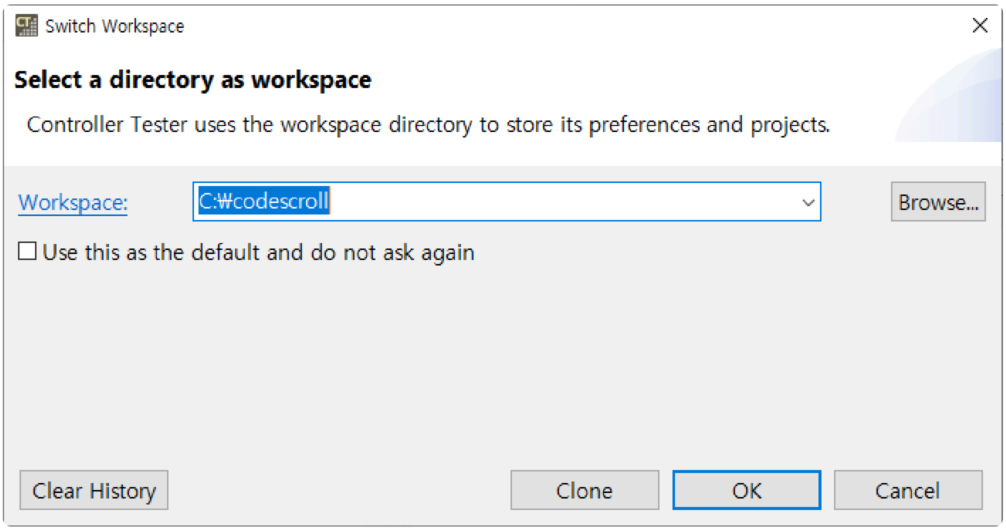


1. In [New] menu, click [Other…], select [Module] in [Other] and click [Next].
2. Select the project that you want to create a new module.
3. Enter the module name. The module name existed already cannot be used.
4. Click [Finish] to create the module.

> You can also create a module by using the [New] menu displayed when right-clicking a project in Test Navigator view.

19.2. Switch Workspace

You can switch the directory of workspace. When you witch the workspace, the tool restarts with the switched workspace.


Switch Workspace

Select a directory as workspace

Controller Tester uses the workspace directory to store its preferences and projects.

Workspace: C:₩codescroll

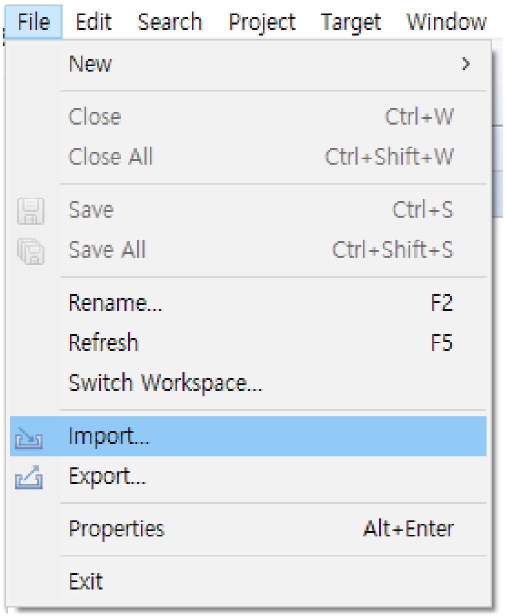
□ Use this as the default and do not ask again

Click [Browse…] to select the workspace directory to be switched or to enter it manually. You can select the workspace directory selected previously in the list displayed when clicking [▼].
If you select the checkbox [Use this as the default and do not ask again], you are not prompted again to select a workspace directory the next time you execute the tool.
If you click [Clone], the selected workspace is copied to the other directory.
If you click [Clear History], you can delete the workspace list.

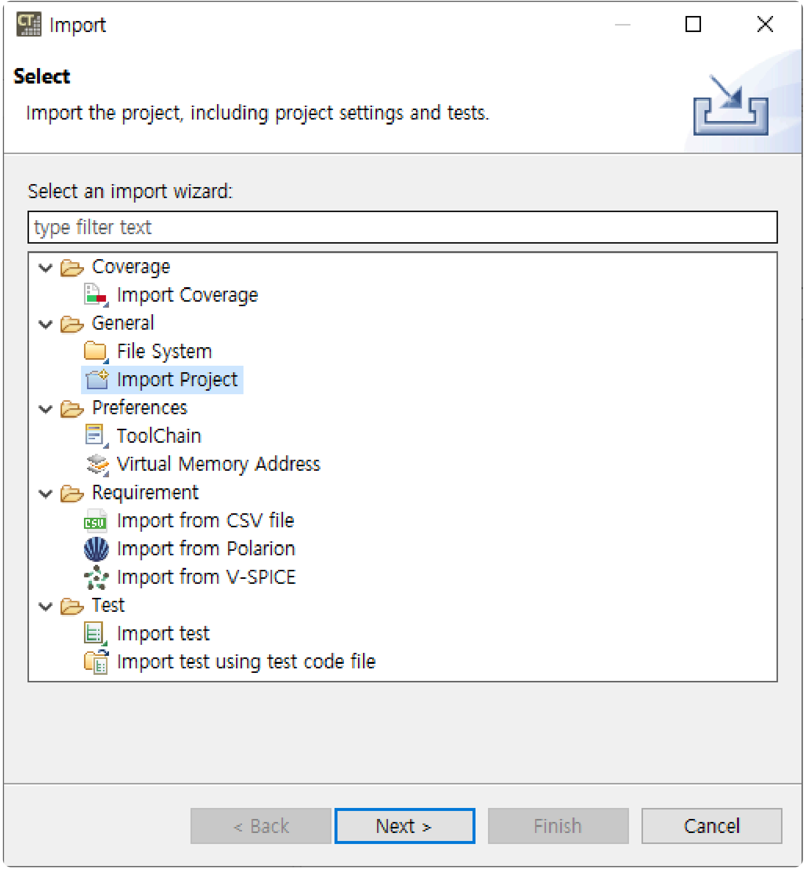
19.3. Import

CT 2023.12 provides a feature that import project and data used other version or other PC.

1. Select [File] > [Import] from the main menu or [Import] from the dashboard to open the Import Wizard.



2. Select a item to import and click [Next].


Import

Select

Import the project, including project settings and tests.

Select an import wizard:

type filter text

- Coverage
  - Import Coverage
- General
  - File System
  - Import Project
- Preferences
  - ToolChain
  - Virtual Memory Address
- Requirement
  - Import from CSV file
  - Import from Polarion
  - Import from V-SPICE
- Test
  - Import test
  - Import test using test code file

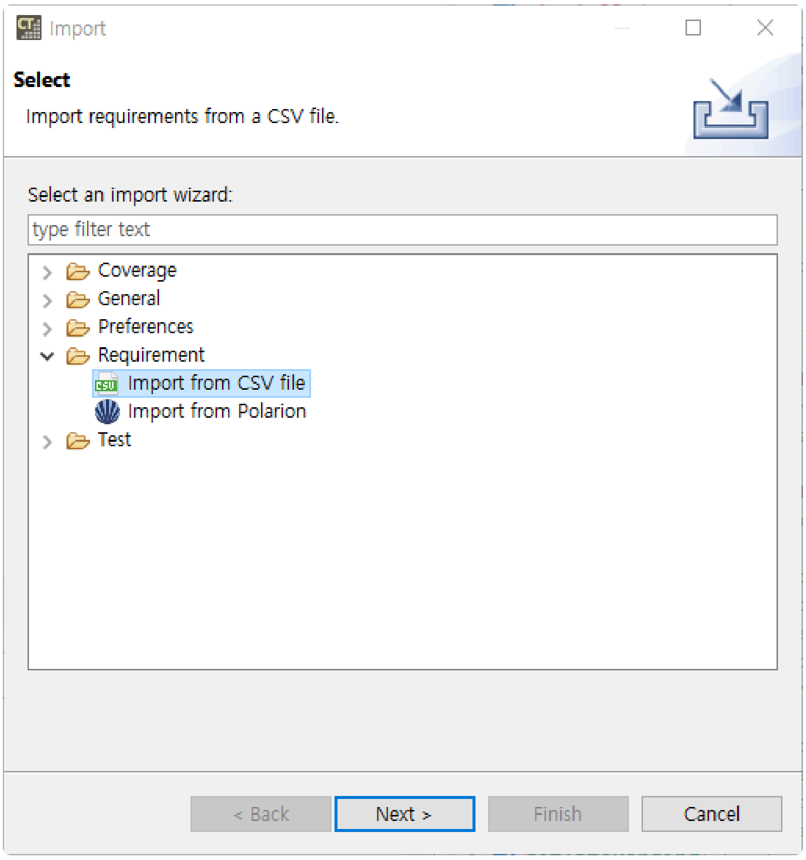
Parent item	Child item	Description

Coverage	Import Coverage	import coverages in csd format.
General	File System Import project	Import files or projects.
Preferences	ToolChain Virtual Memory Adress	Import toolchains or virtual memory adress exported before.
Requirement	Import from CSV file Import from Polarion Import from V-SPICE	Import requirements from CSV files or requirement management tools.
Test	Import test Import test using test code file	import tests exported before or tests from test codes.

19.3.1. Requirement − Import from CSV file

You can import requirement documents written in CSV file to CT 2023.12.

1. In the Import Wizard, select [Requirement] -> [Import from CSV file] and click [Next].



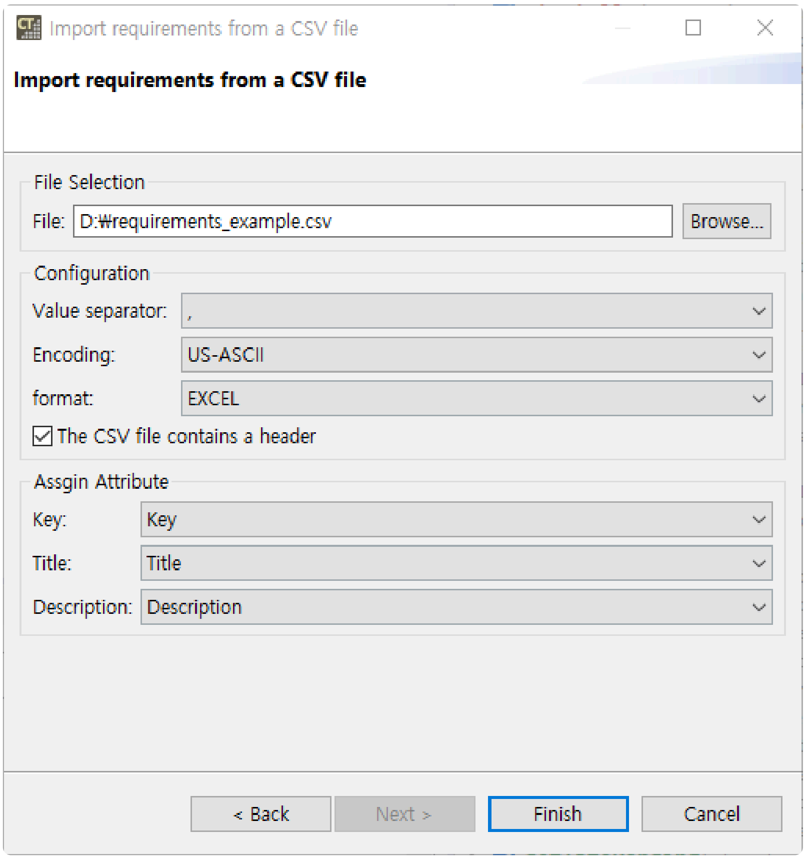
Select

Import requirements from a CSV file.

Select an import wizard:

type filter text

2. Enter informations for importing requirements and click [Finish].



Import requirements from a CSV file

Import requirements from a CSV file

File Selection

File: D:₩requirements_example.csv

Configuration

Value separator: ,

Encoding: US-ASCII

format: EXCEL

☑ The CSV file contains a header

Assgin Attribute

Key: Key

Title: Title

Description: Description

a. File Selection
   - Enter the path of a file that the requirements are stored.

b. Configuration
   - **Value seperator** : Enter a separator that separate each value in the CSV file. Default value is ,(comma).
   - **Encoding** : Enter a encoding of the CSV file. Default value is US-ASCII.
   - **format** : Enter a format of the CSV file. Default value is EXCEL.
   - **The CSV file contains a header** : Check when the CSV file contains a header.

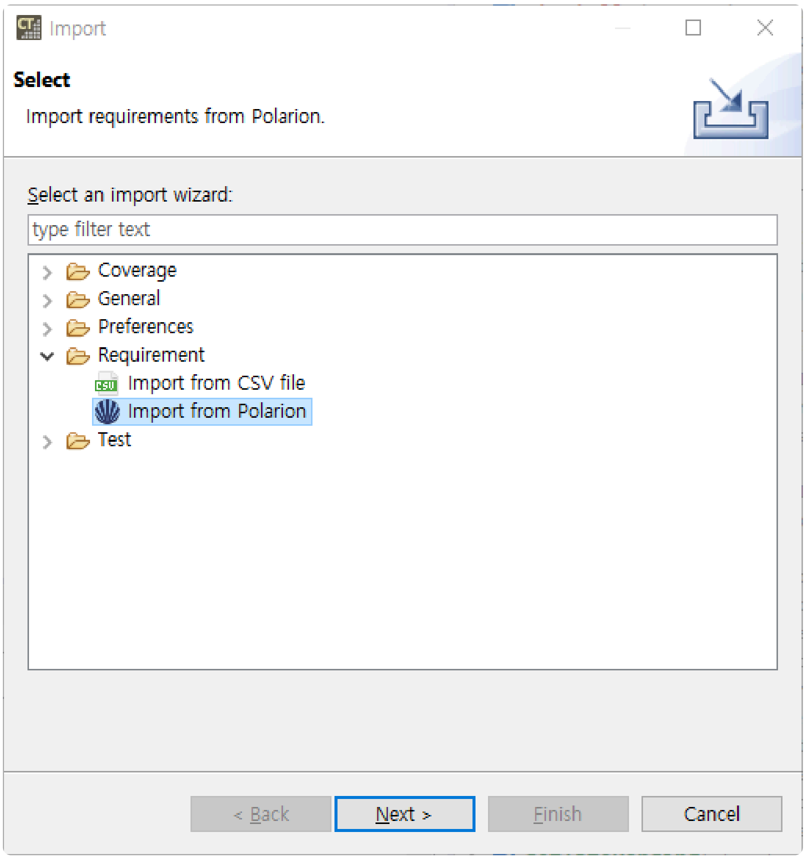
c. Assign Attribute
   - **Key** : Select the column that corresponds to the key of the requirements.
   - **Title** : Select the column that corresponds to the title of the requirements.
   - **Description** : Select the column that corresponds to the description of the requirements.

> ✻ The information you entered in the previous import is automatically filled in.

19.3.2. Requirement − Import from Polarion

You can import requirement documents from Polarion to CT 2023.12.

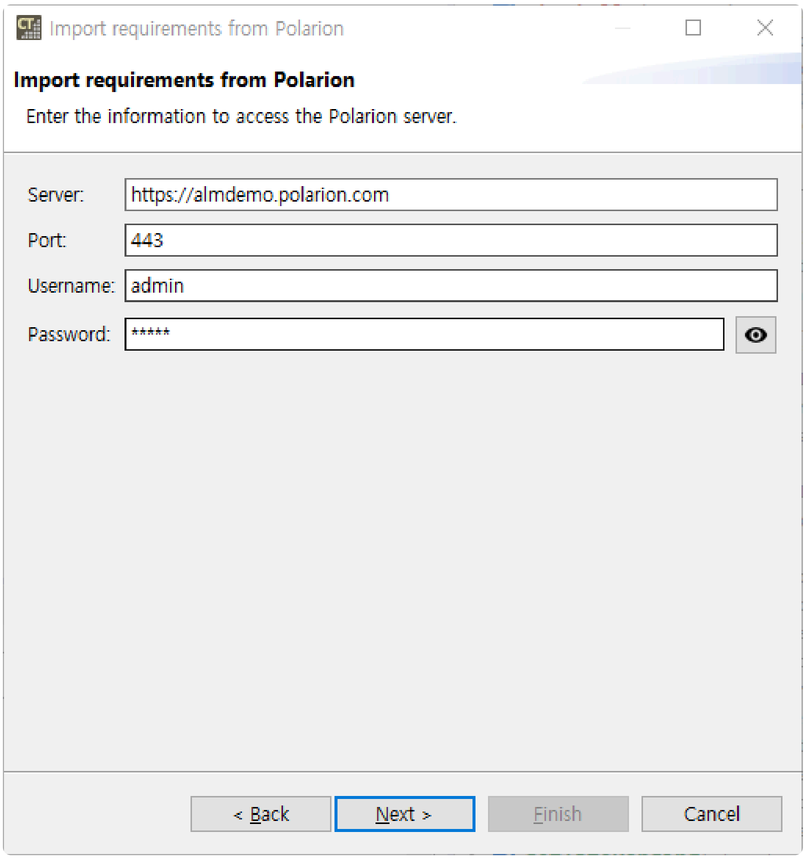
1. In the Import Wizard, select [Requirement] -> [Import from Polarion] and click [Next].



Import requirements from Polarion.

Select an import wizard:

2. Enter the information to connect with Polarion server and click [Next]. You can see the entered password to click 👁 button.



Import requirements from Polarion

Enter the information to access the Polarion server.

Server: https://almdemo.polarion.com

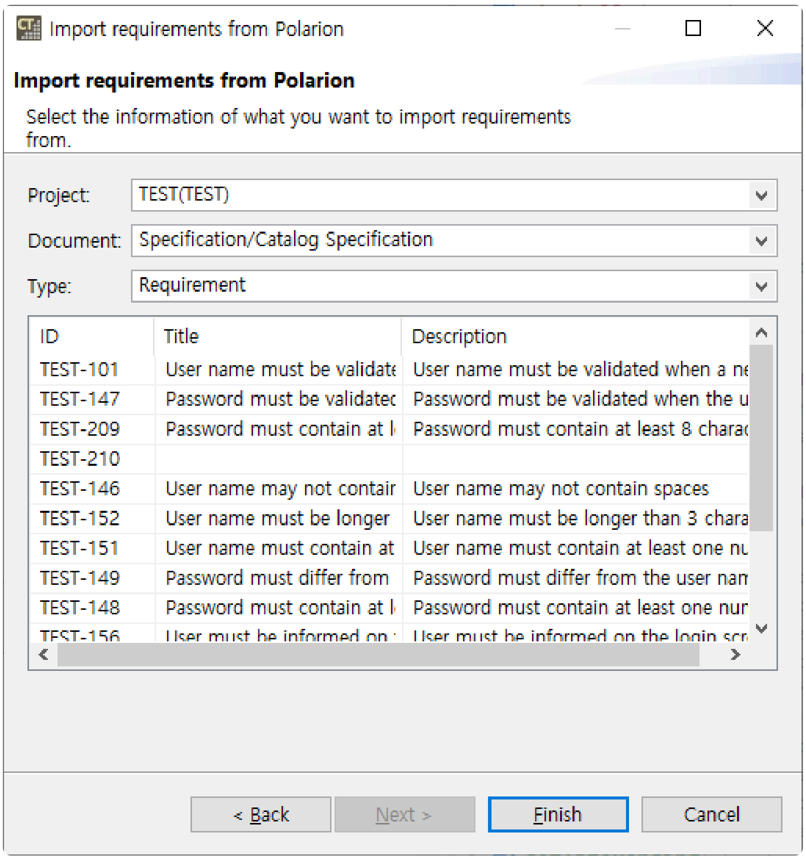
Port: 443

Username: admin

Password: *****

- The information of Polarion’s demo server is entered in server and port.
- If you use a local server, enter `http://ip_address` in server and port number of local server in port.

3. When you enter the Project, Document, and Type to import from Polarion, the corresponding requirements list appears. Check the requirements and click the [Finish] button to import the requirements.



Import requirements from Polarion

Select the information of what you want to import requirements from.

Project: TEST(TEST)

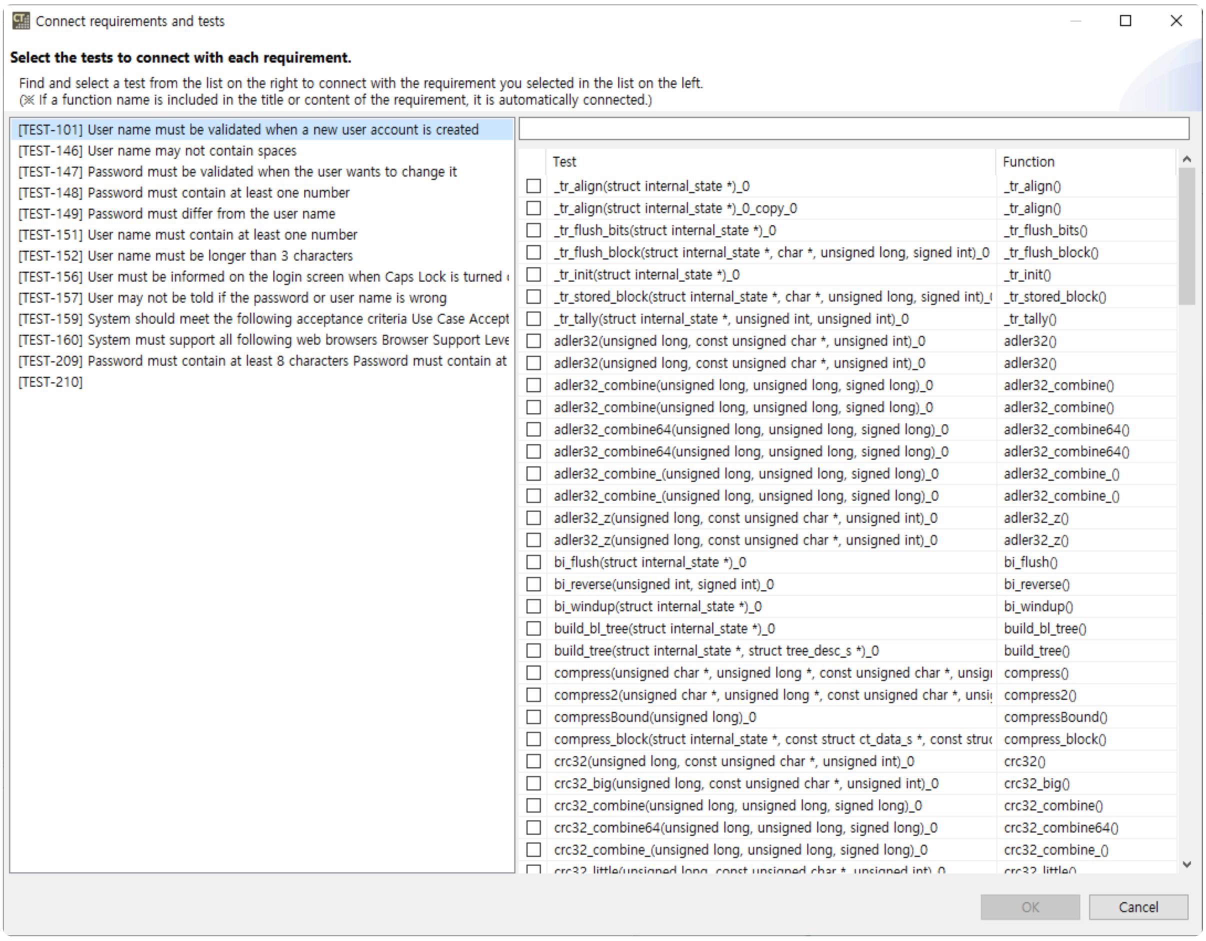
Document: Specification/Catalog Specification

Type: Requirement

ID	Title	Description
TEST-101	User name must be validate	User name must be validated when a ne
TEST-147	Password must be validatec	Password must be validated when the u
TEST-209	Password must contain at l	Password must contain at least 8 charac
TEST-210		
TEST-146	User name may not contair	User name may not contain spaces
TEST-152	User name must be longer	User name must be longer than 3 chara
TEST-151	User name must contain at	User name must contain at least one nu
TEST-149	Password must differ from	Password must differ from the user nam
TEST-148	Password must contain at l	Password must contain at least one nur
TEST-156	User must be informed on :	User must be informed on the login scr

- If you do not select the Document, you can also import requirements that are not included in a specific document.

4. [Connect requirements and tests] dialog appears where you can connect the imported requirements and tests. If the title or description of the requirement contains the name of the function associated with the test, it is automatically linked. Click [Cancel] to finish [Connect requirements and tests] without linking requirements and tests.



Select the tests to connect with each requirement.

Find and select a test from the list on the right to connect with the requirement you selected in the list on the left.
(※ If a function name is included in the title or content of the requirement, it is automatically connected.)

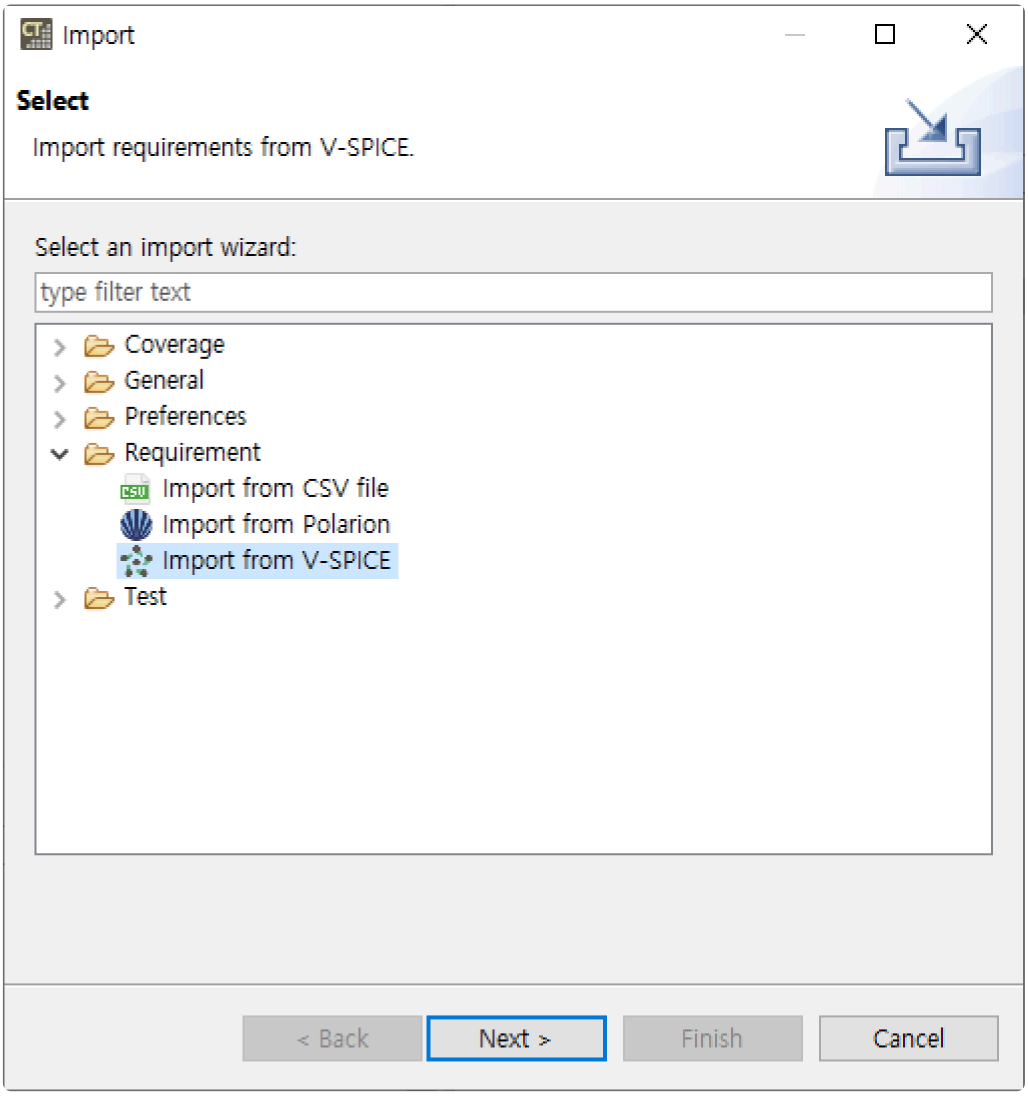
- [TEST-101] User name must be validated when a new user account is created
- [TEST-146] User name may not contain spaces
- [TEST-147] Password must be validated when the user wants to change it
- [TEST-148] Password must contain at least one number
- [TEST-149] Password must differ from the user name
- [TEST-151] User name must contain at least one number
- [TEST-152] User name must be longer than 3 characters
- [TEST-156] User must be informed on the login screen when Caps Lock is turned
- [TEST-157] User may not be told if the password or user name is wrong
- [TEST-159] System should meet the following acceptance criteria Use Case Accept
- [TEST-160] System must support all following web browsers Browser Support Leve
- [TEST-209] Password must contain at least 8 characters Password must contain at
- [TEST-210]

	Test	Function
□	_tr_align(struct internal_state *)_0	_tr_align()
□	_tr_align(struct internal_state *)_0_copy_0	_tr_align()
□	_tr_flush_bits(struct internal_state *)_0	_tr_flush_bits()
□	_tr_flush_block(struct internal_state *, char *, unsigned long, signed int)_0	_tr_flush_block()
□	_tr_init(struct internal_state *)_0	_tr_init()
□	_tr_stored_block(struct internal_state *, char *, unsigned long, signed int)_	_tr_stored_block()
□	_tr_tally(struct internal_state *, unsigned int, unsigned int)_0	_tr_tally()
□	adler32(unsigned long, const unsigned char *, unsigned int)_0	adler32()
□	adler32(unsigned long, const unsigned char *, unsigned int)_0	adler32()
□	adler32_combine(unsigned long, unsigned long, signed long)_0	adler32_combine()
□	adler32_combine(unsigned long, unsigned long, signed long)_0	adler32_combine()
□	adler32_combine64(unsigned long, unsigned long, signed long)_0	adler32_combine64()
□	adler32_combine64(unsigned long, unsigned long, signed long)_0	adler32_combine64()
□	adler32_combine_(unsigned long, unsigned long, signed long)_0	adler32_combine_()
□	adler32_combine_(unsigned long, unsigned long, signed long)_0	adler32_combine_()
□	adler32_z(unsigned long, const unsigned char *, unsigned int)_0	adler32_z()
□	adler32_z(unsigned long, const unsigned char *, unsigned int)_0	adler32_z()
□	bi_flush(struct internal_state *)_0	bi_flush()
□	bi_reverse(unsigned int, signed int)_0	bi_reverse()
□	bi_windup(struct internal_state *)_0	bi_windup()
□	build_bl_tree(struct internal_state *)_0	build_bl_tree()
□	build_tree(struct internal_state *, struct tree_desc_s *)_0	build_tree()
□	compress(unsigned char *, unsigned long *, const unsigned char *, unsig	compress()
□	compress2(unsigned char *, unsigned long *, const unsigned char *, unsi	compress2()
□	compressBound(unsigned long)_0	compressBound()
□	compress_block(struct internal_state *, const struct ct_data_s *, const stru	compress_block()
□	crc32(unsigned long, const unsigned char *, unsigned int)_0	crc32()
□	crc32_big(unsigned long, const unsigned char *, unsigned int)_0	crc32_big()
□	crc32_combine(unsigned long, unsigned long, signed long)_0	crc32_combine()
□	crc32_combine64(unsigned long, unsigned long, signed long)_0	crc32_combine64()
□	crc32_combine_(unsigned long, unsigned long, signed long)_0	crc32_combine_()
□	crc32_little(unsigned long, const unsigned char *, unsigned int)_0	crc32_little()

19.3.3. Requirement – Import from V-SPICE

You can import requirement documents from V-SPICE to CT 2023.12.

1. In the Import Wizard, select [Requirement] > [Import from V-SPICE] and click [Next].



Import

Select

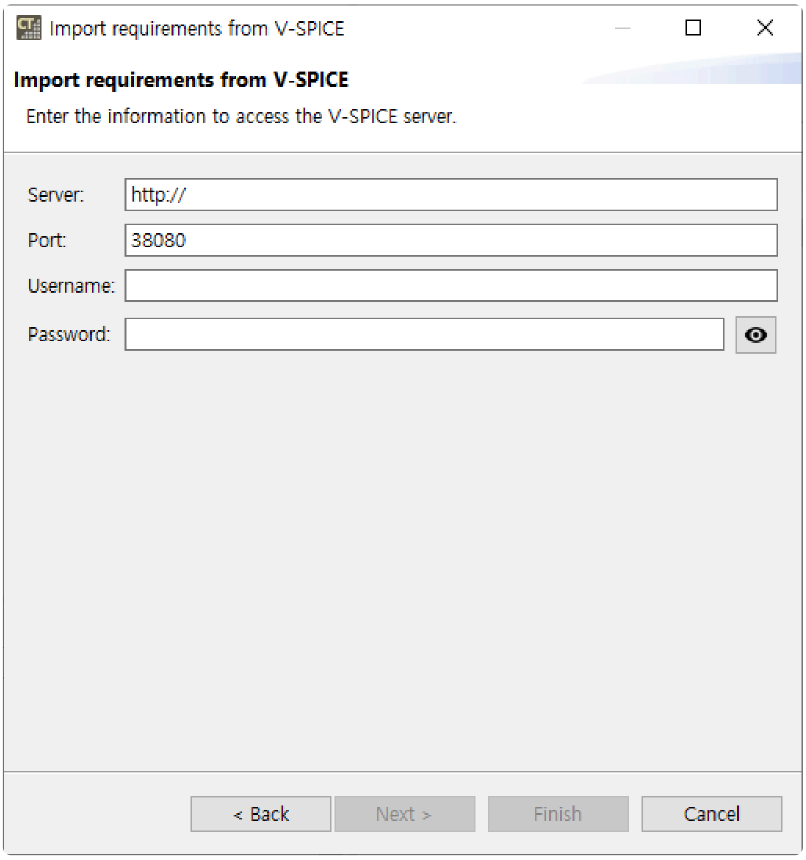
Import requirements from V-SPICE.

Select an import wizard:

type filter text

- Coverage
- General
- Preferences
- Requirement
  - Import from CSV file
  - Import from Polarion
  - Import from V-SPICE
- Test

2. Enter the information to connect with V-SPICE server and click [Next]. You can see the entered password to click 👁 button.



Import requirements from V-SPICE

Import requirements from V-SPICE

Enter the information to access the V-SPICE server.

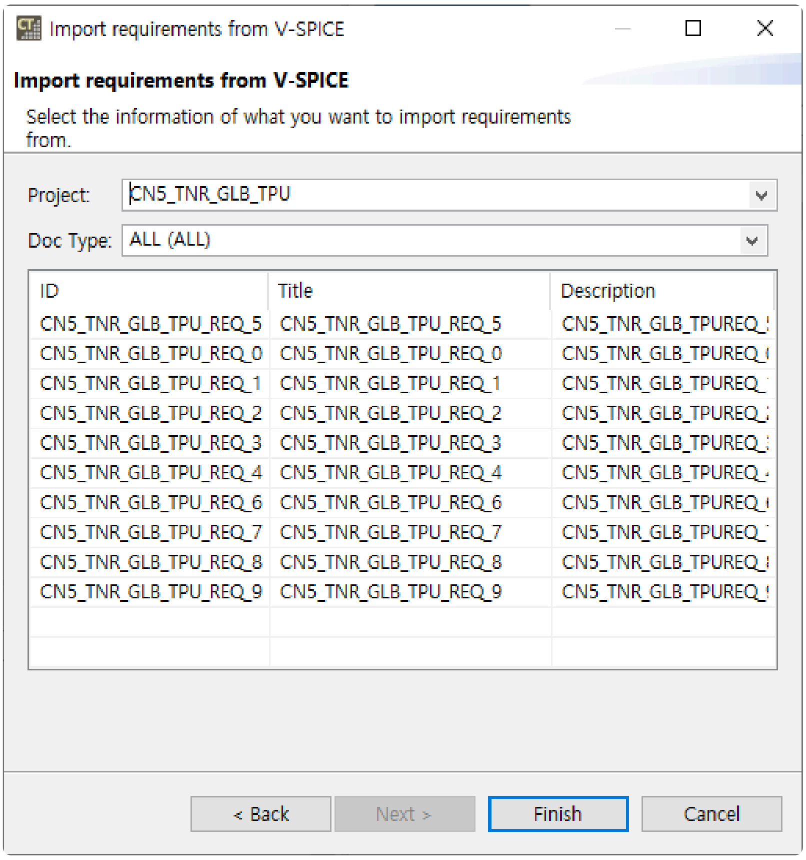
Server: http://

Port: 38080

Username:

Password:

3. When you enter the Project to import from V-SPICE, the corresponding requirements list appears. Check the requirements and click the [Finish] button to import the requirements.



Import requirements from V-SPICE

Import requirements from V-SPICE

Select the information of what you want to import requirements from.

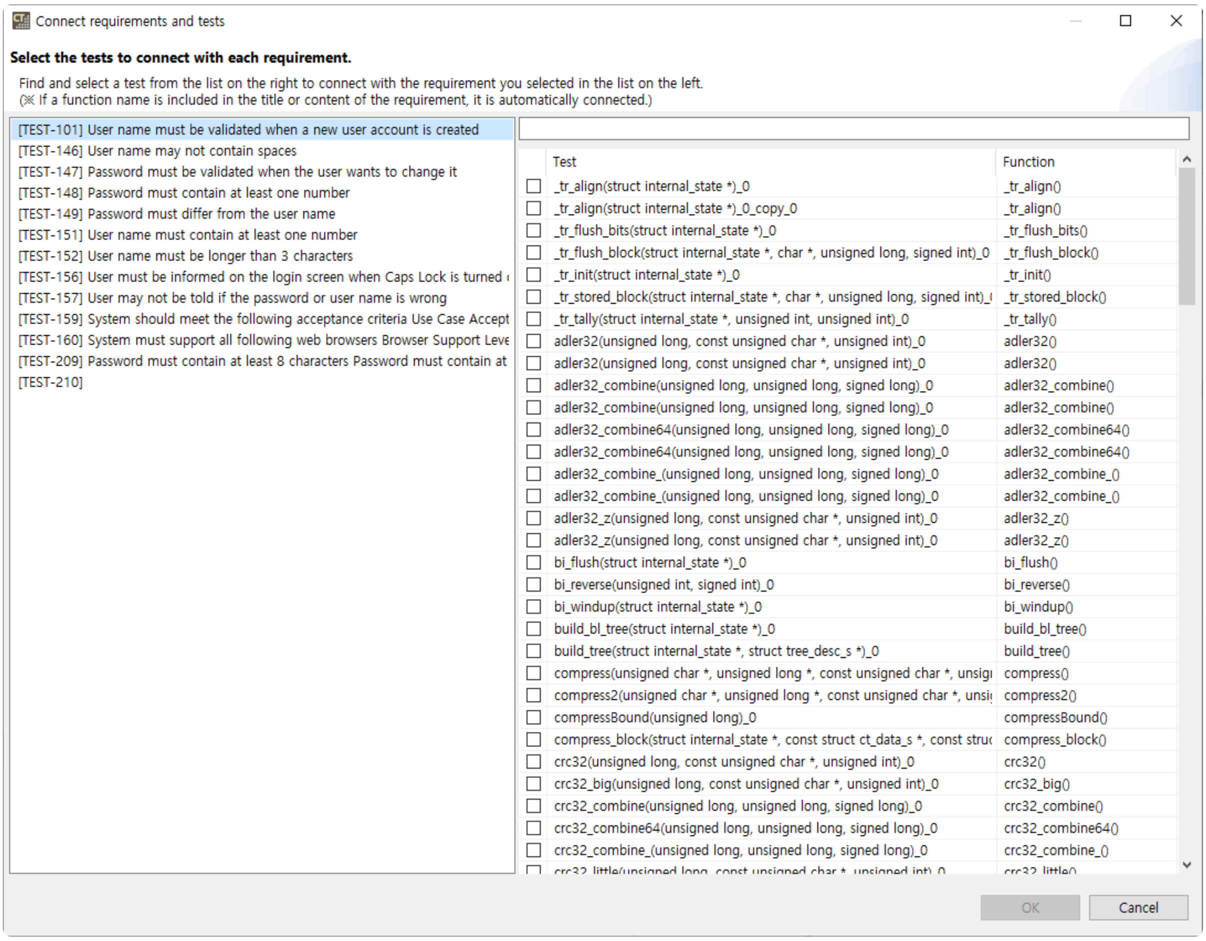
Project: CN5_TNR_GLB_TPU

Doc Type: ALL (ALL)

ID	Title	Description
CN5_TNR_GLB_TPU_REQ_5	CN5_TNR_GLB_TPU_REQ_5	CN5_TNR_GLB_TPUREQ_
CN5_TNR_GLB_TPU_REQ_0	CN5_TNR_GLB_TPU_REQ_0	CN5_TNR_GLB_TPUREQ_
CN5_TNR_GLB_TPU_REQ_1	CN5_TNR_GLB_TPU_REQ_1	CN5_TNR_GLB_TPUREQ_
CN5_TNR_GLB_TPU_REQ_2	CN5_TNR_GLB_TPU_REQ_2	CN5_TNR_GLB_TPUREQ_
CN5_TNR_GLB_TPU_REQ_3	CN5_TNR_GLB_TPU_REQ_3	CN5_TNR_GLB_TPUREQ_
CN5_TNR_GLB_TPU_REQ_4	CN5_TNR_GLB_TPU_REQ_4	CN5_TNR_GLB_TPUREQ_
CN5_TNR_GLB_TPU_REQ_6	CN5_TNR_GLB_TPU_REQ_6	CN5_TNR_GLB_TPUREQ_
CN5_TNR_GLB_TPU_REQ_7	CN5_TNR_GLB_TPU_REQ_7	CN5_TNR_GLB_TPUREQ_
CN5_TNR_GLB_TPU_REQ_8	CN5_TNR_GLB_TPU_REQ_8	CN5_TNR_GLB_TPUREQ_
CN5_TNR_GLB_TPU_REQ_9	CN5_TNR_GLB_TPU_REQ_9	CN5_TNR_GLB_TPUREQ_

4. [Connect requirements and tests] dialog appears where you can connect the imported requirements and tests. If the title or description of the requirement contains the name of the function associated with the test, it is automatically linked. Click [Cancel] to finish [Connect

requirements and tests] without linking requirements and tests.



Select the tests to connect with each requirement.

Find and select a test from the list on the right to connect with the requirement you selected in the list on the left.
(※ If a function name is included in the title or content of the requirement, it is automatically connected.)

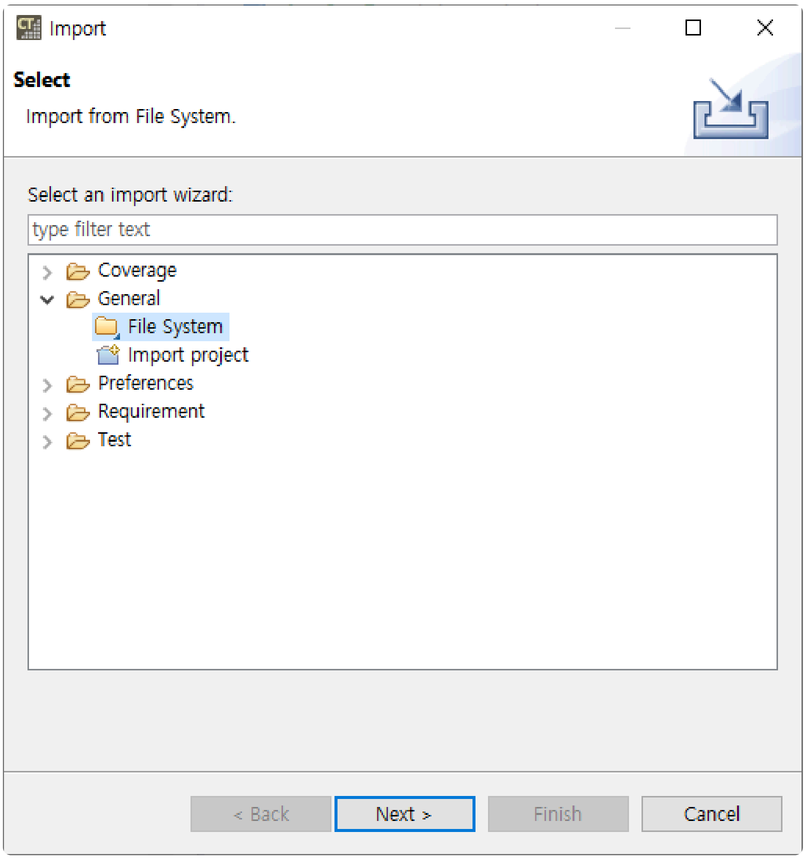
[TEST-101] User name must be validated when a new user account is created
[TEST-146] User name may not contain spaces
[TEST-147] Password must be validated when the user wants to change it
[TEST-148] Password must contain at least one number
[TEST-149] Password must differ from the user name
[TEST-151] User name must contain at least one number
[TEST-152] User name must be longer than 3 characters
[TEST-156] User must be informed on the login screen when Caps Lock is turned
[TEST-157] User may not be told if the password or user name is wrong
[TEST-159] System should meet the following acceptance criteria Use Case Accept
[TEST-160] System must support all following web browsers Browser Support Leve
[TEST-209] Password must contain at least 8 characters Password must contain at
[TEST-210]

	Test	Function
□	_tr_align(struct internal_state *)_0	_tr_align()
□	_tr_align(struct internal_state *)_0_copy_0	_tr_align()
□	_tr_flush_bits(struct internal_state *)_0	_tr_flush_bits()
□	_tr_flush_block(struct internal_state *, char *, unsigned long, signed int)_0	_tr_flush_block()
□	_tr_init(struct internal_state *)_0	_tr_init()
□	_tr_stored_block(struct internal_state *, char *, unsigned long, signed int)_	_tr_stored_block()
□	_tr_tally(struct internal_state *, unsigned int, unsigned int)_0	_tr_tally()
□	adler32(unsigned long, const unsigned char *, unsigned int)_0	adler32()
□	adler32(unsigned long, const unsigned char *, unsigned int)_0	adler32()
□	adler32_combine(unsigned long, unsigned long, signed long)_0	adler32_combine()
□	adler32_combine(unsigned long, unsigned long, signed long)_0	adler32_combine()
□	adler32_combine64(unsigned long, unsigned long, signed long)_0	adler32_combine64()
□	adler32_combine64(unsigned long, unsigned long, signed long)_0	adler32_combine64()
□	adler32_combine_(unsigned long, unsigned long, signed long)_0	adler32_combine_()
□	adler32_combine_(unsigned long, unsigned long, signed long)_0	adler32_combine_()
□	adler32_z(unsigned long, const unsigned char *, unsigned int)_0	adler32_z()
□	adler32_z(unsigned long, const unsigned char *, unsigned int)_0	adler32_z()
□	bi_flush(struct internal_state *)_0	bi_flush()
□	bi_reverse(unsigned int, signed int)_0	bi_reverse()
□	bi_windup(struct internal_state *)_0	bi_windup()
□	build_bl_tree(struct internal_state *)_0	build_bl_tree()
□	build_tree(struct internal_state *, struct tree_desc_s *)_0	build_tree()
□	compress(unsigned char *, unsigned long *, const unsigned char *, unsig	compress()
□	compress2(unsigned char *, unsigned long *, const unsigned char *, unsi	compress2()
□	compressBound(unsigned long)_0	compressBound()
□	compress_block(struct internal_state *, const struct ct_data_s *, const stru	compress_block()
□	crc32(unsigned long, const unsigned char *, unsigned int)_0	crc32()
□	crc32_big(unsigned long, const unsigned char *, unsigned int)_0	crc32_big()
□	crc32_combine(unsigned long, unsigned long, signed long)_0	crc32_combine()
□	crc32_combine64(unsigned long, unsigned long, signed long)_0	crc32_combine64()
□	crc32_combine_(unsigned long, unsigned long, signed long)_0	crc32_combine_()
□	crc32_little(unsigned long, const unsigned char *, unsigned int)_0	crc32_little()

19.3.4. General – File System

You can add the source files to the project by using [Import] – [File System] feature.

1. In the Import Wizard, select [General] -> [File System] and click the [Next] button.



Import

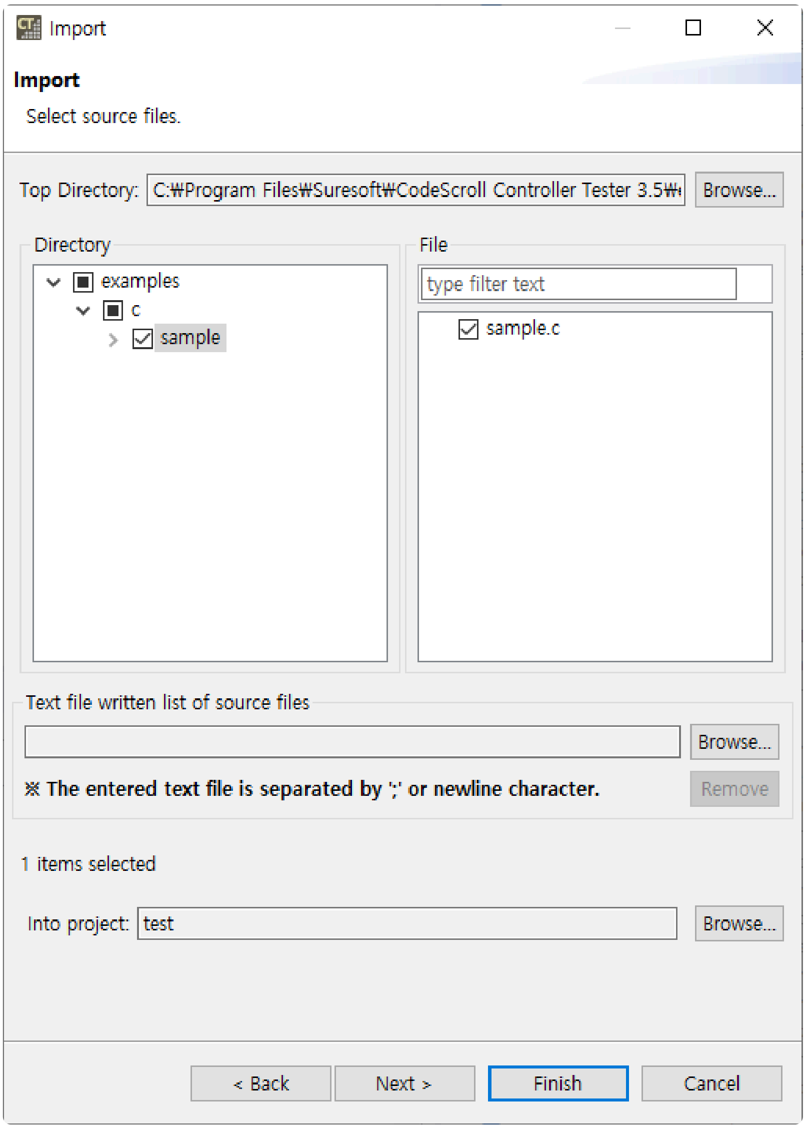
Select

Import from File System.

Select an import wizard:

type filter text

2. Enter the information of the file to be imported and click the [Next] button.



Import

Import

Select source files.

Top Directory: C:₩Program Files₩Suresoft₩CodeScroll Controller Tester 3.5₩

Directory

- ■ examples
  - ■ c
    - ☑ sample

File

type filter text

☑ sample.c

Text file written list of source files

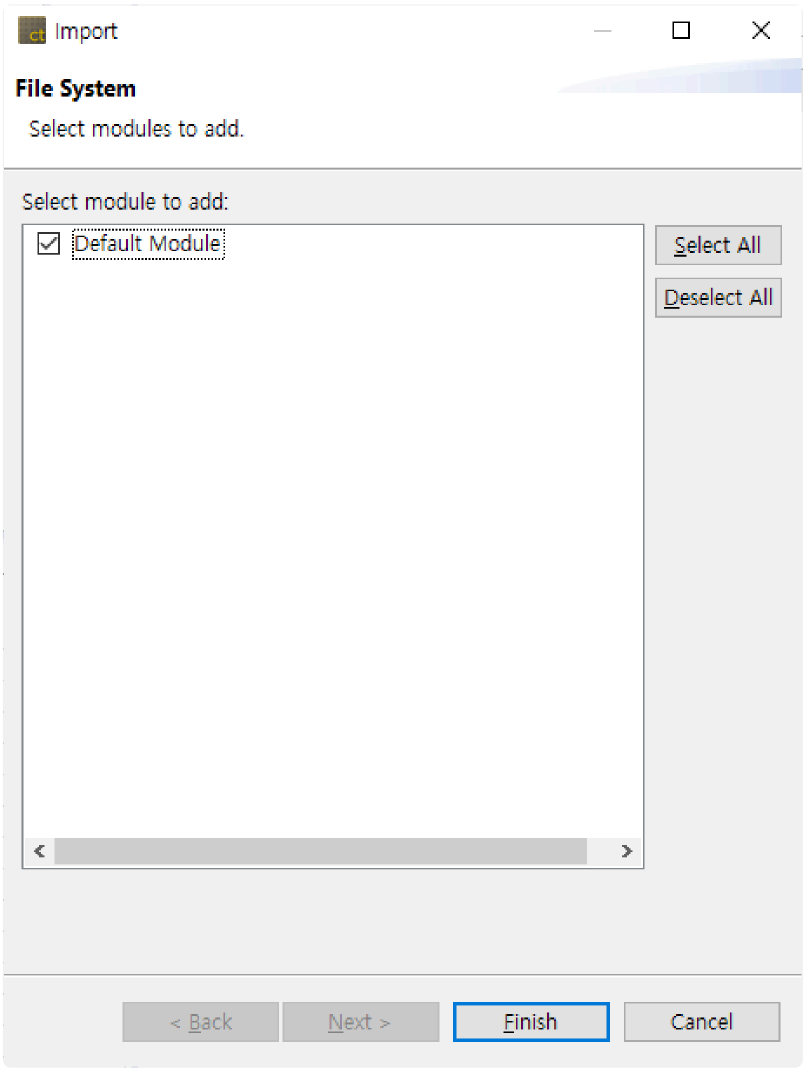
※ The entered text file is separated by ';' or newline character.

1 items selected

Into project: test

Item	Description
Top Directory	Select the directory of the source files to be imported.
Directory, File	Select the source files to be imported.
Text file written list of source files	Select the directory of the txt file containing a list of source files.(Option)
Into project	Select the project to add the imported source files.

3. Select the module that the source file will be added from the list of modules included in the project and click the [Finish] button.



Import

File System

Select modules to add.

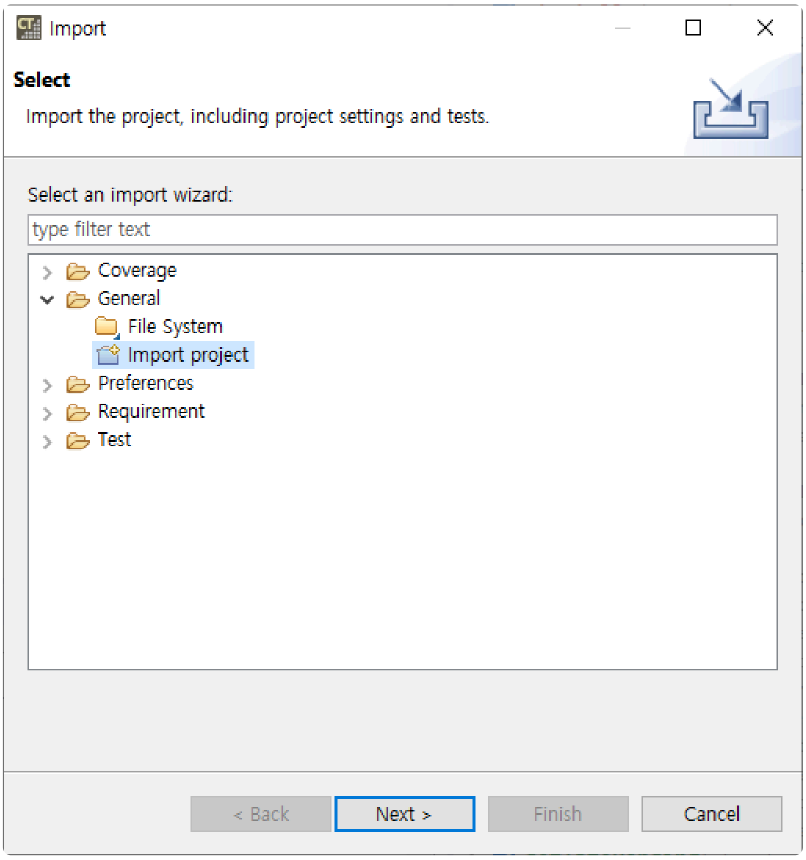
Select module to add:

☑ Default Module

19.3.5. General – Import project

Using the Import Project feature, you can import a project exported from another PC.

1. In the Import Wizard, click [General] > [Import Project] and then click the [Next] button.



Import

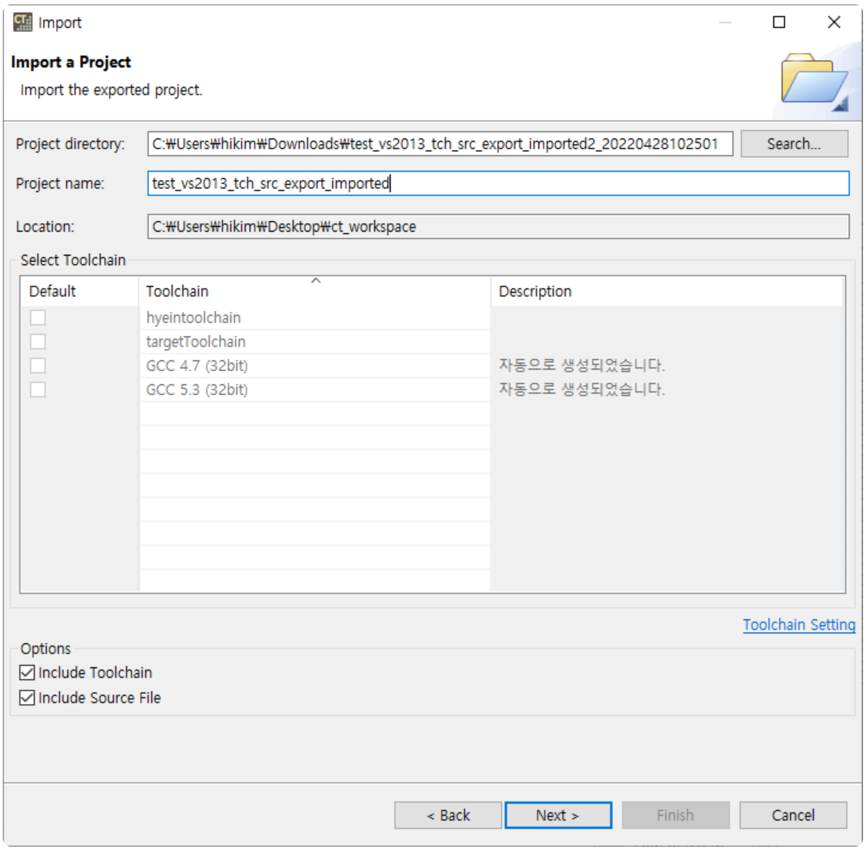
Select

Import the project, including project settings and tests.

Select an import wizard:

type filter text

2. Click the [Next] button after entering the exported project directory and selecting the toolchain. If the exported project has toolchain and source code information, Include Toolchain and Include Source Files are automatically selected when you select the directory.



Import

Import a Project

Import the exported project.

Project directory: C:₩Users₩hikim₩Downloads₩test_vs2013_tch_src_export_imported2_20220428102501

Project name: test_vs2013_tch_src_export_imported

Location: C:₩Users₩hikim₩Desktop₩ct_workspace

Select Toolchain

Default	Toolchain	Description
□	hyeintoolchain	
□	targetToolchain	
□	GCC 4.7 (32bit)	자동으로 생성되었습니다.
□	GCC 5.3 (32bit)	자동으로 생성되었습니다.

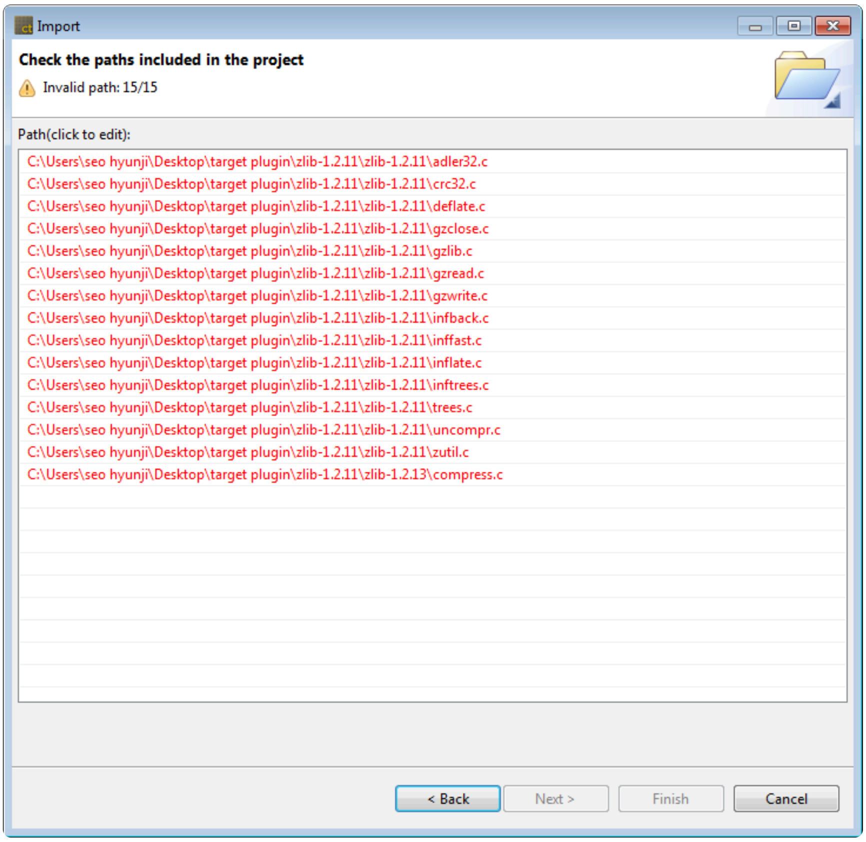
Options

☑ Include Toolchain

☑ Include Source File

If you don’t use the include toolchain option without a suitable toolchain, you need to import the toolchain using the toolchain export/import feature before importing the project.

3. You can check the path information included in the project to be imported. Invalid paths are marked in red and can be modified by clicking with the mouse or pressing the F2 key.



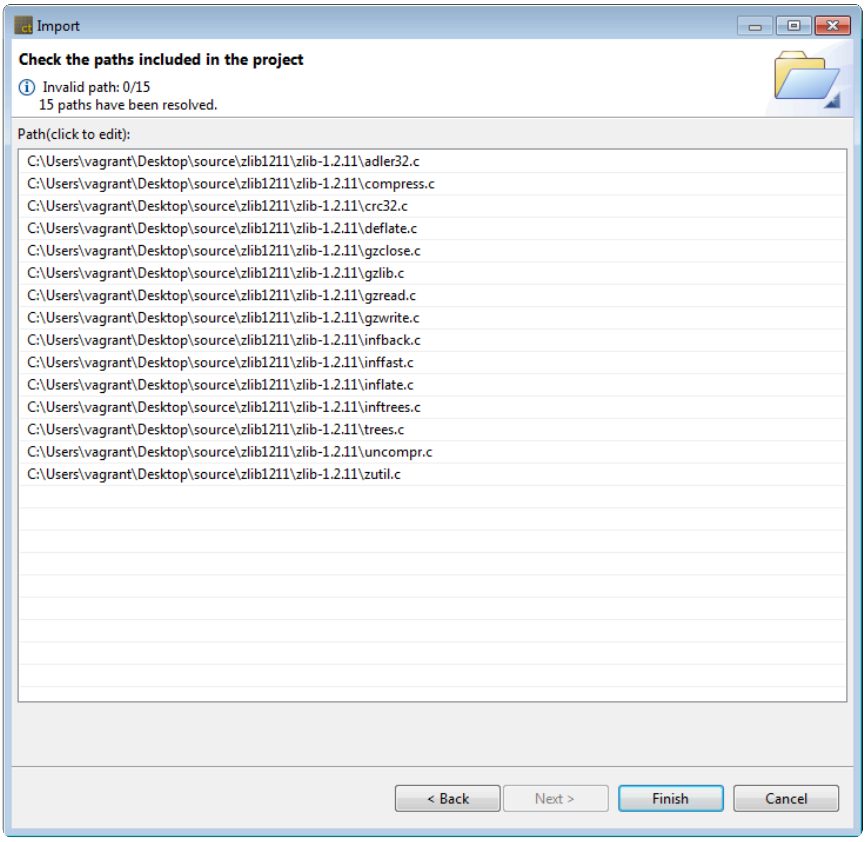
Check the paths included in the project

⚠ Invalid path: 15/15

Path(click to edit):

```
C:\Users\seo hyunji\Desktop\target plugin\zlib-1.2.11\zlib-1.2.11\adler32.c
C:\Users\seo hyunji\Desktop\target plugin\zlib-1.2.11\zlib-1.2.11\crc32.c
C:\Users\seo hyunji\Desktop\target plugin\zlib-1.2.11\zlib-1.2.11\deflate.c
C:\Users\seo hyunji\Desktop\target plugin\zlib-1.2.11\zlib-1.2.11\gzclose.c
C:\Users\seo hyunji\Desktop\target plugin\zlib-1.2.11\zlib-1.2.11\gzlib.c
C:\Users\seo hyunji\Desktop\target plugin\zlib-1.2.11\zlib-1.2.11\gzread.c
C:\Users\seo hyunji\Desktop\target plugin\zlib-1.2.11\zlib-1.2.11\gzwrite.c
C:\Users\seo hyunji\Desktop\target plugin\zlib-1.2.11\zlib-1.2.11\infback.c
C:\Users\seo hyunji\Desktop\target plugin\zlib-1.2.11\zlib-1.2.11\inffast.c
C:\Users\seo hyunji\Desktop\target plugin\zlib-1.2.11\zlib-1.2.11\inflate.c
C:\Users\seo hyunji\Desktop\target plugin\zlib-1.2.11\zlib-1.2.11\inftrees.c
C:\Users\seo hyunji\Desktop\target plugin\zlib-1.2.11\zlib-1.2.11\trees.c
C:\Users\seo hyunji\Desktop\target plugin\zlib-1.2.11\zlib-1.2.11\uncompr.c
C:\Users\seo hyunji\Desktop\target plugin\zlib-1.2.11\zlib-1.2.11\zutil.c
C:\Users\seo hyunji\Desktop\target plugin\zlib-1.2.11\zlib-1.2.13\compress.c
```

4. If you edit one path, all paths that can be found in the relative path are automatically corrected. The number of modified paths is displayed at the top of the wizard. After editting, click the [Finish] button.



Check the paths included in the project

ⓘ Invalid path: 0/15
15 paths have been resolved.

Path(click to edit):

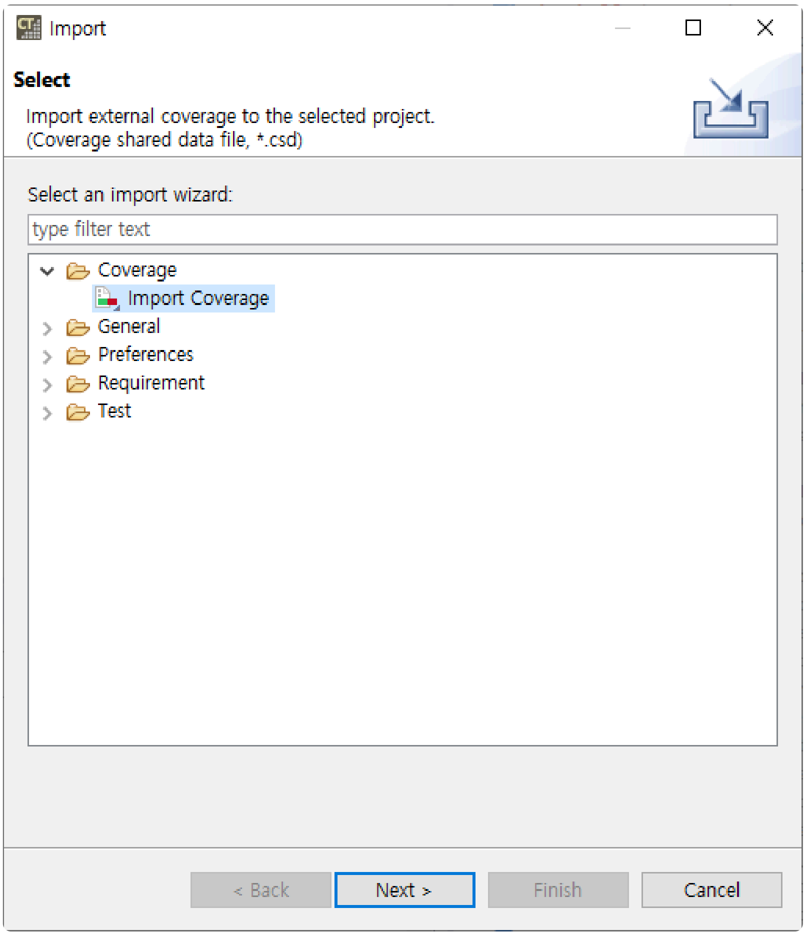
```
C:\Users\vagrant\Desktop\source\zlib1211\zlib-1.2.11\adler32.c
C:\Users\vagrant\Desktop\source\zlib1211\zlib-1.2.11\compress.c
C:\Users\vagrant\Desktop\source\zlib1211\zlib-1.2.11\crc32.c
C:\Users\vagrant\Desktop\source\zlib1211\zlib-1.2.11\deflate.c
C:\Users\vagrant\Desktop\source\zlib1211\zlib-1.2.11\gzclose.c
C:\Users\vagrant\Desktop\source\zlib1211\zlib-1.2.11\gzlib.c
C:\Users\vagrant\Desktop\source\zlib1211\zlib-1.2.11\gzread.c
C:\Users\vagrant\Desktop\source\zlib1211\zlib-1.2.11\gzwrite.c
C:\Users\vagrant\Desktop\source\zlib1211\zlib-1.2.11\infback.c
C:\Users\vagrant\Desktop\source\zlib1211\zlib-1.2.11\inffast.c
C:\Users\vagrant\Desktop\source\zlib1211\zlib-1.2.11\inflate.c
C:\Users\vagrant\Desktop\source\zlib1211\zlib-1.2.11\inftrees.c
C:\Users\vagrant\Desktop\source\zlib1211\zlib-1.2.11\trees.c
C:\Users\vagrant\Desktop\source\zlib1211\zlib-1.2.11\uncompr.c
C:\Users\vagrant\Desktop\source\zlib1211\zlib-1.2.11\zutil.c
```

✻ If path is not in absolute path format of Windows OS, the path is not checked for validity.

19.3.6. Coverage – Import Coverage

! If the version, the coverage type, and the ternary operator option of the coverage file to be imported are the same as those of CT 2023.12, the coverage can be imported. For details, please refer to the Coverage Import Guide page of User Guides.

1. In the [Import] wizard, select [Coverage] > [Import Coverage] and click [Next].



Import

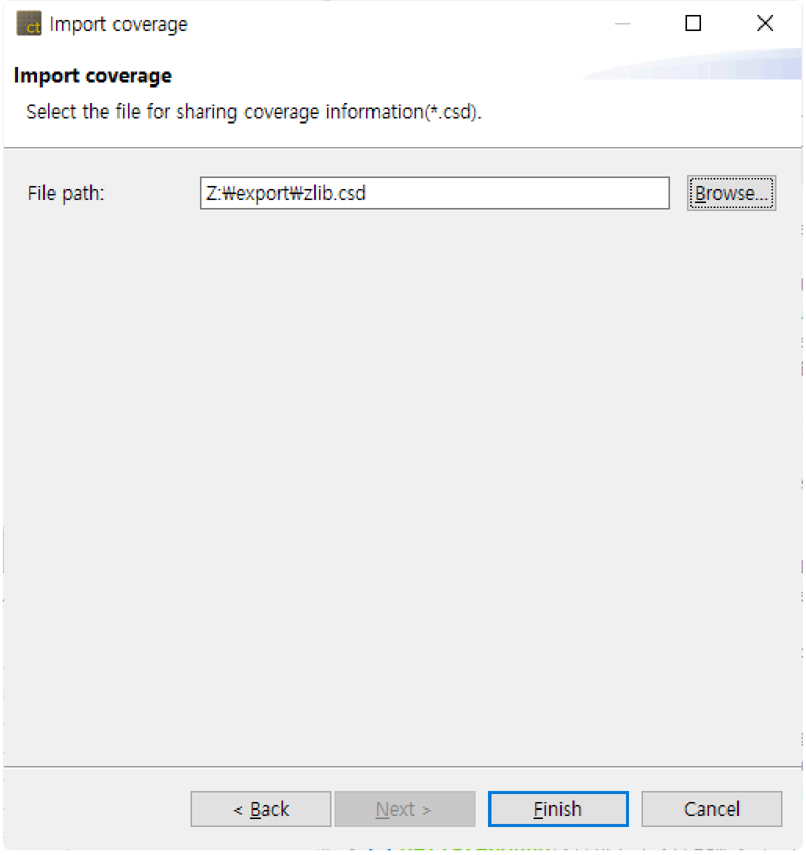
Select

Import external coverage to the selected project.
(Coverage shared data file, *.csd)

Select an import wizard:

type filter text

2. Enter the path of coverage file to be imported and click [Finish].

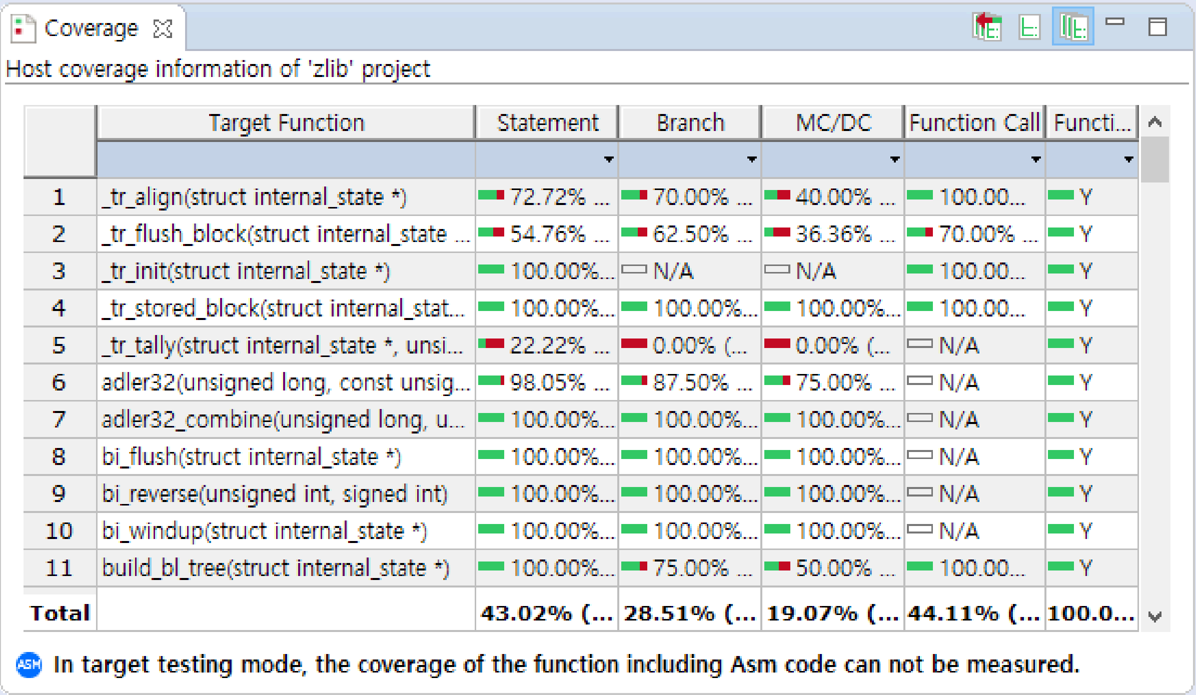


Import coverage

Select the file for sharing coverage information(*.csd).

File path: Z:₩export₩zlib.csd

The imported coverage information can be checked by selecting [Show full coverage (Include External Coverage)] in the toolbar menu of the Coverage View.



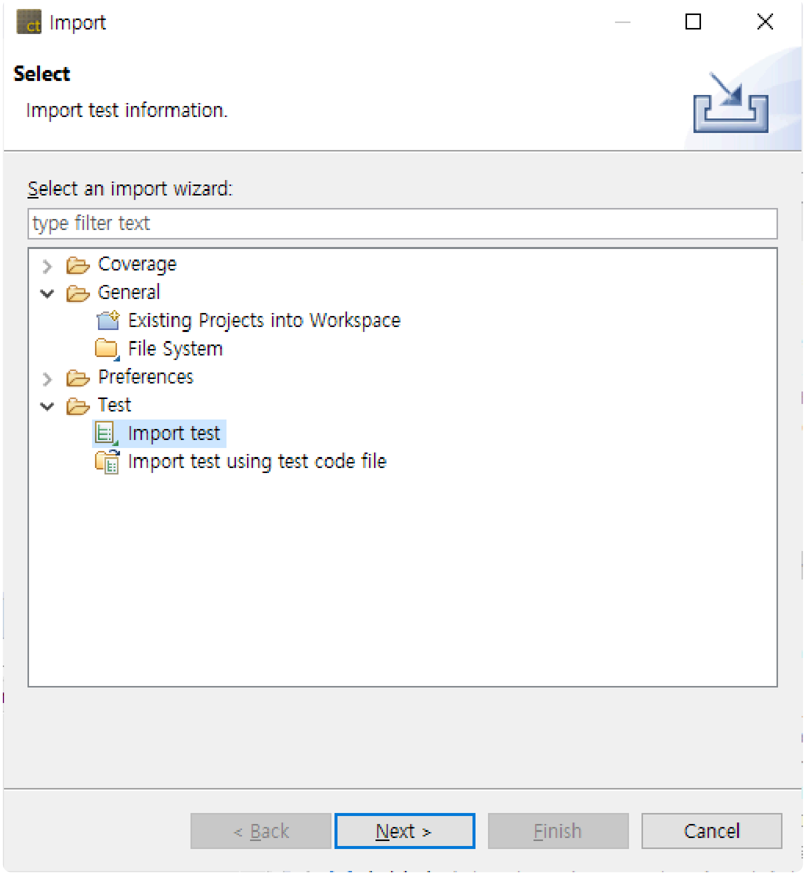
Host coverage information of 'zlib' project

	Target Function	Statement	Branch	MC/DC	Function Call	Functi...
1	_tr_align(struct internal_state *)	72.72% ...	70.00% ...	40.00% ...	100.00...	Y
2	_tr_flush_block(struct internal_state ...	54.76% ...	62.50% ...	36.36% ...	70.00% ...	Y
3	_tr_init(struct internal_state *)	100.00%...	N/A	N/A	100.00...	Y
4	_tr_stored_block(struct internal_stat...	100.00%...	100.00%...	100.00%...	100.00...	Y
5	_tr_tally(struct internal_state *, unsi...	22.22% ...	0.00% (...	0.00% (...	N/A	Y
6	adler32(unsigned long, const unsig...	98.05% ...	87.50% ...	75.00% ...	N/A	Y
7	adler32_combine(unsigned long, u...	100.00%...	100.00%...	100.00%...	N/A	Y
8	bi_flush(struct internal_state *)	100.00%...	100.00%...	100.00%...	N/A	Y
9	bi_reverse(unsigned int, signed int)	100.00%...	100.00%...	100.00%...	N/A	Y
10	bi_windup(struct internal_state *)	100.00%...	100.00%...	100.00%...	N/A	Y
11	build_bl_tree(struct internal_state *)	100.00%...	75.00% ...	50.00% ...	100.00...	Y
Total		**43.02% (...**	**28.51% (...**	**19.07% (...**	**44.11% (...**	**100.0...**

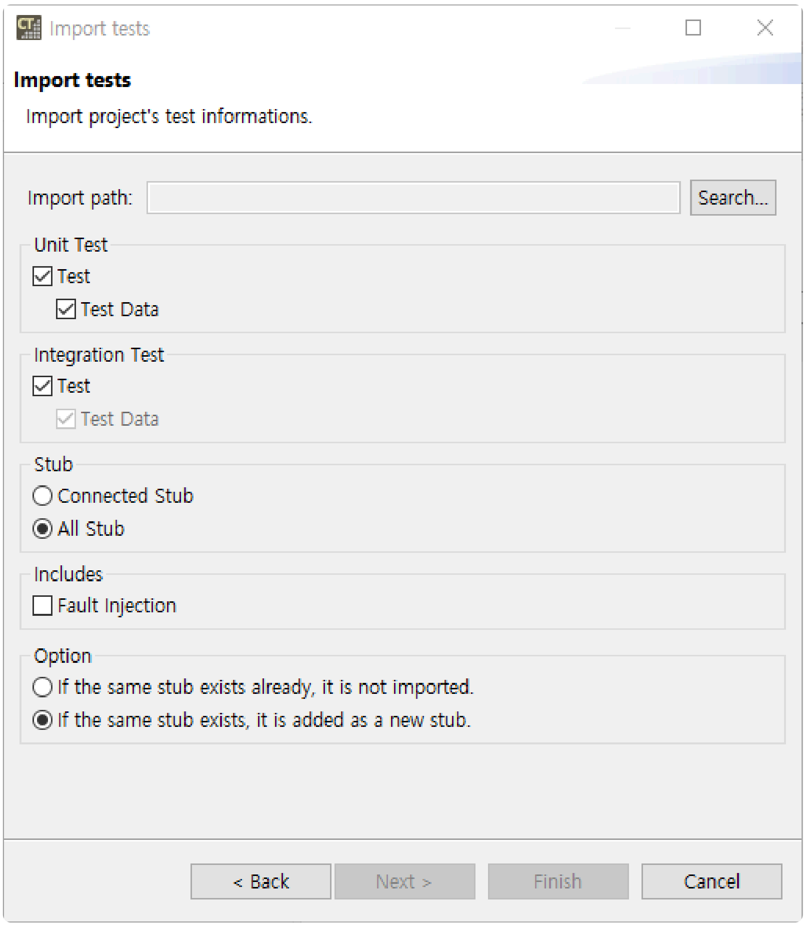
In target testing mode, the coverage of the function including Asm code can not be measured.

19.3.7. Test – Import test

1. In the Import Wizard, select [Test] > [Import Test] and click [Next].



2. Enter the information for the test to be imported and click [Finish].



Import tests

Import tests

Import project's test informations.

Import path:

Unit Test
☑ Test
☑ Test Data

Integration Test
☑ Test
☑ Test Data

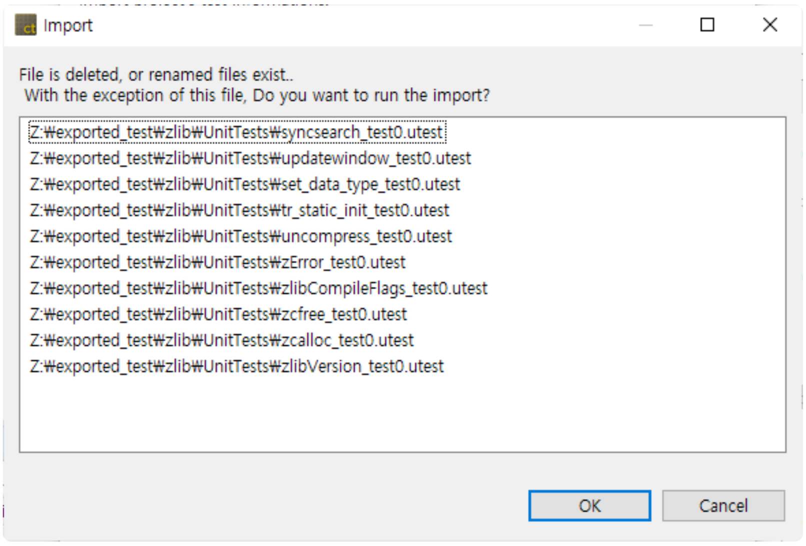
Stub
○ Connected Stub
● All Stub

Includes
□ Fault Injection

Option
○ If the same stub exists already, it is not imported.
● If the same stub exists, it is added as a new stub.

a. In [Import path], enter the path to import the test.
b. In [Unit Test] group, check whether to import [Test] and [Test Data] respectively.
c. In [Integration Test] group, check whether to import [Test].
    - When importing the integration test, it is imported with the test data in a set.
d. In [Stub] group, select the stub to be imported among [Connected stubs] and [All stubs].
    - **Connected stubs**: It imports only the stubs associated with the test you want to import.
    - **All Stub**: It imports all the stubs in the path to import.
e. In [Includes] group, select whether to import with fault injections.
f. In [Option] group, select the method to import if stubs exist.

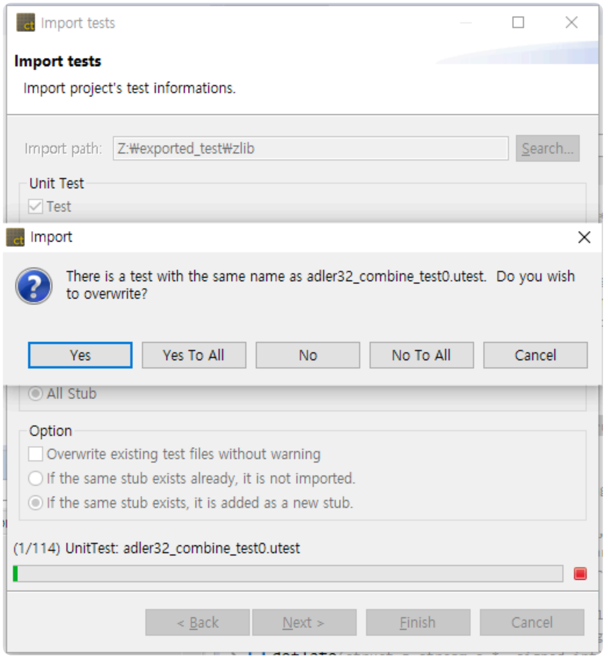
3. If there are items that the name has been changed or the file has been deleted when importing the test information, the notification windows is displayed, allowing you to select whether to import the information except for that items. This notification window is displayed only if the information was exported from Controller Tester 2.6.14 or later version at a time. If the information is exported from the other menu and previous version, the notification is not displayed.



File is deleted, or renamed files exist..
With the exception of this file, Do you want to run the import?

```
Z:₩exported_test₩zlib₩UnitTests₩syncsearch_test0.utest
Z:₩exported_test₩zlib₩UnitTests₩updatewindow_test0.utest
Z:₩exported_test₩zlib₩UnitTests₩set_data_type_test0.utest
Z:₩exported_test₩zlib₩UnitTests₩tr_static_init_test0.utest
Z:₩exported_test₩zlib₩UnitTests₩uncompress_test0.utest
Z:₩exported_test₩zlib₩UnitTests₩zError_test0.utest
Z:₩exported_test₩zlib₩UnitTests₩zlibCompileFlags_test0.utest
Z:₩exported_test₩zlib₩UnitTests₩zcfree_test0.utest
Z:₩exported_test₩zlib₩UnitTests₩zcalloc_test0.utest
Z:₩exported_test₩zlib₩UnitTests₩zlibVersion_test0.utest
```

4. If the same test exists in the project, select whether to overwrite the test. Select [Yes] to overwrite and select [No] to cancel the import.



Import tests

Import project's test informations.

Import path: Z:₩exported_test₩zlib

Unit Test

☑ Test

There is a test with the same name as adler32_combine_test0.utest. Do you wish to overwrite?

● All Stub

Option

□ Overwrite existing test files without warning

○ If the same stub exists already, it is not imported.

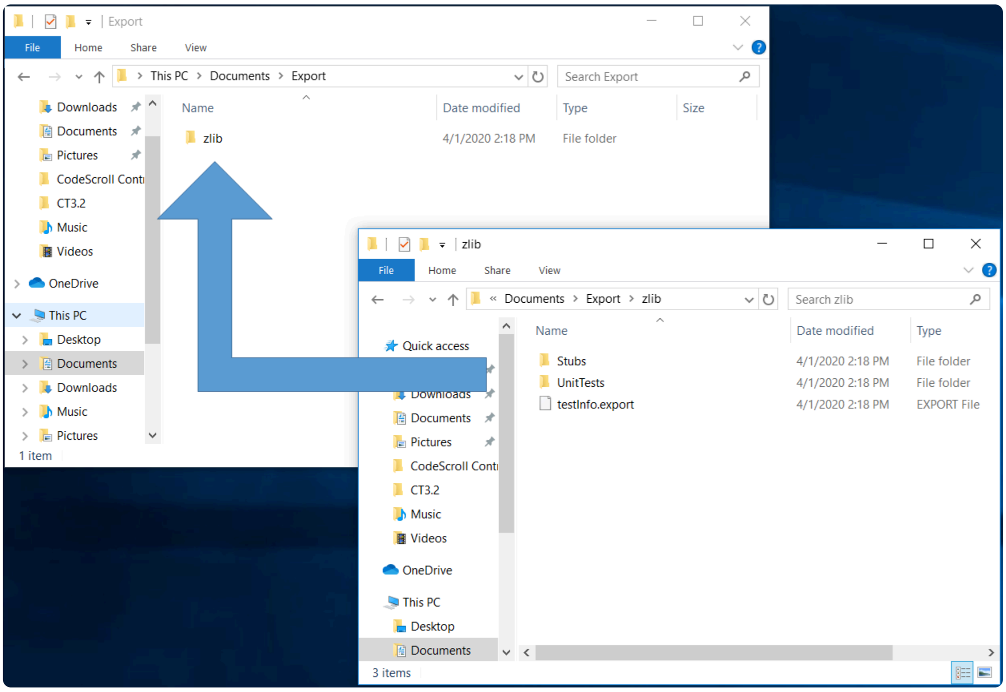
● If the same stub exists, it is added as a new stub.

(1/114) UnitTest: adler32_combine_test0.utest

5. After the import has completed, it is applied to the selected project.

Import information exported from Controller Tester 2.6.14 or earlier

1. Enter the path to import the test in [Import path].



Name	Date modified	Type	Size
zlib	4/1/2020 2:18 PM	File folder	

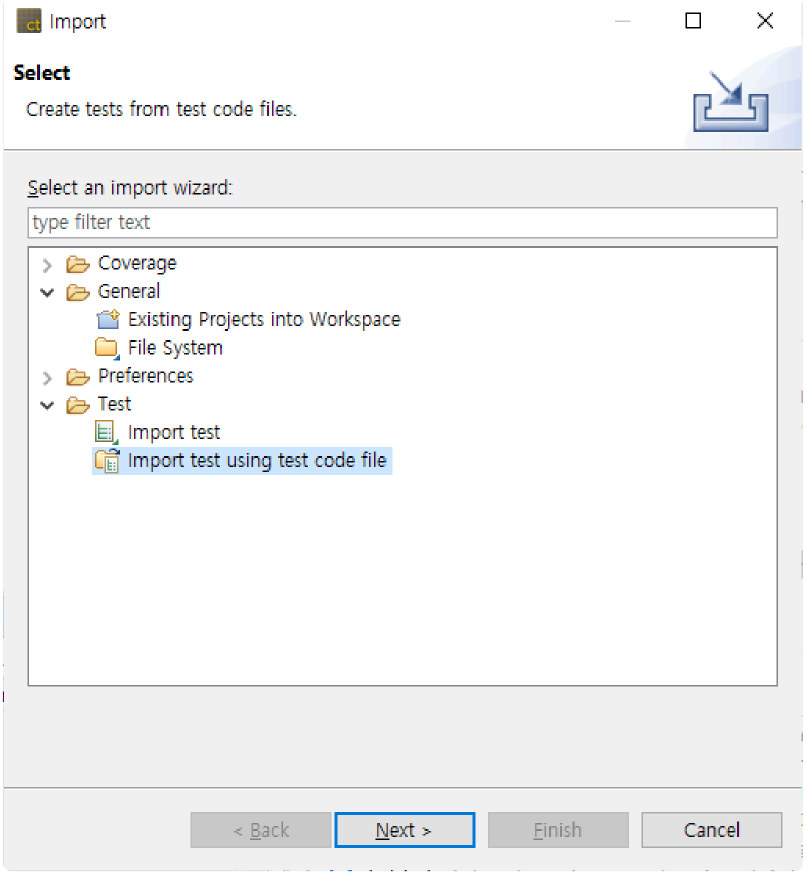
Name	Date modified	Type
Stubs	4/1/2020 2:18 PM	File folder
UnitTests	4/1/2020 2:18 PM	File folder
testInfo.export	4/1/2020 2:18 PM	EXPORT File

- If [testinfo.export] file exists in the test path to be imported, select the directory containing the file.
  If you import the information exported separately from Controller Tester 2.6.14 or less version, select the higher-level directory containing the information exported.

2. In [Unit Test] group, check whether to import [Test] and [Test data] respectively.
3. In [Integration Test] group, check whether to import [Test].
   - The test and data must always be in the same directory, and if it is not, the data is not imported.
4. In [Stub] group, select the stub to be imported among [Connected Stubs] and [All stubs].
   - For the stubs created in Controller Tester 2.3 version, or the stubs migrated to Controller Tester 2.6, if the same stubs exist in the project, the import cannot be carried out.
   - For the stubs created in Controller Tester 2.6 version, if the same stubs exist, you can select either not to import them optionally or to create as a new stub additionally.
   - **There is no feature to link the stubs to the test in Controller Tester 2.3 version, so you need to link directly to the test when migrating to version Controller Tester 2.6 or later.**
5. In [Option] group, select whether to overwrite the existing test files if they exist and how to handle them when the same stub exists.

19.3.8. Test – Import test using test code file

1. In the Import Wizard, select [Test] -> [Import test using test code file] and click [Next].



Import

Select

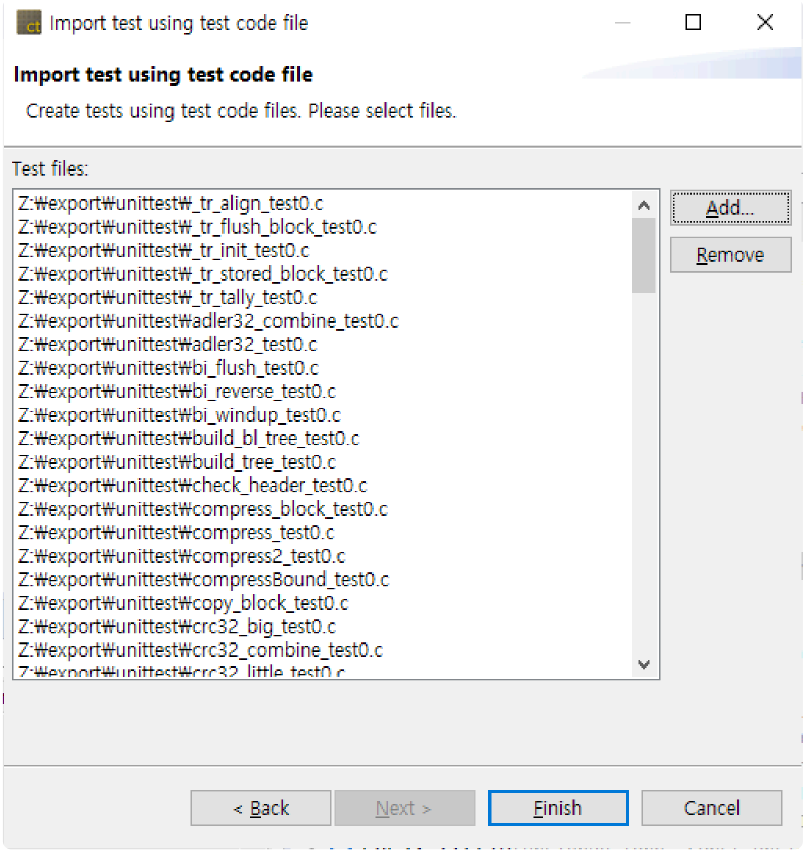
Create tests from test code files.

Select an import wizard:

type filter text

- Coverage
- General
  - Existing Projects into Workspace
  - File System
- Preferences
- Test
  - Import test
  - Import test using test code file

2. Click [Add…] and select the test to be imported.



Import test using test code file

Import test using test code file

Create tests using test code files. Please select files.

Test files:

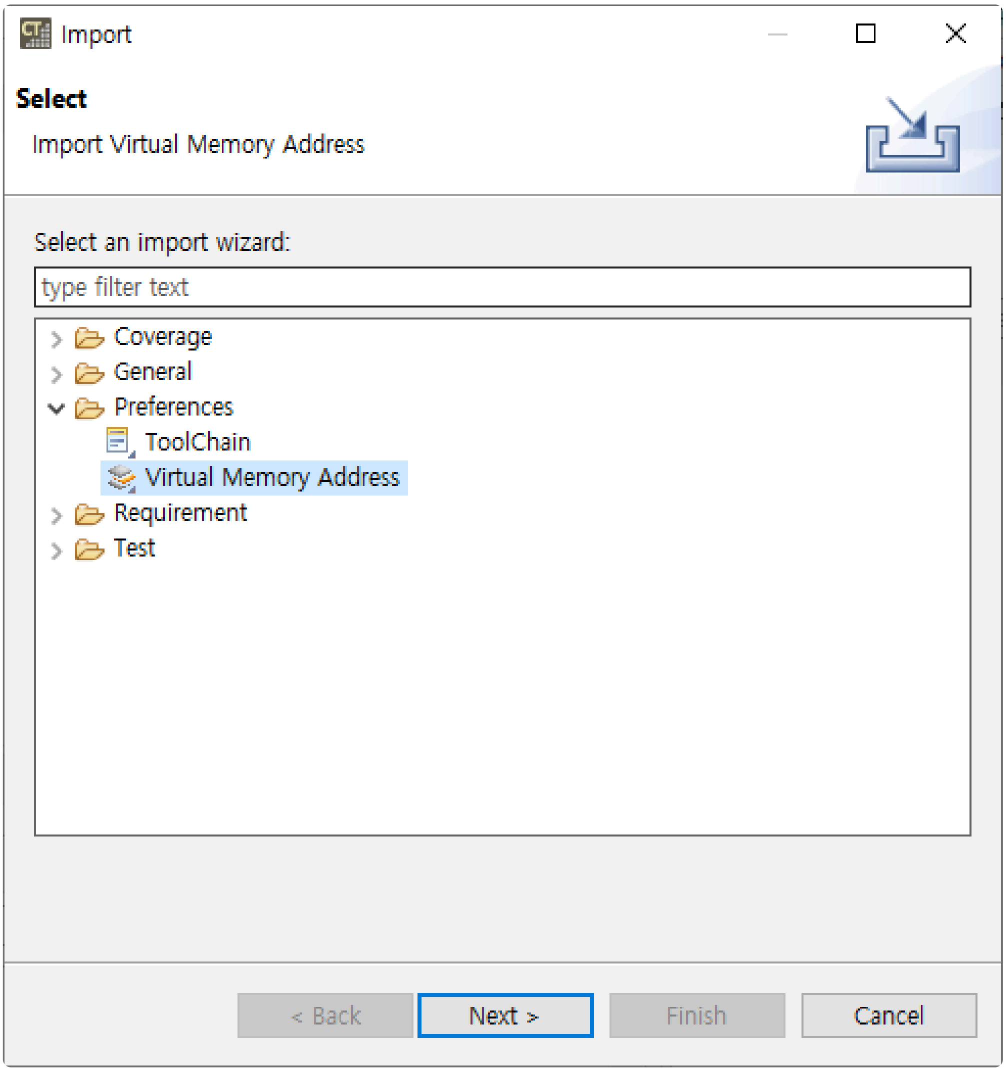
```
Z:₩export₩unittest₩_tr_align_test0.c
Z:₩export₩unittest₩_tr_flush_block_test0.c
Z:₩export₩unittest₩_tr_init_test0.c
Z:₩export₩unittest₩_tr_stored_block_test0.c
Z:₩export₩unittest₩_tr_tally_test0.c
Z:₩export₩unittest₩adler32_combine_test0.c
Z:₩export₩unittest₩adler32_test0.c
Z:₩export₩unittest₩bi_flush_test0.c
Z:₩export₩unittest₩bi_reverse_test0.c
Z:₩export₩unittest₩bi_windup_test0.c
Z:₩export₩unittest₩build_bl_tree_test0.c
Z:₩export₩unittest₩build_tree_test0.c
Z:₩export₩unittest₩check_header_test0.c
Z:₩export₩unittest₩compress_block_test0.c
Z:₩export₩unittest₩compress_test0.c
Z:₩export₩unittest₩compress2_test0.c
Z:₩export₩unittest₩compressBound_test0.c
Z:₩export₩unittest₩copy_block_test0.c
Z:₩export₩unittest₩crc32_big_test0.c
Z:₩export₩unittest₩crc32_combine_test0.c
Z:₩export₩unittest₩crc32_little_test0.c
```

3. Click [Finish] to apply the selected test to the selected project.

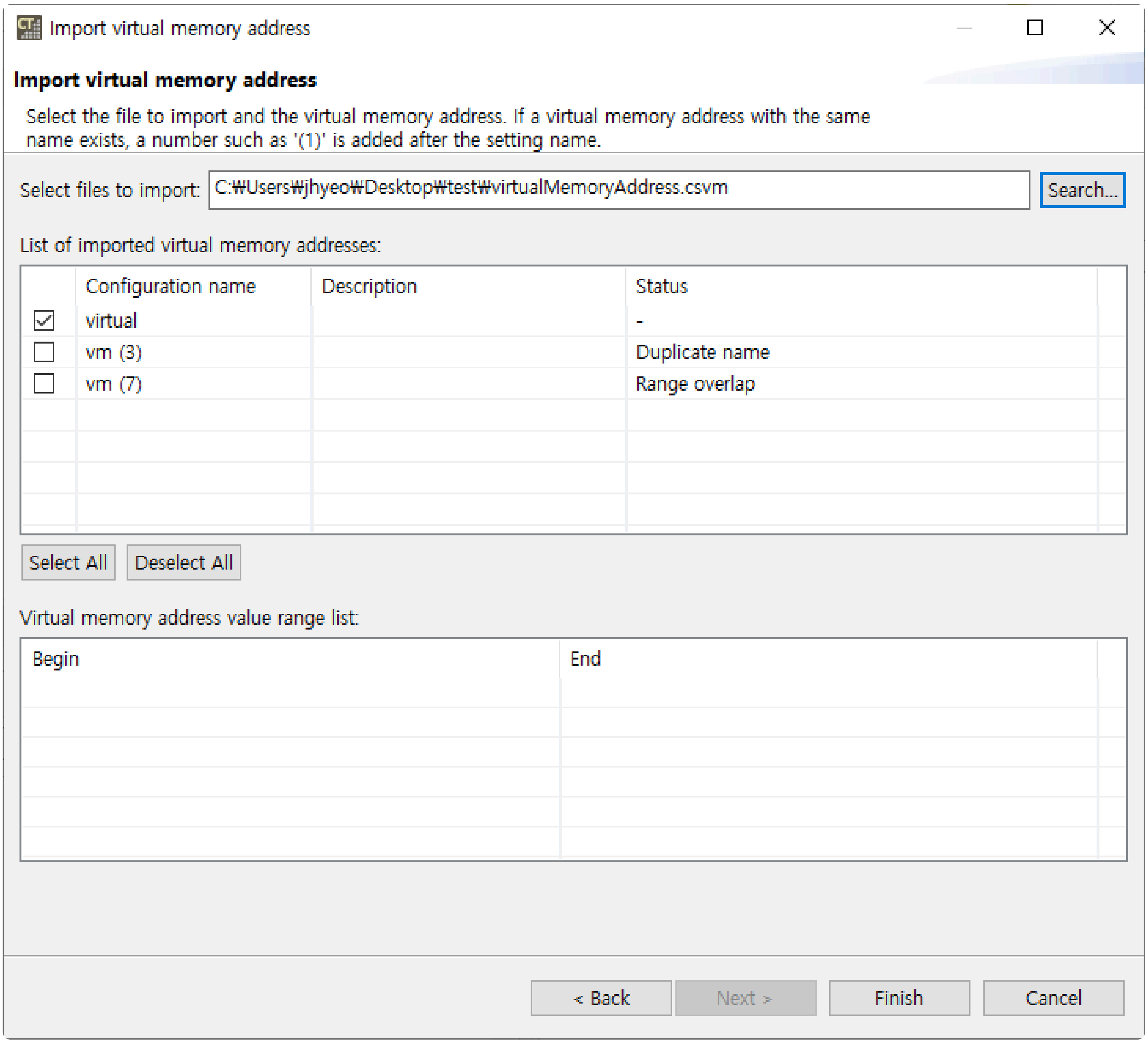
19.3.9. Preferences – Virtual Memory Address

You can import the virtual memory address exported by using the Import function.

1. In the Import Wizard, select [Preferences] > [Virtual Memory Address] and click [Next].



2. When you select a file(*.csvm) to import, a list of virtual memory addresses included in the selected file appears. Select virtual memory addresses to import from the list of virtual memory addresses.



Import virtual memory address

Import virtual memory address

Select the file to import and the virtual memory address. If a virtual memory address with the same name exists, a number such as '(1)' is added after the setting name.

Select files to import: C:₩Users₩jhyeo₩Desktop₩test₩virtualMemoryAddress.csvm

List of imported virtual memory addresses:

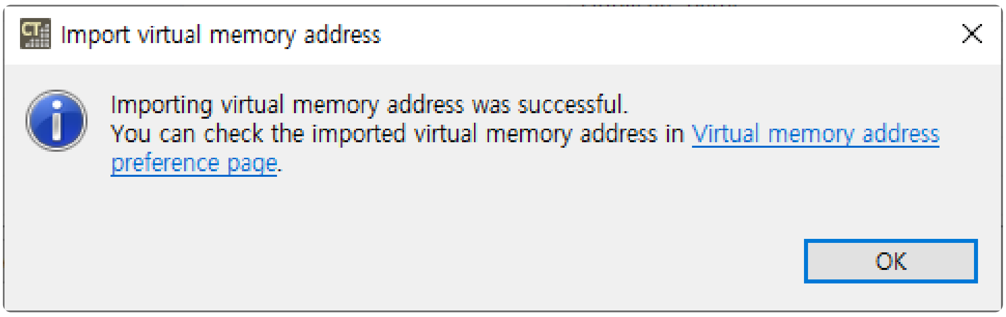
	Configuration name	Description	Status
☑	virtual		-
□	vm (3)		Duplicate name
□	vm (7)		Range overlap

Virtual memory address value range list:

Begin	End

- Status
  - Duplicate name: If there is a virtual memory address with the same name, the import status will be “Duplicate Name”. If you get a virtual memory address that is “Duplicate Name”, it will be imported with the displayed setting name.
  - Range overlap: If there are virtual memory addresses in the same range, the import status will be “Range overlap”. When you get a virtual memory address that is “Range overlap”, the virtual memory address in the same range is imported.

3. Click the [Finish]. You can click the link to check the imported virtual memory address on the [Preference] page.



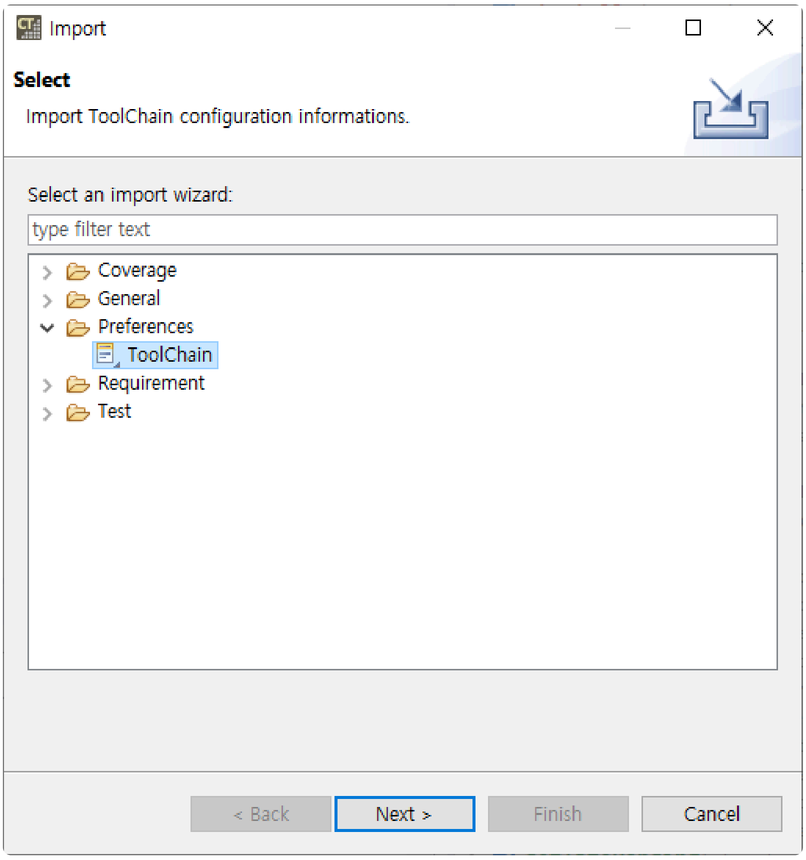
Import virtual memory address

Importing virtual memory address was successful.
You can check the imported virtual memory address in Virtual memory address preference page.

19.3.10. Preferences − ToolChain

You can import the toolchain information exported by using the Import function.

1. In the Import Wizard, select [Preferences] > [ToolChain] and click [Next].



Import

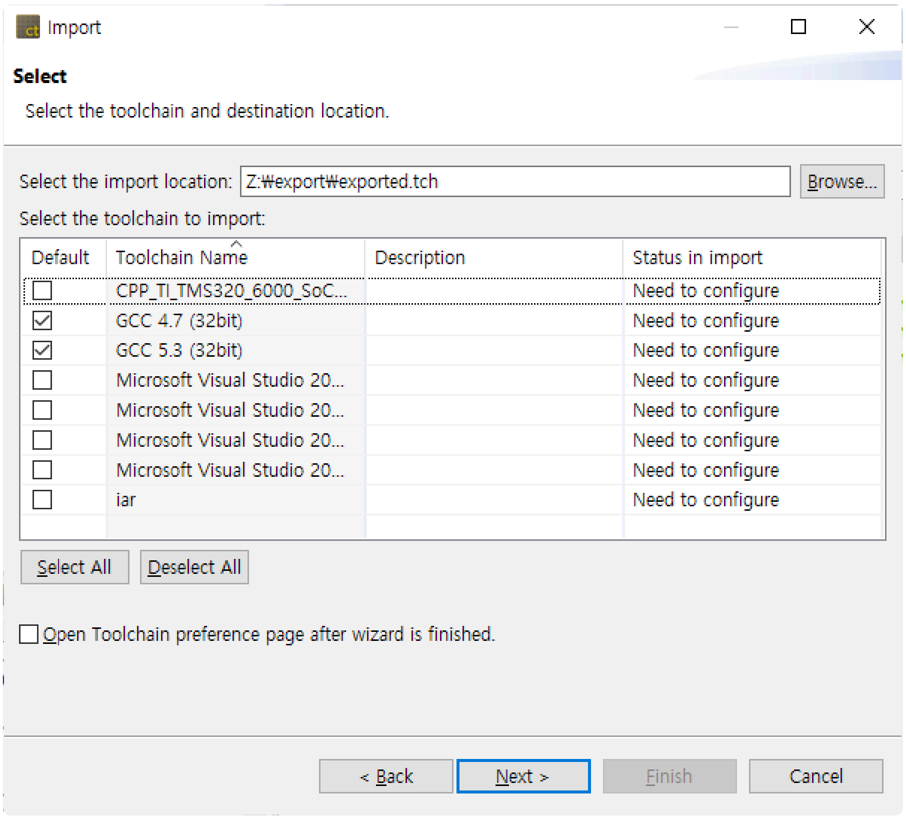
Select

Import ToolChain configuration informations.

Select an import wizard:

type filter text

2. If you select the file (*.tch) to be imported, the list of toolchains included in the selected file are displayed. Select the toolchains to be imported from the toolchain list.



Select

Select the toolchain and destination location.

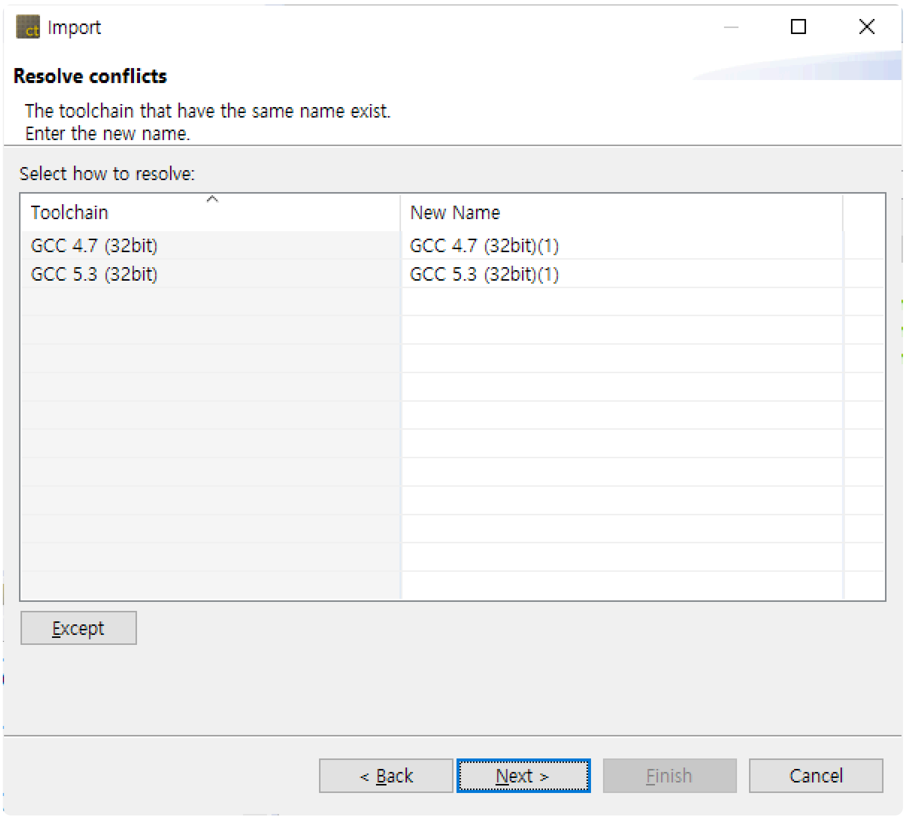
Select the import location: Z:₩export₩exported.tch

Select the toolchain to import:

Default	Toolchain Name	Description	Status in import
□	CPP_TI_TMS320_6000_SoC...		Need to configure
☑	GCC 4.7 (32bit)		Need to configure
☑	GCC 5.3 (32bit)		Need to configure
□	Microsoft Visual Studio 20...		Need to configure
□	Microsoft Visual Studio 20...		Need to configure
□	Microsoft Visual Studio 20...		Need to configure
□	Microsoft Visual Studio 20...		Need to configure
□	iar		Need to configure

□ Open Toolchain preference page after wizard is finished.

3. If the toolchain name is duplicated with the name of the existing toolchain, the import status becomes “Need to modify”. You can change the toolchain name to be imported in the [Select how to resolve] window displayed when clicking [Next] button.



Resolve conflicts

The toolchain that have the same name exist.
Enter the new name.

Select how to resolve:

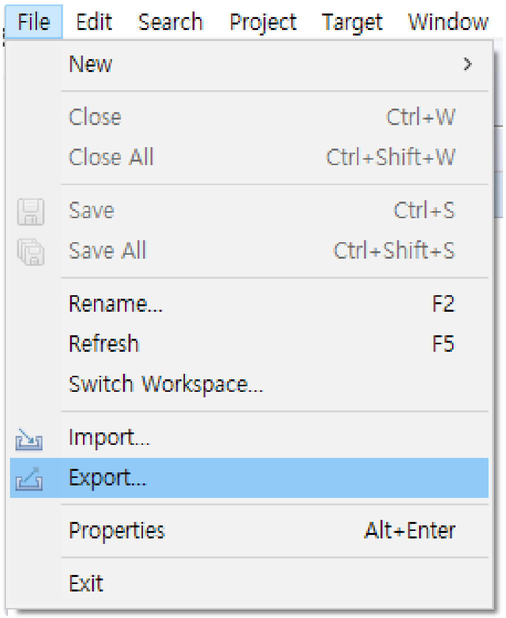
Toolchain	New Name
GCC 4.7 (32bit)	GCC 4.7 (32bit)(1)
GCC 5.3 (32bit)	GCC 5.3 (32bit)(1)

4. Click [Finish].

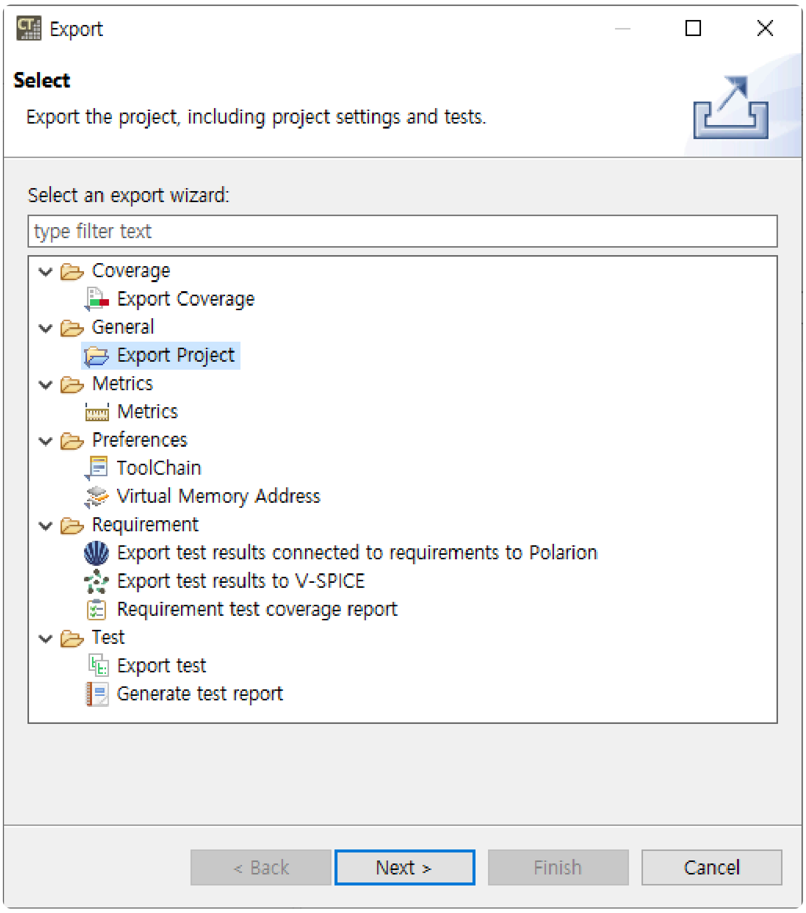
19.4. Export

You can export projects, tests, toolchains, and etc in CT 2023.12.

1. Select [File] > [Export] from the main menu or [Export] from the dashboard to open the Export Wizard.



2. Select a item to export and click [Next].


Export

Select

Export the project, including project settings and tests.

Select an export wizard:

type filter text

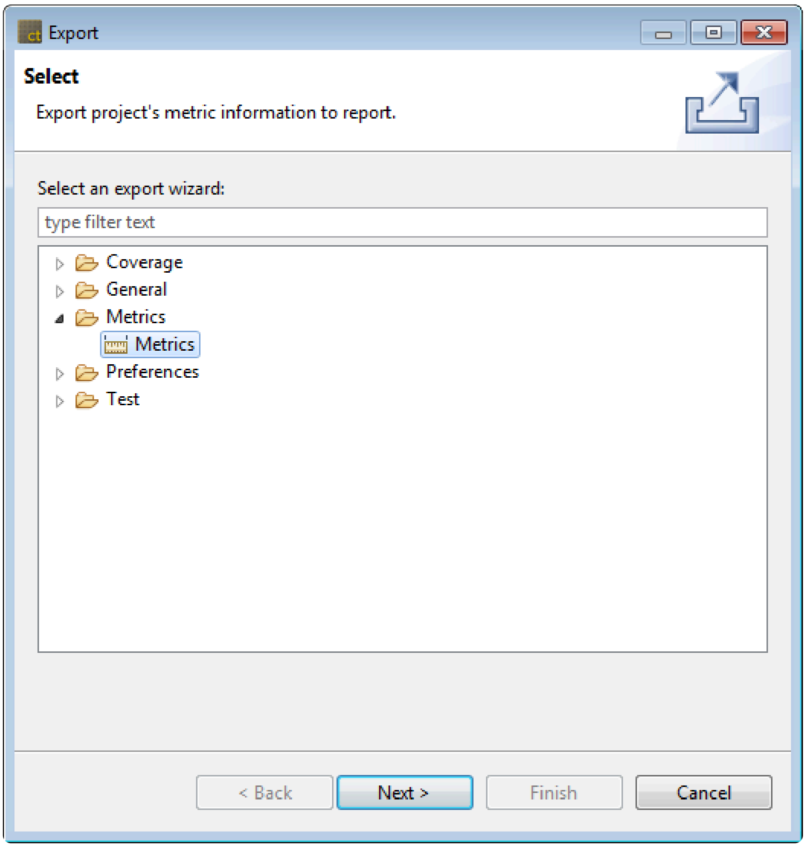
Parent item	Child item	Description

Metrics	Metrics	Export the project’s metrics measurement results in a report format.
Requirement	Export test results connected to requirements to Polarion Requirement test coverage report	Export the results of tests associated with requirements to a requirement management tool or to a CSV file.
General	Export project	Export CT 2023.12 projects.
Coverage	Export Coverage	Export the coverage results in a csd file.
Test	Export test Generate test report	Export tests or generate test reports.
Preferences	ToolChain Virtual Memory Addres	Export virtual memory address or toolchain information.

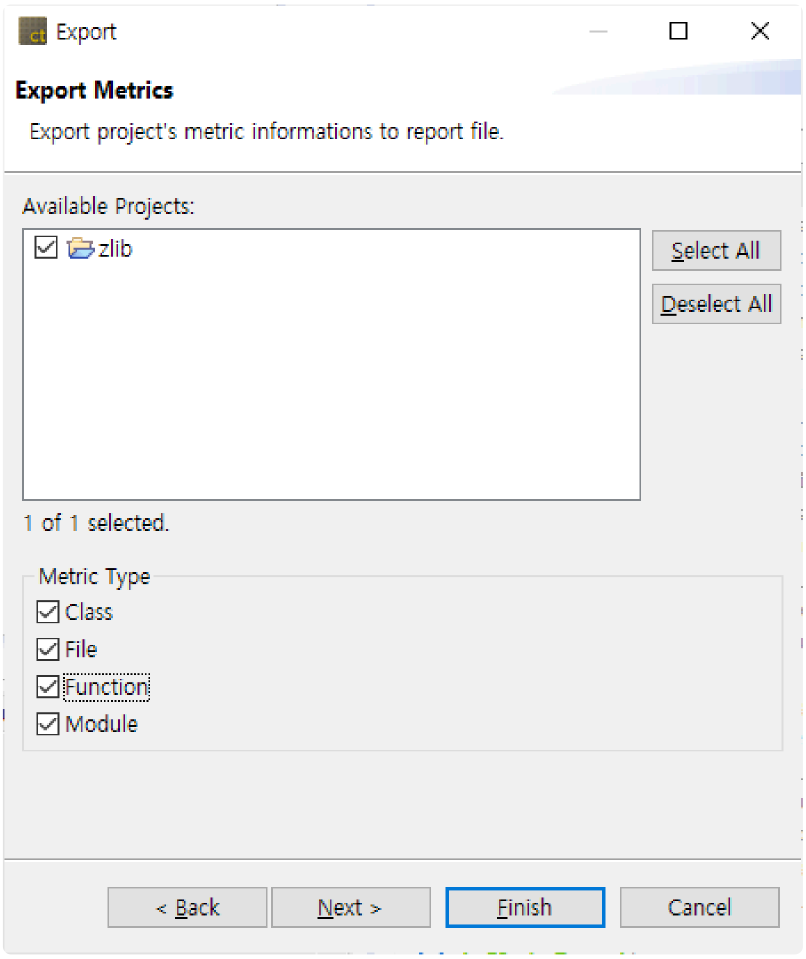
19.4.1. Metrics – Metrics

It exports the metric result of the project in a report file.

1. In the Export Wizard, click [Metric] -> [Metric] and then click the [Next] button.



2. Select the project and metric type to export metric information and click the [Next] button.



Export

Export Metrics

Export project's metric informations to report file.

Available Projects:

☑ zlib

1 of 1 selected.

Metric Type

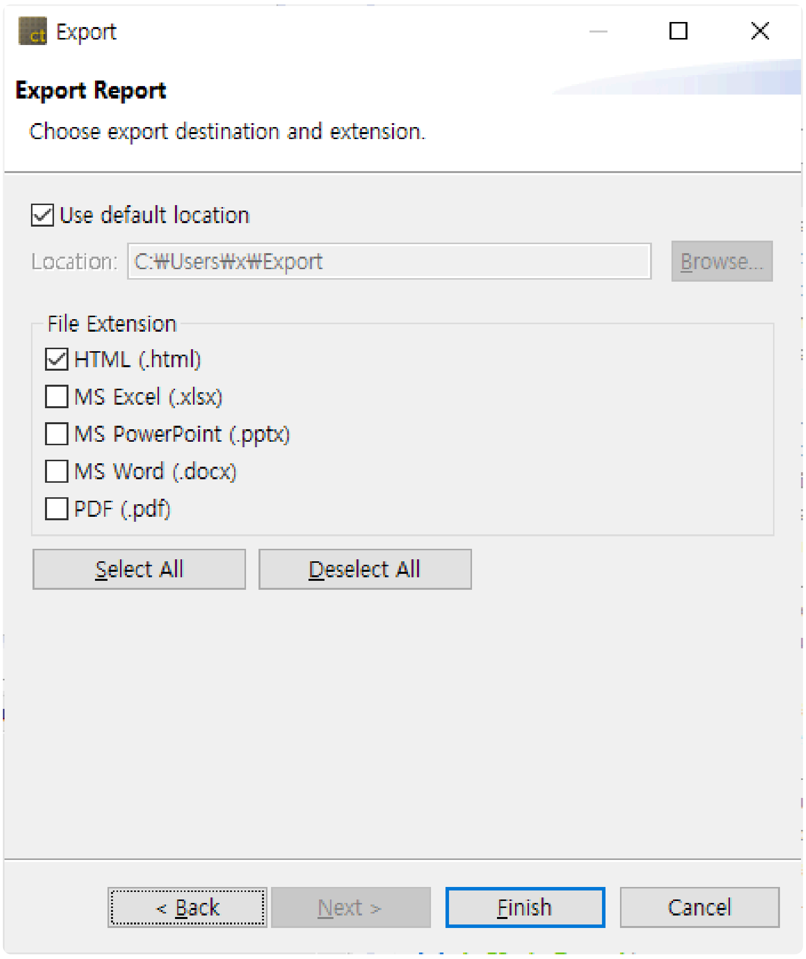
☑ Class

☑ File

☑ Function

☑ Module

3. Select the path and report format to export the report and click the [Finish] button.



Export

Export Report

Choose export destination and extension.

☑ Use default location

Location: C:₩Users₩x₩Export

File Extension

☑ HTML (.html)

☐ MS Excel (.xlsx)

☐ MS PowerPoint (.pptx)

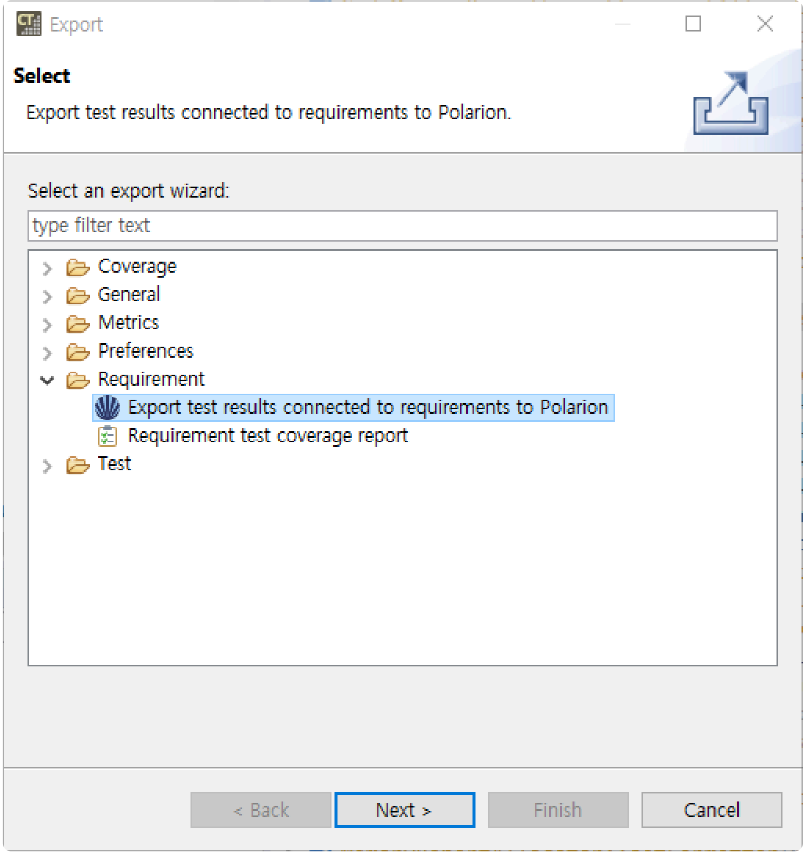
☐ MS Word (.docx)

☐ PDF (.pdf)

19.4.2. Requirement − Export test results connected to requirements to Polarion

You can export test results, which is connected to requirement, to Polarion.

1. In the Export Wizard, select [Requirement] -> [Export test results connected to requirements to Polarion] and click [Next].



Export

Select

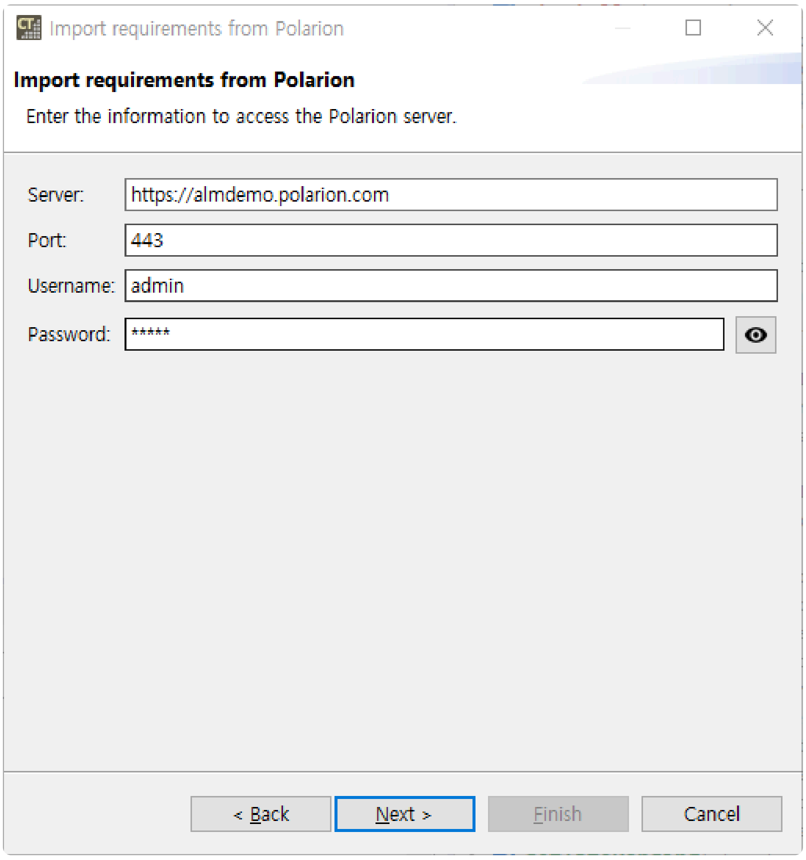
Export test results connected to requirements to Polarion.

Select an export wizard:

type filter text

- Coverage
- General
- Metrics
- Preferences
- Requirement
  - Export test results connected to requirements to Polarion
  - Requirement test coverage report
- Test

2. Enter the information to connect with Polarion server and click [Next]. You can see the entered password to click 👁 button.



Import requirements from Polarion

Enter the information to access the Polarion server.

Server: https://almdemo.polarion.com

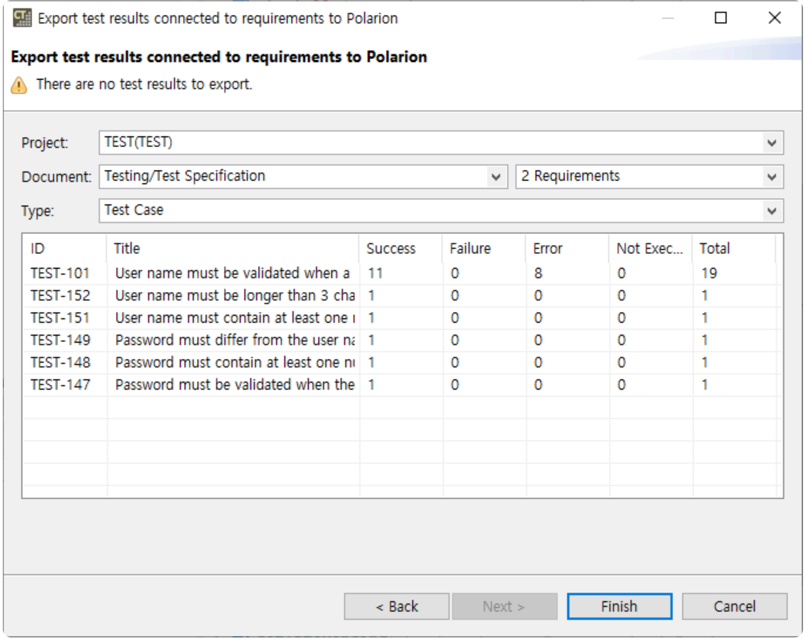
Port: 443

Username: admin

Password: *****

- The information of Polarion’s demo server is entered in server and port.
- If you use a local server, enter `http://ip_address` in server and port number of local server in port.

3. Enter the information of target to export test result and click [Finish].



Export test results connected to requirements to Polarion

⚠ There are no test results to export.

Project: TEST(TEST)

Document: Testing/Test Specification | 2 Requirements

Type: Test Case

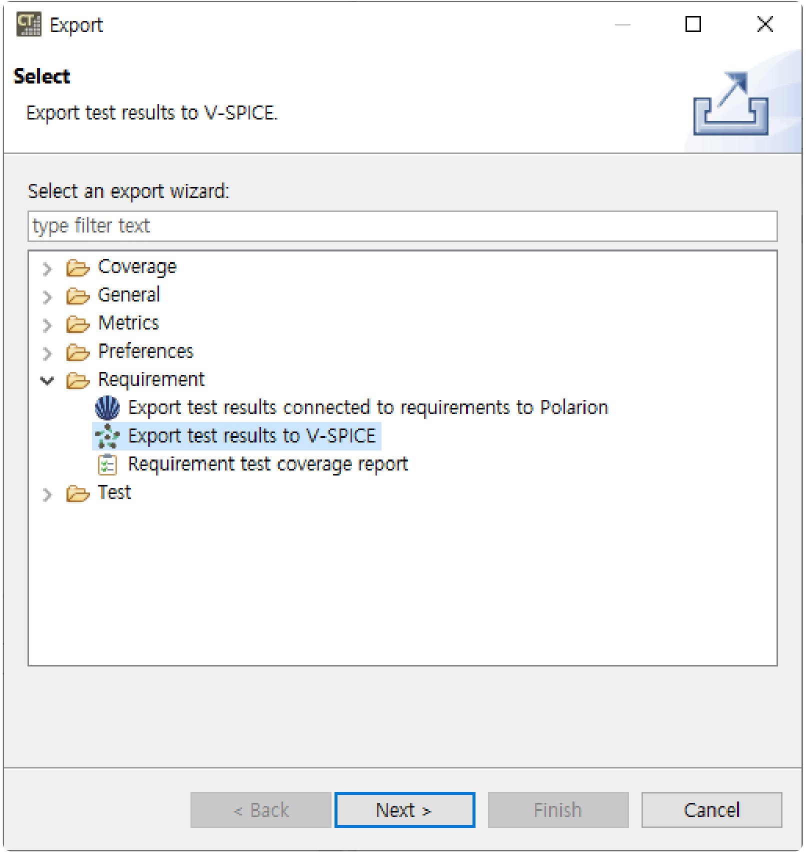
ID	Title	Success	Failure	Error	Not Exec...	Total
TEST-101	User name must be validated when a	11	0	8	0	19
TEST-152	User name must be longer than 3 cha	1	0	0	0	1
TEST-151	User name must contain at least one ı	1	0	0	0	1
TEST-149	Password must differ from the user nạ	1	0	0	0	1
TEST-148	Password must contain at least one nı	1	0	0	0	1
TEST-147	Password must be validated when the	1	0	0	0	1

- Project : Select a project to export test results. The project from which the requirements were imported is selected by default.
- Document : Select a document and a content to export the test results. You can export test results without selecting a document.
- Type : Select a type of work item to export the test results.

19.4.3. Requirement – Export test results to V-SPICE

You can export test results to V-SPICE.

1. In the Export Wizard, select [Requirement] -> [Export test result to V-SPICE] and click [Next].



Export

Select

Export test results to V-SPICE.

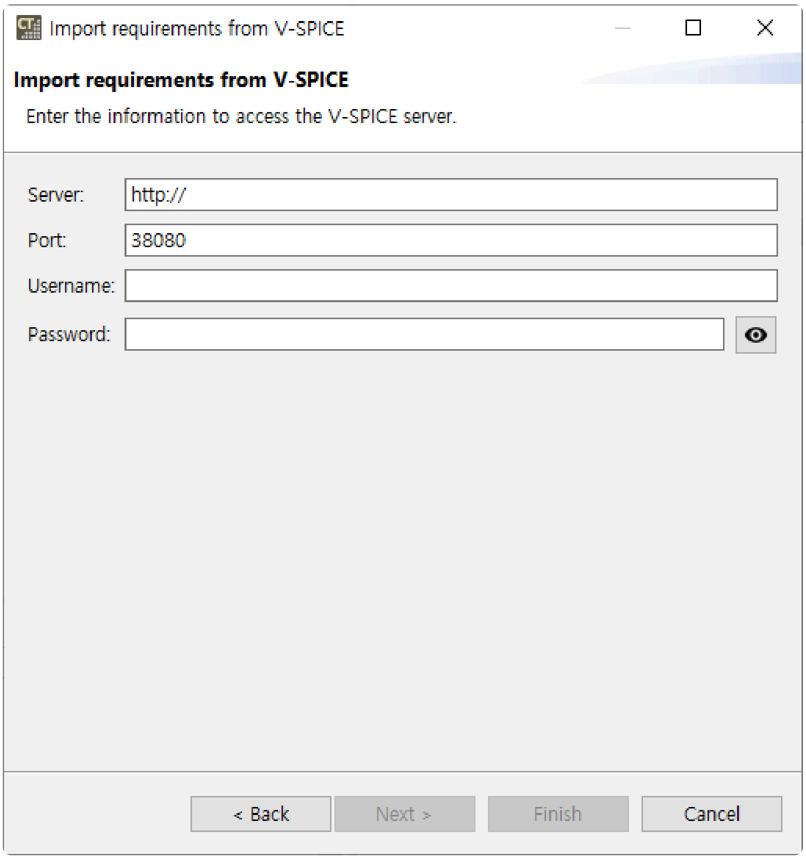
Select an export wizard:

type filter text

- Coverage
- General
- Metrics
- Preferences
- Requirement
  - Export test results connected to requirements to Polarion
  - Export test results to V-SPICE
  - Requirement test coverage report
- Test

< Back | Next > | Finish | Cancel

2. Enter the information to connect with V-SPICEserver and click [Next]. You can see the entered password to click 👁 button.



Import requirements from V-SPICE

Import requirements from V-SPICE

Enter the information to access the V-SPICE server.

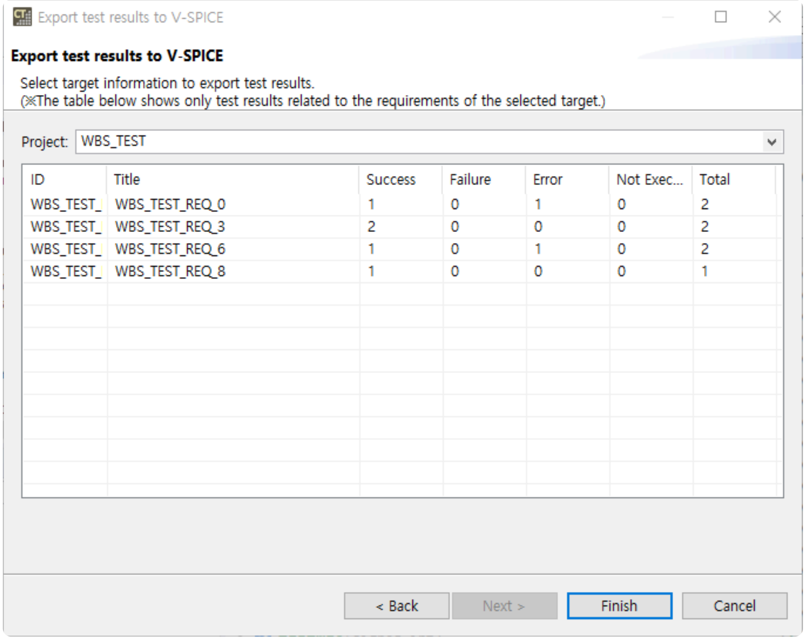
Server: http://

Port: 38080

Username:

Password:

3. Enter the information of target to export test result and click [Finish].



Export test results to V-SPICE

Export test results to V-SPICE

Select target information to export test results.
(※The table below shows only test results related to the requirements of the selected target.)

Project: WBS_TEST

ID	Title	Success	Failure	Error	Not Exec...	Total
WBS_TEST_	WBS_TEST_REQ_0	1	0	1	0	2
WBS_TEST_	WBS_TEST_REQ_3	2	0	0	0	2
WBS_TEST_	WBS_TEST_REQ_6	1	0	1	0	2
WBS_TEST_	WBS_TEST_REQ_8	1	0	0	0	1

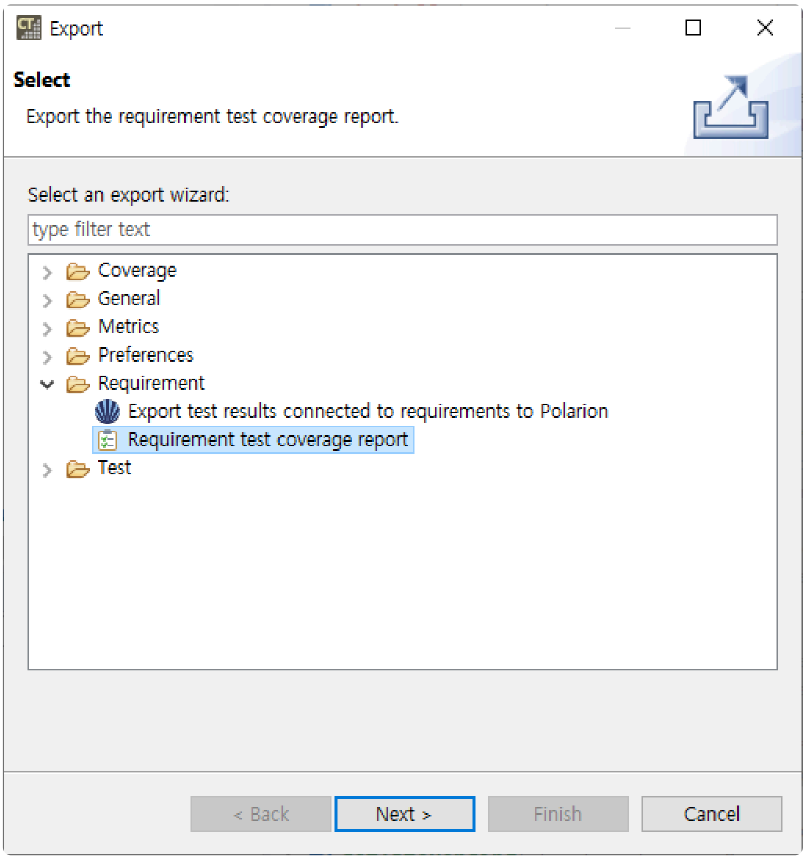
- Project : Select a project to export test results. The project from which the requirements were imported is selected by default.

> ✻ If there are no tests connected with a requirement in the selected V-SPICE project, the list of requirements is not displayed. All test information is exported even if the requirements list is not displayed.

19.4.4. Requirement – Requirement test coverage report

You can generate requirement test coverage report in excel format.

1. In the Export Wizard, select [Requirement] -> [Requirement test coverage report] and click [Next].



Export

Select

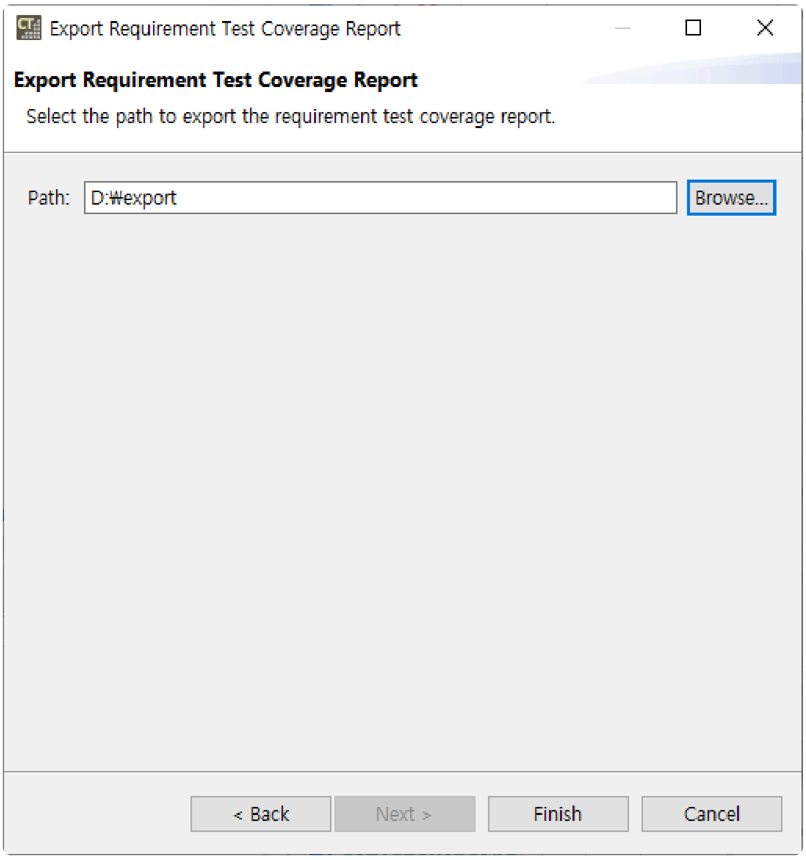
Export the requirement test coverage report.

Select an export wizard:

type filter text

- Coverage
- General
- Metrics
- Preferences
- Requirement
  - Export test results connected to requirements to Polarion
  - Requirement test coverage report
- Test

2. Select the path to export requirement test coverage report and click [Finish].



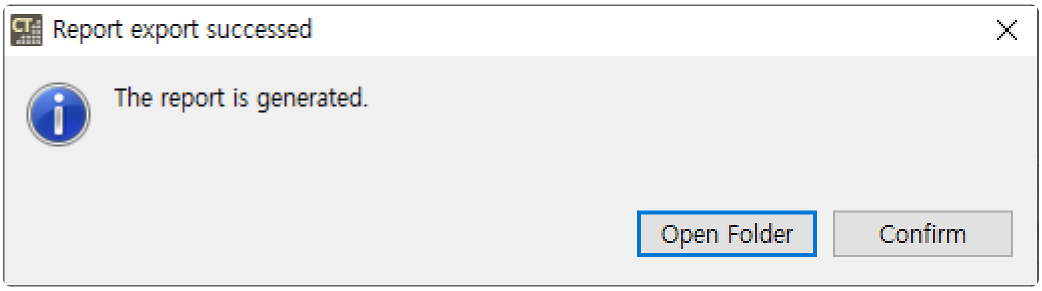
Export Requirement Test Coverage Report

Export Requirement Test Coverage Report

Select the path to export the requirement test coverage report.

Path: D:₩export

3. You can check the exported report by clicking [Open Folder] .



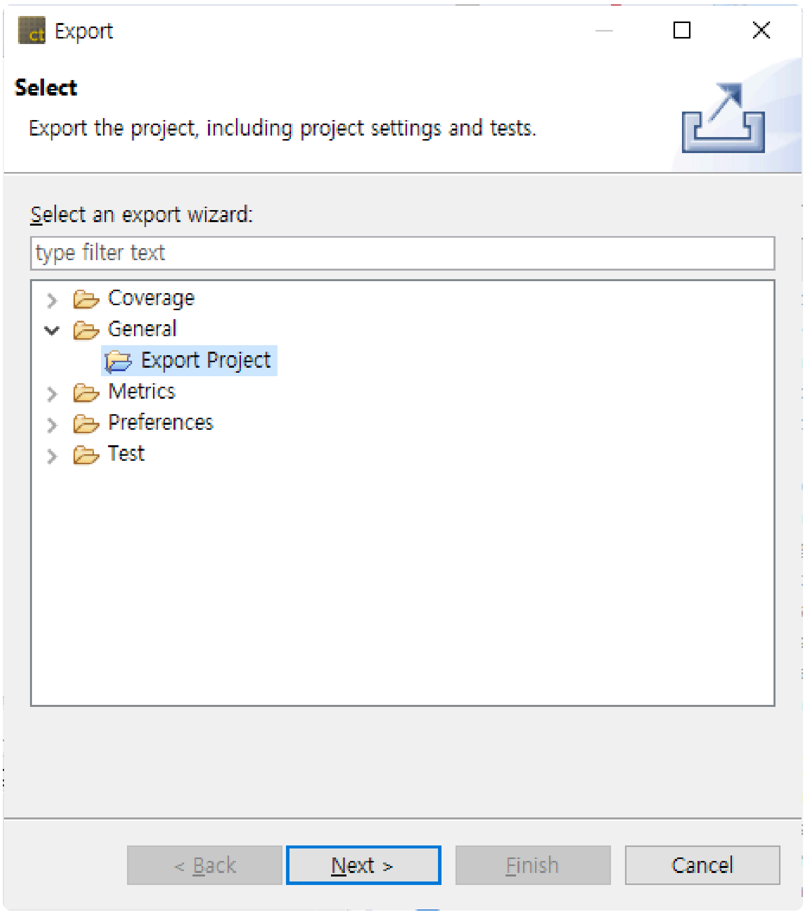
Report export successed

The report is generated.

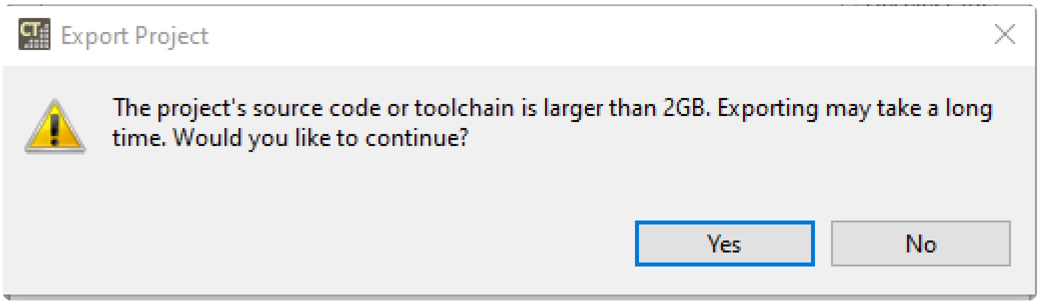
19.4.5. General − Export project

The project can be exported including the project settings and the test. The exported project can be imported with [Import Project].

1. In the Export Wizard, select [General] > [Export Project] and click [Next].



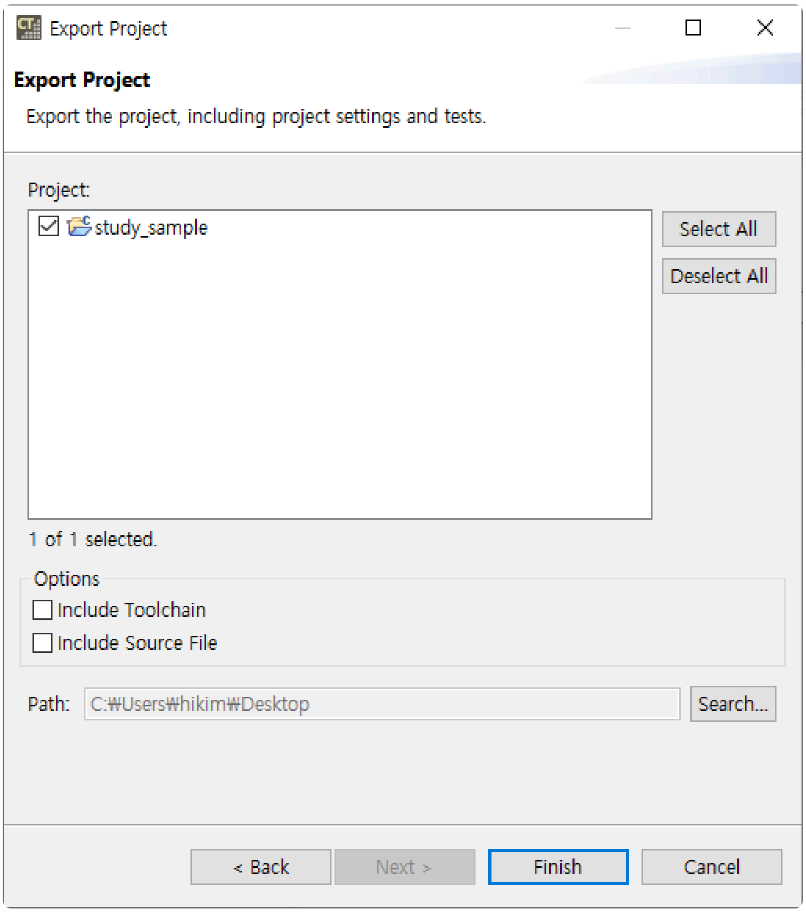
2. When exporting, including toolchains or source files, if it exceeds 2GB, a warning may occur that it could take a long time. If there are unnecessary files in the project source file path, you can improve the export speed by deleting those files. If you wish to proceed as is, click the [Yes] button.



Export Project

The project's source code or toolchain is larger than 2GB. Exporting may take a long time. Would you like to continue?

3. Select the project to be exported and the export path and click [Finish]. When you export a project, you can export it including the toolchain and source files.



Export Project

Export Project

Export the project, including project settings and tests.

Project:

☑ study_sample

1 of 1 selected.

Options

☐ Include Toolchain

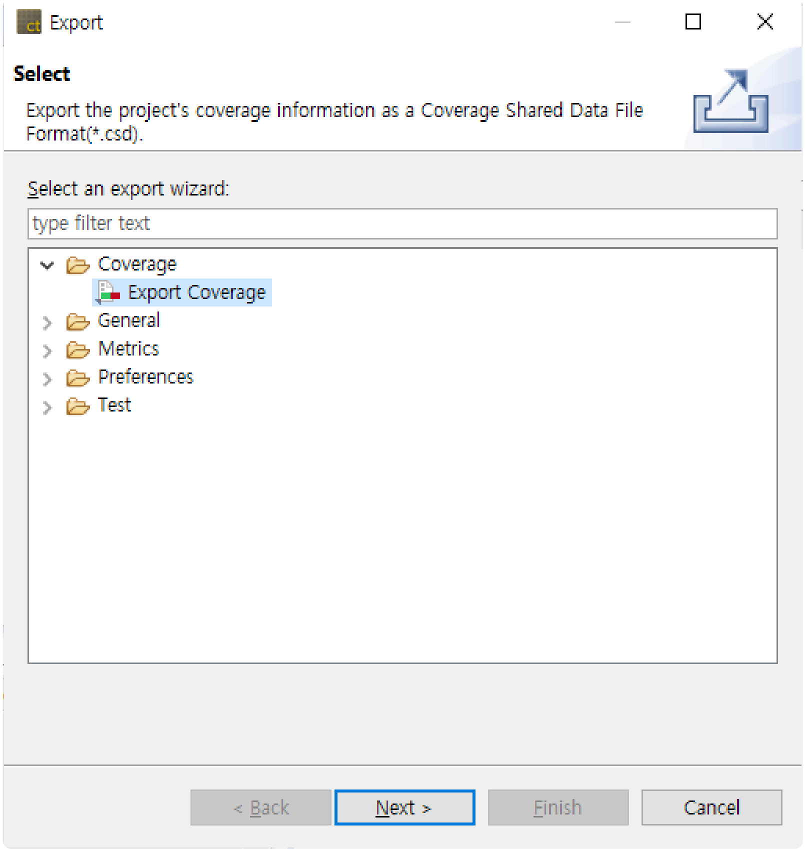
☐ Include Source File

Path: C:₩Users₩hikim₩Desktop

19.4.6. Coverage – Export Coverage

You can export the coverage information measured in the project as a file in Coverage Shared Data (*.csd) format. The exported coverage can be imported with [Import Coverage].

1. In the Export Wizard, select [Coverage] -> [Export Coverage] and click [Next].



Export

Select

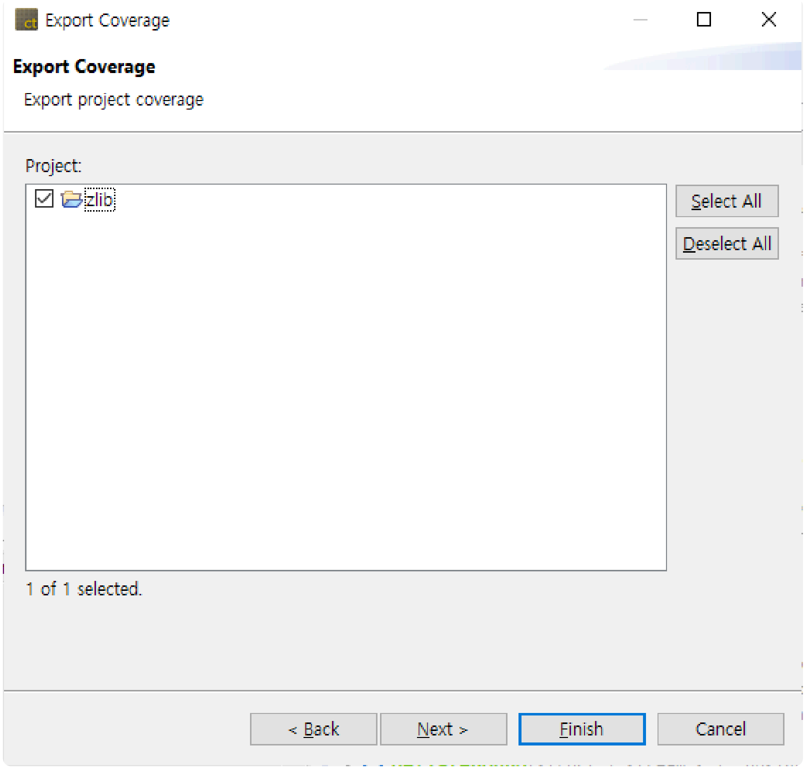
Export the project's coverage information as a Coverage Shared Data File Format(*.csd).

Select an export wizard:

type filter text

- Coverage
  - Export Coverage
- General
- Metrics
- Preferences
- Test

2. Select the project that you want to export coverage information and click [Next].



Export Coverage

Export Coverage

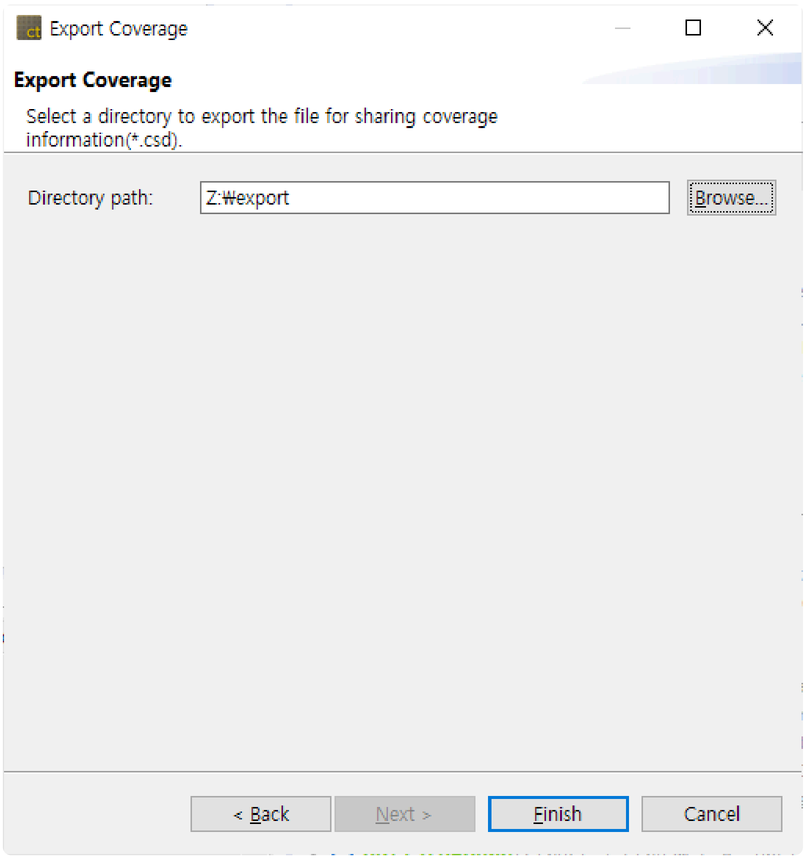
Export project coverage

Project:

☑ zlib

1 of 1 selected.

3. Enter the directory path to export and click [Finish].



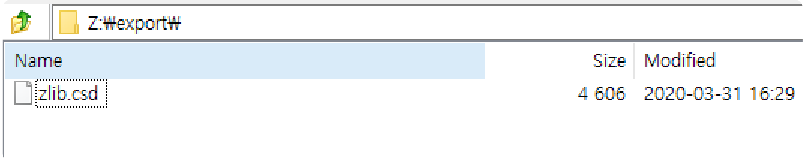
Export Coverage

Export Coverage

Select a directory to export the file for sharing coverage information(*.csd).

Directory path: Z:₩export

4. A file with the same name as the project name is created.



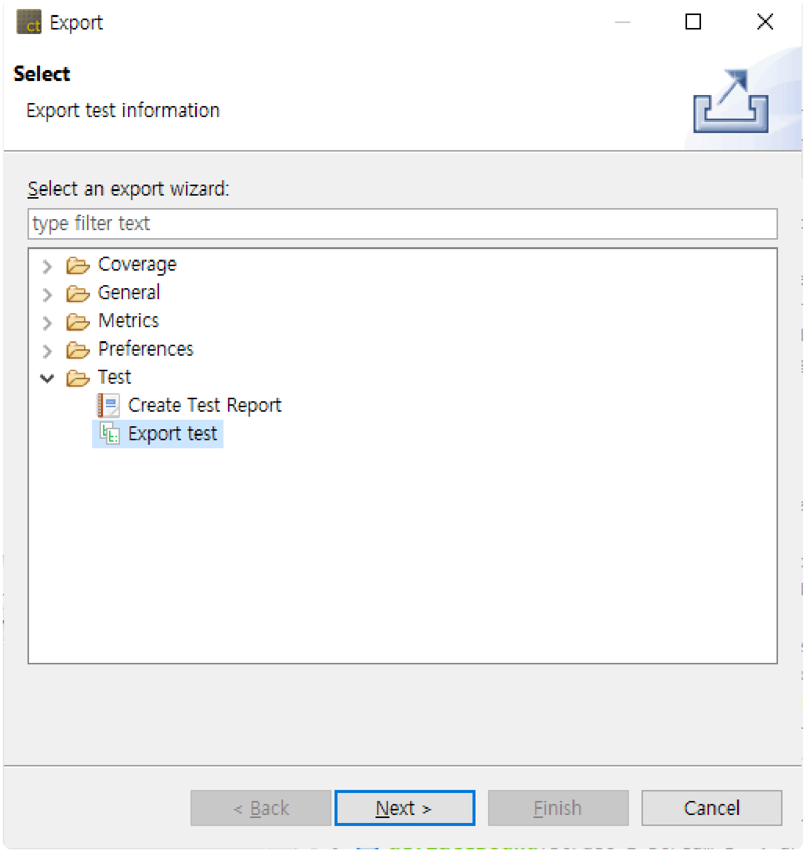
Z:₩export₩

Name	Size	Modified
zlib.csd	4 606	2020-03-31 16:29

19.4.7. Test – Export test

The test information created in the project can be exported at once. Before a project is not analyzed or if there is no test information (Unit/Integration Test, Stub) created, the export cannot be carried out.

1. Select [Test] > [Export Test] in the Export Wizard and click [Next].



Export

Select

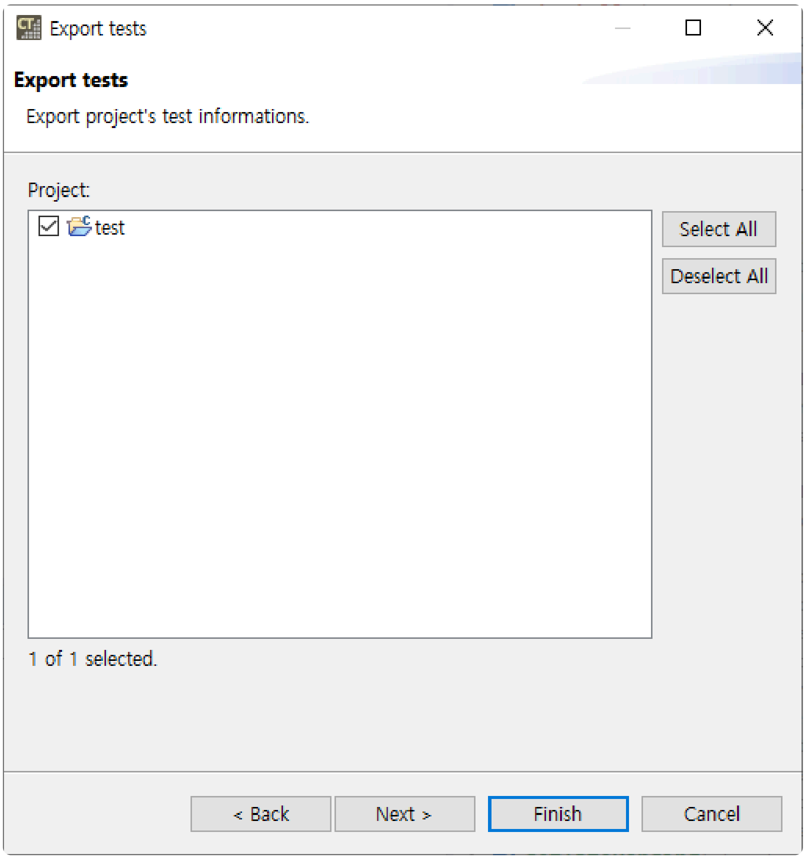
Export test information

Select an export wizard:

type filter text

- Coverage
- General
- Metrics
- Preferences
- Test
  - Create Test Report
  - Export test

2. Select the project that tests are exported and click [Next].



Export tests

Export tests

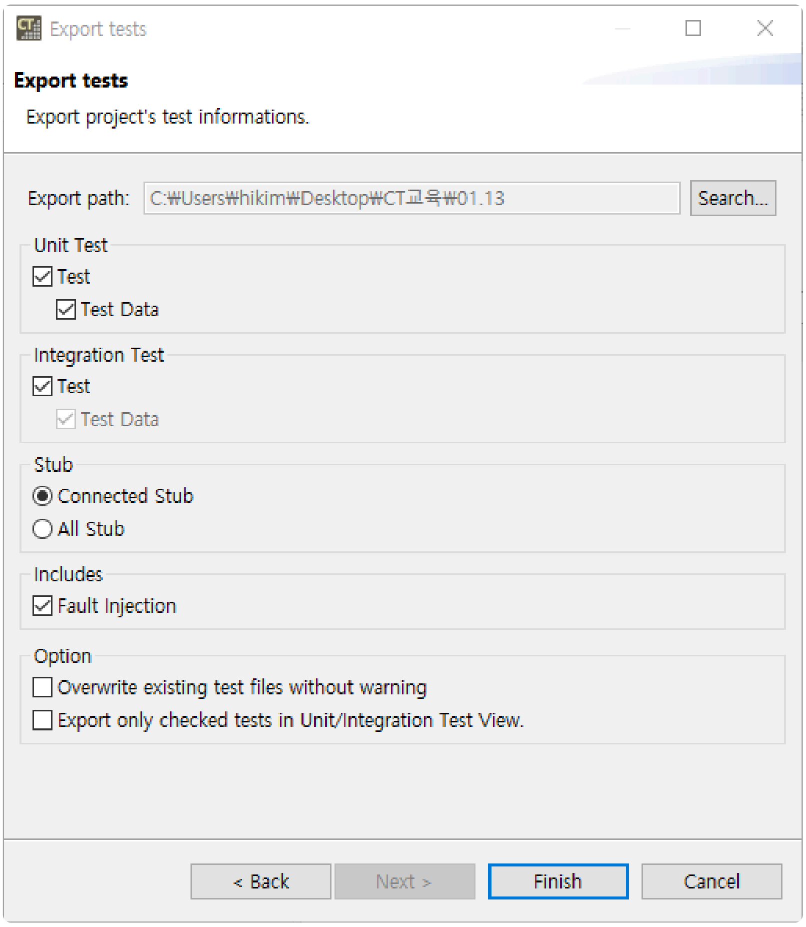
Export project's test informations.

Project:

☑ test

1 of 1 selected.

3. Select the export path, the unit test items, the integration test items, the stub items, the fault injection and the options, and click [Finish].



Export tests

Export tests

Export project's test informations.

Export path: C:₩Users₩hikim₩Desktop₩CT교육₩01.13

Unit Test
☑ Test
☑ Test Data

Integration Test
☑ Test
☑ Test Data

Stub
● Connected Stub
○ All Stub

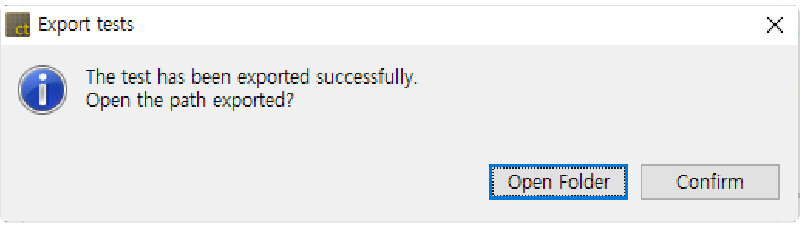
Includes
☑ Fault Injection

Option
□ Overwrite existing test files without warning
□ Export only checked tests in Unit/Integration Test View.

   a. In [Export path], enter the path to export the test.
   b. In [Unit Test] group, check whether to export [Test] and [Test Data] respectively.

   c. In [Integration Test] group, check whether to export [Test].
      - When exporting the integration test, it is exported with the test data in a set.
   d. In [Stub] group, select the stub to be exported among [Connected stubs] and [All stubs].
      - **Connected stubs**: The stubs connected with the test to be exported. If the stubs have no link with the test or the test to be exported is not selected, it does not export that stubs.
      - **All Stub**: It exports all the stubs created in the project.
   e. In [Includes] group, select whether to export with fault injections.
   f. In [Option] group, choose whether to overwrite the existing test file when they exist, and whether to export only the tests checked in the Unit/Integration Test view.

4. Click [Open Folder] button in the message “Test has been exported successfully.” to check the test exported in the folder where it is saved, or click [Confirm] to finish the export.



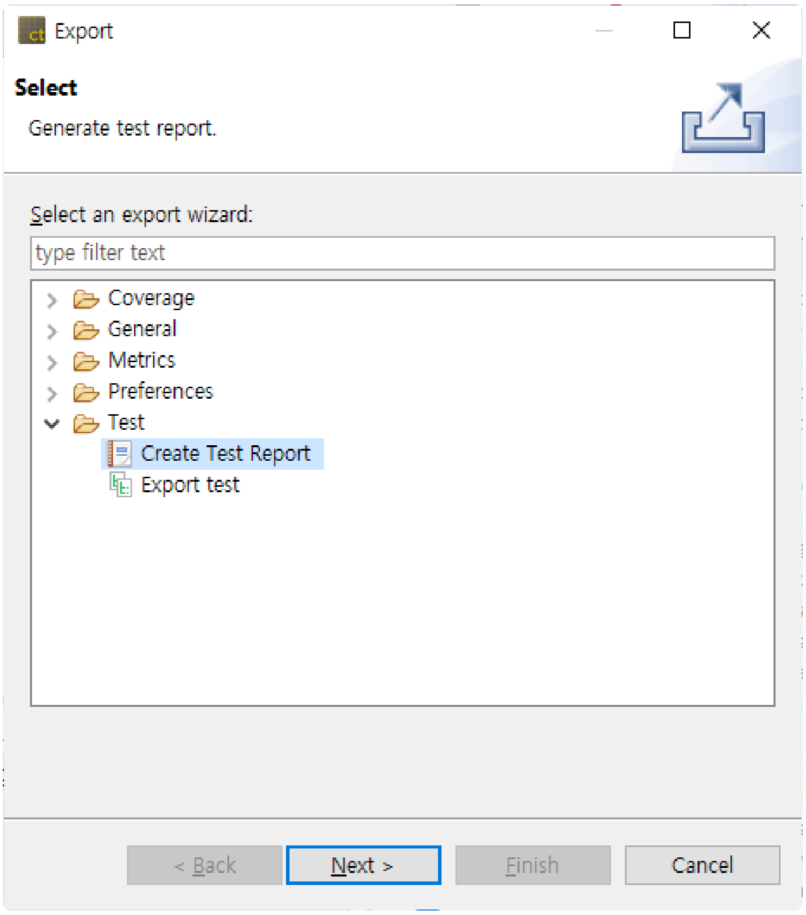
The test has been exported successfully.
Open the path exported?

From Controller Tester 2.6.14 or later version, when exporting tests, [testinfo.export] file is created in the project directory exported.
(**testinfo.export**: the file that records the exported information)

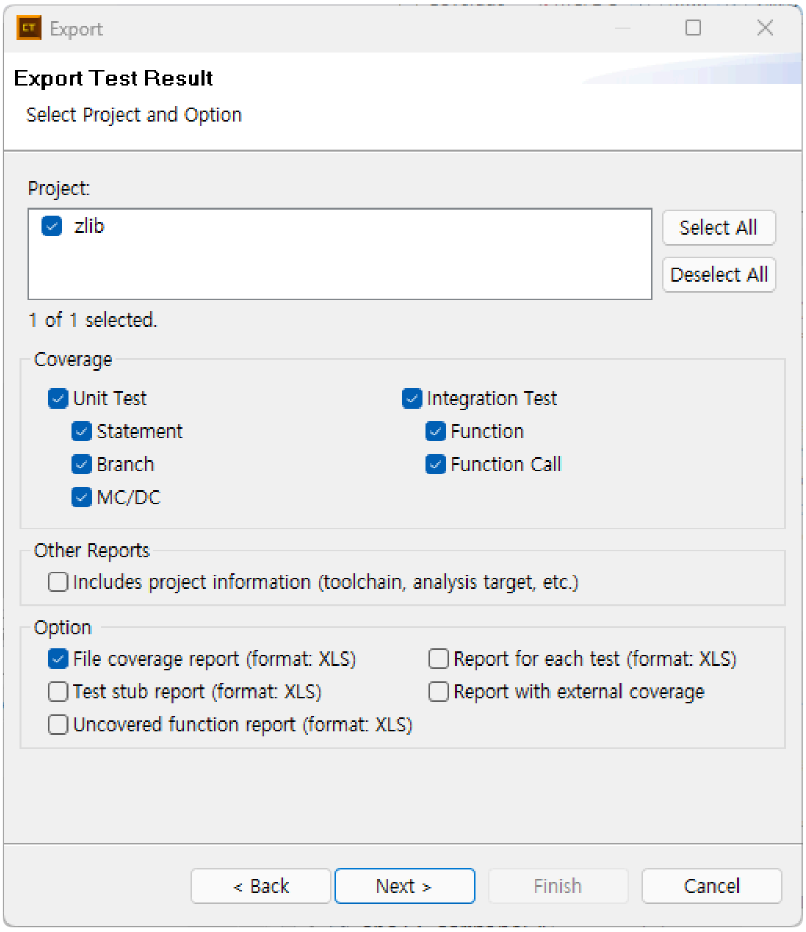
19.4.8. Test – Generate test report

You can create the test result report in various formats by using Export.

1. In the Export Wizard, click [Test] -> [Create Test Report] and click [Next].



2. Select the project for which you want to create a report and the report format.



Export

Export Test Result

Select Project and Option

Project:

☑ zlib

1 of 1 selected.

Coverage

☑ Unit Test
- ☑ Statement
- ☑ Branch
- ☑ MC/DC

☑ Integration Test
- ☑ Function
- ☑ Function Call

Other Reports

□ Includes project information (toolchain, analysis target, etc.)

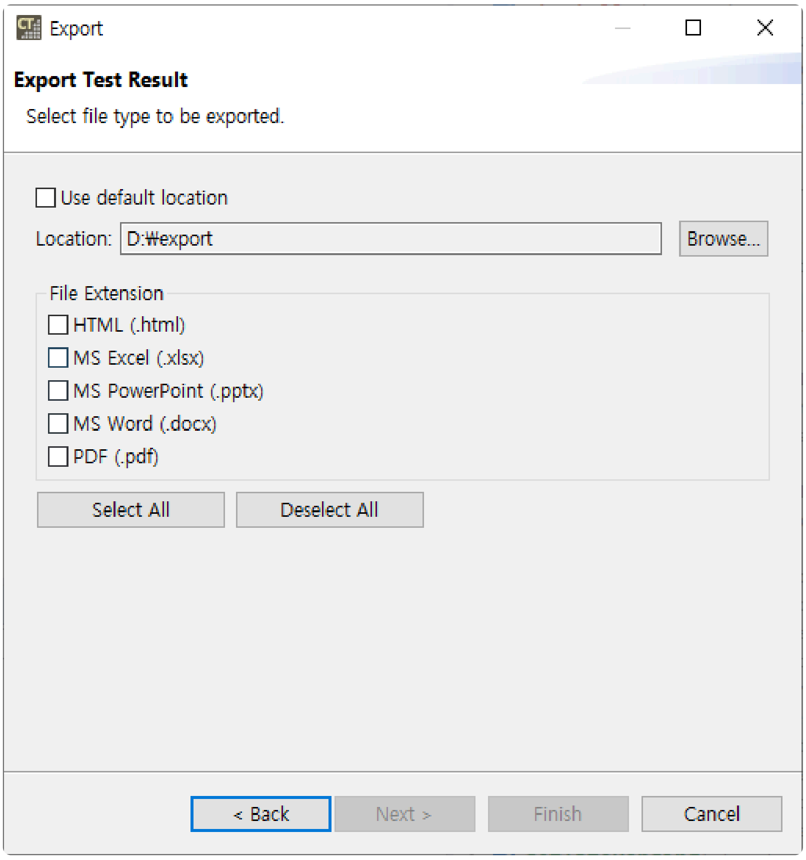
Option

☑ File coverage report (format: XLS)
□ Test stub report (format: XLS)
□ Uncovered function report (format: XLS)
□ Report for each test (format: XLS)
□ Report with external coverage

a. In [Project], select the project that you want to generate the report
b. In [Coverage], check the coverage to include in the report.
c. In [Other Reports], check whether to include project information (toolchain, analysis target, etc.)
d. In [Option], check each report to be exported.

Report type	Description
File coverage report	Generate reports of covered functions for each files in the selected project.
Report for each test	Generate reports of test result and coverage for each test in the selected project.
Test stub report	Generate a report of stubs created in the selected project.
Report with external coverage	Generates a report containing the external coverage in the selected project.
Uncovered function report	Generate a report of the uncovered function in the selected project.

3. Select the location where the reports are exported and the report file extensions and click [Finish].



Export

Export Test Result

Select file type to be exported.

□ Use default location

Location: D:₩export

File Extension

□ HTML (.html)

□ MS Excel (.xlsx)

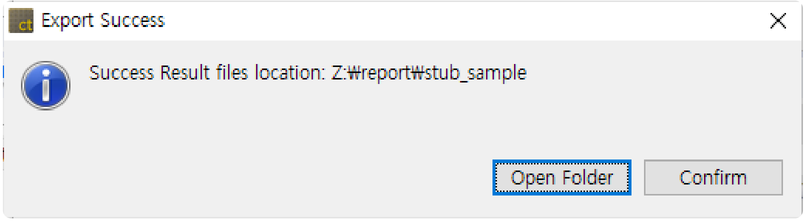
□ MS PowerPoint (.pptx)

□ MS Word (.docx)

□ PDF (.pdf)

a. Selecting the checkbox [Use default location] specified “User Account\Export” directory by default.
b. [File Extension] provides the report file format with html, pdf, docx, pptx and xlsx. The report file extension can be selected in duplicate.

1. Click [Open Folder] button in the message “Report has been created” to check the report in the folder where it is saved.



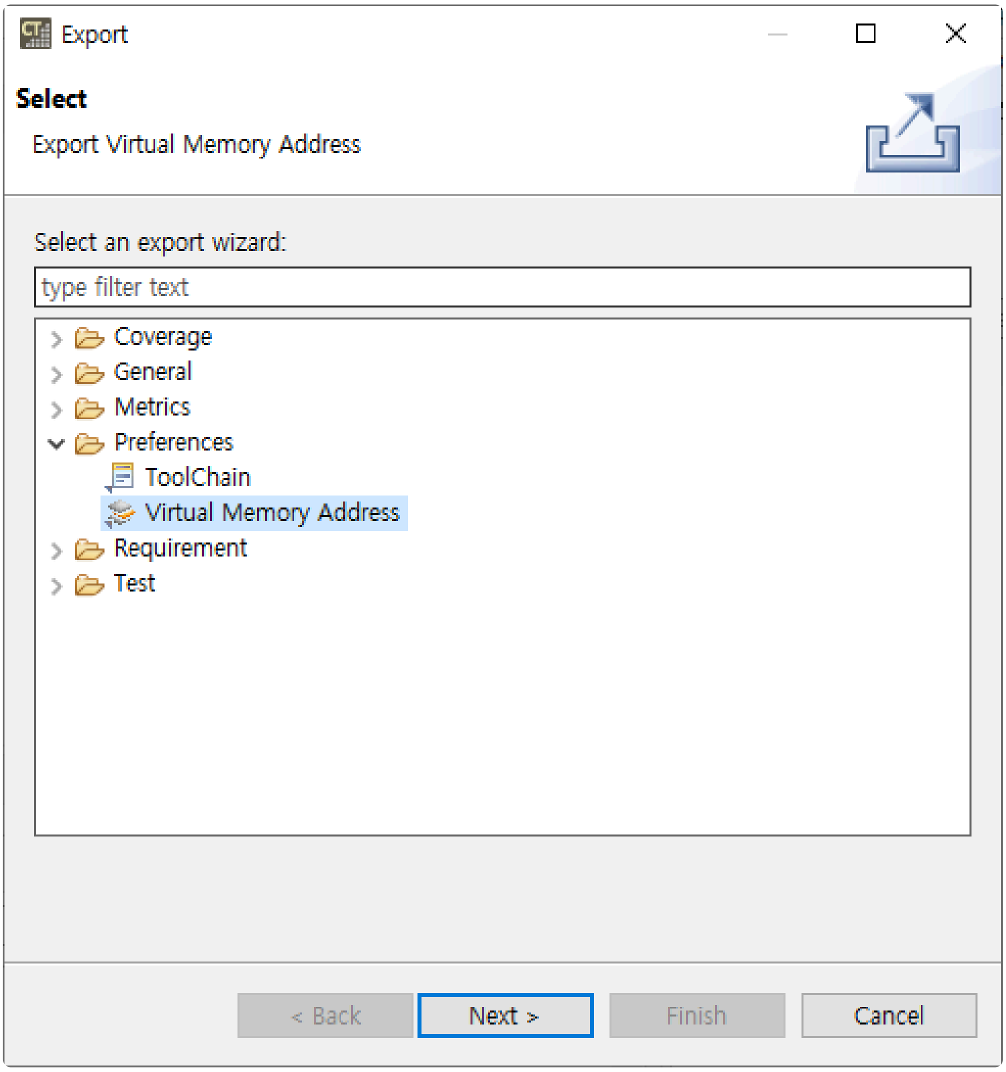
Export Success

Success Result files location: Z:₩report₩stub_sample

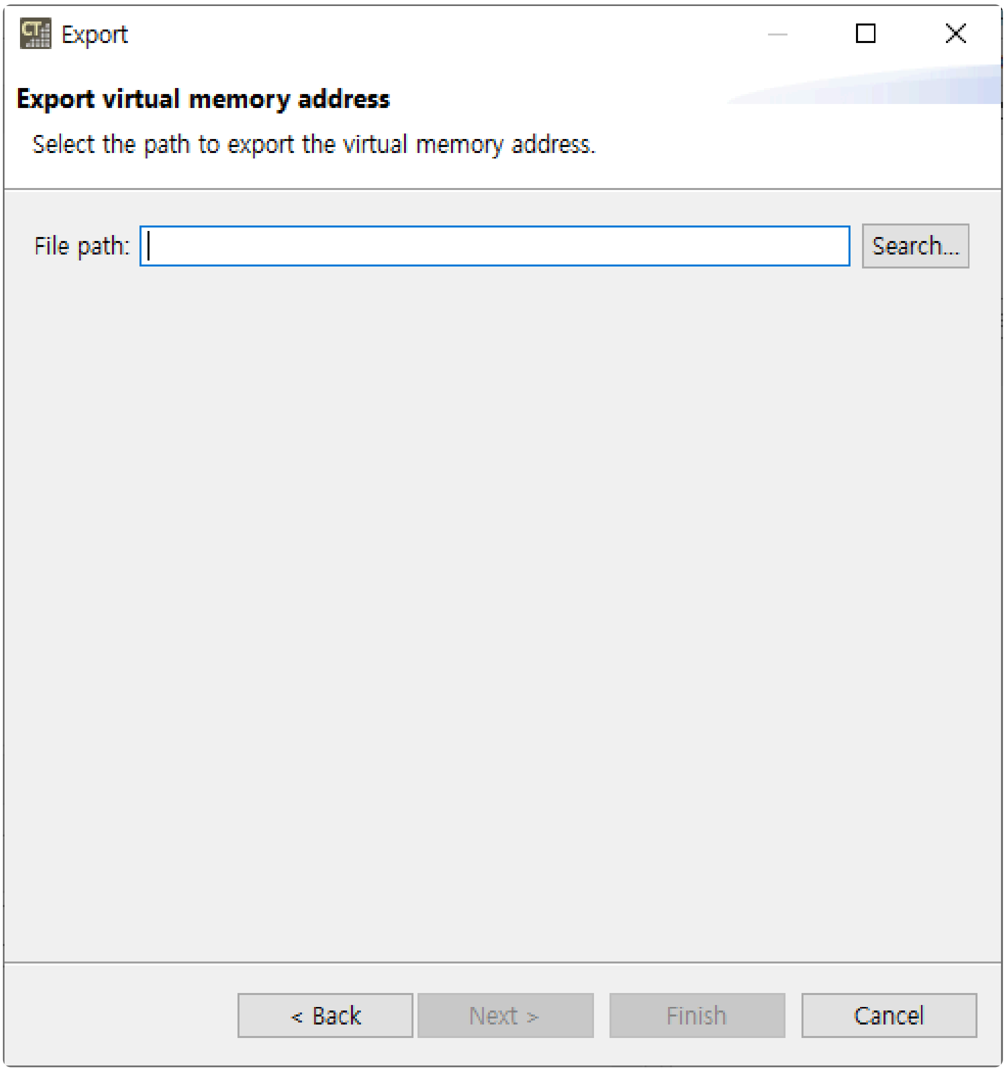
19.4.9. Preferences − Virtual Memory Address

You can export the information of the virtual memory address.

1. In the Export Wizard, click [Preferences] > [Virtual Memory Address] and click the [Next].



2. Select the path to export the virtual memory address and click the [Finish].



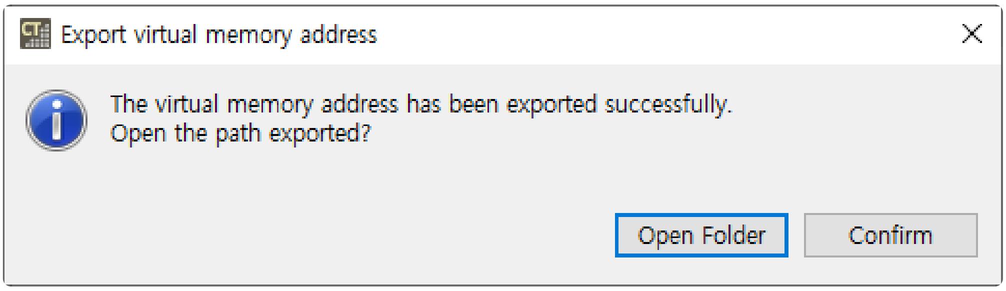
Export

Export virtual memory address

Select the path to export the virtual memory address.

File path:

3. You can check the exported virtual memory address file by clicking the [Open Folder].



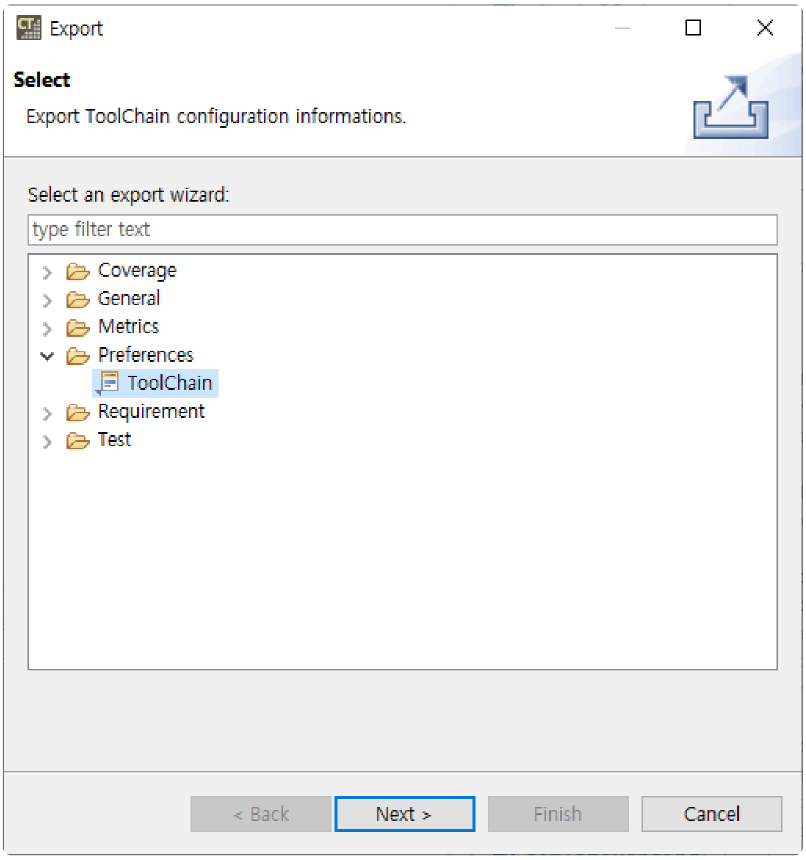
Export virtual memory address

The virtual memory address has been exported successfully.
Open the path exported?

19.4.10. Preferences – ToolChain

You can export the information of the toolchain created.

1. In the Export Wizard, click [Preferences] > [ToolChain] and click [Next].



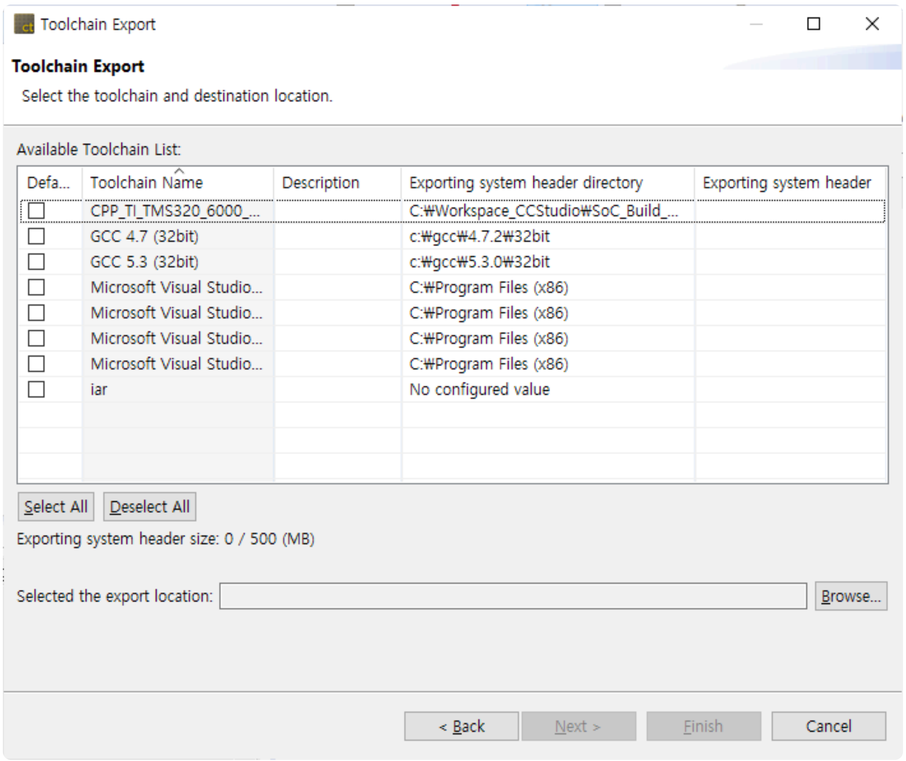
Select

Export ToolChain configuration informations.

Select an export wizard:

type filter text

2. The list of toolchains registered currently is displayed. Check [Exporting system header] to export including system header. Enter the export path and click [Finish].



Toolchain Export

Select the toolchain and destination location.

Available Toolchain List:

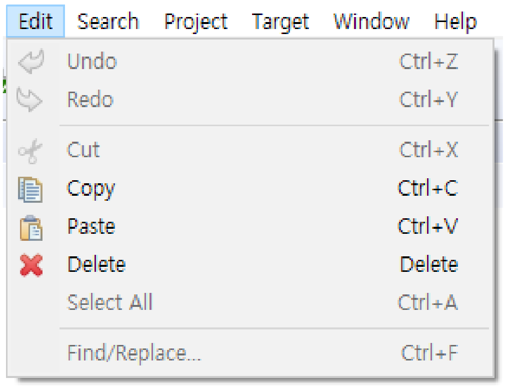
Defa...	Toolchain Name	Description	Exporting system header directory	Exporting system header
□	CPP_TI_TMS320_6000_...		C:₩Workspace_CCStudio₩SoC_Build_...	
□	GCC 4.7 (32bit)		c:₩gcc₩4.7.2₩32bit	
□	GCC 5.3 (32bit)		c:₩gcc₩5.3.0₩32bit	
□	Microsoft Visual Studio...		C:₩Program Files (x86)	
□	Microsoft Visual Studio...		C:₩Program Files (x86)	
□	Microsoft Visual Studio...		C:₩Program Files (x86)	
□	Microsoft Visual Studio...		C:₩Program Files (x86)	
□	iar		No configured value	

Exporting system header size: 0 / 500 (MB)

Selected the export location:

20. Edit Menu

In the Edit menu, you can carry out the functions such as Cut, Copy, Paste, Delete and Find/Replace the items selected in the view or editor, or undo or redo the last action performed.

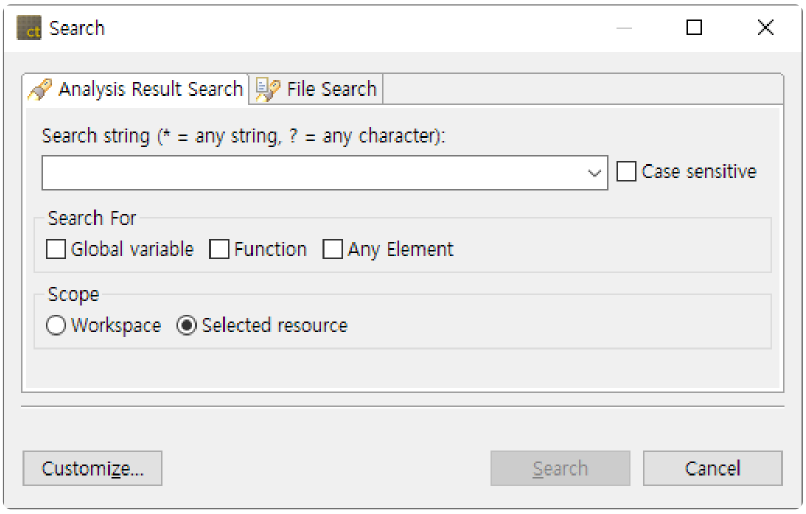


The menu may vary depending on the selected view or editor.

21. Search Menu

Search Analysis Result

You can search the result created after analysis.



Search string (* = any string, ? = any character):

□ Case sensitive

Search For

□ Global variable □ Function □ Any Element

Scope

○ Workspace ● Selected resource

Search word

Enter characters to be searched.
The available wildcards are displayed in the Search dialog box.

- “*” Wildcard string: matches the set of characters containing the empty string.
- “?” Wildcard character: matches all characters.

Search target

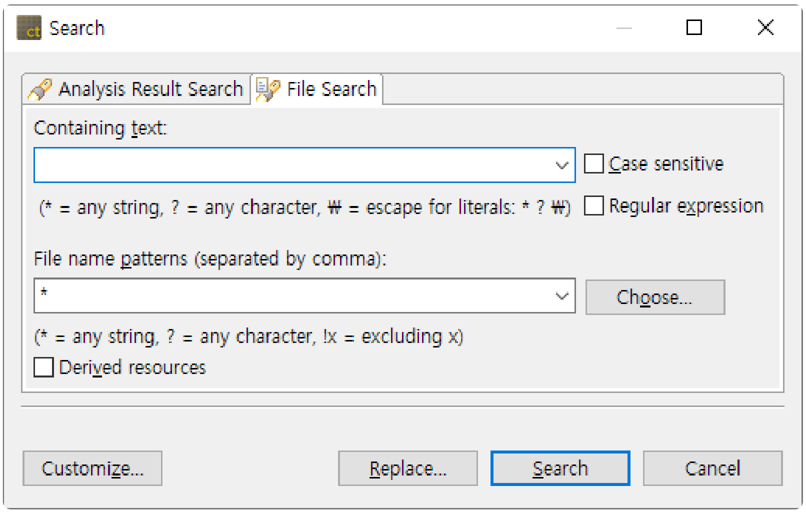
Select the target to be searched. The global variable, function or all targets can be searched.

Search range

Select the searching range. It can be searched within the workspace or the selected item range.

File search

A file can be searched.



Containing text:

☐ Case sensitive

(* = any string, ? = any character, ₩ = escape for literals: * ? ₩)

☐ Regular expression

File name patterns (separated by comma):

*

(* = any string, ? = any character, !x = excluding x)

☐ Derived resources

Text included

Enter a character to be searched. To search a file, the field must be empty.
Click [▼] to select the characters searched recently.
The available wildcards are displayed in the Search dialog box.

- "*" Wildcard string: matches the set of characters containing the blank string.
- "?" Wildcard character: matches all characters.
- To search "*", "?" or "\" character, enter a backslash before the characters in order to indicate that you do not use these characters by "\ *" wildcards. (Ex: "\?" or "\ \")

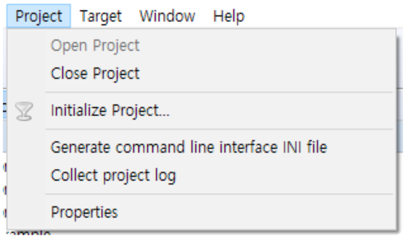
File Name Pattern

Enter the pattern of all file names for the files to be searched by using the specific expression.
The wildcards that can use the file name pattern are displayed in the Search dialog box.

- "*" Wildcard string: matches the set of characters containing the blank string.
- "?" Wildcard character: matches all characters.

22. Project Menu

In the Project menu, you can execute the operations for the project (open, close, initialize).



Open Project

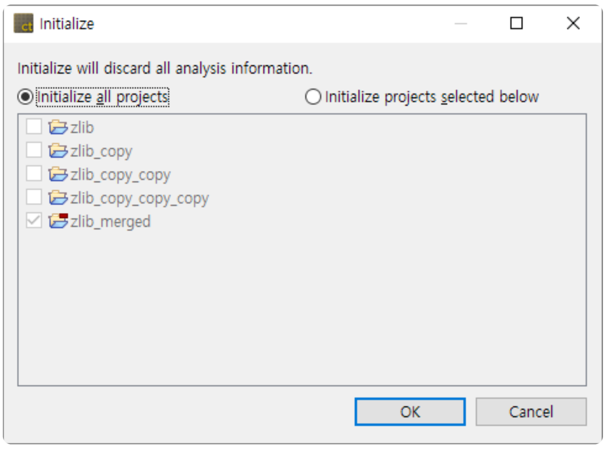
You can open a closed project selected in the Test Navigator view.

Close Project

You can close an open project selected in the Test Navigator view.

Initialize Project

You can initialize all the open projects in the workspace or the selected projects in the project list below. If you initialize the project, all analysis results are cleared.


Initialize

Initialize will discard all analysis information.

● Initialize all projects ○ Initialize projects selected below

- □ zlib
- □ zlib_copy
- □ zlib_copy_copy
- □ zlib_copy_copy_copy
- ☑ zlib_merged

Generate Command Line Interface INI File

Based on the project information selected in the Test Navigator, you can create the configuration file needed to execute the CT 2023.12 in CLI environment.

Collect Project Log

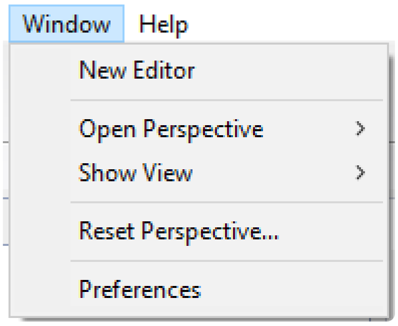
You can export the log file of the project selected in the Test Navigator view into the specified path.

Properties

You can see the information or change the settings for the project selected in the Test Navigator view.

23. Window Menu

In the Window menu, you can open the same new editor as an active editor, open a perspective or a new view, and see the preferences.



New Editor

It copies the selected source code editor or test editor.

Open Perspective

You can select and open the perspective registered in CT 2023.12.

Show View

You can select and open the view registered in CT 2023.12.

Reset Perspective

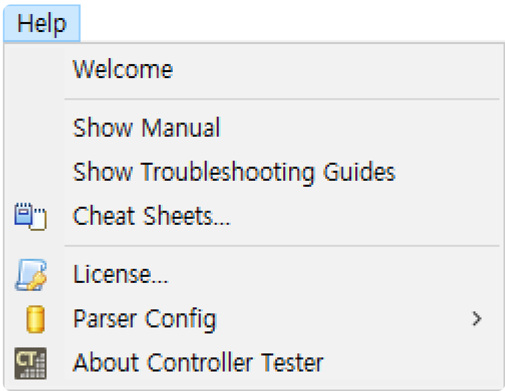
Resets the perspective into the initial state.

Preferences

You can check or change the settings currently applied to the tool.
For more information, please refer to Preferences

24. Help Menu

In the Help menu, you can find manuals, troubleshooting guides, tutorials, license settings, changing and reverting analysis settings, and information about the installed product.



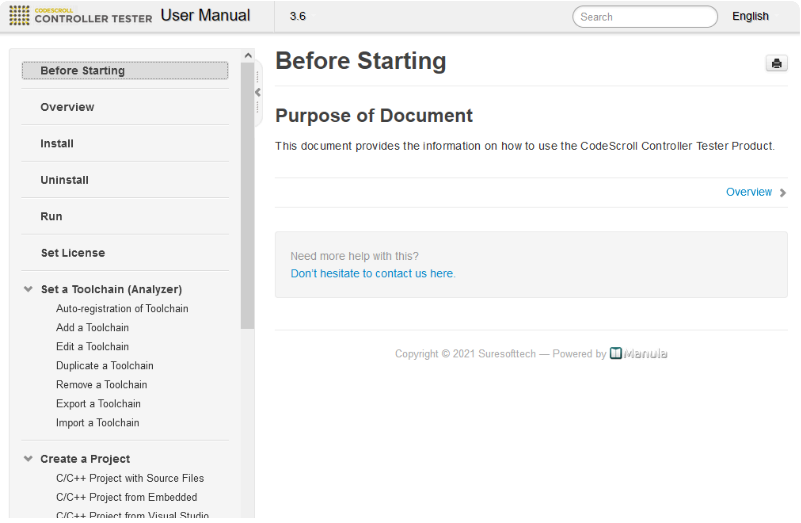
Welcome

You can see the welcome page that appears when the tool is executed for the first time.

Software for Safe world
CONTROLLER TESTER 단위/통합 테스트 도구
Needs
Mission Critical 도메인은 안전성 및 신뢰성 인증 필요
APPROVED
APPROVED
APPROVED
APPROVED
APPROVED

Show Manual

You can see the CT 2023.12 User Manual.



Before Starting

Purpose of Document

This document provides the information on how to use the CodeScroll Controller Tester Product.

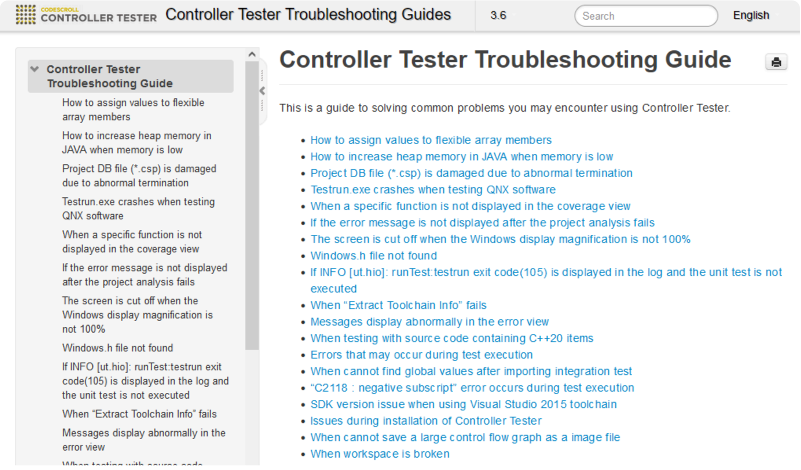
Overview

Need more help with this?
Don't hesitate to contact us here.

Copyright © 2021 Suresofttech — Powered by Manula

Show Troubleshooting Guides

You can see the CT 2023.12 Troubleshooting Guides.


CONTROLLER TESTER
Controller Tester Troubleshooting Guides
3.6
Search
English
Controller Tester Troubleshooting Guide
How to assign values to flexible array members
How to increase heap memory in JAVA when memory is low
Project DB file (*.csp) is damaged due to abnormal termination
Testrun.exe crashes when testing QNX software
When a specific function is not displayed in the coverage view
If the error message is not displayed after the project analysis fails
The screen is cut off when the Windows display magnification is not 100%
Windows.h file not found
If INFO [ut.hio]: runTest:testrun exit code(105) is displayed in the log and the unit test is not executed
When "Extract Toolchain Info" fails
Messages display abnormally in the error view

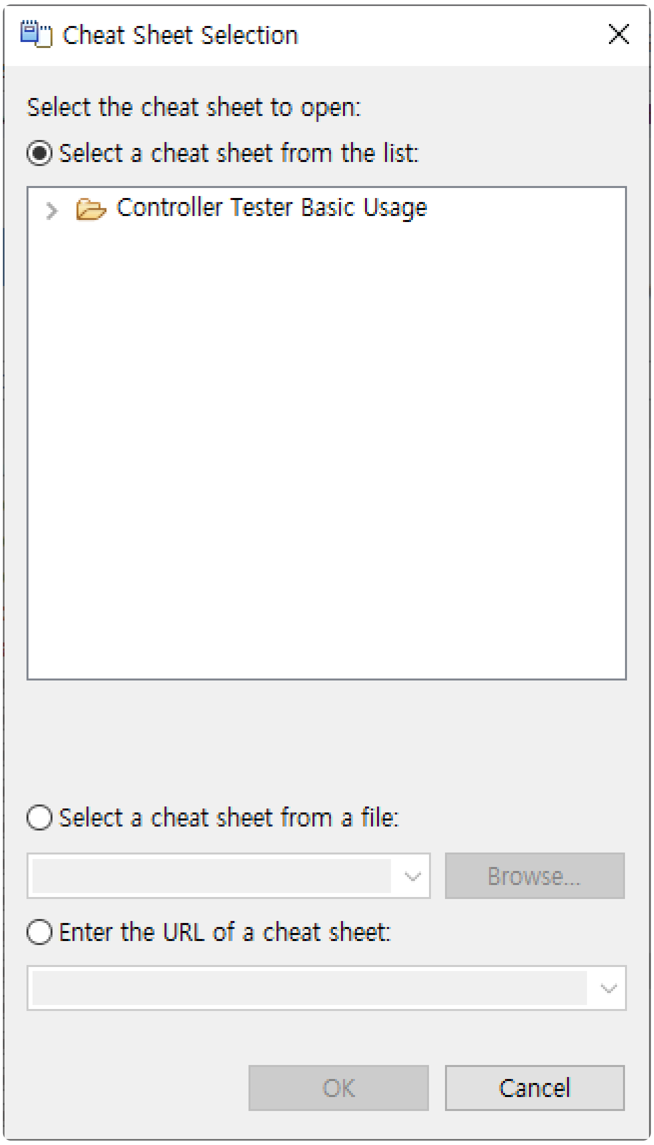
Controller Tester Troubleshooting Guide

This is a guide to solving common problems you may encounter using Controller Tester.

- How to assign values to flexible array members
- How to increase heap memory in JAVA when memory is low
- Project DB file (*.csp) is damaged due to abnormal termination
- Testrun.exe crashes when testing QNX software
- When a specific function is not displayed in the coverage view
- If the error message is not displayed after the project analysis fails
- The screen is cut off when the Windows display magnification is not 100%
- Windows.h file not found
- If INFO [ut.hio]: runTest:testrun exit code(105) is displayed in the log and the unit test is not executed
- When "Extract Toolchain Info" fails
- Messages display abnormally in the error view
- When testing with source code containing C++20 items
- Errors that may occur during test execution
- When cannot find global values after importing integration test
- "C2118 : negative subscript" error occurs during test execution
- SDK version issue when using Visual Studio 2015 toolchain
- Issues during installation of Controller Tester
- When cannot save a large control flow graph as a image file
- When workspace is broken

Cheat Sheets

You can run cheat sheets on how to use CT 2023.12.



Cheat Sheet Selection

Select the cheat sheet to open:

● Select a cheat sheet from the list:

Controller Tester Basic Usage

○ Select a cheat sheet from a file:

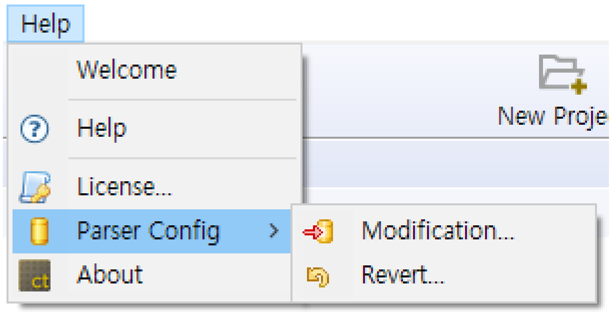
○ Enter the URL of a cheat sheet:

Modify Parser Config

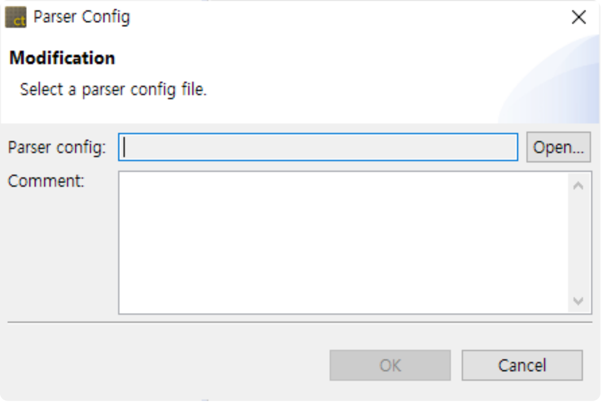
You can modify the parser config by entering the compressed file provided by SureSoft Technologies, Inc.

How to use

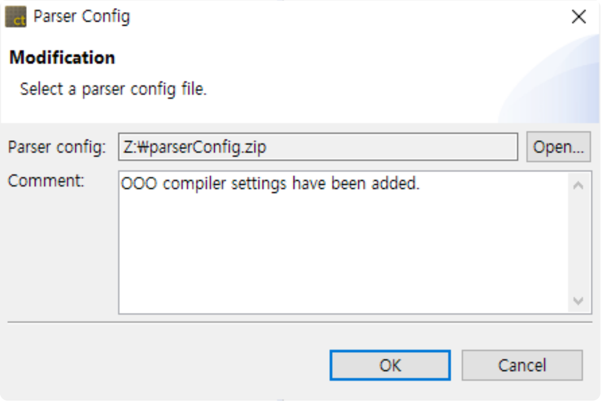
1. Select [Help] > [Parser Config] > [Modification…] menu.



2. Click [Open…] to select the compressed analysis setting file and enter the changes of analysis settings to [Comment] text as an option.



3. Click [OK].

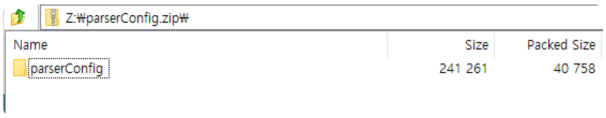


Parser config: Z:₩parserConfig.zip

Comment: OOO compiler settings have been added.

Format of the parser config file

- The directory [parserConfig] must exist immediately when opening the compressed file as shown in the figure below.
- The extension is “zip”.



Z:₩parserConfig.zip₩

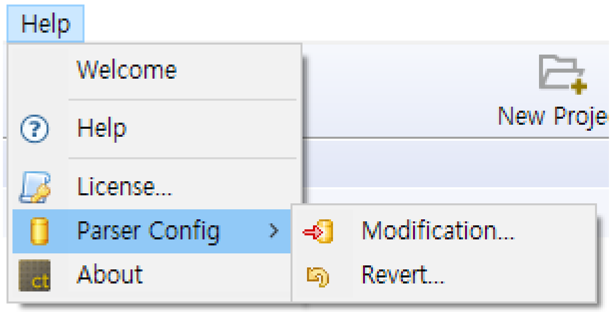
Name	Size	Packed Size
parserConfig	241 261	40 758

Revert the Parser Config

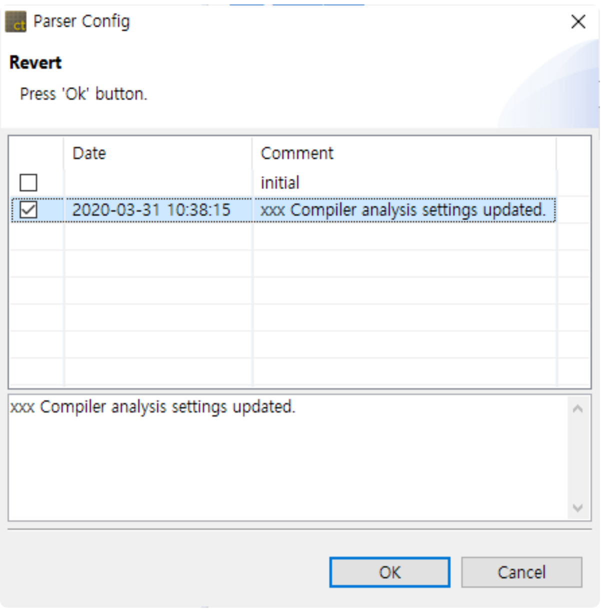
You can revert the parser config by selecting one among the previous parser configs.

How to use

1. Select [Help] > [Parser Config] > [Revert] menu.



2. Check the parser config to be reverted in the list of the existing parser configs and select [OK].



Parser Config

Revert

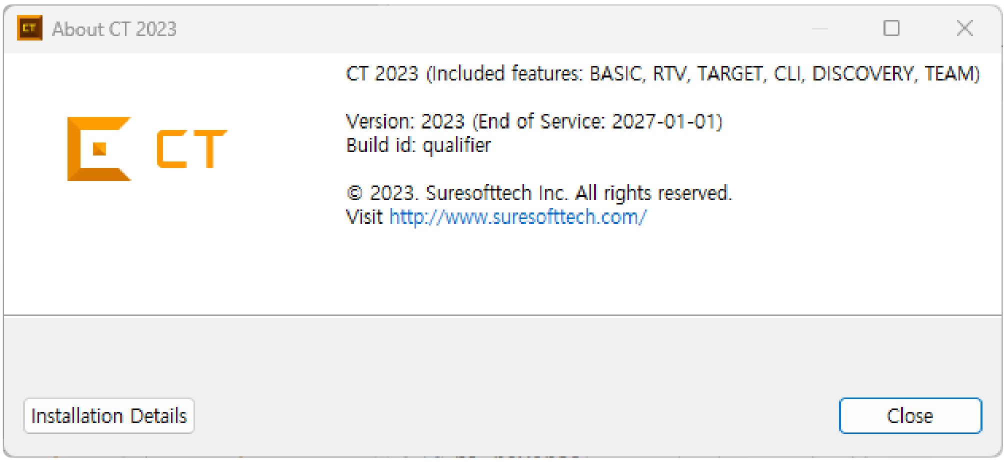
Press 'Ok' button.

	Date	Comment
□		initial
☑	2020-03-31 10:38:15	xxx Compiler analysis settings updated.

xxx Compiler analysis settings updated.

Information

You can see the information and version of the product installed.



About CT 2023

CT 2023 (Included features: BASIC, RTV, TARGET, CLI, DISCOVERY, TEAM)

Version: 2023 (End of Service: 2027-01-01)
Build id: qualifier

© 2023. Suresofttech Inc. All rights reserved.
Visit http://www.suresofttech.com/

Select [Installation Details] to review the included features, plugins, and end-of-service dates. While CT 2023.12 remains accessible after service termination, it won’t receive maintenance support.

25. Troubleshooting

If it conflicts with the security program at installation

Some security programs may stop running the tool installation package. If an error occurred, temporarily stop the security program operation and proceed with the installation again.

If the product does not operate after specifying the workspace when executing it

When executing the product for the first time, the global data of CodeScroll is stored in \APPDATA\ path.
If access to this path is restricted, the product may not be operated.
To solve this problem, please use the feature to set the global data path.
Setting method: Enter the global data path to be set instead of –g default (default value) in CodeScroll.ini file. (the same if a case of -g or –global and csc.ini file)
If the -g option is not given, the dialog for setting any global data path when executing the product for the first time is displayed. If canceled here, it is set to the default path.

If it is installed and run in Windows Vista/7

It can only be run with the User Access Control (UAC) features disabled.
If you want to use it without disabling UAC, change the directory during installation so that it is not installed under the Program Files.
In addition, the Windows accounts for installation and execution must be the same and must be installed with an administrator account.

If an analysis is failed or Compile (pre-processing) error occurred

It is the state of source code that the test cannot be run. Please check the compile/link flag and header file/library settings.
You can check the settings in [Preferences] -> [Toolchain settings].
If all settings are correct (if it is possible to build without any problems in the actual development environment (IDE etc.)), please contact SureSoft Technologies, Inc.

If it fails to run all test cases

This is because the test engine operation is blocked by the firewall. The test engine loaded in memory when executing the test must be added as an exception to the firewall setting to run normally.

If it fails to register toolchain automatically

If it fails to register toolchain automatically due to some problem with toolchain information installed on

PC, the toolchain auto-registration feature can be turned off. (`--disableAutoToolchain option`)

- Add `--disableAutoToolchain` option to CodeScroll.ini file

Preprocessing error when running tests after connecting stub

When you create and connect a stub and run the tests, the stub may display the error `catastrophicerror:cannot open source file`.
This error occurs because the path of the stub file is too long. Windows defines the maximum length of the path as 260, so please rename the workspace and the project to reduce the path.

Etc.

For other issues, please refer to the Troubleshooting Guide .

Technical support

If you find any problems, please contact the Technical support contact below.

- help@suresofttech.com
- +82-31-606-2000

26. CT Target Plug-in

Introduction

CT Target Plug-in complements the functionality of the default CT.
CT allows you to automate testing in your own host environment. In other words, you run the test in a software development environment (normal PC). CT Target Plug-in allows you to run tests of CT in a real embedded target environment. This makes it easy to check whether the test results are the same in the host and target environment and to run tests that cannot be executed in the host environment because of factors dependent on the target environment.

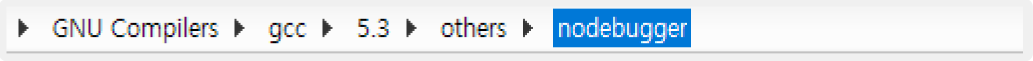
26.1. Target Environment Settings

To run tests in a target environment using CT Target Plug-in, you need to enter information about the target environment.
CT Target Plug-in builds a test harness using information about the target environment entered by the user and automatically gets the results of running in the target environment.

The target environment can be set in the project properties page or in the new target test project wizard.

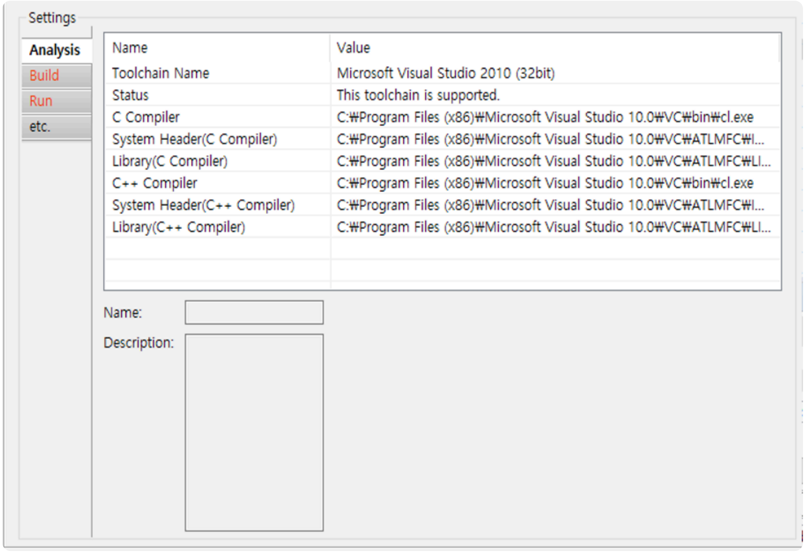
Target environment settings

Target environment settings are divided into basic information and detailed settings.



▶ GNU Compilers ▶ gcc ▶ 5.3 ▶ others ▶ nodebugger

After entering the basic information, detailed settings that require input are displayed.



Name	Value
Toolchain Name	Microsoft Visual Studio 2010 (32bit)
Status	This toolchain is supported.
C Compiler	C:₩Program Files (x86)₩Microsoft Visual Studio 10.0₩VC₩bin₩cl.exe
System Header(C Compiler)	C:₩Program Files (x86)₩Microsoft Visual Studio 10.0₩VC₩ATLMFC₩I...
Library(C Compiler)	C:₩Program Files (x86)₩Microsoft Visual Studio 10.0₩VC₩ATLMFC₩LI...
C++ Compiler	C:₩Program Files (x86)₩Microsoft Visual Studio 10.0₩VC₩bin₩cl.exe
System Header(C++ Compiler)	C:₩Program Files (x86)₩Microsoft Visual Studio 10.0₩VC₩ATLMFC₩I...
Library(C++ Compiler)	C:₩Program Files (x86)₩Microsoft Visual Studio 10.0₩VC₩ATLMFC₩LI...

Target environment detailed settings

Target environment detailed settings are divided into the analysis, build, run, and etc.

Category	Description
Analysis	The toolchain information is displayed, and in the case of a target test project, the target compiler related settings required for analysis are displayed.
Build	The settings for building the test software are displayed.
Run	Settings for running tests and getting results in the target environment are displayed.
etc.	Other settings are displayed. (Program entry point, etc.)

Required settings for each category are indicated in red. Depending on whether the required settings for each category are entered or not, the behavior when clicking the [Run] button is different as shown below.

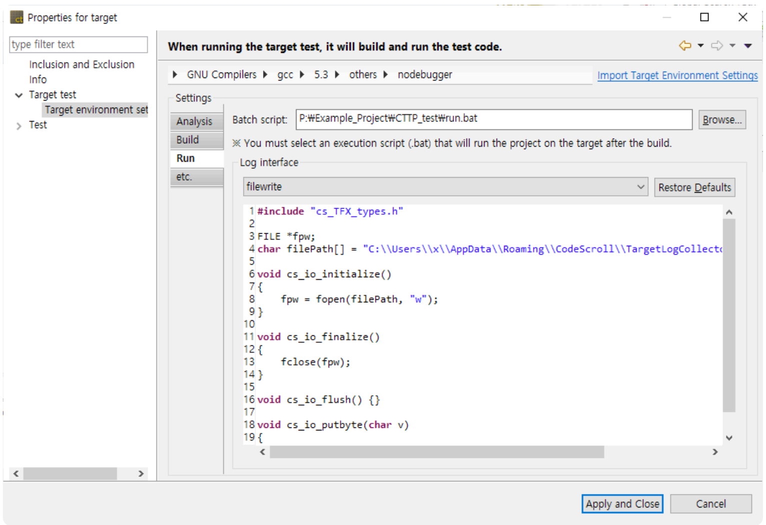
Required settings completed category	Description
None	Test run impossible
Analysis	If you click [Run], it overwrites the original source code with the test code. To perform the test, the user must manually build and run the test.
Analysis, Build	If you click [Run], it builds the test code. To perform the test, the user has to manually run the test on the target.
Analysis, Build, Run	Automatically run tests in the target environment.

Import target test results

CT Target Plug-in saves and imports the result of running the test in the target environment in log format.
If you do not use the debugger, you need the settings for saving the target test results(Log interface) and the settings for importing(Target Log Collector – Preferences).

Log interface

Log interface is a setting for saving the test results in the target environment. Log interface is written in the form of a source code that is actually run in the target environment.



When running the target test, it will build and run the test code.

Batch script: P:₩Example_Project₩CTTP_test₩run.bat

※ You must select an execution script (.bat) that will run the project on the target after the build.

Log interface: filewrite

```
#include "cs_TFX_types.h"

FILE *fpw;
char filePath[] = "C:\\Users\\x\\AppData\\Roaming\\CodeScroll\\TargetLogCollect

void cs_io_initialize()
{
    fpw = fopen(filePath, "w");
}

void cs_io_finalize()
{
    fclose(fpw);
}

void cs_io_flush() {}

void cs_io_putbyte(char v)
{
```

Log interface structure

Function	Description
`viod cs_io_initialize()`	Initial function for transfer
`void_cs_io_finalize()`	Transfer end function
`void cs_io_flush()`	Remaining data transfer function
`void cs_io_putbyte(codescroll_byte v)`	1-byte data transfer function

Import target log automatically

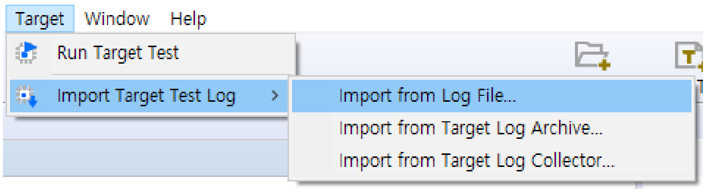
The target log, which is the result of the test execution, can be automatically imported through the target log collector. For the target log collector settings, please refer to [Target Log Collector] in Target Log Collector and Target Test Preferences.

Import target log manually

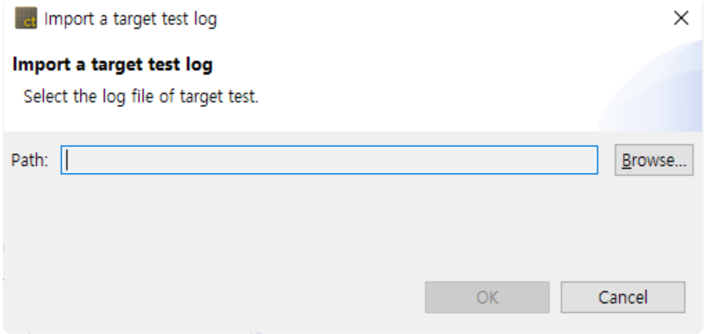
If the target log cannot be imported automatically, you can import the target log manually.

Import from a log file

1. After selecting an analyzed project, click [Target] -> [import Target Test Log] -> [Import from Log File…] in the global menu.

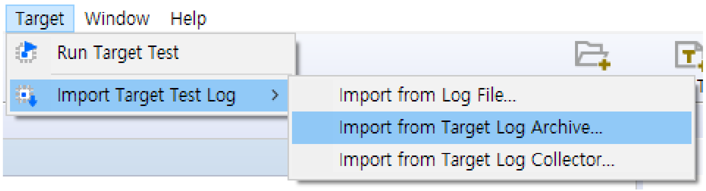


2. Select a target test log file and click the [OK] button.

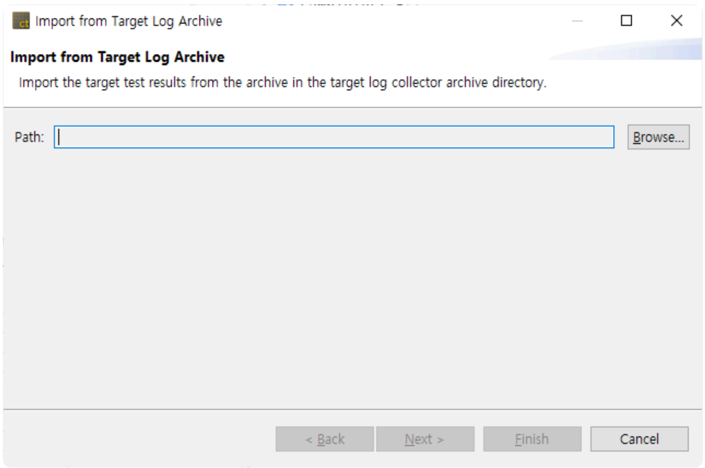


Import from a target log archive

1. After selecting an analyzed project, click [Target] -> [import Target Test Log] -> [Import from Target Log Archive…] in the global menu.



2. Select a target log archive file and click the [Next] button.



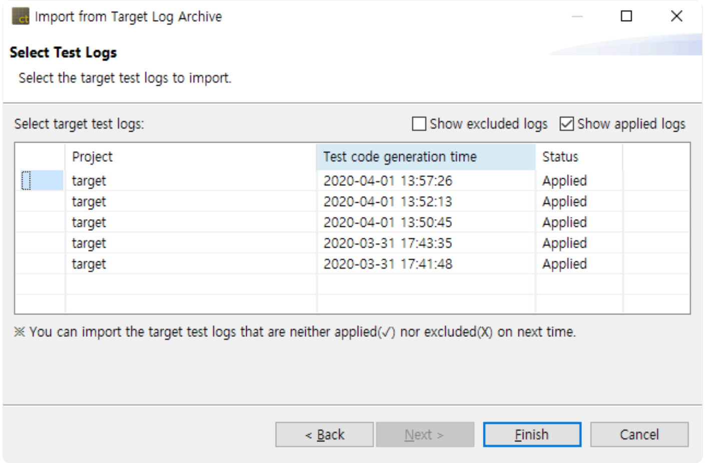
Import from Target Log Archive

Import from Target Log Archive

Import the target test results from the archive in the target log collector archive directory.

Path:

3. Check a target test log file and click the [Finish] button.



Import from Target Log Archive

Select Test Logs

Select the target test logs to import.

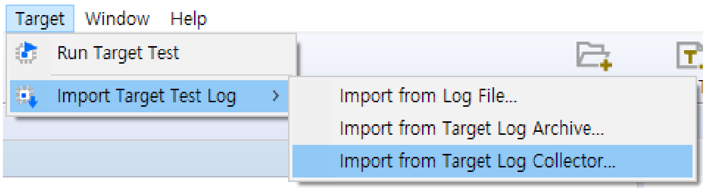
Select target test logs: □ Show excluded logs ☑ Show applied logs

	Project	Test code generation time	Status
□	target	2020-04-01 13:57:26	Applied
	target	2020-04-01 13:52:13	Applied
	target	2020-04-01 13:50:45	Applied
	target	2020-03-31 17:43:35	Applied
	target	2020-03-31 17:41:48	Applied

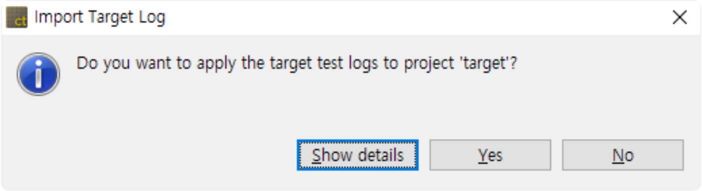
※ You can import the target test logs that are neither applied(✓) nor excluded(X) on next time.

Import from target log collector

1. To get logs from the target log collector, you need to select ‘Use the default target log collector’ from [Preferences] -> [Target Test] -> [Target Log Collector].
2. After selecting an analyzed project, click [Target] -> [import Target Test Log] -> [Import from Target Log Collector…] in the global menu.



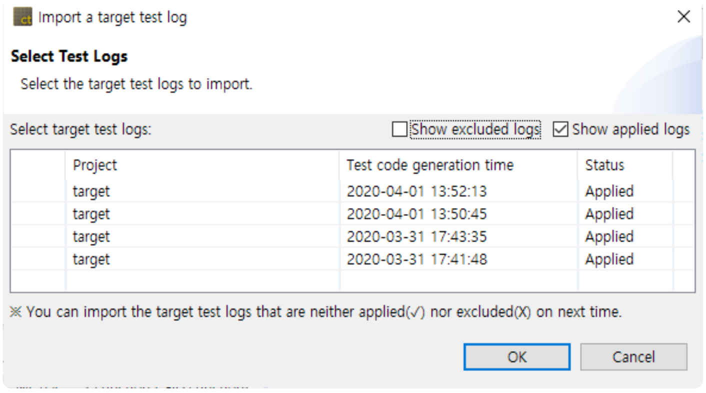
3. Click the [Yes] button to import all the new target test logs or click the [Show details] button.



Import Target Log

Do you want to apply the target test logs to project 'target'?

4. If you click the [Show details] button, check the target test log to be imported and click the [OK] button.



Select Test Logs

Select the target test logs to import.

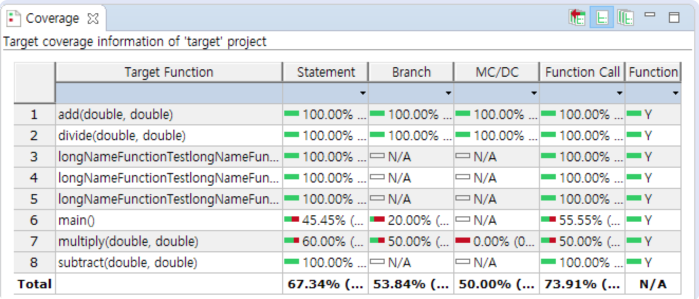
Select target test logs: □ Show excluded logs ☑ Show applied logs

Project	Test code generation time	Status
target	2020-04-01 13:52:13	Applied
target	2020-04-01 13:50:45	Applied
target	2020-03-31 17:43:35	Applied
target	2020-03-31 17:41:48	Applied

※ You can import the target test logs that are neither applied(✓) nor excluded(X) on next time.

Result

After the import is completed, you can check the target coverage information in the coverage view.



Target coverage information of 'target' project

	Target Function	Statement	Branch	MC/DC	Function Call	Function
1	add(double, double)	100.00% ...	100.00% ...	100.00% ...	100.00% ...	Y
2	divide(double, double)	100.00% ...	100.00% ...	100.00% ...	100.00% ...	Y
3	longNameFunctionTestlongNameFun...	100.00% ...	N/A	N/A	100.00% ...	Y
4	longNameFunctionTestlongNameFun...	100.00% ...	N/A	N/A	100.00% ...	Y
5	longNameFunctionTestlongNameFun...	100.00% ...	N/A	N/A	100.00% ...	Y
6	main()	45.45% (...	20.00% (...	N/A	55.55% (...	Y
7	multiply(double, double)	60.00% (...	50.00% (...	0.00% (0...	50.00% (...	Y
8	subtract(double, double)	100.00% ...	N/A	N/A	100.00% ...	Y
Total		**67.34% (...**	**53.84% (...**	**50.00% (...**	**73.91% (...**	**N/A**

✻ [Import Target Test Log] may fail because the target test run information and the host test information are not valid if the host test case, source file, function information, etc. are changed before importing the log of the target test result.

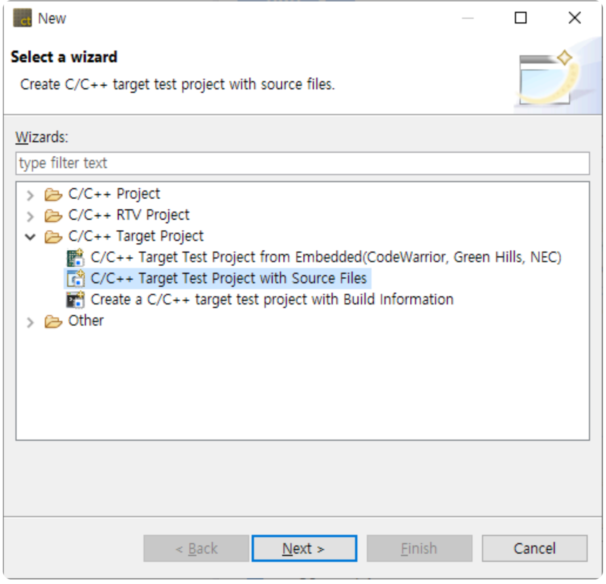
26.2. C/C++ Target Test Project

The C / C ++ target test project (hereinafter referred to as the target test project) is a project for target environment testing. Target testing projects do not support host testing.

Create a target test project

C/C++ Target Test Project with Source Files

1. Create a project by selecting [File]-> [New]-> [Other …] in the global menu and clicking [C / C ++ Target Test Project with Source Files].



New

Select a wizard

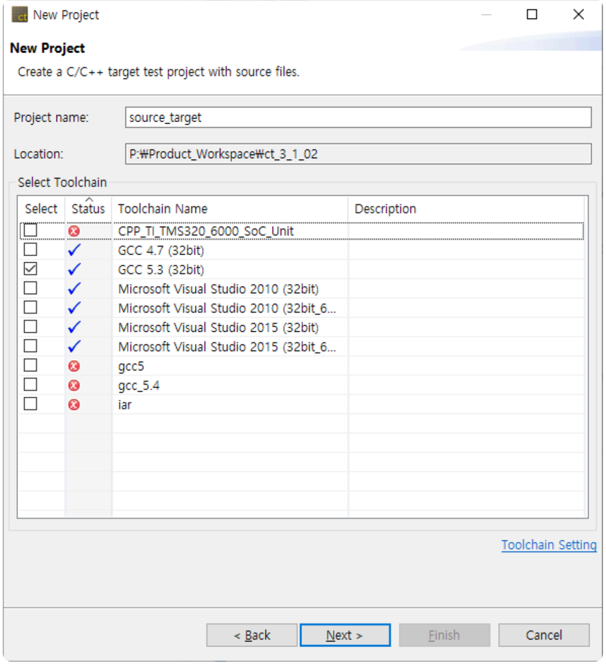
Create C/C++ target test project with source files.

Wizards:

type filter text

- C/C++ Project
- C/C++ RTV Project
- C/C++ Target Project
  - C/C++ Target Test Project from Embedded(CodeWarrior, Green Hills, NEC)
  - C/C++ Target Test Project with Source Files
  - Create a C/C++ target test project with Build Information
- Other

2. Enter a project name and select a toolchain to use.



New Project

New Project

Create a C/C++ target test project with source files.

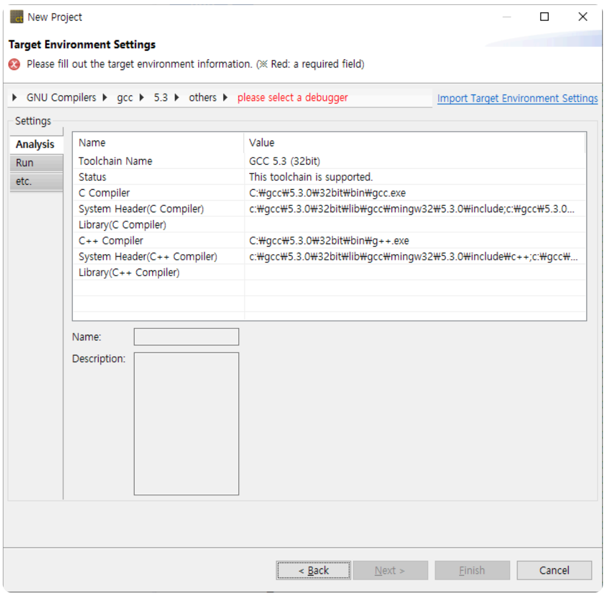
Project name: source_target

Location: P:₩Product_Workspace₩ct_3_1_02

Select Toolchain

Select	Status	Toolchain Name	Description
□	⊗	CPP_TI_TMS320_6000_SoC_Unit	
□	✓	GCC 4.7 (32bit)	
☑	✓	GCC 5.3 (32bit)	
□	✓	Microsoft Visual Studio 2010 (32bit)	
□	✓	Microsoft Visual Studio 2010 (32bit_6...	
□	✓	Microsoft Visual Studio 2015 (32bit)	
□	✓	Microsoft Visual Studio 2015 (32bit_6...	
□	⊗	gcc5	
□	⊗	gcc_5.4	
□	⊗	iar	

3. After selecting the basic information of the target environment, enter the detailed settings for each category and click the [Next] button.



New Project

Target Environment Settings

Please fill out the target environment information. (※ Red: a required field)

GNU Compilers ▸ gcc ▸ 5.3 ▸ others ▸ please select a debugger

Import Target Environment Settings

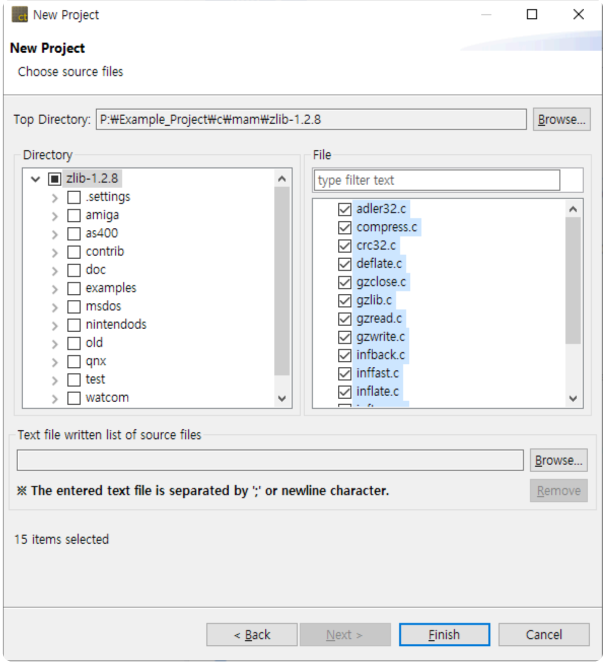
Settings

Name	Value
Toolchain Name	GCC 5.3 (32bit)
Status	This toolchain is supported.
C Compiler	C:₩gcc₩5.3.0₩32bit₩bin₩gcc.exe
System Header(C Compiler)	c:₩gcc₩5.3.0₩32bit₩lib₩gcc₩mingw32₩5.3.0₩include;c:₩gcc₩5.3.0...
Library(C Compiler)	
C++ Compiler	C:₩gcc₩5.3.0₩32bit₩bin₩g++.exe
System Header(C++ Compiler)	c:₩gcc₩5.3.0₩32bit₩lib₩gcc₩mingw32₩5.3.0₩include₩c++;c:₩gcc₩...
Library(C++ Compiler)	

Name:

Description:

4. Select the source files under test and click the [Finish] button.



New Project

New Project

Choose source files

Top Directory: P:₩Example_Project₩c₩mam₩zlib-1.2.8

Directory

- ■ zlib-1.2.8
  - □ .settings
  - □ amiga
  - □ as400
  - □ contrib
  - □ doc
  - □ examples
  - □ msdos
  - □ nintendods
  - □ old
  - □ qnx
  - □ test
  - □ watcom

File

type filter text

- ☑ adler32.c
- ☑ compress.c
- ☑ crc32.c
- ☑ deflate.c
- ☑ gzclose.c
- ☑ gzlib.c
- ☑ gzread.c
- ☑ gzwrite.c
- ☑ infback.c
- ☑ inffast.c
- ☑ inflate.c

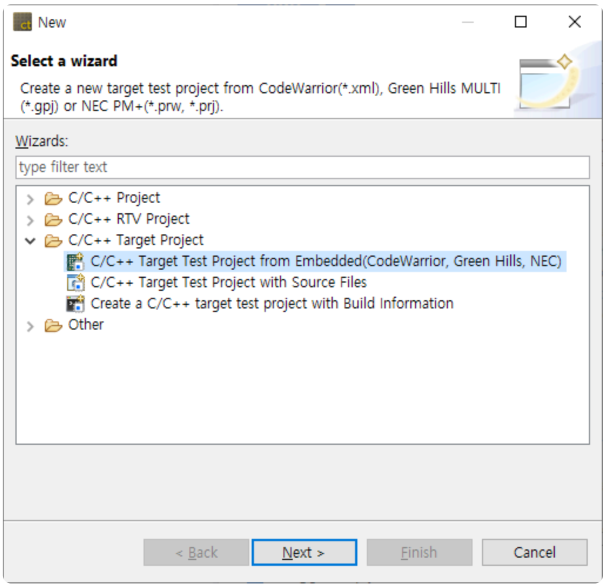
Text file written list of source files

※ The entered text file is separated by ';' or newline character.

15 items selected

C/C++ Target Test Project from Embedded(CodeWarrior, Green Hills, NEC)

1. Create a project by selecting [File]-> [New]-> [Other …] in the global menu and clicking [C/C++ Target Test Project from Embedded(CodeWarrior, Green Hills, NEC)].



New

Select a wizard

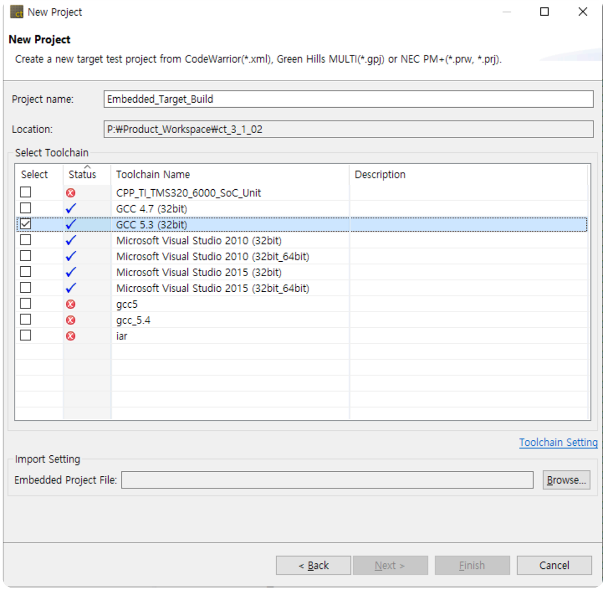
Create a new target test project from CodeWarrior(*.xml), Green Hills MULTI (*.gpj) or NEC PM+(*.prw, *.prj).

Wizards:

type filter text

- C/C++ Project
- C/C++ RTV Project
- C/C++ Target Project
  - C/C++ Target Test Project from Embedded(CodeWarrior, Green Hills, NEC)
  - C/C++ Target Test Project with Source Files
  - Create a C/C++ target test project with Build Information
- Other

2. Enter a project name and select a toolchain to use. After selecting the toolchain, import the embedded project file to test. Currently, embedded projects supported by CT 2023.12 are CodeWarrior, Green Hills, and NEC.



New Project

New Project

Create a new target test project from CodeWarrior(*.xml), Green Hills MULTI(*.gpj) or NEC PM+(*.prw, *.prj).

Project name: Embedded_Target_Build

Location: P:₩Product_Workspace₩ct_3_1_02

Select Toolchain

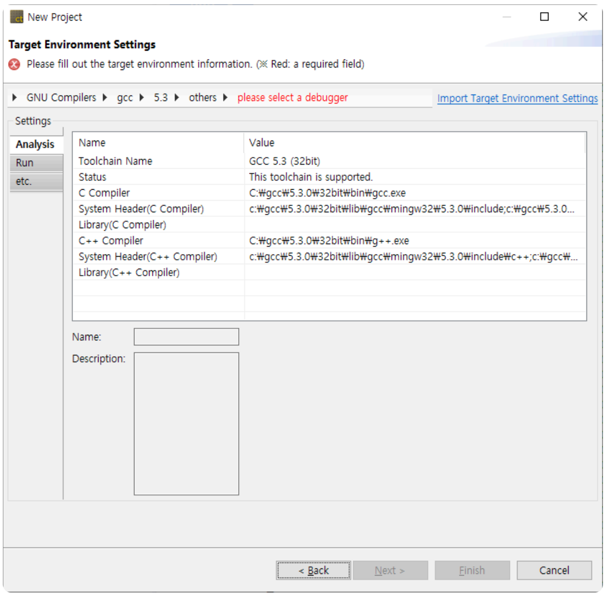
Select	Status	Toolchain Name	Description
□	⊗	CPP_TI_TMS320_6000_SoC_Unit	
□	✓	GCC 4.7 (32bit)	
☑	✓	GCC 5.3 (32bit)	
□	✓	Microsoft Visual Studio 2010 (32bit)	
□	✓	Microsoft Visual Studio 2010 (32bit_64bit)	
□	✓	Microsoft Visual Studio 2015 (32bit)	
□	✓	Microsoft Visual Studio 2015 (32bit_64bit)	
□	⊗	gcc5	
□	⊗	gcc_5.4	
□	⊗	iar	

Toolchain Setting

Import Setting

Embedded Project File:

3. After selecting the basic information of the target environment, enter the detailed settings for each category.



Target Environment Settings

Please fill out the target environment information. (※ Red: a required field)

GNU Compilers ▸ gcc ▸ 5.3 ▸ others ▸ please select a debugger

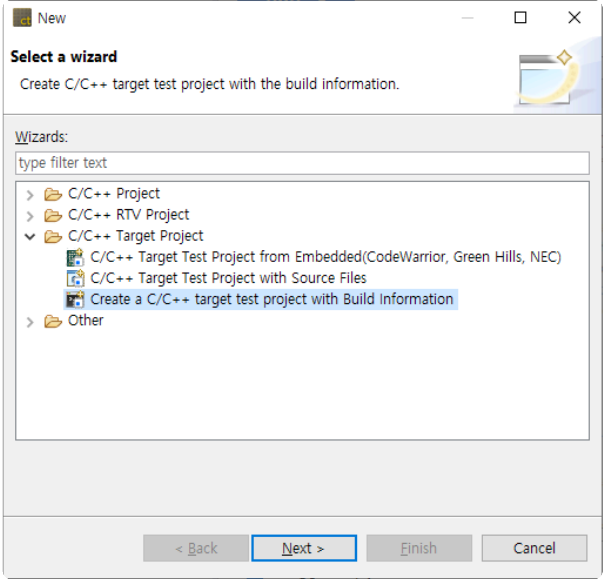
Name	Value
Toolchain Name	GCC 5.3 (32bit)
Status	This toolchain is supported.
C Compiler	C:₩gcc₩5.3.0₩32bit₩bin₩gcc.exe
System Header(C Compiler)	c:₩gcc₩5.3.0₩32bit₩lib₩gcc₩mingw32₩5.3.0₩include;c:₩gcc₩5.3.0...
Library(C Compiler)	
C++ Compiler	C:₩gcc₩5.3.0₩32bit₩bin₩g++.exe
System Header(C++ Compiler)	c:₩gcc₩5.3.0₩32bit₩lib₩gcc₩mingw32₩5.3.0₩include₩c++;c:₩gcc₩...
Library(C++ Compiler)	

Name:

Description:

Create a C/C++ Target Test Project with Build Information

1. Create a project by selecting [File]-> [New]-> [Other …] in the global menu and clicking [Create a C/C++ Target Test Project with Build Information].

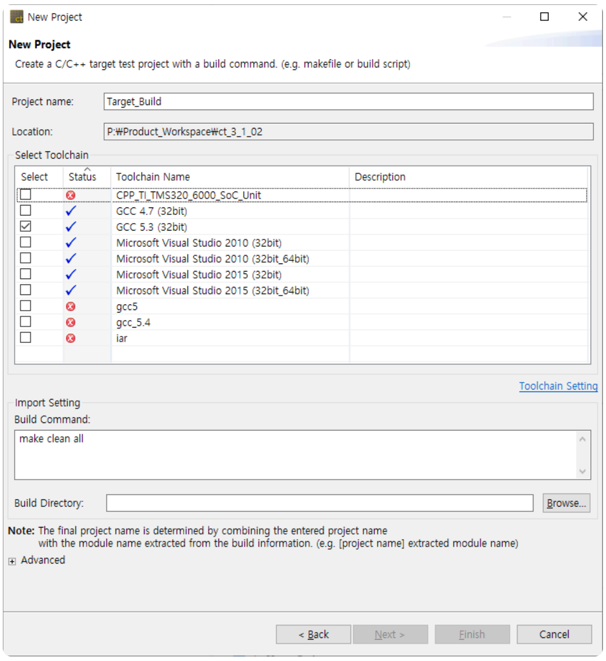


Select a wizard

Create C/C++ target test project with the build information.

Wizards:
type filter text
C/C++ Project
C/C++ RTV Project
C/C++ Target Project
C/C++ Target Test Project from Embedded(CodeWarrior, Green Hills, NEC)
C/C++ Target Test Project with Source Files
Create a C/C++ target test project with Build Information
Other
< Back
Next >
Finish
Cancel

2. Enter a project name and select a toolchain to use. After selecting the toolchain, Specify the path of the created Makefile and build script as the build directory and write the build command. You can choose a script file to set the build-environment from the [Advanced] menu.



New Project

Create a C/C++ target test project with a build command. (e.g. makefile or build script)

Project name: Target_Build

Location: P:₩Product_Workspace₩ct_3_1_02

Select Toolchain

Select	Status	Toolchain Name	Description
□	☒	CPP_TI_TMS320_6000_SoC_Unit	
□	✓	GCC 4.7 (32bit)	
☑	✓	GCC 5.3 (32bit)	
□	✓	Microsoft Visual Studio 2010 (32bit)	
□	✓	Microsoft Visual Studio 2010 (32bit_64bit)	
□	✓	Microsoft Visual Studio 2015 (32bit)	
□	✓	Microsoft Visual Studio 2015 (32bit_64bit)	
□	☒	gcc5	
□	☒	gcc_5.4	
□	☒	iar	

Toolchain Setting

Import Setting

Build Command:

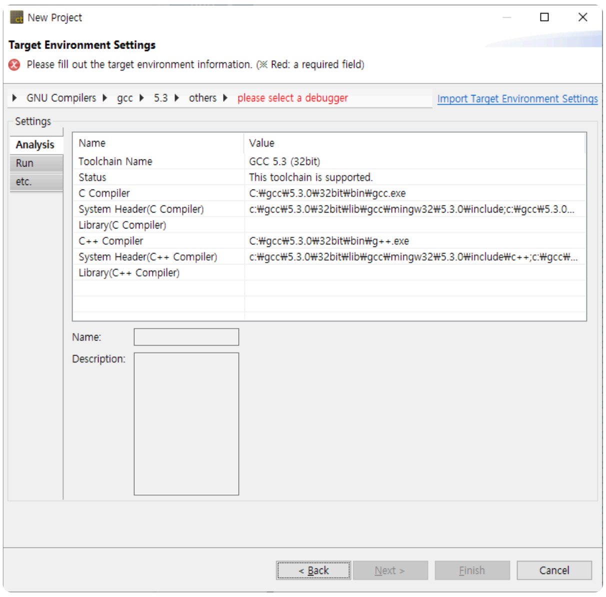
```
make clean all
```

Build Directory:

Browse...

Note: The final project name is determined by combining the entered project name with the module name extracted from the build information. (e.g. [project name] extracted module name)

3. After selecting the basic information of the target environment, enter the detailed settings for each category.



Target Environment Settings

☒ Please fill out the target environment information. (※ Red: a required field)

GNU Compilers ▸ gcc ▸ 5.3 ▸ others ▸ please select a debugger

Import Target Environment Settings

Settings

Name	Value
Toolchain Name	GCC 5.3 (32bit)
Status	This toolchain is supported.
C Compiler	C:₩gcc₩5.3.0₩32bit₩bin₩gcc.exe
System Header(C Compiler)	c:₩gcc₩5.3.0₩32bit₩lib₩gcc₩mingw32₩5.3.0₩include;c:₩gcc₩5.3.0...
Library(C Compiler)	
C++ Compiler	C:₩gcc₩5.3.0₩32bit₩bin₩g++.exe
System Header(C++ Compiler)	c:₩gcc₩5.3.0₩32bit₩lib₩gcc₩mingw32₩5.3.0₩include₩c++;c:₩gcc₩...
Library(C++ Compiler)	

Name:

Description:

! Toolchains with invalid compiler paths cannot be selected when creating a target test project.

26.3. Target Test Run Settings

You can check the target test execution settings on the target test page in [Project]-> [Properties].

Coverage kind

You can select the type of coverage(Statement, Branch, MC/DC) to be measured for the target test.

Target for coverage measurement

In addition to the functions under test, you can select functions to measure coverage.

All functions called by the target function	Measures coverages for all functions called by the function under test.
The functions called by the previous test run	Includes functions whose coverage was measured from the previous test.

Testcase run

You can choose how to run the test case.

Run at once	Loads and runs all test cases on target at once. Each test case is affected by the previous test case run results.
Run one by one	Repeats loading and running each test case on target. It takes longer than running at once but uses less memory.

26.4. Target Log Collector

The target log collector is a server that collects target test results and sends them to CT 2023.12.
Collecting target test results methods are largely divided into communication and file scanning.
Supported communication protocols and scannable file formats are as follows.

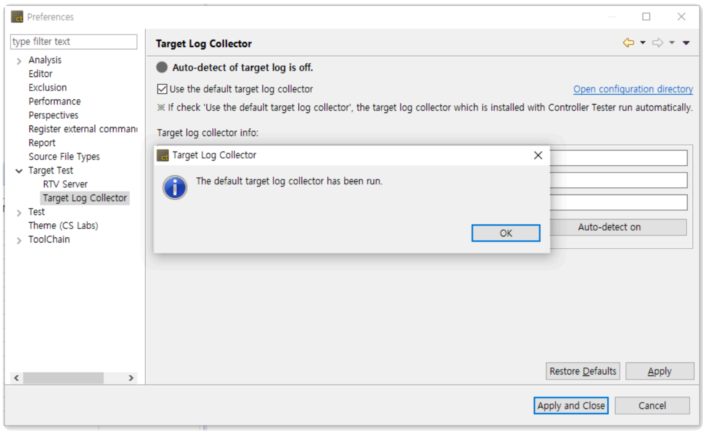
Protocol	TCP, UDP, UART
File format	Target log(text), memory dump(Hex, Intel HEX)

Installation

The target log collector is automatically installed when CT 2023.12 is installed.

Run

When [Use the default target log collector] is checked in [Preferences] -> [Target Test] -> [Target Log Collector], the target log collector starts collecting target test results.
If you use TargetLogCollector.zip after extracting it, run TargetLogCollector.exe in the unzipped directory at the Windows command prompt.



● Auto-detect of target log is off.

☑ Use the default target log collector

※ If check 'Use the default target log collector', the target log collector which is installed with Controller Tester run automatically.

Target log collector info:

Target Log Collector

The default target log collector has been run.

Settings

It can be set through the ‘settings.ini’ file in the target log collector installation path, and the options are as follows.

[LogReceiveServer]	Settings for receiving target test results
port	TCP, UDP communication port
protocol	Communication protocol for receiving target test results
timeout	Connection timeout
lastString	String representing the end of the data
serialPort	Serial communication port

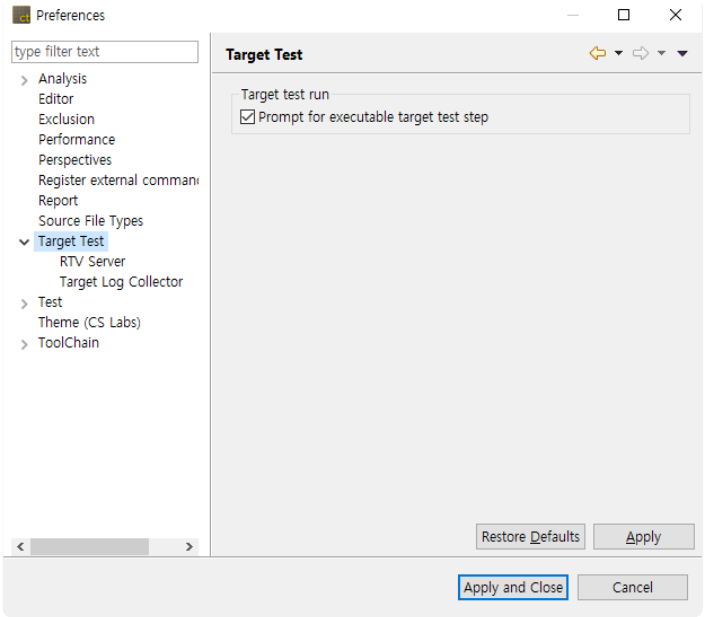
	(Windows: COM#, Linux: /dev/ttyS#)
baudRate	Serial communication settings
dataBits	Serial communication settings
stopBits	Serial communication settings
parity	Serial communication settings
flowControl	Serial communication settings
[ScanLog]	Settings for file scanning
dir	Directory to scan
fileExtension	File extensions to scan(Scan all files if blank)
[LogSendServer]	Settings for communication with CT 2023.12
port	Target log file transfer port

✻ **timeout**: If there is no data transmission for the specified number of seconds from the last reception, the received data is saved.
dir: When a target log file (text, hex) is entered in the specified directory, the target log collector recognizes it.

26.5. Preferences

Target Test

You can set whether to open the target test step notification dialog when the target test is run.



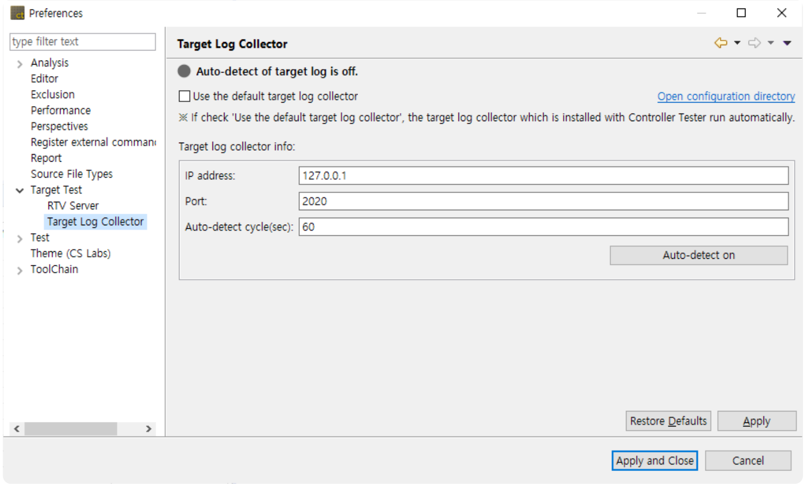
Target Test

Target test run

☑ Prompt for executable target test step

Target Log Collector

Set target log collector information to use and whether to automatically detect target test results. If you turn on automatic target log detection by clicking the [Atuto-detect on] button, a new target test result is received from the target log collector at a specified automatic detection cycle.



Target Log Collector

● Auto-detect of target log is off.

□ Use the default target log collector

※ If check 'Use the default target log collector', the target log collector which is installed with Controller Tester run automatically.

Target log collector info:

IP address: 127.0.0.1

Port: 2020

Auto-detect cycle(sec): 60

Target Log Collector Setting	Description
Auto-detect cycle(sec)	Cycle to check for new target test results
IP	IP on the server or PC where the target log collector runs
Port	Target log collector’s communication port

! When using the default target log collector, set only the auto-detection interval(sec).

27. CT RTV(Remote Target Verifier)

Introduction

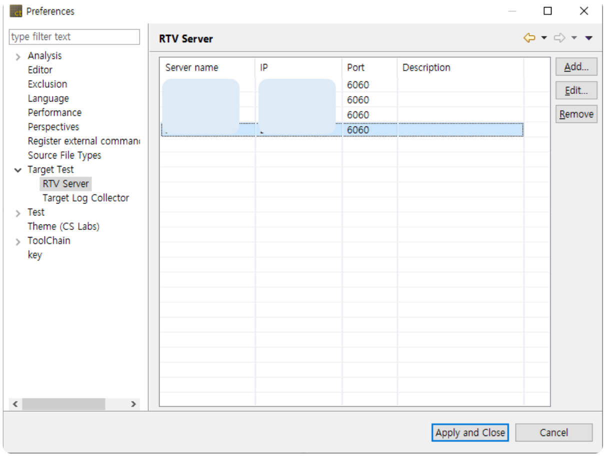
CT RTV helps you perform automated testing in your Linux environment.
After installing the RTV server in your Linux environment and completing the default configuration, you can use the RTV client to perform the RTV test as easily as you would in a hosted environment.
For information on how to install the RTV server in your Linux environment, please contact the Technical support contact on bottom of the Troubleshooting page of this document.

Supported Operating Systems

Server: Linux (RHEL, Ubuntu, Debian, Fedora based)
Client: Windows 7/10

27.1. RTV Server Settings

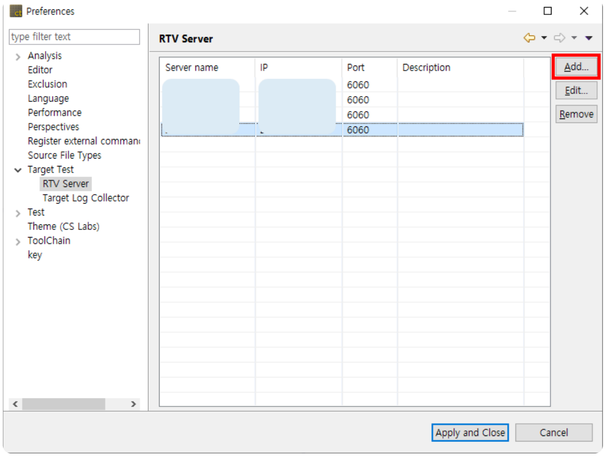
In order to use CT RTV, you need to add a RTV server with RTV server installed.
The RTV server can be added in [Window] -> [Preferences] -> [RTV Server].



Server name	IP	Port	Description
[redacted]	[redacted]	6060	
		6060	
		6060	
		6060	

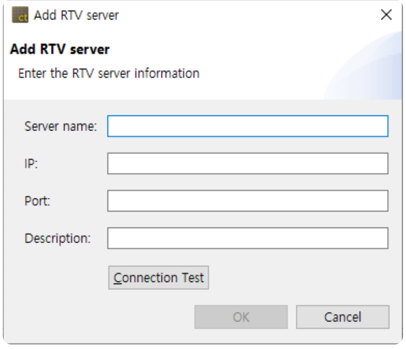
Add a RTV server

1. Click [Add] in [Window] -> [Preferences] -> [RTV Server].



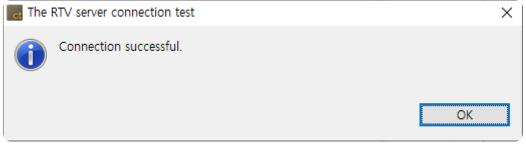
Server name	IP	Port	Description
[redacted]	[redacted]	6060	
		6060	
		6060	
		6060	

2. In the [Add RTV Server] window, enter the RTV server information.



! The server name only accepts characters that can be used as Windows file names and can not be modified after adding the RTV server.

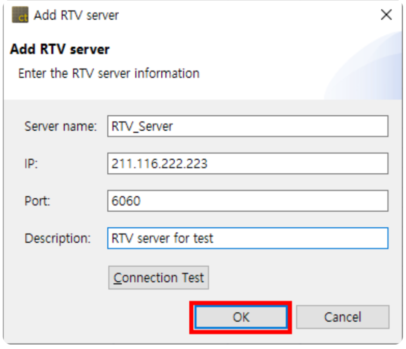
3. Click the [Connection Test] button to check the connection status with the RTV server you entered.



The RTV server connection test

Connection successful.

4. If the connection test with the RTV server is successful, click the [OK] button to add the RTV server.



Add RTV server

Add RTV server

Enter the RTV server information

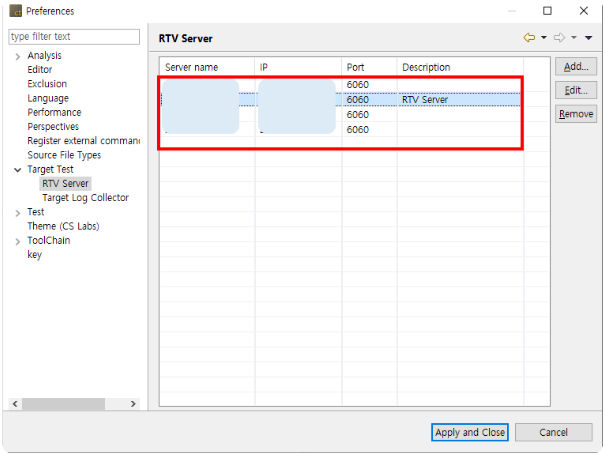
Server name: RTV_Server

IP: 211.116.222.223

Port: 6060

Description: RTV server for test

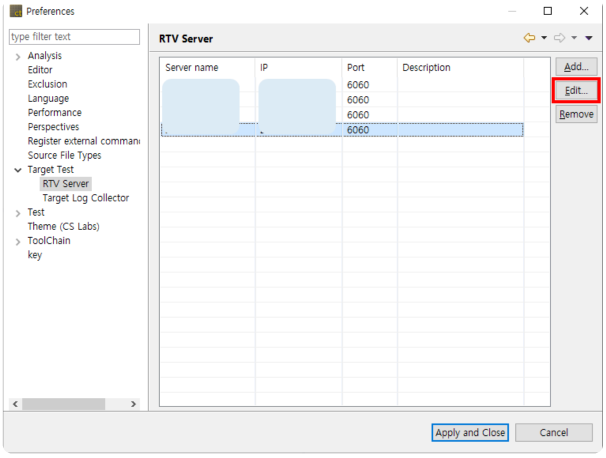
5. You can see that the RTV server has been added.



Server name	IP	Port	Description
[redacted]	[redacted]	6060	
		6060	RTV Server
		6060	
		6060	

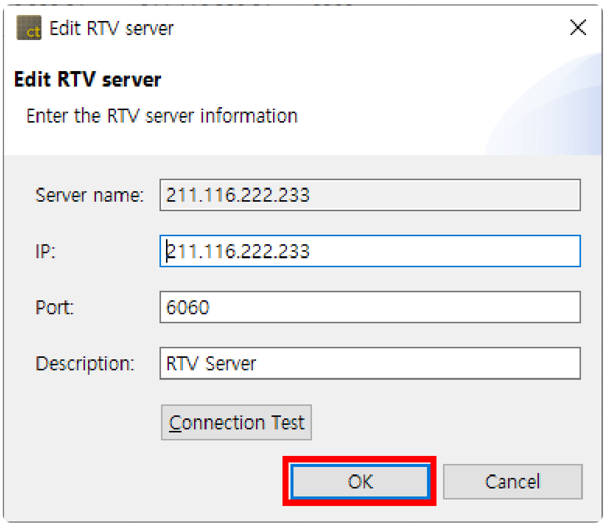
Edit a RTV server

1. Double-click the server in the RTV server list, or select the server and click the [Edit] button.



Server name	IP	Port	Description
[redacted]	[redacted]	6060	
		6060	
		6060	
		6060	

2. On the [Edit RTV server] window, edit the server information and then click [OK].



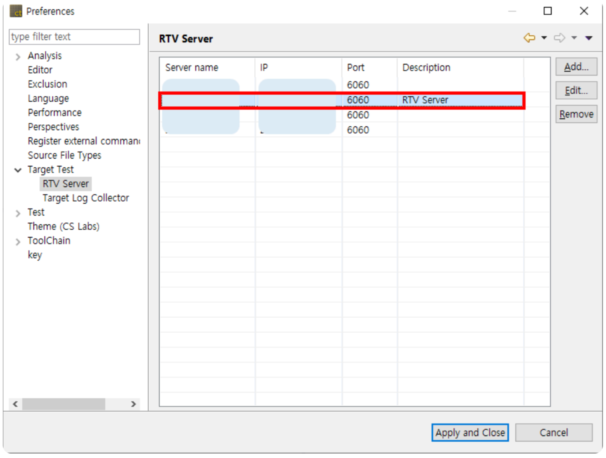
Server name: 211.116.222.233

IP: 211.116.222.233

Port: 6060

Description: RTV Server

3. You can see that the RTV server information has been edited.

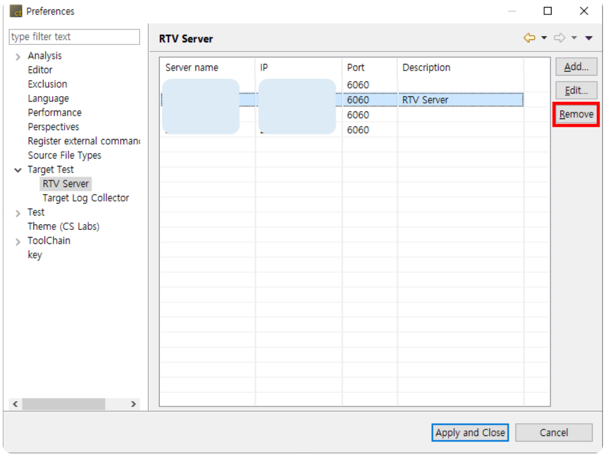


Server name	IP	Port	Description
[redacted]	[redacted]	6060	
		6060	RTV Server
		6060	
		6060	

Remove a RTV server

If you no longer use the RTV server, you can remove it.
When you remove a RTV server, the toolchain or project resources associated with the RTV server are deleted from the client environment(Can not be deleted if a RTV Toolchain added from that RTV server exists).

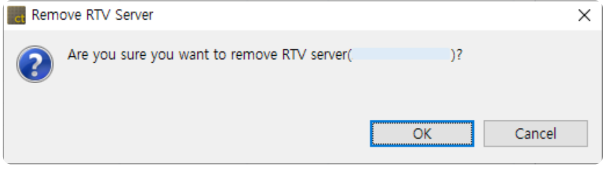
1. Select a server from the list of RTV servers and click the [Remove] button.



Server name	IP	Port	Description
[redacted]	[redacted]	6060	
		6060	RTV Server
		6060	
		6060	

2. Click the [OK] button in the [Remove RTV Server] window(Depending on the size of the RTV

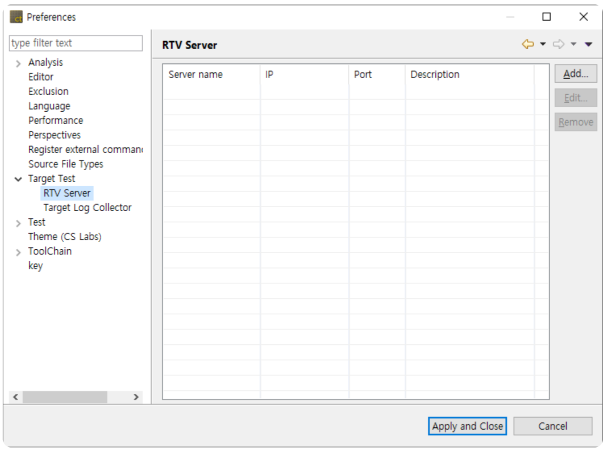
server resource, it may take a minute or two).



Remove RTV Server

Are you sure you want to remove RTV server( )?

3. You can see that the RTV server has been removed.



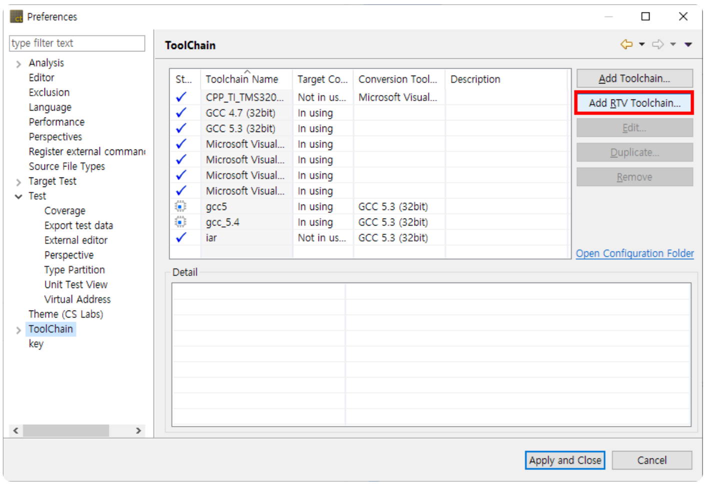
27.2. RTV Toolchain Settings

RTV toolchain

To build and run a test in a RTV environment with CT RTV, you need to set the toolchain (compiler) information for the source file being tested.
This chapter describes how to add, edit, and delete the RTV Toolchain information that has previously extracted from the RTV environment where the RTV Server is installed.
(For extracting toolchain information from your RTV environment, please contact the Technical support contact at the bottom of this document Troubleshooting page.)

Add an RTV toolchain

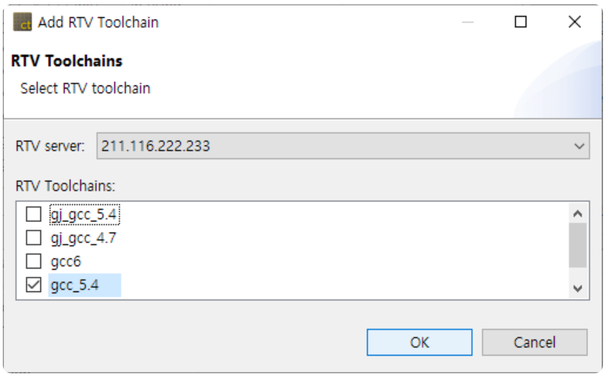
1. Click the [Add RTV Toolchain] button in the [Window] -> [Preferences] -> [Toolchain] window.



St...	Toolchain Name	Target Co...	Conversion Tool...	Description
✓	CPP_TI_TMS320...	Not in us...	Microsoft Visual...	
✓	GCC 4.7 (32bit)	In using		
✓	GCC 5.3 (32bit)	In using		
✓	Microsoft Visual...	In using		
✓	Microsoft Visual...	In using		
✓	Microsoft Visual...	In using		
✓	Microsoft Visual...	In using		
▣	gcc5	In using	GCC 5.3 (32bit)	
▣	gcc_5.4	In using	GCC 5.3 (32bit)	
✓	iar	Not in us...	GCC 5.3 (32bit)	

> ✻ If you do not have a RTV server, the [Add RTV Server] window will appear first.

2. If you select the RTV server in the [Add RTV Toolchain] window, you can see the list of RTV Toolchain extracted from the RTV server. Select the toolchain you want to add and click the [OK] button.



RTV Toolchains

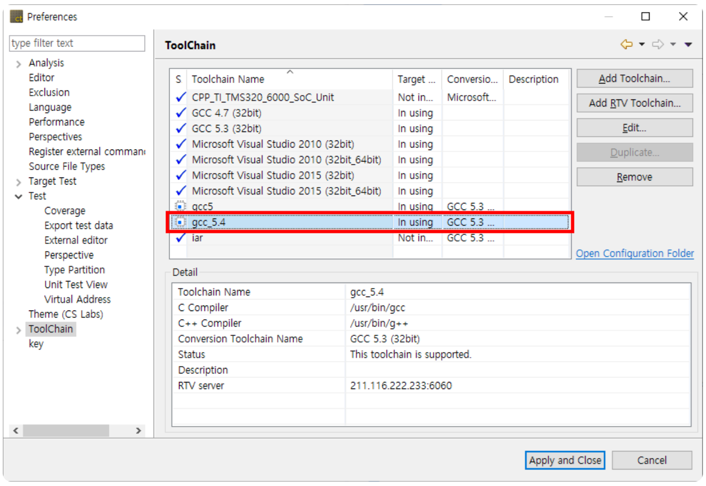
Select RTV toolchain

RTV server: 211.116.222.233

RTV Toolchains:

☐ gj_gcc_5.4
☐ gj_gcc_4.7
☐ gcc6
☑ gcc_5.4

3. The toolchain information is imported from the RTV server (Depending on the size of the system header, it may take 1 to 2 minutes). When the operation is completed, you can see that the RTV Toolchain has been added.



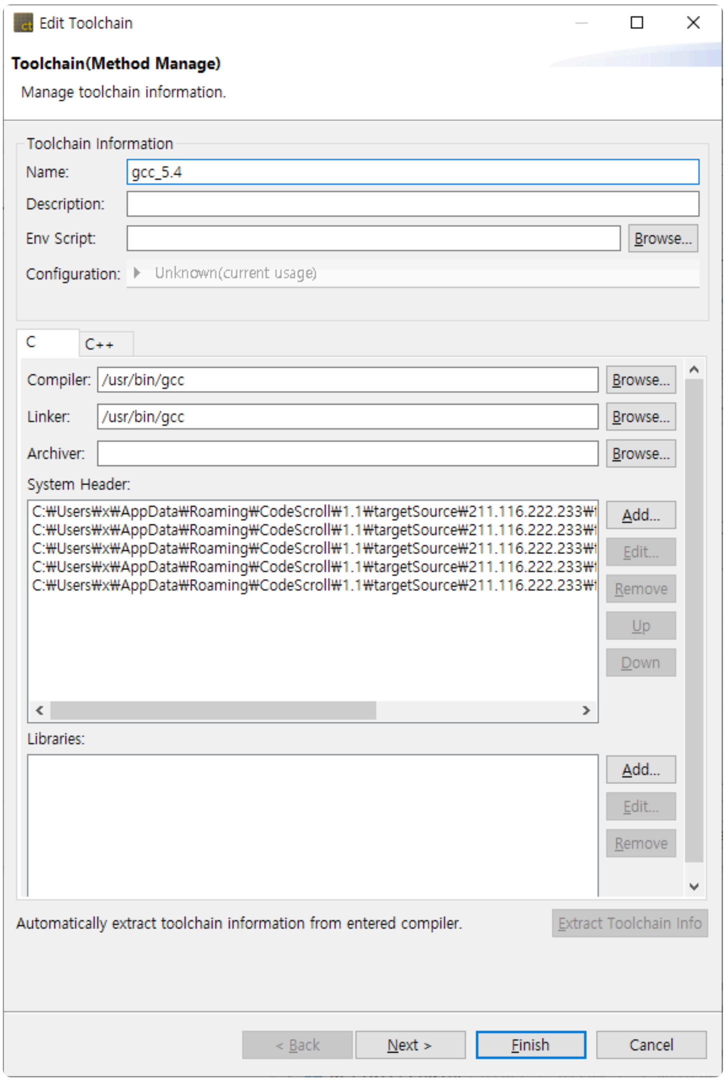
S	Toolchain Name	Target ...	Conversio...	Description
✓	CPP_TI_TMS320_6000_SoC_Unit	Not in...	Microsoft...	
✓	GCC 4.7 (32bit)	In using		
✓	GCC 5.3 (32bit)	In using		
✓	Microsoft Visual Studio 2010 (32bit)	In using		
✓	Microsoft Visual Studio 2010 (32bit_64bit)	In using		
✓	Microsoft Visual Studio 2015 (32bit)	In using		
✓	Microsoft Visual Studio 2015 (32bit_64bit)	In using		
	gcc5	In using	GCC 5.3 ...	
	gcc_5.4	In using	GCC 5.3 ...	
✓	iar	Not in...	GCC 5.3 ...	

Toolchain Name	gcc_5.4
C Compiler	/usr/bin/gcc
C++ Compiler	/usr/bin/g++
Conversion Toolchain Name	GCC 5.3 (32bit)
Status	This toolchain is supported.
Description	
RTV server	211.116.222.233:6060

4. If you select the RTV Toolchain added, you can see that the information of the RTV server is displayed on the [Detail].

Edit an RTV toolchain

1. Select the toolchain to be edited and click the [Edit] button.



Name: gcc_5.4

Description:

Env Script:

Configuration: Unknown(current usage)

Compiler: /usr/bin/gcc

Linker: /usr/bin/gcc

Archiver:

System Header:

```
C:₩Users₩x₩AppData₩Roaming₩CodeScroll₩1.1₩targetSource₩211.116.222.233₩
C:₩Users₩x₩AppData₩Roaming₩CodeScroll₩1.1₩targetSource₩211.116.222.233₩
C:₩Users₩x₩AppData₩Roaming₩CodeScroll₩1.1₩targetSource₩211.116.222.233₩
C:₩Users₩x₩AppData₩Roaming₩CodeScroll₩1.1₩targetSource₩211.116.222.233₩
C:₩Users₩x₩AppData₩Roaming₩CodeScroll₩1.1₩targetSource₩211.116.222.233₩
```

Libraries:

Automatically extract toolchain information from entered compiler.

2. Edit the RTV toolchain information.
3. Click the [Finish] button.

Duplicate an RTV toolchain

The duplication for an RTV toolchain is not provided.

Remove an RTV toolchain

Select the toolchain to delete and click the [Remove] button.

> ! If you have a project associated with the toolchain you want to delete, you can not use the project normally after deleting the toolchain.

Import/Export an RTV toolchain

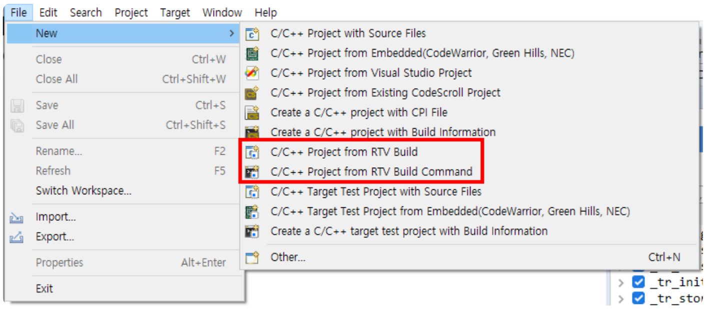
The RTV Toolchain can not be imported/exported because it can be added through the RTV server.

27.3. Create a RTV Project

Create an RTV project to test the source files that exist in the RTV environment.

When building source files in the RTV environment, you can extract the information needed to create the RTV project.
This chapter describes how to create an RTV project by using pre-extracted source file build information(using the RTV Server Utility) in the RTV environment, or extracting information at the same time as building the source file.

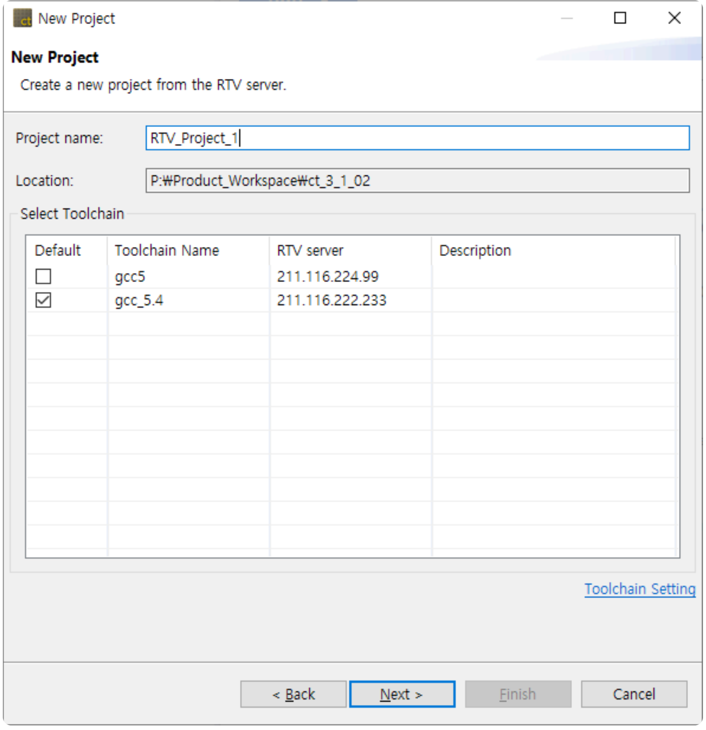
To create an RTV project, run the [Create Project Wizard].
Click [File] -> [New] or Shortcut.


File
Edit
Search
Project
Target
Window
Help
New
Close Ctrl+W
Close All Ctrl+Shift+W
Save Ctrl+S
Save All Ctrl+Shift+S
Rename... F2
Refresh F5
Switch Workspace...
Import...
Export...
Properties Alt+Enter
Exit
C/C++ Project with Source Files
C/C++ Project from Embedded(CodeWarrior, Green Hills, NEC)
C/C++ Project from Visual Studio Project
C/C++ Project from Existing CodeScroll Project
Create a C/C++ project with CPI File
Create a C/C++ project with Build Information
C/C++ Project from RTV Build
C/C++ Project from RTV Build Command
C/C++ Target Test Project with Source Files
C/C++ Target Test Project from Embedded(CodeWarrior, Green Hills, NEC)
Create a C/C++ target test project with Build Information
Other... Ctrl+N
_tr_init
_tr_stop

C/C++ Project from RTV Build

It is selected when creating an RTV project using pre-extracted source file build information (using the RTV Server Utility) in the RTV environment.

1. Enter the project name in [Project name].



New Project

Create a new project from the RTV server.

Project name: RTV_Project_1

Location: P:₩Product_Workspace₩ct_3_1_02

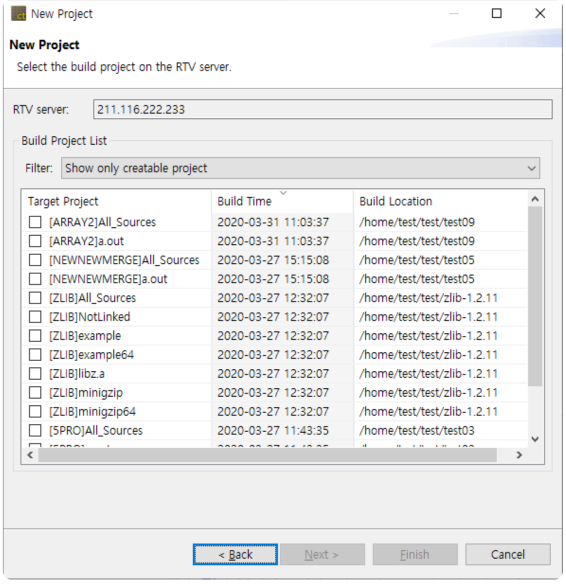
Select Toolchain

Default	Toolchain Name	RTV server	Description
□	gcc5	211.116.224.99	
☑	gcc_5.4	211.116.222.233	

Toolchain Setting

2. A list of RTV toolchains appears in the [Select Toolchain]. Select the RTV toolchain to use.

3. After selecting the toolchain, then click the [Next] button. You can see the list of source file builds pre-extracted from the RTV toolchain.



New Project

Select the build project on the RTV server.

RTV server: 211.116.222.233

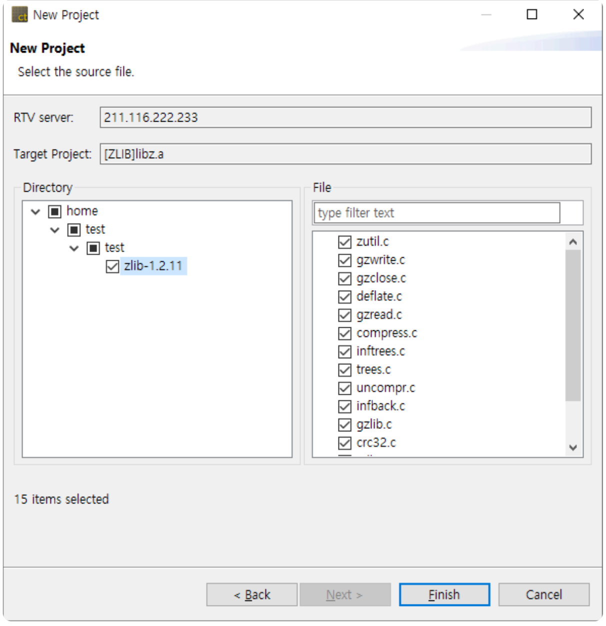
Build Project List

Filter: Show only creatable project

Target Project	Build Time	Build Location
□ [ARRAY2]All_Sources	2020-03-31 11:03:37	/home/test/test/test09
□ [ARRAY2]a.out	2020-03-31 11:03:37	/home/test/test/test09
□ [NEWNEWMERGE]All_Sources	2020-03-27 15:15:08	/home/test/test/test05
□ [NEWNEWMERGE]a.out	2020-03-27 15:15:08	/home/test/test/test05
□ [ZLIB]All_Sources	2020-03-27 12:32:07	/home/test/test/zlib-1.2.11
□ [ZLIB]NotLinked	2020-03-27 12:32:07	/home/test/test/zlib-1.2.11
□ [ZLIB]example	2020-03-27 12:32:07	/home/test/test/zlib-1.2.11
□ [ZLIB]example64	2020-03-27 12:32:07	/home/test/test/zlib-1.2.11
□ [ZLIB]libz.a	2020-03-27 12:32:07	/home/test/test/zlib-1.2.11
□ [ZLIB]minigzip	2020-03-27 12:32:07	/home/test/test/zlib-1.2.11
□ [ZLIB]minigzip64	2020-03-27 12:32:07	/home/test/test/zlib-1.2.11
□ [5PRO]All_Sources	2020-03-27 11:43:35	/home/test/test/test03

> ✻ Among the generated projects, ‘All_Sources_Project Name’ is a project that combines all the source files of the modules captured by ctbuild. Since this project is a combined project without considering whether it is built or not, it may not be able to perform the test normally.

4. In the [Build Project List], select the item for which you want to create the RTV project and click the [Next] button.



New Project

Select the source file.

RTV server: 211.116.222.233

Target Project: [ZLIB]libz.a

Directory

- ■ home
  - ■ test
    - ■ test
      - ☑ zlib-1.2.11

File

type filter text

☑ zutil.c
☑ gzwrite.c
☑ gzclose.c
☑ deflate.c
☑ gzread.c
☑ compress.c
☑ inftrees.c
☑ trees.c
☑ uncompr.c
☑ infback.c
☑ gzlib.c
☑ crc32.c

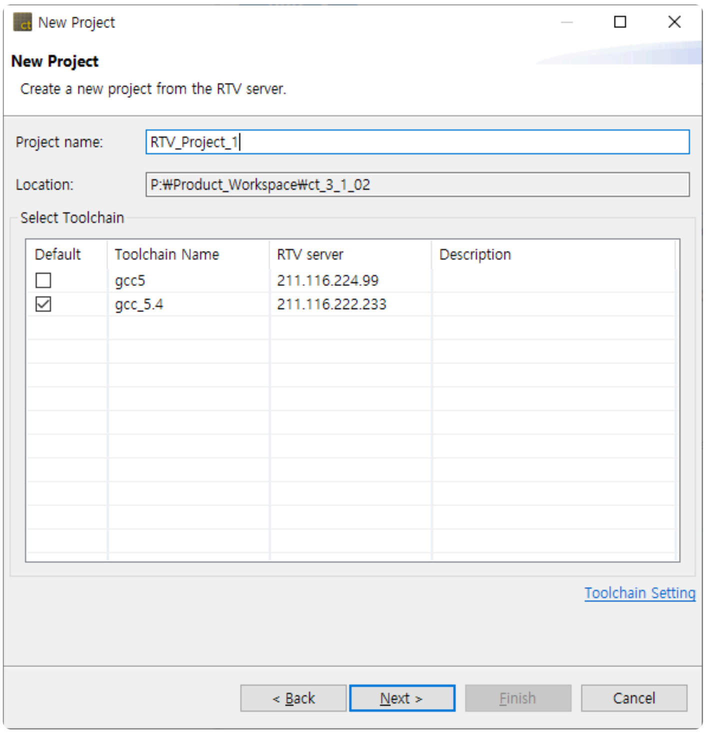
15 items selected

5. After selecting source files to be tested, click the [Finish] button to create the project.

C/C++ Project from RTV Build Command

It is selected when creating an RTV project by extracting information at the same time as building the source file. The user builds the source file on the RTV server using the build command and then creates the RTV project.

1. Enter the project name in [Project name].



New Project

New Project

Create a new project from the RTV server.

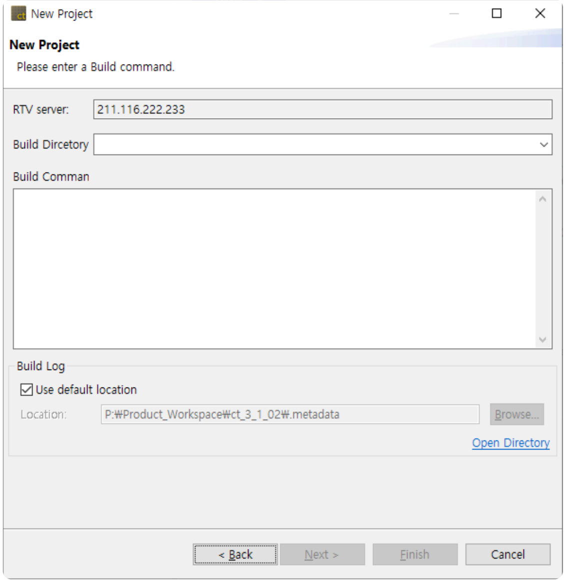
Project name: RTV_Project_1

Location: P:₩Product_Workspace₩ct_3_1_02

Select Toolchain

Default	Toolchain Name	RTV server	Description
□	gcc5	211.116.224.99	
☑	gcc_5.4	211.116.222.233	

2. A list of RTV toolchains appears in the toolchain list. Select the RTV toolchain to use.
3. After selecting the toolchain, click the [Next] button. The build will be performed on the RTV server from which the selected toolchain was imported.



New Project

New Project

Please enter a Build command.

RTV server: 211.116.222.233

Build Dircetory

Build Comman

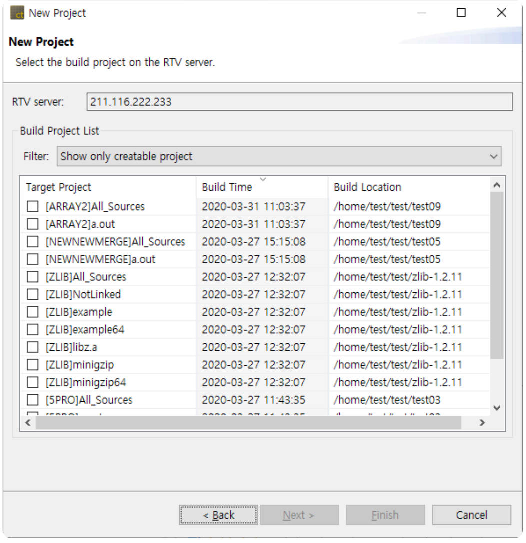
Build Log

☑ Use default location

Location: P:₩Product_Workspace₩ct_3_1_02₩.metadata

4. Enter the path to build from the RTV server (for example, the directory where the make file is located), and enter the build command.
5. In [Build Log], specify the path to the build results file.
   The default location is the .metadata directory of the workspace. If you uncheck [Use default location], you can change the path.
6. After entering the required information for the build, click the [Next] button. It builds the source file on the RTV server with the entered build command (depending on the build target, it can take a lot of time).

7. When the build is complete, a list of built projects appears.



New Project

Select the build project on the RTV server.

RTV server: 211.116.222.233

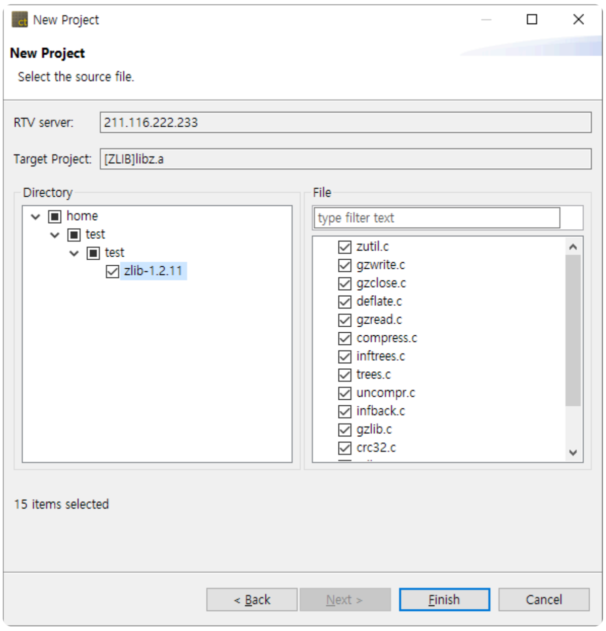
Build Project List

Filter: Show only creatable project

Target Project	Build Time	Build Location
□ [ARRAY2]All_Sources	2020-03-31 11:03:37	/home/test/test/test09
□ [ARRAY2]a.out	2020-03-31 11:03:37	/home/test/test/test09
□ [NEWNEWMERGE]All_Sources	2020-03-27 15:15:08	/home/test/test/test05
□ [NEWNEWMERGE]a.out	2020-03-27 15:15:08	/home/test/test/test05
□ [ZLIB]All_Sources	2020-03-27 12:32:07	/home/test/test/zlib-1.2.11
□ [ZLIB]NotLinked	2020-03-27 12:32:07	/home/test/test/zlib-1.2.11
□ [ZLIB]example	2020-03-27 12:32:07	/home/test/test/zlib-1.2.11
□ [ZLIB]example64	2020-03-27 12:32:07	/home/test/test/zlib-1.2.11
□ [ZLIB]libz.a	2020-03-27 12:32:07	/home/test/test/zlib-1.2.11
□ [ZLIB]minigzip	2020-03-27 12:32:07	/home/test/test/zlib-1.2.11
□ [ZLIB]minigzip64	2020-03-27 12:32:07	/home/test/test/zlib-1.2.11
□ [5PRO]All_Sources	2020-03-27 11:43:35	/home/test/test/test03

> Among the generated projects, ‘All_Sources_Project Name’ is a project that combines all the source files of the modules captured by ctbuild. Since this project is a combined project without considering whether it is built or not, it may not be able to perform the test normally.

8. In the [Build Project List], select the item for which you want to create the RTV project and click the [Next] button.



New Project

Select the source file.

RTV server: 211.116.222.233

Target Project: [ZLIB]libz.a

Directory

- ▣ home
  - ▣ test
    - ▣ test
      - ☑ zlib-1.2.11

File

type filter text

- ☑ zutil.c
- ☑ gzwrite.c
- ☑ gzclose.c
- ☑ deflate.c
- ☑ gzread.c
- ☑ compress.c
- ☑ inftrees.c
- ☑ trees.c
- ☑ uncompr.c
- ☑ infback.c
- ☑ gzlib.c
- ☑ crc32.c

15 items selected

9. When creating the RTV project, select the source file to be included and click the [Finish] button to create the project.

RTV build command

To create a project from build information, you must use the ctbuild command on the build command.

ctbuild command

The cs is a utility that automatically extracts the CT 2023.12 project configuration information of the source files that are built so that the CT 2023.12 RTV project can be created.

How to use ctbuild

Prefix the existing build command with ctbuild.

- Ex) `make` → `ctbuild capture make`

ctbuild option

new: Generate the necessary information before extracting build commands. Specify the toolchain with the `--toolchain` option and the project name with the `--project` option.

- Ex) `ctbuild new --toolchain=gcc5.4 --project=PRJ`

! The `--toolchain` option is required.

capture: Creates an RTV project by performing build command extraction.

- Ex) `ctbuild capture make`

convert: Convert a STATIC project to an RTV project.

- Ex) `ctbuild convert`

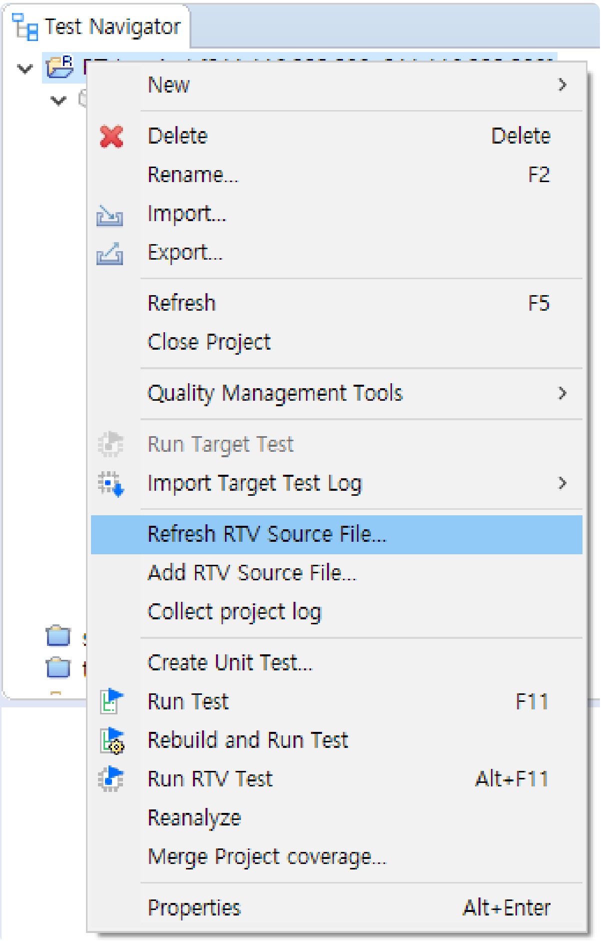
27.4. Refresh/Add RTV Source Files

Refresh RTV source file

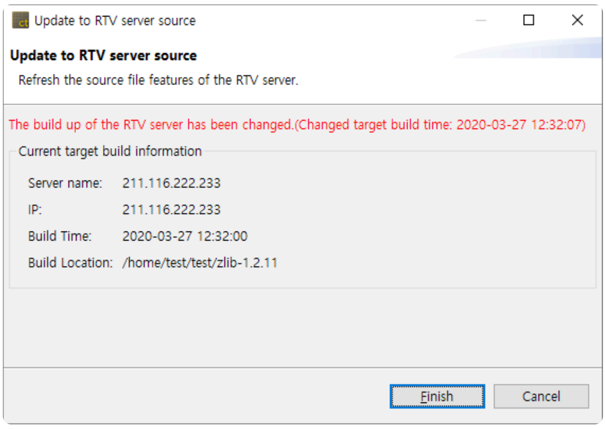
If the source file is modified and rebuilt on the RTV server, the [Refresh RTV Source File] allows the revised content to be reflected in the project.

> ! If the source file is modified but not rebuilt, the changed contents will not be reflected.
> If you modify the source files on the RTV server and then rebuild, you must perform a full build.

1. In the [Test Navigator] view, click the [Refresh RTV Source File] context menu.



2. When you create an RTV project, you can see the latest build information for the source files you selected (display a change notification if the build has changed). Click the [Finish] button to confirm your changes.



Update to RTV server source

Update to RTV server source

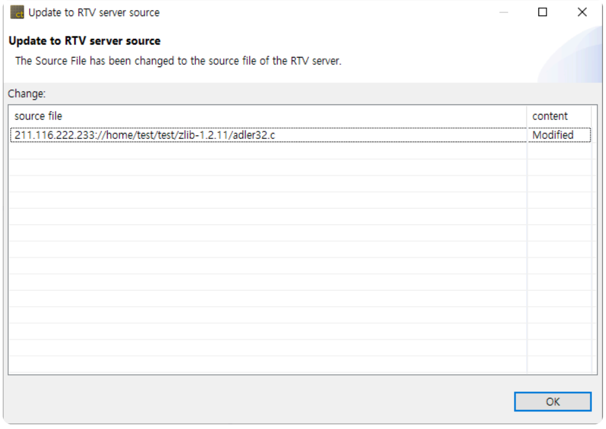
Refresh the source file features of the RTV server.

The build up of the RTV server has been changed.(Changed target build time: 2020-03-27 12:32:07)

Current target build information

Server name:	211.116.222.233
IP:	211.116.222.233
Build Time:	2020-03-27 12:32:00
Build Location:	/home/test/test/zlib-1.2.11

3. After confirming the changes, click the [OK] button.



Update to RTV server source

Update to RTV server source

The Source File has been changed to the source file of the RTV server.

Change:

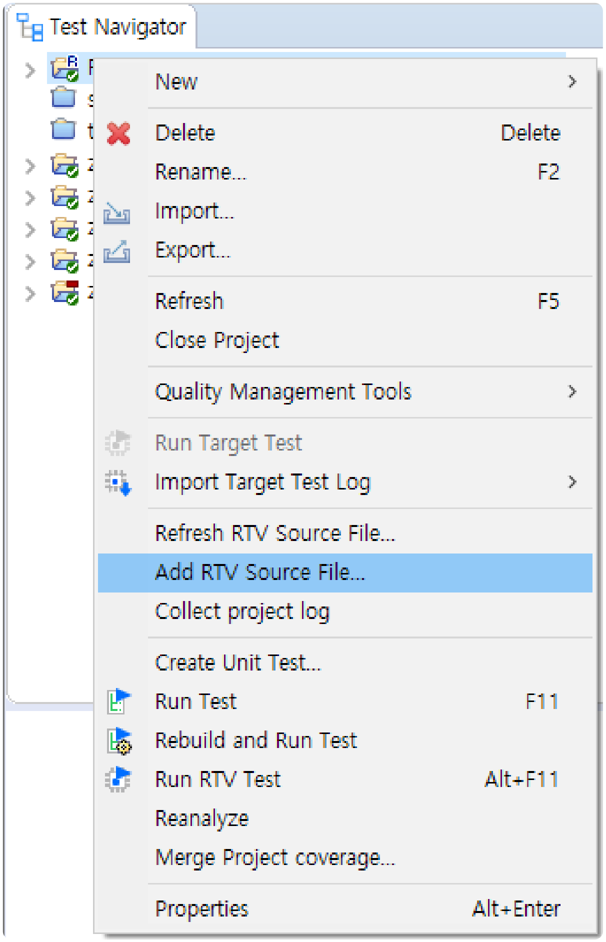
source file	content
211.116.222.233://home/test/test/zlib-1.2.11/adler32.c	Modified

Add RTV source file

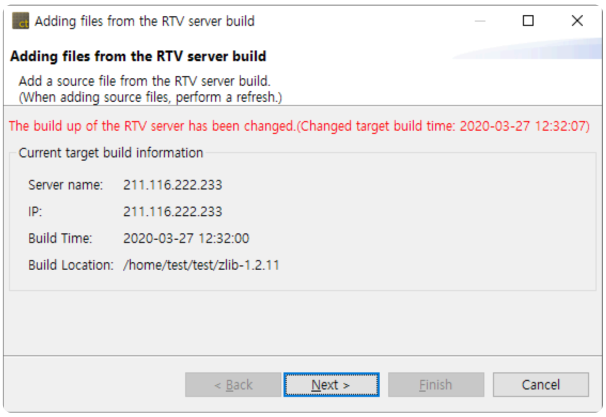
You can add source files to your RTV projects via the [Add RTV Source File] if new source files are added and built on the RTV server, or if only some source files are selected when you create the RTV project.

> ! If the source file is added but not rebuilt, the changed contents will not be reflected.
> If you build the target server after adding the source file, you must perform a full build.

1. In the [Test Navigator] view, click the [Add RTV Source File] context menu.



2. When you create the RTV project, you can see the latest build information for the selected source file (show change notification if the build has changed). Click the [Next] button to confirm the new file list.


Adding files from the RTV server build

Adding files from the RTV server build

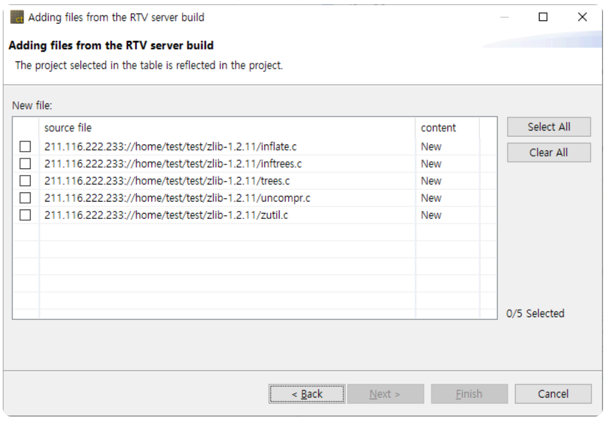
Add a source file from the RTV server build.
(When adding source files, perform a refresh.)

The build up of the RTV server has been changed.(Changed target build time: 2020-03-27 12:32:07)

Current target build information

Server name: 211.116.222.233
IP: 211.116.222.233
Build Time: 2020-03-27 12:32:00
Build Location: /home/test/test/zlib-1.2.11

3. In the [New file], select the file you want to add and click the [Finish] button.



Adding files from the RTV server build

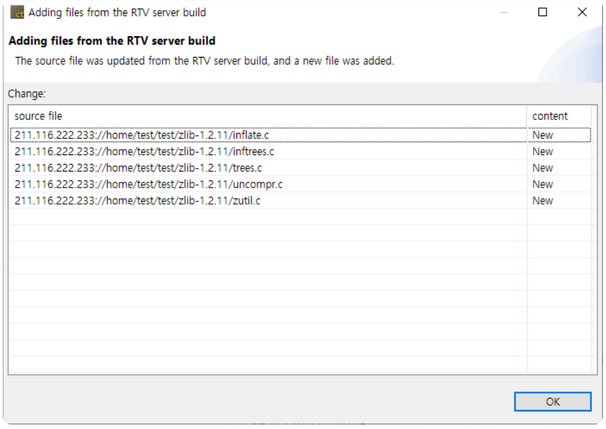
The project selected in the table is reflected in the project.

New file:

	source file	content
□	211.116.222.233://home/test/test/zlib-1.2.11/inflate.c	New
□	211.116.222.233://home/test/test/zlib-1.2.11/inftrees.c	New
□	211.116.222.233://home/test/test/zlib-1.2.11/trees.c	New
□	211.116.222.233://home/test/test/zlib-1.2.11/uncompr.c	New
□	211.116.222.233://home/test/test/zlib-1.2.11/zutil.c	New

0/5 Selected

4. After confirming the changes, click the [OK] button.



Adding files from the RTV server build

The source file was updated from the RTV server build, and a new file was added.

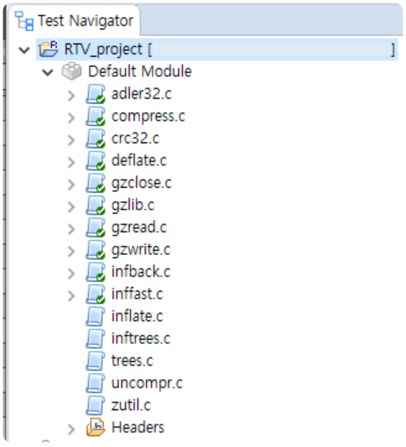
Change:

source file	content
211.116.222.233://home/test/test/zlib-1.2.11/inflate.c	New
211.116.222.233://home/test/test/zlib-1.2.11/inftrees.c	New
211.116.222.233://home/test/test/zlib-1.2.11/trees.c	New
211.116.222.233://home/test/test/zlib-1.2.11/uncompr.c	New
211.116.222.233://home/test/test/zlib-1.2.11/zutil.c	New

27.5. RTV Project Information

Test navigator

1. The icon for the RTV project is displayed as 📂 .
2. The RTV server’s information ([server name: IP]) is displayed after the name of the RTV project.

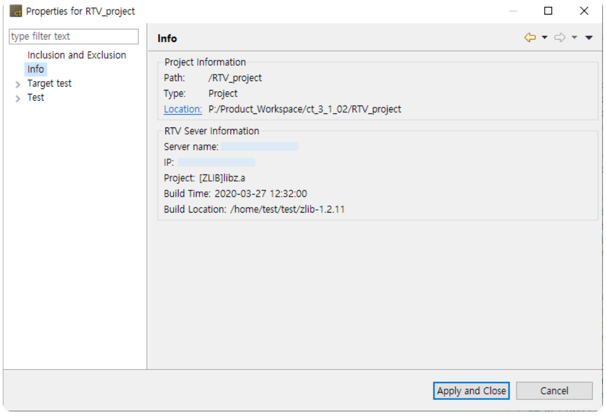


3. Source files in the RTV project can not be modified(the source file editor of the RTV project is read-only).

Project property

Info

1. The RTV project displays the RTV server and project information.



Project Information

Path: /RTV_project

Type: Project

Location: P:/Product_Workspace/ct_3_1_02/RTV_project

RTV Sever Information

Server name: [redacted]

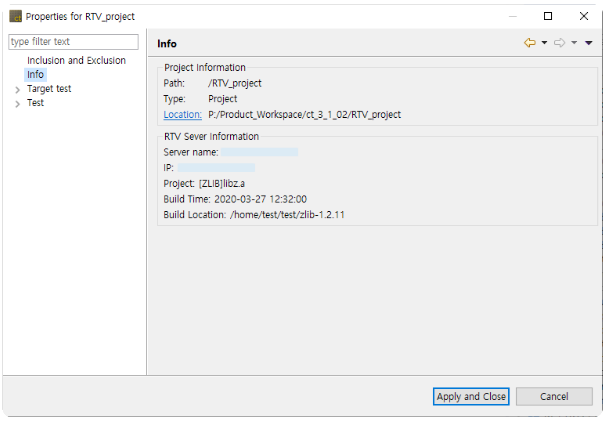
IP: [redacted]

Project: [ZLIB]libz.a

Build Time: 2020-03-27 12:32:00

Build Location: /home/test/test/zlib-1.2.11

2. If the general project has set the toolchain as the RTV toolchain, information about the RTV server from which the RTV toolchain was imported is displayed.



Project Information
Path: /RTV_project
Type: Project
Location: P:/Product_Workspace/ct_3_1_02/RTV_project

RTV Sever Information
Server name:
IP:
Project: [ZLIB]libz.a
Build Time: 2020-03-27 12:32:00
Build Location: /home/test/test/zlib-1.2.11

Module/File property

Build

1. The RTV project can not change the RTV toolchain that was set when the project was created.
2. However, if the RTV toolchain you set originally is deleted, you can change it to another toolchain.
3. In general projects, you can change the toolchain to the RTV toolchain. Changing to the RTV toolchain changes all toolchain settings (modules and source files) under the project and allows you to run the RTV tests.
4. The project with the RTV toolchain can not change the compiler settings of the source file (the module’s linker configuration can be changed).

27.6. Run RTV Test

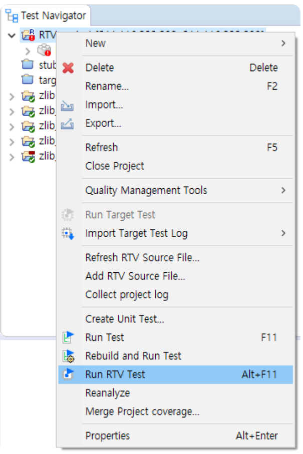
The RTV project allows you to run RTV tests without any additional setup. To test a general project in the RTV environment, you must set the toolchain of the project to the RTV toolchain created from the RTV server to be tested.

Run all RTV tests

It runs the selected tests in the [Unit Test] view and the [Integration Test] view.

RTV tests can be run in the following way.

1. Select the project to be tested, right-click it and click [Run RTV Test].

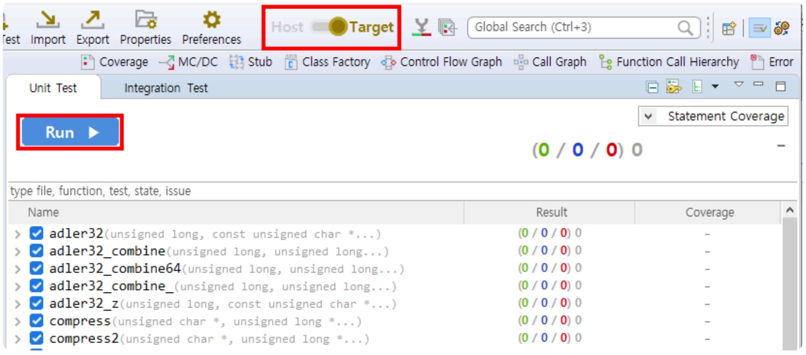


Run RTV unit test

Runs the selected test in the [Unit Test] view.

Run RTV test

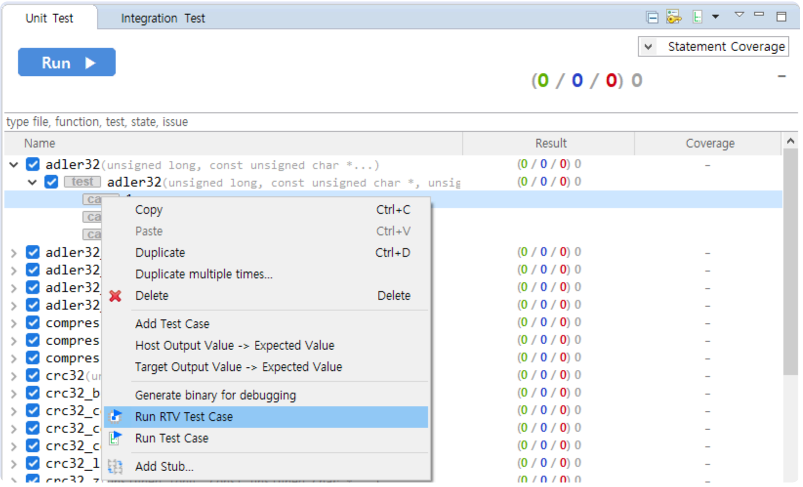
[Run] button In the [Unit Test] view.



Name	Result	Coverage
☑ adler32(unsigned long, const unsigned char *...)	(0 / 0 / 0) 0	-
☑ adler32_combine(unsigned long, unsigned long...)	(0 / 0 / 0) 0	-
☑ adler32_combine64(unsigned long, unsigned long...)	(0 / 0 / 0) 0	-
☑ adler32_combine_(unsigned long, unsigned long...)	(0 / 0 / 0) 0	-
☑ adler32_z(unsigned long, const unsigned char *...)	(0 / 0 / 0) 0	-
☑ compress(unsigned char *, unsigned long *...)	(0 / 0 / 0) 0	-
☑ compress2(unsigned char *, unsigned long *...)	(0 / 0 / 0) 0	-

Run RTV test case

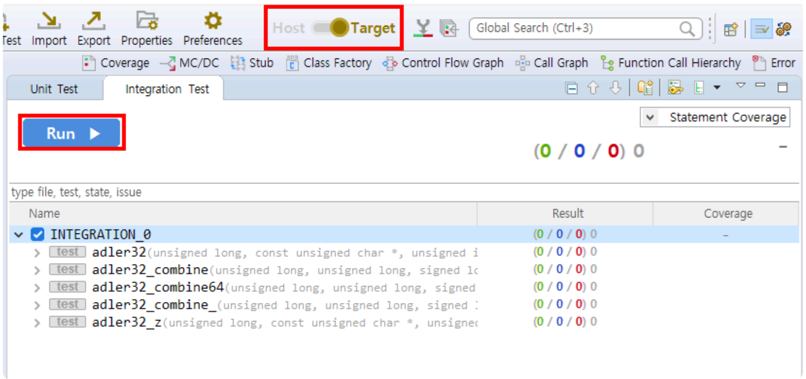
[Run RTV Test Case] context menu (multi-selectable) in the [Unit Test] view.


Unit Test
Integration Test
Run ▶
Statement Coverage
(0 / 0 / 0) 0
type file, function, test, state, issue
Name
Result
Coverage
adler32(unsigned long, const unsigned char *...)
test adler32(unsigned long, const unsigned char *, unsig
Copy Ctrl+C
Paste Ctrl+V
Duplicate Ctrl+D
Duplicate multiple times...
Delete Delete
Add Test Case
Host Output Value -> Expected Value
Target Output Value -> Expected Value
Generate binary for debugging
Run RTV Test Case
Run Test Case
Add Stub...

Run RTV integration test

Runs the selected test in the [Integration Test] view.

[Run] button In the [Integration Test] view.


Test
Import
Export
Properties
Preferences
Host
Target
Global Search (Ctrl+3)
Coverage
MC/DC
Stub
Class Factory
Control Flow Graph
Call Graph
Function Call Hierarchy
Error
Unit Test
Integration Test
Run ▶
Statement Coverage
(0 / 0 / 0) 0
type file, test, state, issue
Name
Result
Coverage
INTEGRATION_0
test adler32(unsigned long, const unsigned char *, unsigned i
test adler32_combine(unsigned long, unsigned long, signed lo
test adler32_combine64(unsigned long, unsigned long, signed
test adler32_combine_(unsigned long, unsigned long, signed
test adler32_z(unsigned long, const unsigned char *, unsigned

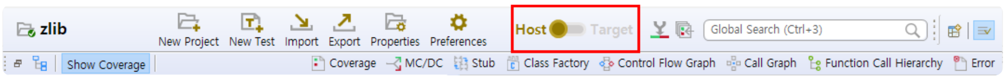
27.7. RTV Test Results

Coverage

You can change the coverage information (host, target, host/target merged) displayed in each view and editor through the coverage view menu in the top toolbar menu.
You can check the detailed information of each view in Test Perspective.

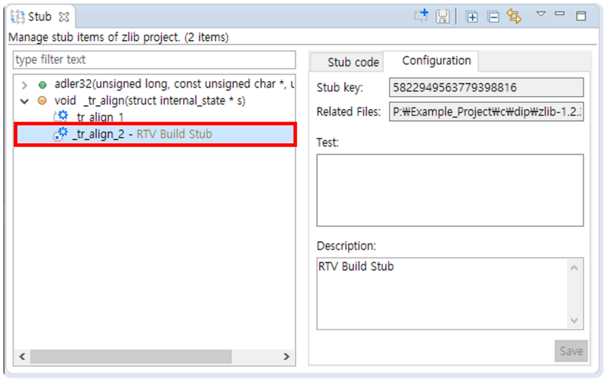
Test results

You can change the test results through the host/target settings menu on the dashboard.



Stub

The RTV build stubs that are created when running the RTV test is distinct from the build stubs which are created when running the host test.



Manage stub items of zlib project. (2 items)

- adler32(unsigned long, const unsigned char *, u
- void _tr_align(struct internal_state * s)
  - _tr_align_1
  - _tr_align_2 - RTV Build Stub

Stub key: 5822949563779398816

Related Files: P:₩Example_Project₩c₩dip₩zlib-1.2.

Test:

Description: RTV Build Stub

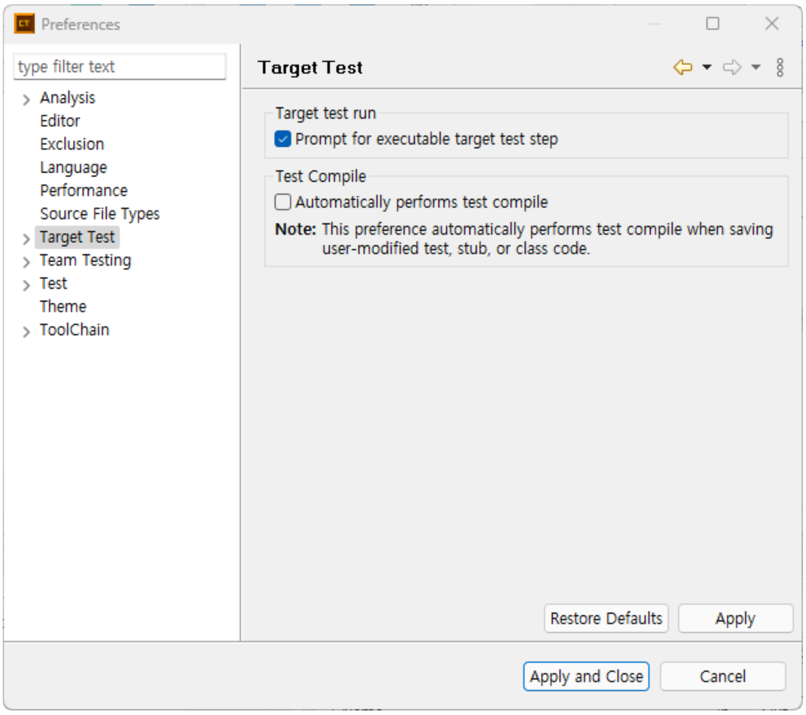
Type	Description
Target build stub	Auto-created stub during RTV tests

27.8. Test Compile

When a user modifies code associated with tests, CT 2023.12 provides a test compile feature to check for errors in that code before running tests.

Test Compile Settings

In [Preferences] > [Target Test], you can check whether to perform test compile automatically. Test compile is performed whenever a user modifies and saves test, stub, or class code.



Target test run

☑ Prompt for executable target test step

Test Compile

□ Automatically performs test compile

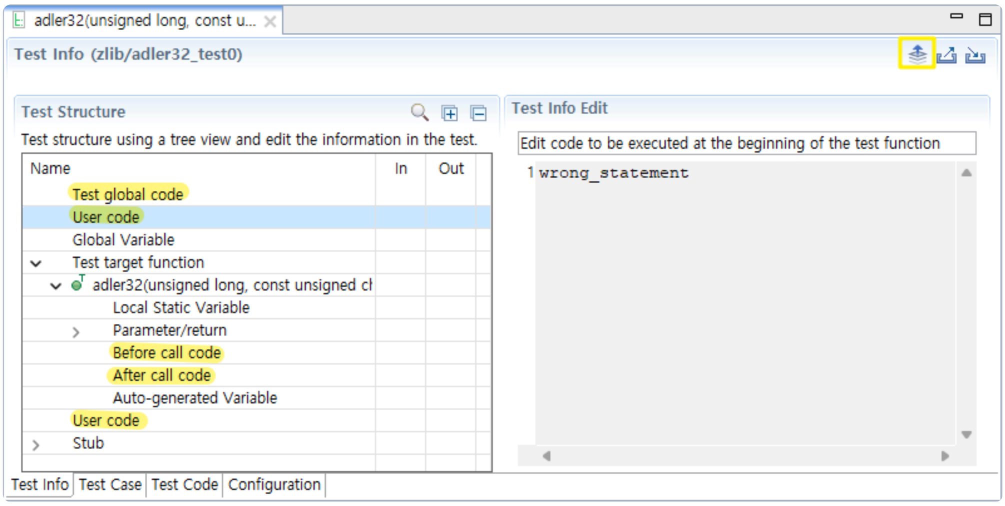
Note: This preference automatically performs test compile when saving user-modified test, stub, or class code.

Test Compile

If automatic test compile isn't selected, you can click ⇪ in the toolbar menu of each view to perform test compile.

Test Editor

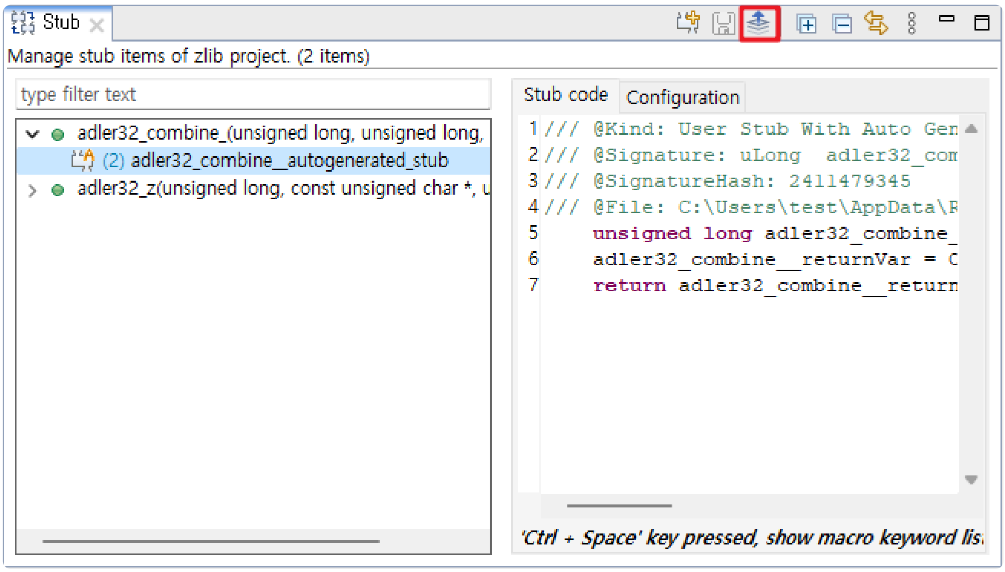
Test compile is available for the test global code, user code, and before/after call code in each function.



```
wrong_statement
```

Stub View

Test compile is available for user stub code.



Manage stub items of zlib project. (2 items)

type filter text

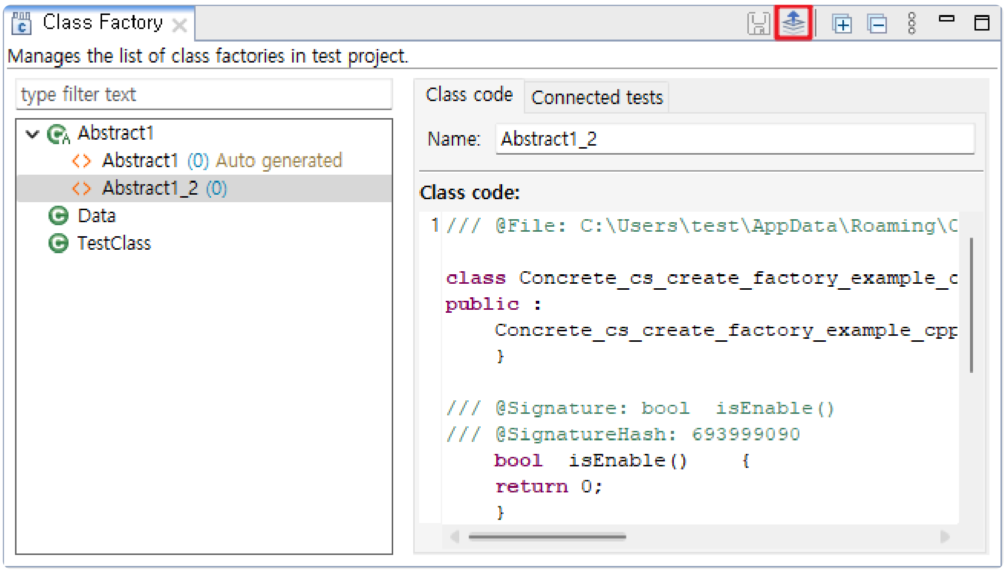
- adler32_combine_(unsigned long, unsigned long,
  - (2) adler32_combine__autogenerated_stub
- adler32_z(unsigned long, const unsigned char *, u

```
/// @Kind: User Stub With Auto Gen
/// @Signature: uLong  adler32_com
/// @SignatureHash: 2411479345
/// @File: C:\Users\test\AppData\R
    unsigned long adler32_combine_
    adler32_combine__returnVar = C
    return adler32_combine__return
```

'Ctrl + Space' key pressed, show macro keyword lis

Class Factory View

Test compile is available for user-created class code.



Manages the list of class factories in test project.

type filter text

- Abstract1
  - Abstract1 (0) Auto generated
  - Abstract1_2 (0)
- Data
- TestClass

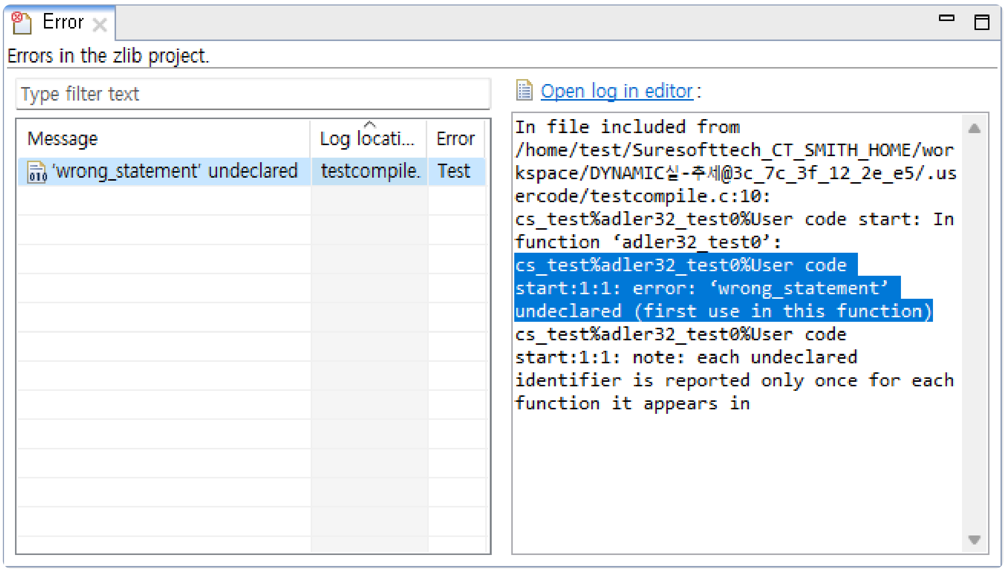
Name: Abstract1_2

Class code:

```
/// @File: C:\Users\test\AppData\Roaming\C

class Concrete_cs_create_factory_example_c
public :
    Concrete_cs_create_factory_example_cpp
    }

/// @Signature: bool  isEnable()
/// @SignatureHash: 693999090
    bool  isEnable()    {
    return 0;
    }
```

Result

Test compile is available for the test editor, stubs, and class codes. If errors occur during test compile, they can be displayed in [Error View].



Errors in the zlib project.

Message	Log locati...	Error
'wrong_statement' undeclared	testcompile.	Test

```
In file included from
/home/test/Suresofttech_CT_SMITH_HOME/wor
kspace/DYNAMIC실-추세@3c_7c_3f_12_2e_e5/.us
ercode/testcompile.c:10:
cs_test%adler32_test0%User code start: In
function ‘adler32_test0’:
cs_test%adler32_test0%User code
start:1:1: error: ‘wrong_statement’
undeclared (first use in this function)
cs_test%adler32_test0%User code
start:1:1: note: each undeclared
identifier is reported only once for each
function it appears in
```

28. CT RTV(Remote Target Verifier) Target Plug-in

Using CT RTV (Remot Target Verifier) Target Plug-in, software developed in Linux environment can be tested in a real embedded target environment. You can run RTV target after installing RTV server in Linux and setting target environment in CT 2023.12. For information on how to install the RTV server in your Linux environment, please contact the Technical support contact on bottom of the Troubleshooting page of this document.

The followings are how to create CT RTV Target Plug-in project and run a test.

- RTV Server Settings
- RTV Toolchain Settings
- RTV Target Environment Settings
- Create a RTV Target Project
- Refresh/Add RTV Target Source Files
- RTV Target Project Information
- Run RTV Target Test

Supported Operating Systems

Server: Linux (RHEL, Ubuntu, Debian, Fedora based)
Client: Windows 7/10/11

28.1. RTV Server Settings

For RTV server setting to use CT RTV Target Plug-in, refer to RTV Server Settings.

28.2. RTV Toolchain Settings

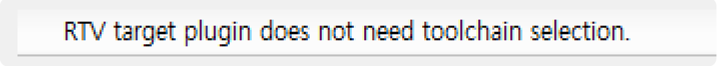
For RTV toolchain setting to use CT 2023.12 RTV Target Plug-in, refer to RTV Toolchain Settings.

28.3. RTV Target Environment Settings

To run tests in a target environment using CT RTV Target Plug-in, you need to enter information about the target environment as with CT Target Plug-in. Using information about the target environment entered by the user, CT 2023.12 builds a test harness in RTV server and run in the target environment. Target log collector can get the test results automatically.
The target environment can be set in the project properties page or in the new RTV target test project wizard.

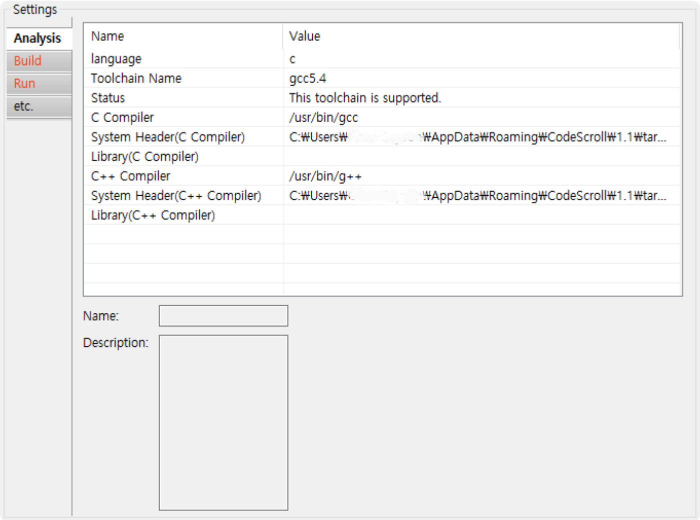
Target environment settings.

Target environment settings are divided into basic information and detailed settings.
RTV target project don’t need to enter the basic information.



RTV target plugin does not need toolchain selection.

After entering the basic information, detailed settings that require input are displayed.



Name	Value
language	c
Toolchain Name	gcc5.4
Status	This toolchain is supported.
C Compiler	/usr/bin/gcc
System Header(C Compiler)	C:₩Users₩[redacted]₩AppData₩Roaming₩CodeScroll₩1.1₩tar...
Library(C Compiler)	
C++ Compiler	/usr/bin/g++
System Header(C++ Compiler)	C:₩Users₩[redacted]₩AppData₩Roaming₩CodeScroll₩1.1₩tar...
Library(C++ Compiler)	

Name:

Description:

Target environment detailed settings

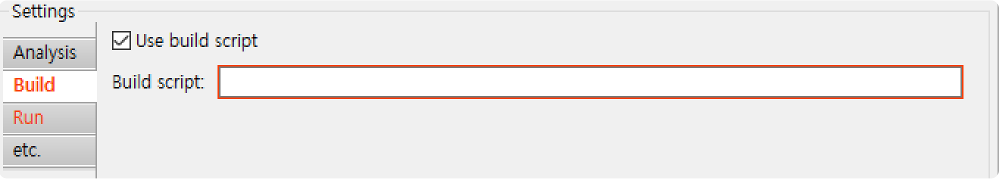
Target environment detailed settings are divided into the analysis, build, run, and etc.

Category	Description
Analysis	The toolchain information is displayed, and in the case of a target test project, the target compiler related settings required for analysis are displayed.
Build	The settings for building the test software are displayed.
Run	Settings for running tests and getting results in the target environment are displayed.
etc.	Other settings are displayed. (Program entry point, etc.)

Required settings for each category are indicated in red. Depending on whether the required settings for each category are entered or not, the behavior when clicking the [Run] button is different as shown below.

Required settings completed category	Description
None	Test run impossible
Analysis	If you click [Run], it overwrites the original source code with the test code. To perform the test, the user must manually build and run the test.
Analysis, Build	If you click [Run], it builds the test code. To perform the test, the user has to manually run the test on the target.
Analysis, Build, Run	Automatically run tests in the target environment.

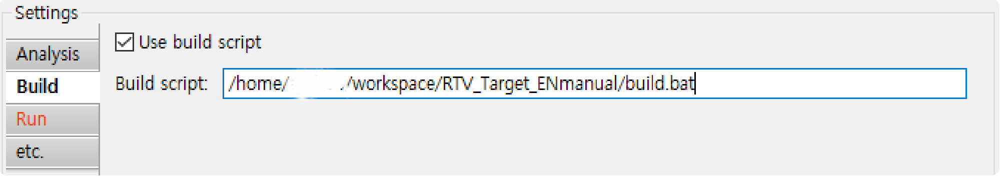
Target environment detailed settings – Build



☑ Use build script

Build script:

Enter a build script path of RTV server into build script area. After entering the build script path, CT 2023.12 checks validity of the path. If the path is invalid, build script area is displayed in red and if vaild, it is displayed in black.



☑ Use build script

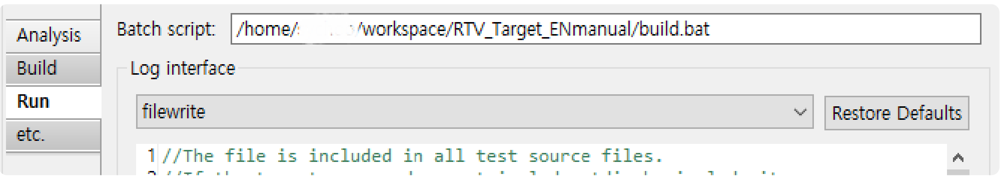
Build script: /home/ ./workspace/RTV_Target_ENmanual/build.bat

Target environment detailed settings – Run

Run setting is divided into batch script area and log interface area. CT 2023.12 checks validity of batch script area as with build script area. Informations to get results of RTV target test from target environment is entered in log interface area.

Batch script area

Enter a batch script path of RTV server into batch script area as with build script area.



Batch script: /home/ /workspace/RTV_Target_ENmanual/build.bat

Log interface

filewrite

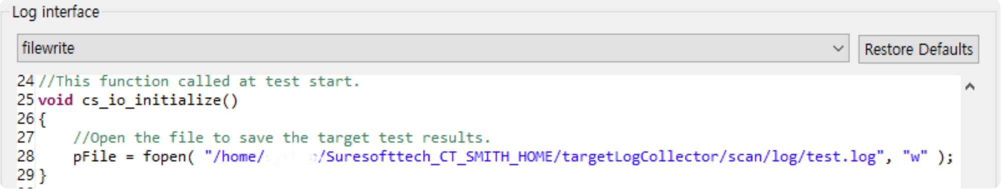
```
//The file is included in all test source files.
```

Log interface area

The log interface area is a setting to record test result from target environment. The followings are how to get target log into Target Log Collector.

- File
- Socket communication (TCP, UDP)
- Serial communication (UART)

To allow target log collector to get test results during recoding the results in file, you modify a path in log interface into `%SMITH_HOME%/targetLogCollector/scan/log/%file_name%`.



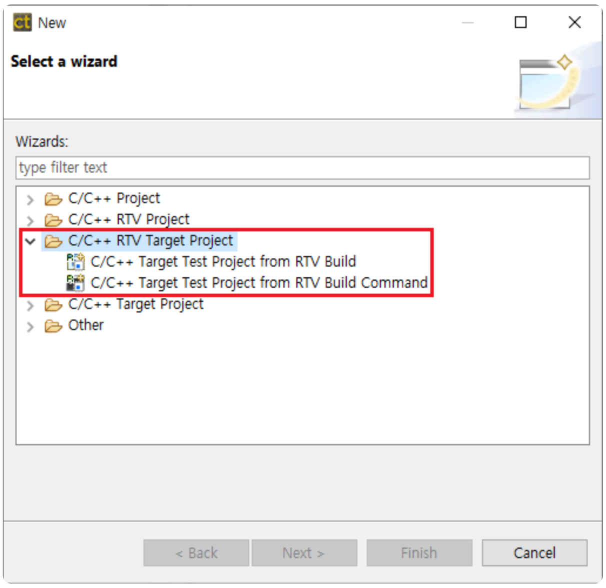
```
//This function called at test start.
void cs_io_initialize()
{
    //Open the file to save the target test results.
    pFile = fopen( "/home/[redacted]/Suresofttech_CT_SMITH_HOME/targetLogCollector/scan/log/test.log", "w" );
}
```

28.4. Create a RTV Target Project

Create an RTV project to test the source files that exist in the RTV environment.

When building source files in the RTV environment, you can extract the information needed to create the RTV project.
This chapter describes how to create an RTV target project by using pre-extracted source file build information(using the CT 2023.12 RTV Server Utility) in the RTV environment, or extracting information at the same time as building the source file.

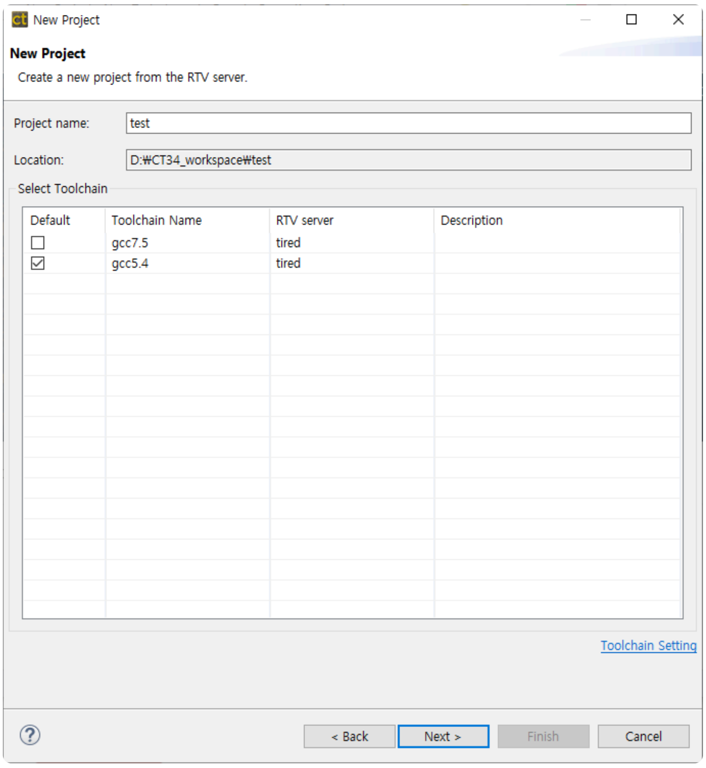
To create an RTV project, run the [Create Project Wizard].
Click [File] -> [New] or Shortcut.



C/C++ Target Test Project from RTV Build

It is selected when creating an RTV target project using pre-extracted source file build information (using the CT 2023.12 RTV Server Utility) in the RTV environment.

1. Enter the project name in [Project name] and select the RTV toolchain to use in the [Select Toolchain]. After selecting the toolchain, then click the [Next] button.



New Project

New Project

Create a new project from the RTV server.

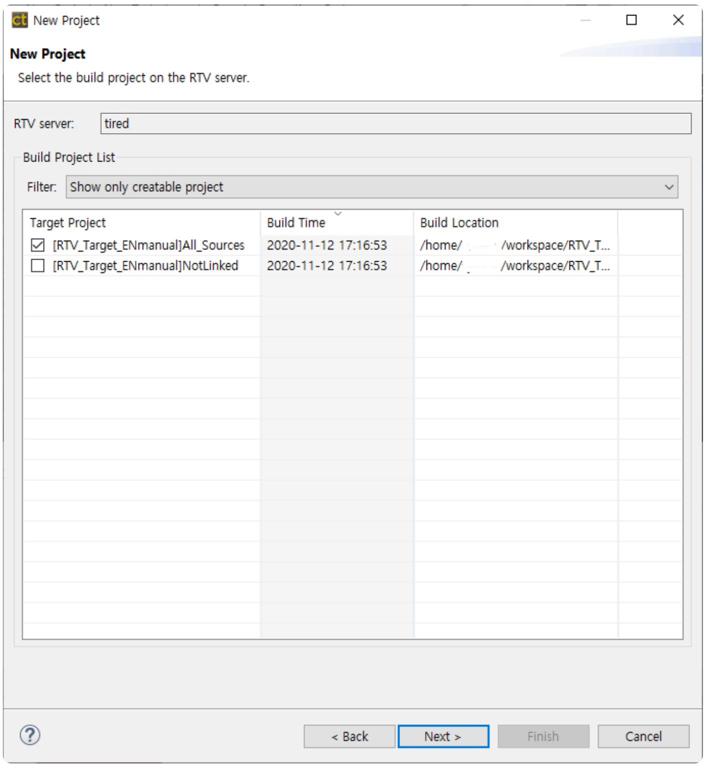
Project name: test

Location: D:₩CT34_workspace₩test

Select Toolchain

Default	Toolchain Name	RTV server	Description
☐	gcc7.5	tired	
☑	gcc5.4	tired	

2. You can see the list of source file builds pre-extracted from the RTV server. In the [Build Project List], select the item for which you want to create the RTV project and click the [Next] button.



New Project

New Project

Select the build project on the RTV server.

RTV server: tired

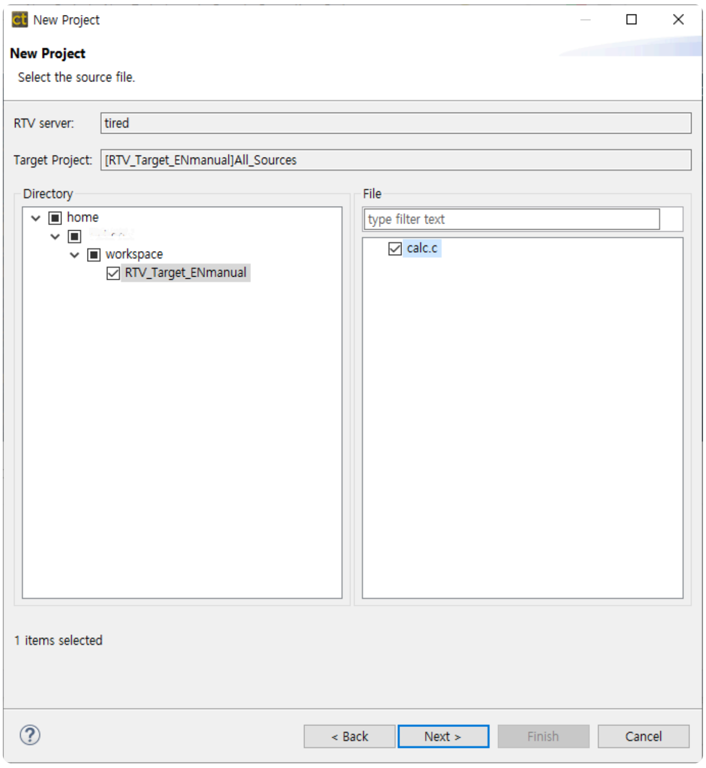
Build Project List

Filter: Show only creatable project

Target Project	Build Time	Build Location
☑ [RTV_Target_ENmanual]All_Sources	2020-11-12 17:16:53	/home/ /workspace/RTV_T...
☐ [RTV_Target_ENmanual]NotLinked	2020-11-12 17:16:53	/home/ /workspace/RTV_T...

✻ Among the generated projects, ‘All_Sources_Project Name’ is a project that combines all the source files of the modules captured by ctbuild. Since this project is a combined project without considering whether it is built or not, it may not be able to perform the test normally.

3. After selecting source files to be tested, click the [Next] button.



New Project

Select the source file.

RTV server: tired

Target Project: [RTV_Target_ENmanual]All_Sources

Directory

- home
  - workspace
    - ☑ RTV_Target_ENmanual

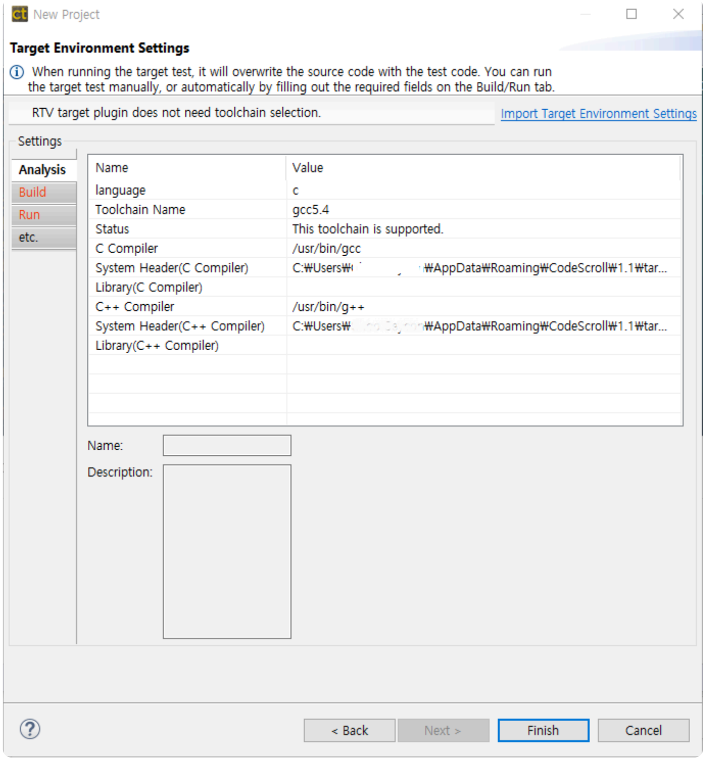
File

type filter text

☑ calc.c

1 items selected

4. After entering the detailed settings for each category and click the [Next] button



Target Environment Settings

ⓘ When running the target test, it will overwrite the source code with the test code. You can run the target test manually, or automatically by filling out the required fields on the Build/Run tab.

RTV target plugin does not need toolchain selection.

Import Target Environment Settings

Settings

Name	Value
language	c
Toolchain Name	gcc5.4
Status	This toolchain is supported.
C Compiler	/usr/bin/gcc
System Header(C Compiler)	C:₩Users₩ ₩AppData₩Roaming₩CodeScroll₩1.1₩tar...
Library(C Compiler)	
C++ Compiler	/usr/bin/g++
System Header(C++ Compiler)	C:₩Users₩ ₩AppData₩Roaming₩CodeScroll₩1.1₩tar...
Library(C++ Compiler)	

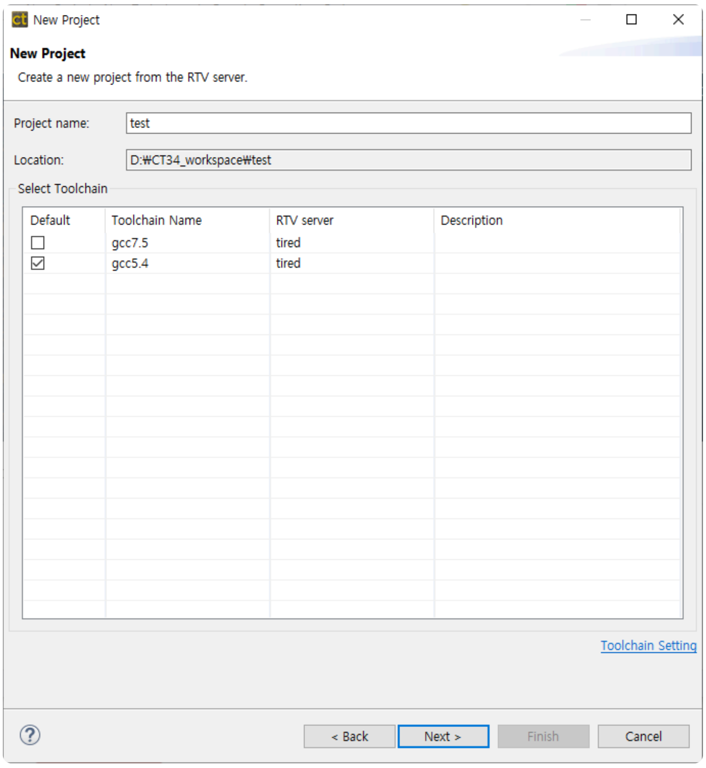
Name:

Description:

C/C++ Target Test Project from RTV Build Command

It is selected when creating an RTV target project by extracting information at the same time as building the source file. The user builds the source file on the RTV server using the build command and then creates the RTV target project.

1. Enter the project name in [Project name] and select the RTV toolchain to use in the [Select Toolchain]. After selecting the toolchain, then click the [Next] button.



New Project

Create a new project from the RTV server.

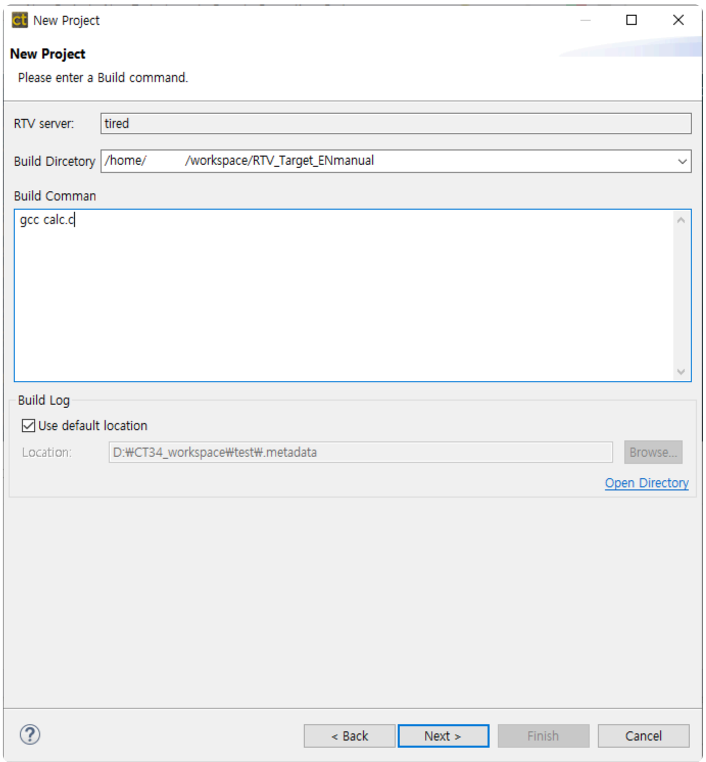
Project name: test

Location: D:₩CT34_workspace₩test

Select Toolchain

Default	Toolchain Name	RTV server	Description
□	gcc7.5	tired	
☑	gcc5.4	tired	

2. Enter the path to build from the target server (for example, the directory where the make file is located), and enter the build command. In [Build Log], specify the path to the build results file. After entering the required information for the build, click the [Next] button. It builds the source file on the target server with the entered build command (depending on the build target, it can take a lot of time).



New Project

Please enter a Build command.

RTV server: tired

Build Dircetory /home/ /workspace/RTV_Target_ENmanual

Build Comman

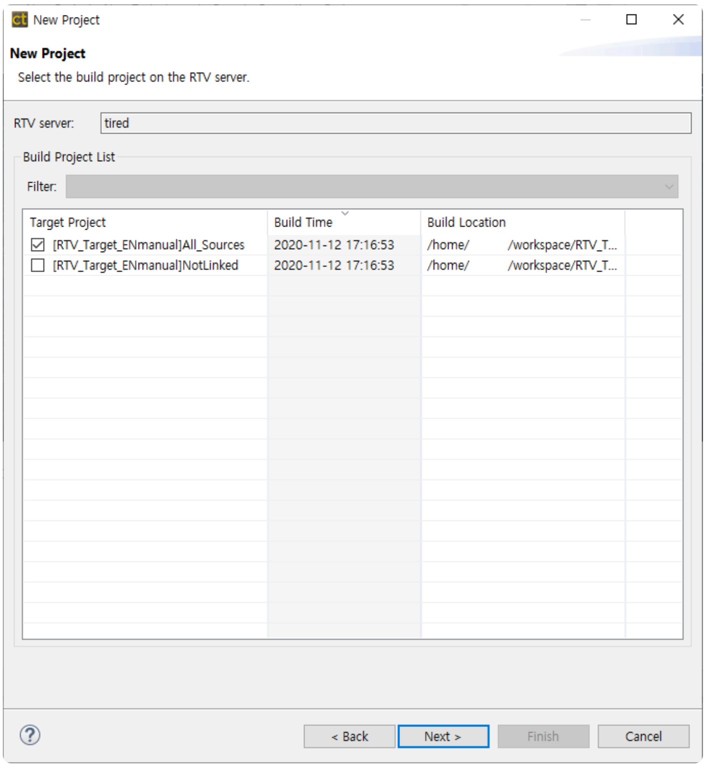
```
gcc calc.c
```

Build Log

☑ Use default location

Location: D:₩CT34_workspace₩test₩.metadata

3. When the build is complete, a list of built projects appears. In the [Build Project List], select the item for which you want to create the RTV target project and click the [Next] button.



New Project

New Project

Select the build project on the RTV server.

RTV server: tired

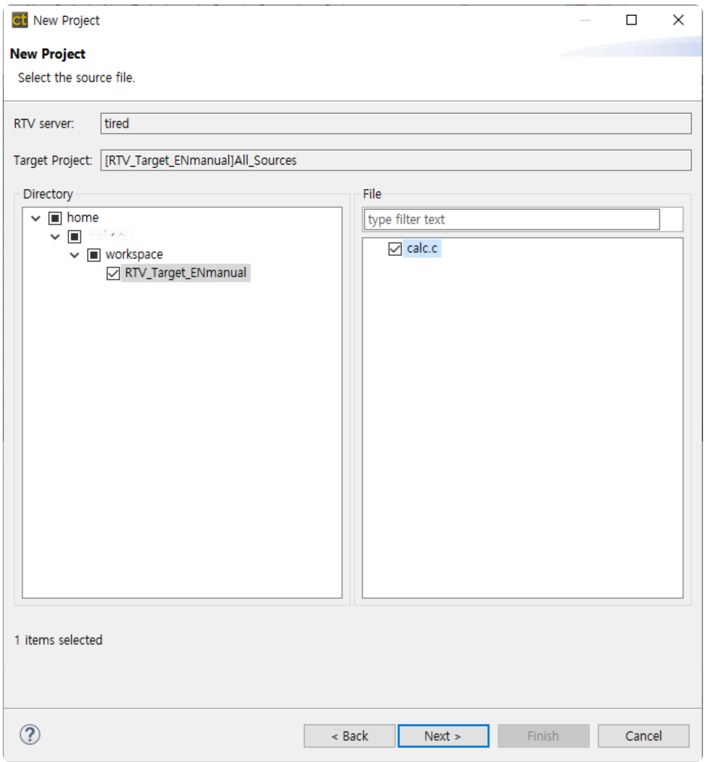
Build Project List

Filter:

Target Project	Build Time	Build Location
☑ [RTV_Target_ENmanual]All_Sources	2020-11-12 17:16:53	/home/ /workspace/RTV_T...
□ [RTV_Target_ENmanual]NotLinked	2020-11-12 17:16:53	/home/ /workspace/RTV_T...

Among the generated projects, 'All_Sources_Project Name' is a project that combines all the source files of the modules captured by ctbuild. Since this project is a combined project without considering whether it is built or not, it may not be able to perform the test normally.

4. After selecting source files to be tested, click the [Next] button.



New Project

New Project

Select the source file.

RTV server: tired

Target Project: [RTV_Target_ENmanual]All_Sources

Directory

- home
  - workspace
    - ☑ RTV_Target_ENmanual

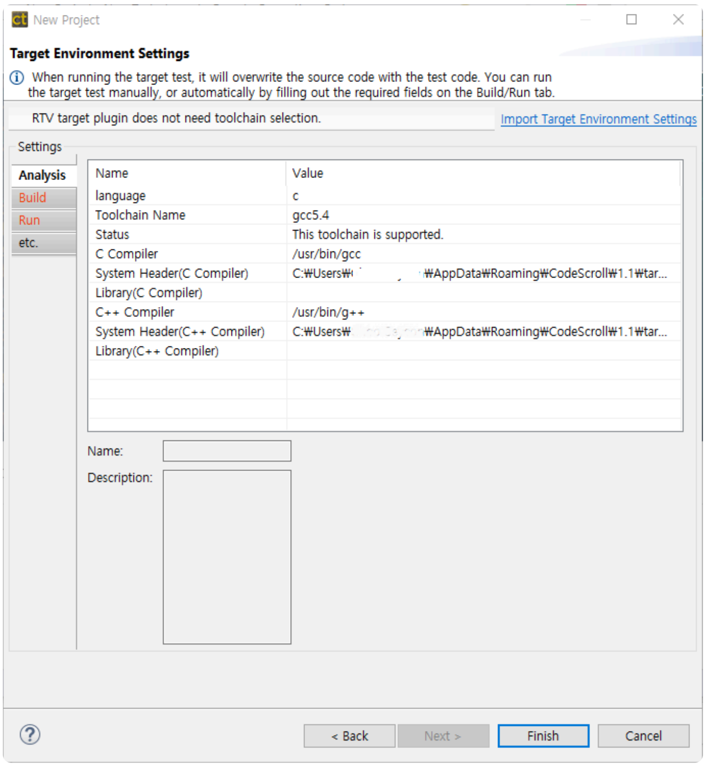
File

type filter text

☑ calc.c

1 items selected

5. After entering the detailed settings for each category and click the [Next] button



Target Environment Settings

When running the target test, it will overwrite the source code with the test code. You can run the target test manually, or automatically by filling out the required fields on the Build/Run tab.

RTV target plugin does not need toolchain selection.

Name	Value
language	c
Toolchain Name	gcc5.4
Status	This toolchain is supported.
C Compiler	/usr/bin/gcc
System Header(C Compiler)	C:₩Users₩[redacted]₩AppData₩Roaming₩CodeScroll₩1.1₩tar...
Library(C Compiler)	
C++ Compiler	/usr/bin/g++
System Header(C++ Compiler)	C:₩Users₩[redacted]₩AppData₩Roaming₩CodeScroll₩1.1₩tar...
Library(C++ Compiler)	

Name:

Description:

RTV build command

To create a project from build information, you must use the ctbuild command on the build command. For RTV build command, refer to [RTV build command] in Create a RTV Project

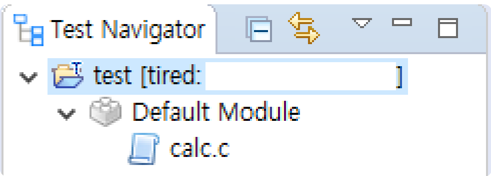
28.5. Refresh/Add RTV Target Source Files

If the source file is modified or added on the RTV server, the [Refresh RTV Source File] and [Add RTV Source File] allow the revised content to be reflected in the project. For Refresh/Add RTV Target Source Files, refer to Refresh/Add RTV Source Files.

28.6. RTV Target Project Information

Test navigator

- The icon for the RTV project is displayed as 📂.
- The RTV server's information ([server name: IP]) is displayed after the name of the RTV target project.

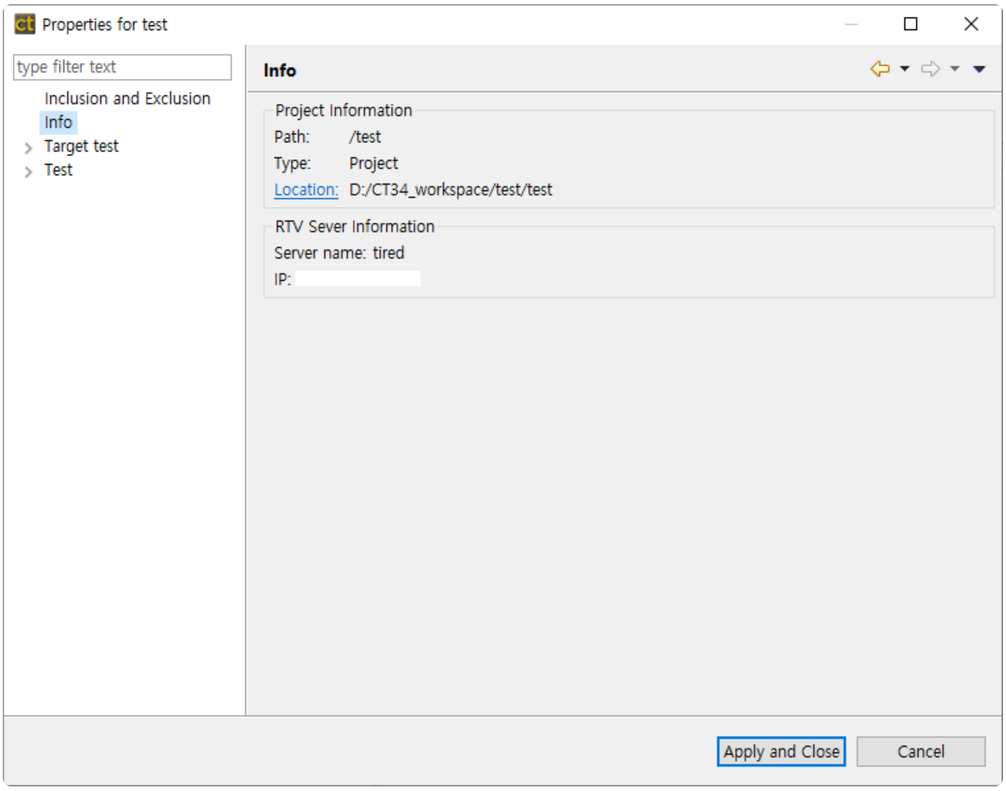


- Source files in the RTV project can not be modified(the source file editor of the RTV project is read-only).

Project properties

Info

The RTV target project displays the RTV server and project information.



Project Information
Path: /test
Type: Project
Location: D:/CT34_workspace/test/test

RTV Sever Information
Server name: tired
IP:

Target test

The RTV target project can set about target test run and RTV environment. For target test run settings, refer to Target Test Run Settings and for RTV environment settings, refer to Target Environment Settings.

Module/file properties

For properties about module or file, refer to RTV Project Information.

28.7. Run RTV Target Test

Test run

The binary file built in Linux environment can be tested in target environment using RTV Target Plug-in. For running the RTV target test, refer to Run RTV Test.

29. DISCOVERY Plug-in

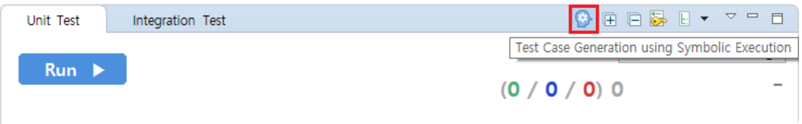
DISCOVERY automatically generates test cases to increase coverage.

Test Case Generation using Symbolic Execution

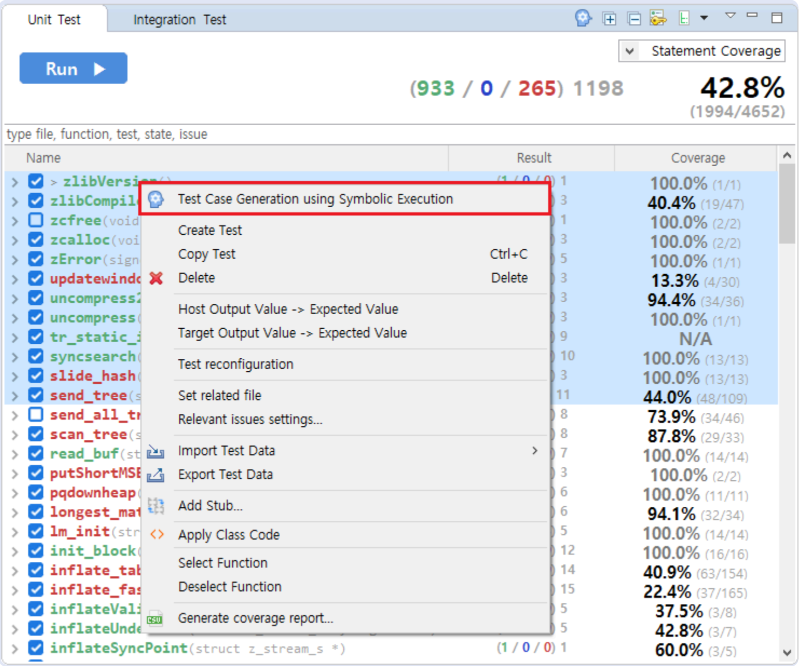
If you use the [Test Case Generation using Symbolic Execution] feature, test cases that can increase coverage are automatically generated.

> ! In Visual Studio projects generated in release mode, the `/D "N_DEBUG"` macro is used, and search is disabled.

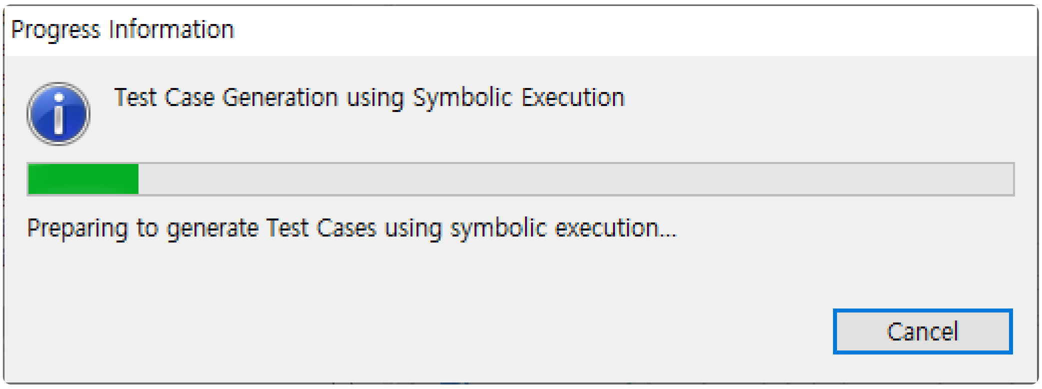
1. Generate test cases based on symbolic execution for the selected tests.
   - Toolbar in Unit Test View
     If you click [Test Case Generation using Symbolic Execution] on the toolbar of Unit Test View, test cases are generated and executed based on symbol execution for the function/test checked in Unit Test View.



   - Context menu in Unit Test View
     Right-clicking a function/test and selecting the [Test Case Generation using Symbolic Execution] menu generates and executes a test case based on the symbolic execution.



2. You can check the progress information after clicking [Test Case Generation using Symbolic Execution].



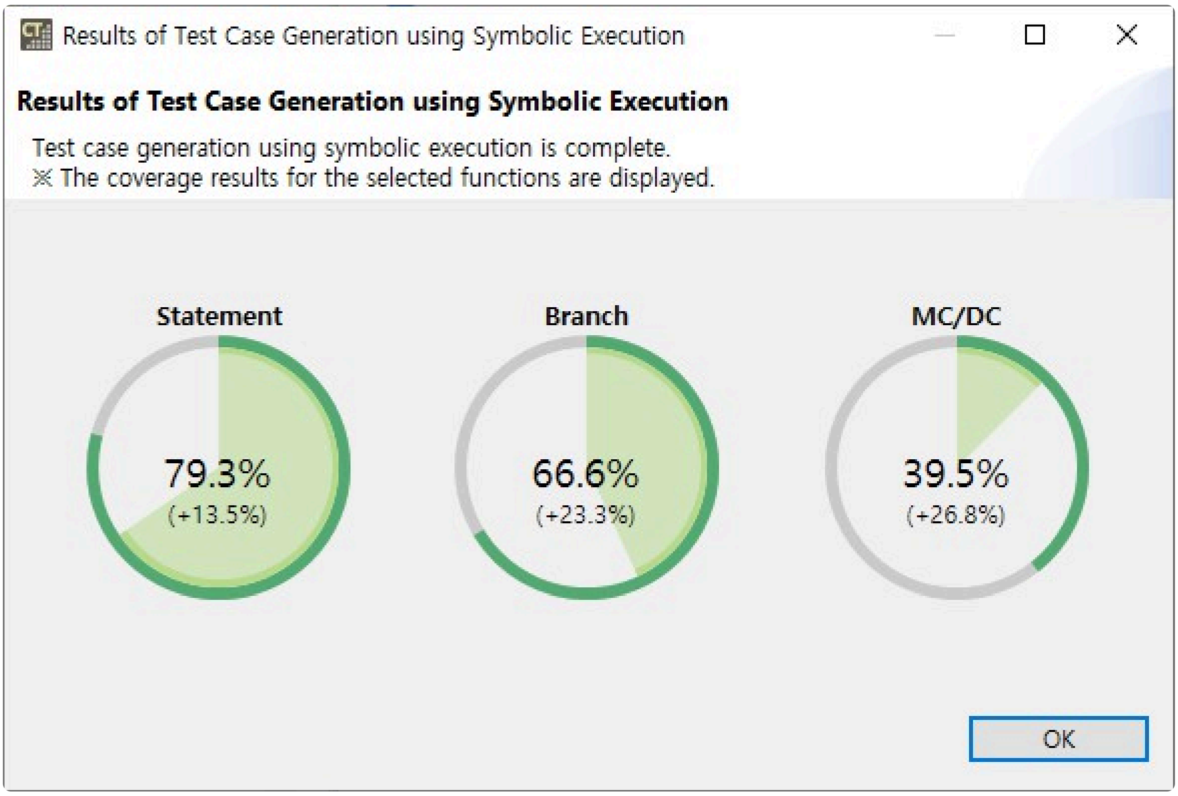
Progress Information

Test Case Generation using Symbolic Execution

Preparing to generate Test Cases using symbolic execution...

! When generating a test case based on symbolic execution, it may take a long time to generate test cases.

3. When the test case generation is completed, you can check the coverage through the [Test Case Generation using Symbolic Execution] dialog.



Results of Test Case Generation using Symbolic Execution

Results of Test Case Generation using Symbolic Execution

Test case generation using symbolic execution is complete.
※ The coverage results for the selected functions are displayed.

30. CT CLI(Command Line Interface)

CT CLI provides CT features through a Command Line Interface.

The Command Line Interface is provided as an executable binary file located at `CT 2023.12 installation_path/csc.exe`

Provides basic functionality such as Project execution(-e), Generate reports(-r), Project deletion(-d), and Help (-h).

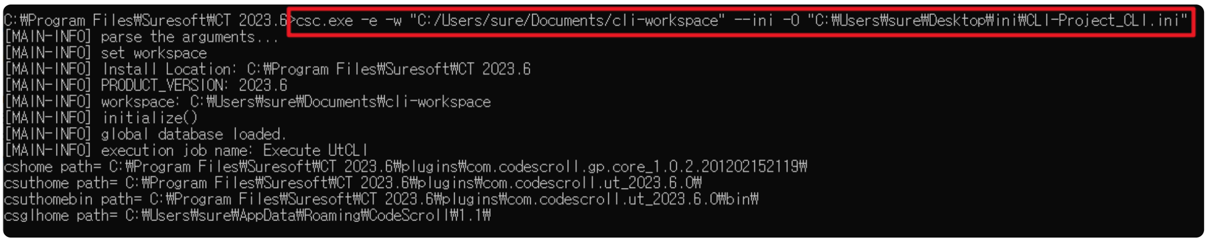
The process of execution in the CLI environment is as follows.

- Project creation and Test execution
- Import project
- Export project
- Export analysis information and VPES data
- Delete project
- DISCOVERY Execution
- Fault Localization
- Import team project

30.1. Project creation and Test execution

In a CLI environment, it is possible to use various CT 2023.12 functions such as project creation and analysis, test case creation, execution, and generating test result reports.

1. In CT 2023.12, click [Project] – [Generate command line interface INI file] to create a CLI.ini file.
2. Edit the CLI.ini file. Refer to the [Editing the CLI Configuration File] section of this page.
3. The following commands can be used to perform test-related functions. `-e -w "%workSpacePath%" --ini -O "%iniFilePath%"`
    - iniFilePath : CLI.ini path



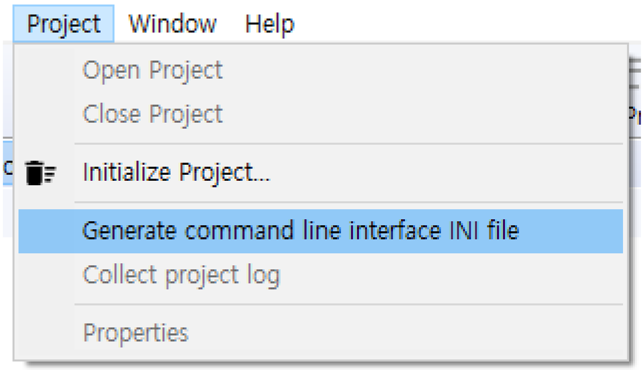
```
C:₩Program Files₩Suresoft₩CT 2023.6>csc.exe -e -w "C:/Users/sure/Documents/cli-workspace" --ini -O "C:₩Users₩sure₩Desktop₩ini₩CLI-Project_CLI.ini"
[MAIN-INFO] parse the arguments...
[MAIN-INFO] set workspace
[MAIN-INFO] Install Location: C:₩Program Files₩Suresoft₩CT 2023.6
[MAIN-INFO] PRODUCT_VERSION: 2023.6
[MAIN-INFO] workspace: C:₩Users₩sure₩Documents₩cli-workspace
[MAIN-INFO] initialize()
[MAIN-INFO] global database loaded.
[MAIN-INFO] execution job name: Execute UtCLI
cshome path= C:₩Program Files₩Suresoft₩CT 2023.6₩plugins₩com.codescroll.gp.core_1.0.2.201202152119₩
csuthome path= C:₩Program Files₩Suresoft₩CT 2023.6₩plugins₩com.codescroll.ut_2023.6.0₩
csuthomebin path= C:₩Program Files₩Suresoft₩CT 2023.6₩plugins₩com.codescroll.ut_2023.6.0₩bin₩
csglhome path= C:₩Users₩sure₩AppData₩Roaming₩CodeScroll₩1.1₩
```

✻ The CLI.ini file must be created and edited before it can be executed.

Creating CLI configuration file

Creates a configuration file to run CT 2023.12 in CLI environment.

- Clicking [Project] – [Generate command line interface INI file] creates a CLI.ini file in the path chosen by the user.



✻ If no project is selected, a CLI.ini file without project information will be generated.

Editing the CLI configuration file

[Project]

Item	Description

create	Whether to create a project.
cpi_file	If `create=true`, the path to the `.cpi` file for project creation.
force	If `create=true`, delete and create the project if a project with the same name already exists.
name	Project name.
toolchain	Toolchain name (create in case of RTV project).
target_project	Target project name (create in case of RTV project).

! The target_project option must be entered in the same way as the target project name in [Project]-[Properties]-[Information]-[RTV Server Information].

[Analysis]

Item	Description
run	Whether to perform analysis.

[InitializeTest]

Item	Description
run	If true, delete all existing tests.

[CreateTest]

Item	Description
run	Whether to generate unit tests.
target_function	It is a function name for generating unit tests. Unit tests can be created for one or more functions. When entering multiple functions, they can be separated with a semicolon (;) or Enter. If there is no target_function list, create unit tests for all functions.
isolate	Whether to create stubs for separating test target functions.

[CreateTestCase]

Item	Description
run	Whether to create a test case.
mode	Test case generation mode. (flat, pairwise, random)
random_testcase_count	In case of random, input the number of test cases generated.

[ImportTestInfo]

Item	Description
run	Whether to fetch test information.
testinfo_file	Path to the testinfo.export file.
include_fault_injection	Inclusion of fault injection.

[ExecuteTest]

Item	Description
run	Whether to run unit test.
remote_target	RTV run or not.
run_robust	If an error occurs while running a test, whether to exclude non-executable tests.
only_build	Build only without test execution
build_option_file_path	Compile command file path

[Report]

Item	Description
run	Whether to generate a report.
output_dir	Report output path. The default output path is project path.
include_project_info	Include project information
test_env_kind	Test environment kind (1: Host, 2: RTV or Target)
each_test	Whether to generate a report by test.
jenkins_test_result	Generate test result xml file
HTML, XLSX, PDF, DOCX, PPTX	Specify Report Format

Individual import of test information

> By setting `run=false` in [ImportTestInfo], [ImportStub], [ImportTest], and [ImportIntegrationTest] can be executed individually.

[ImportStub]

Item	Description

run	Whether to perform stub import.
stub_file	Path to the stub file.
stub_dir	Path to the stub directory.

[ImportTest]

Item	Description
run	Whether to perform test import.
test_source_file	.utest file path. When entering multiple source file paths, they can be separated with a semicolon (;) or Enter.
test_source_dir	Path to the test source directory. If you enter the test source directory path, perform a full test import included in the directory path.

[ImportTestCase]

Item	Description
run	Whether to perform test import.
testcase_dir	Test case directory path. If you enter the test case directory path, import all test cases included in the directory path.

[ImportIntegrationTest]

Item	Description
run	Whether to perform integration tests and import of test cases.
test_file	.itest file path.
test_dir	Common parent path for .itest file. If the test and test case are in the same directory, perform an import.

Create CPI file

CPI file is a configuration file for creating a project in CLI environment. The project is created only when the [Project] – `create` option in the CLI.ini file is set to true.

You can set the option to create a project from the CPI template file in the path of `CT 2023.12 installation path\plugins\com.codescroll.gp.cli_version\cpi`.

You cannot create a project in the CLI environment while using the workspace.

Item	Description
KIND	Project creation type setting. General project =1 Get Build Script = 2 Visual Studio Import =3 Import Embedded Project = 4
NAME	Project name.
LANGUAGE	Project type. Java = 0, C/C++ = 1

SourceFileProject

Item	Description
IUT_LANGUAGE	Target language type. C=0, C++=1, Java=2
LINKFLAG	Link flag.
COMMON_COMPILEFLAG	Compilation flag to apply to all TUs.
TOOLCHAIN_NAME	Toolchain name.
BINARY_KIND	Binary type.
SOURCE_TOP_DIR	Source file top level directory.
SOURCE	Absolute path to source file.
COMPILEFLAG	Compilation flag to apply only to source files.
COMPILER_PATH	Path to the compiler to apply only to source files.

VisualStudioPorject

Item	Description
PROJECT_PATH	Visual Studio project file to import.
ENVFILE	Environment variable required for import.

BuildScriptProject

Item	Description
BUILD_COMMAND	Build script to perform the import.
WORKING_DIRECTORY	Working directory to perform import.
ENVFILE	Environment variable required for import.

EmbeddedProject

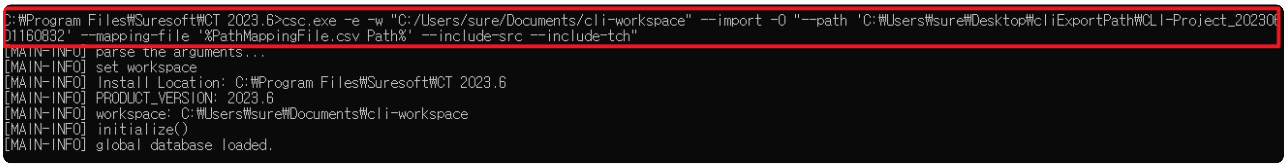
Item	Description
COMMON_COMPILEFLAG	Compilation flag to apply to all Source Files.
TOOLCHAIN_NAME	Toolchain name.
PROJECT_PATH	Visual Studio project file to import.

! When entering a path, \ is an escape character, so please use \\ or / as the path separator.

30.2. Import project

The exported project can be imported into the CT 2023.12.

1. `-e -w "%Workspace Path%" --import -O "--path '%Path of the project to import%' --mapping-file '%PathMappingFile.csv Path%' --include-src --include-tch"` Import the project using a command.



```
C:₩Program Files₩Suresoft₩CT 2023.6>csc.exe -e -w "C:/Users/sure/Documents/cli-workspace" --import -O "--path 'C:₩Users₩sure₩Desktop₩cliExportPath₩CLI-Project_20230
01160832' --mapping-file '%PathMappingFile.csv Path%' --include-src --include-tch"
[MAIN-INFO] parse the arguments...
[MAIN-INFO] set workspace
[MAIN-INFO] Install Location: C:₩Program Files₩Suresoft₩CT 2023.6
[MAIN-INFO] PRODUCT_VERSION: 2023.6
[MAIN-INFO] workspace: C:₩Users₩sure₩Documents₩cli-workspace
[MAIN-INFO] initialize()
[MAIN-INFO] global database loaded.
```

- Without the required options, the project cannot be imported.

Item	Description
`-e, --execute`	(Required) Execution
`-w, --workspace`	(Required) Workspace
`--import`	(Required) Import Project
`-O`	(Required) Import project with specified options
`--path`	(Required) Set the path for the project to import
`--mapping-file`	Path of the mapping file (default: "exported path" + "/PathMappingFile.csv")
`--include-src`	Include source files in the import
`--include-tch`	Include toolchain in the import

> The argument of the -O option is inputted in "double quotation marks", while the argument of the sub-options is inputted in "single quotation marks".

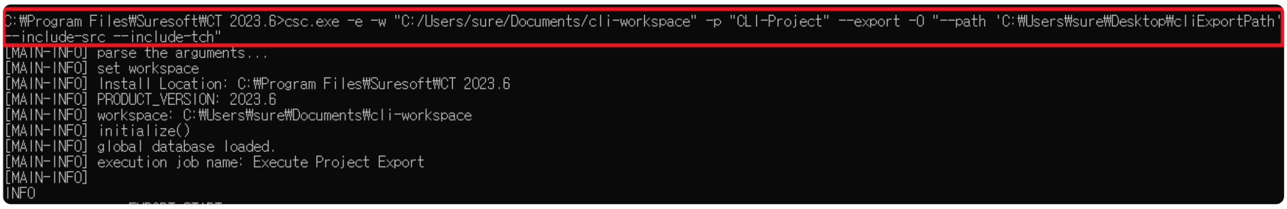
> The `--mapping-file` option is used to map the paths when the project-related path during export and the path on the importing PC are different. The PathMappingFile.csv file is created in the exported folder when exporting the project.

> For more information on the `--mapping-file`, please refer to [CLI Project Import Path Reset] in User Guide 2023.12

30.3. Export project

In project export, the selected project is exported to the desired path.

1. `-e -w "%WorkspacePath%" -p "%ProjectName%" --export -O "--path '%PathToExport%' --include-src --include-tch"` Export the project using commands.



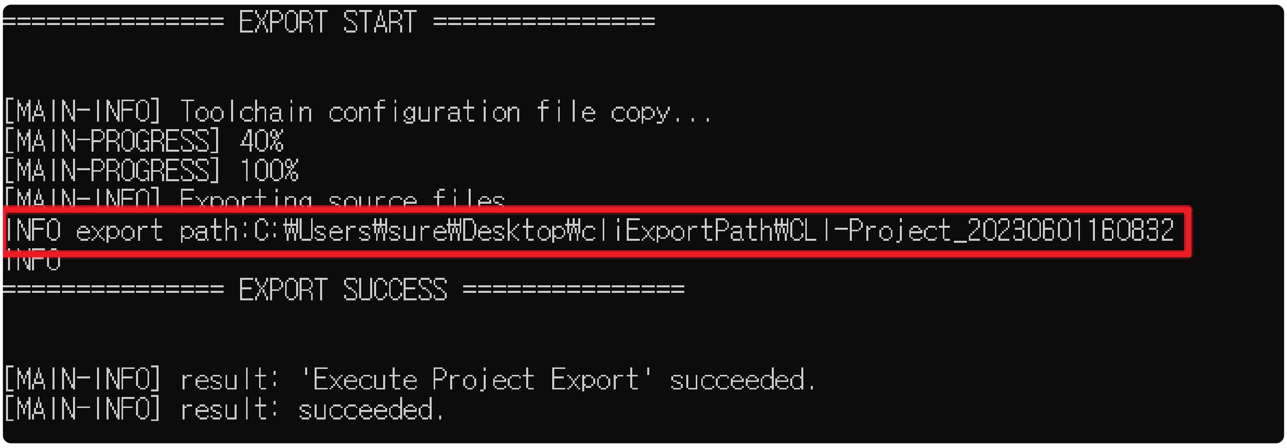
```
C:₩Program Files₩Suresoft₩CT 2023.6>csc.exe -e -w "C:/Users/sure/Documents/cli-workspace" -p "CLI-Project" --export -O "--path 'C:₩Users₩sure₩Desktop₩cliExportPath'
--include-src --include-tch"
[MAIN-INFO] parse the arguments...
[MAIN-INFO] set workspace
[MAIN-INFO] Install Location: C:₩Program Files₩Suresoft₩CT 2023.6
[MAIN-INFO] PRODUCT_VERSION: 2023.6
[MAIN-INFO] workspace: C:₩Users₩sure₩Documents₩cli-workspace
[MAIN-INFO] initialize()
[MAIN-INFO] global database loaded.
[MAIN-INFO] execution job name: Execute Project Export
[MAIN-INFO]
INFO
```

- Without the required options, the project cannot be imported.

Item	Description
`-e, --execute`	(Required) Execution
`-w, --workspace`	(Required) Workspace
`-p`	(Required) Project
`--export`	(Required) Export Project
`-O`	(Required) Export project with specified options
`--path`	(Required) Path to export the project
`--include-src`	Include source files in the export
`--include-tch`	Include toolchain in the export

> The argument of the -O option is inputted in double quotation marks, while the argument of the sub-options is inputted in single quotation marks.

2. Upon successful export, the phrases “Exported path” and “Result: Succeeded.” are displayed.



```
=============== EXPORT START ===============


[MAIN-INFO] Toolchain configuration file copy...
[MAIN-PROGRESS] 40%
[MAIN-PROGRESS] 100%
[MAIN-INFO] Exporting source files
INFO export path:C:₩Users₩sure₩Desktop₩cliExportPath₩CLI-Project_20230601160832
INFO
=============== EXPORT SUCCESS ===============


[MAIN-INFO] result: 'Execute Project Export' succeeded.
[MAIN-INFO] result: succeeded.
```

30.4. Export analysis information and VPES data

The `-r` option in CLI provides the ability to export project results in metric, control flow graph, and VPES data formats.

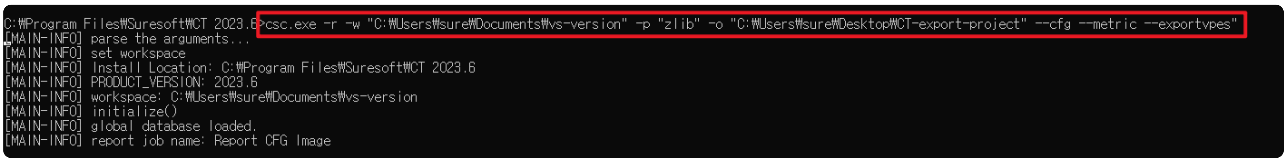
Usage

For the required options to export analysis information, the workspace, project name, and export path must be specified.

```
[-r] [-w path] [-p name] [-o path]
```

Export Execution Results

1. `-r -w "%workspace path%" -p "%project name%" -o "%export path%" --cfg --metric --exportvpes"` Using commands, the project execution results are exported.



```
C:₩Program Files₩Suresoft₩CT 2023.6>csc.exe -r -w "C:₩Users₩sure₩Documents₩vs-version" -p "zlib" -o "C:₩Users₩sure₩Desktop₩CT-export-project" --cfg --metric --exportvpes"
[MAIN-INFO] parse the arguments...
[MAIN-INFO] set workspace
[MAIN-INFO] Install Location: C:₩Program Files₩Suresoft₩CT 2023.6
[MAIN-INFO] PRODUCT_VERSION: 2023.6
[MAIN-INFO] workspace: C:₩Users₩sure₩Documents₩vs-version
[MAIN-INFO] initialize()
[MAIN-INFO] global database loaded.
[MAIN-INFO] report job name: Report CFG Image
```

- Select the desired output format for export using the cfg, metric, uploadvpes, and exportvpes options.
- Export will not be worked if none of the four options are selected.

Item	Description
`-r --report`	(Required) Export execution results
`-w, --workspace`	(Required) Workspace
`-p, --project`	(Required) Project name
`-o, --output`	(Required) Specify the path to export the results
`--cfg, --callgraph`	Export control flow graph images
`--metric`	Export metric reports
`--uploadvpes`	Upload data to VPES
`--exportvpes`	Export data to VPES

2. `--cfg, --callgraph` sub-options

Example: `-r -w "%workspace path%" -p "%project name%" -o "%export path%" --cfg --idPath`

Item	Description
`--idPath`	Include only ID in the exported image path and name

3. `--metric` sub-options

   Example: `-r -w "%workspace path%" -p "%project name%" -o "%export path%" --metric -O "-f example-cli -e html -t module"`

Item	Description
`-f` , `--fileNameSuffix`	Specify the export file name
`-e`, `--extension`	Specify the export file format (html, pdf, doc, xls, ppt)
`-t`, `--type`	Specify the export file model type(module, file, class, function)

4. `--uploadvpes` sub-options

   Example: `-r -w "%workspace path%" -p "%project name%" --uploadvpes -O "%CT 2023.12 install path\plugins\com.codescroll.gp.cli\ini\vpes_access.info%"`

✻ The uploadvpes and exportvpes options cannot be used simultaneously.

30.5. Delete project

The `-d` option of the CLI allows you to delete a project in the CLI environment.

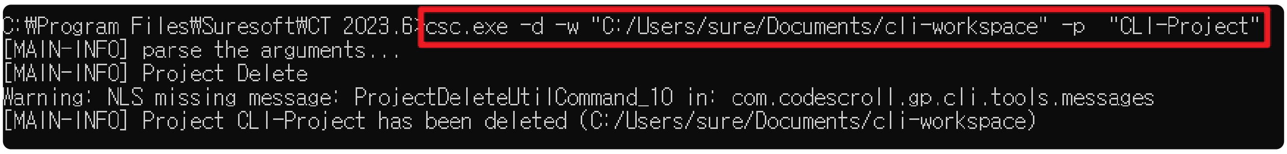
Usage

For the required options to delete a project, the workspace and project name must be specified.

```
csc.exe [-d] [-w path] [-p name]
```

Delete command

1. `-d -w "%workspace path%" -p "%project name%"` Delete the project by using commands.



```
C:₩Program Files₩Suresoft₩CT 2023.6>csc.exe -d -w "C:/Users/sure/Documents/cli-workspace" -p  "CLI-Project"
[MAIN-INFO] parse the arguments...
[MAIN-INFO] Project Delete
Warning: NLS missing message: ProjectDeleteUtilCommand_10 in: com.codescroll.gp.cli.tools.messages
[MAIN-INFO] Project CLI-Project has been deleted (C:/Users/sure/Documents/cli-workspace)
```

   - Deleted projects cannot be recovered.

Item	Description
`-d, --delete`	(Required) Execution
`-w, --workspace`	(Required) Workspace
`-p, --project`	(Required) Project

30.6. DISCOVERY Execution

In the CLI environment, perform the DISCOVERY feature using the `-e` option. DISCOVERY automatically generates test cases that can increase coverage.

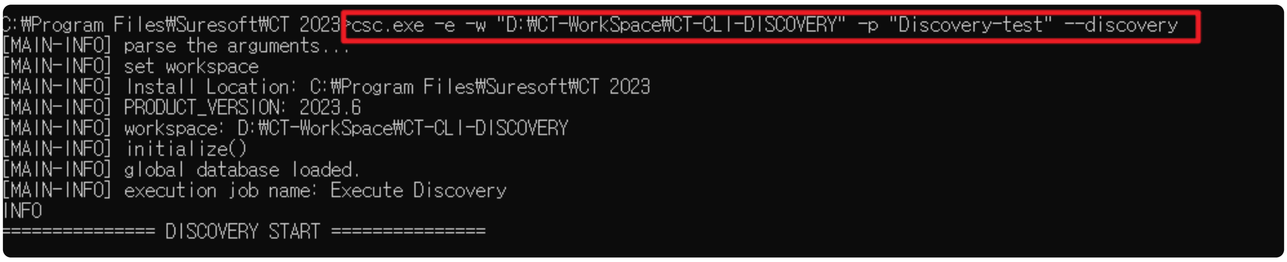
Usage

The required options to be specified are the workspace, project name, and discovery option.

```
csc.exe [-e] [-w path] [-p name] --discovery
```

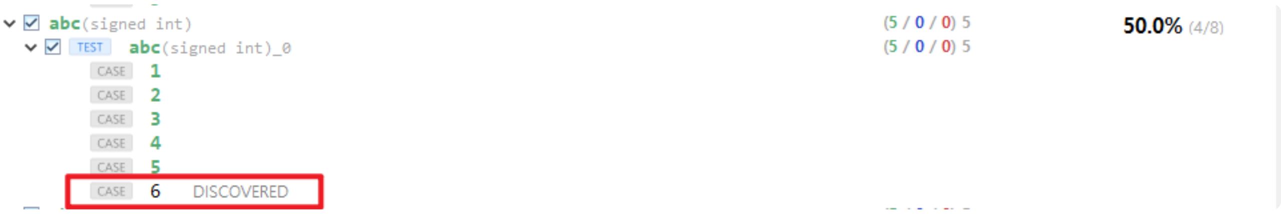
DISCOVERY Execution Command

- `-e -w "%workspace path%" -p "%project name%" --discovery` Execute DISCOVERY using commands.



```
C:₩Program Files₩Suresoft₩CT 2023>csc.exe -e -w "D:₩CT-WorkSpace₩CT-CLI-DISCOVERY" -p "Discovery-test" --discovery
[MAIN-INFO] parse the arguments...
[MAIN-INFO] set workspace
[MAIN-INFO] Install Location: C:₩Program Files₩Suresoft₩CT 2023
[MAIN-INFO] PRODUCT_VERSION: 2023.6
[MAIN-INFO] workspace: D:₩CT-WorkSpace₩CT-CLI-DISCOVERY
[MAIN-INFO] initialize()
[MAIN-INFO] global database loaded.
[MAIN-INFO] execution job name: Execute Discovery
INFO
=============== DISCOVERY START ===============
```

- After the execution is completed, it is possible to verify that the symbolic execution-based test cases have been added in CT 2023.12.



```
☑ abc(signed int)                    (5 / 0 / 0) 5     50.0% (4/8)
  ☑ TEST abc(signed int)_0           (5 / 0 / 0) 5
      CASE 1
      CASE 2
      CASE 3
      CASE 4
      CASE 5
      CASE 6  DISCOVERED
```

DISCOVERY can be executed targeting projects that have generated analysis and test cases.

Detailed information on DISCOVERY is provided on the [DISCOVERY Plug-in] page.

30.7. Fault Localization

In the CLI environment, perform the fault localization feature using the `-e` option. Fault Localization finds the fault location from errors or failed test cases.

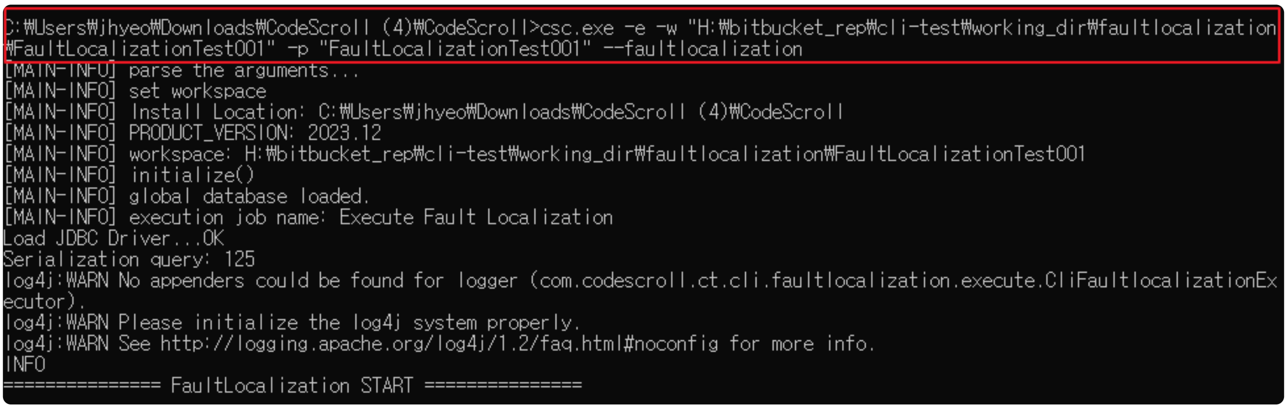
Usage

The required options to be specified are the workspace, project name, and fault localization option.

```
csc.exe [-e] [-w path] [-p name] --faultlocalization
```

Fault Localization Execution Command

- `-e -w "%workspace path%" -p "%project name%" --faultlocalization` Execute Fault Localization using commands.



```
C:₩Users₩jhyeo₩Downloads₩CodeScroll (4)₩CodeScroll>csc.exe -e -w "H:₩bitbucket_rep₩cli-test₩working_dir₩faultlocalization
₩FaultLocalizationTest001" -p "FaultLocalizationTest001" --faultlocalization
[MAIN-INFO] parse the arguments...
[MAIN-INFO] set workspace
[MAIN-INFO] Install Location: C:₩Users₩jhyeo₩Downloads₩CodeScroll (4)₩CodeScroll
[MAIN-INFO] PRODUCT_VERSION: 2023.12
[MAIN-INFO] workspace: H:₩bitbucket_rep₩cli-test₩working_dir₩faultlocalization₩FaultLocalizationTest001
[MAIN-INFO] initialize()
[MAIN-INFO] global database loaded.
[MAIN-INFO] execution job name: Execute Fault Localization
Load JDBC Driver...OK
Serialization query: 125
log4j:WARN No appenders could be found for logger (com.codescroll.ct.cli.faultlocalization.execute.CliFaultlocalizationEx
ecutor).
log4j:WARN Please initialize the log4j system properly.
log4j:WARN See http://logging.apache.org/log4j/1.2/faq.html#noconfig for more info.
INFO
=============== FaultLocalization START ===============
```

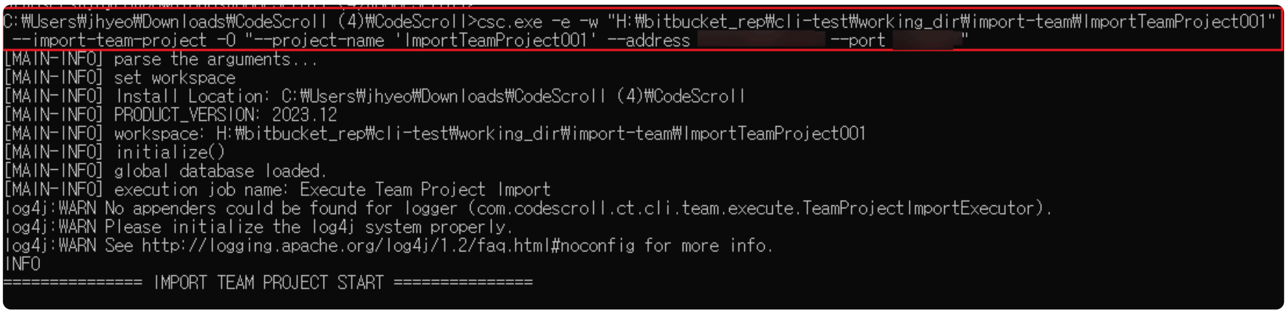
- After the execution is completed, the [Fault Localization View] in CT 2023.12 will provide information about the fault localization

✻ Detailed information on Fault Localization is provided on the [Fault Localization] page.

30.8. Import team project

In the CLI environment, you can import a team project using Team Testing Server.

1. `-e -w "%Workspace Path%" --import-team-project -O "--project-name '%Team project name%' --address '%Team server address%' --port '%Team server port%'"` Import the team project using a command.



```
C:₩Users₩jhyeo₩Downloads₩CodeScroll (4)₩CodeScroll>csc.exe -e -w "H:₩bitbucket_rep₩cli-test₩working_dir₩import-team₩ImportTeamProject001"
 --import-team-project -O "--project-name 'ImportTeamProject001' --address [redacted] --port [redacted]"
[MAIN-INFO] parse the arguments...
[MAIN-INFO] set workspace
[MAIN-INFO] Install Location: C:₩Users₩jhyeo₩Downloads₩CodeScroll (4)₩CodeScroll
[MAIN-INFO] PRODUCT_VERSION: 2023.12
[MAIN-INFO] workspace: H:₩bitbucket_rep₩cli-test₩working_dir₩import-team₩ImportTeamProject001
[MAIN-INFO] initialize()
[MAIN-INFO] global database loaded.
[MAIN-INFO] execution job name: Execute Team Project Import
log4j:WARN No appenders could be found for logger (com.codescroll.ct.cli.team.execute.TeamProjectImportExecutor).
log4j:WARN Please initialize the log4j system properly.
log4j:WARN See http://logging.apache.org/log4j/1.2/faq.html#noconfig for more info.
INFO
=============== IMPORT TEAM PROJECT START ===============
```

- Without the required options, the project cannot be imported.

Item	Description
`-e, --execute`	(Required) Execution
`-w, --workspace`	(Required) Workspace
`--import-team-project`	(Required) Import Team Project
`-O`	(Required) Import project with specified options
`--project-name`	(Required) Team Project Name
`--address`	(Required) Team server address
`--port`	(Required) Team server port
`--exclude-test`	Get without tests
`--run-test-with-commit`	Run test and commit
`--test-env`	Test environment kind (1: Host, 2: RTV, default : 1)

> The argument of the -O option is inputted in “double quotation marks”, while the argument of the sub-options is inputted in “single quotation marks”.

31. CT Team Testing Server plug-in

CT 2023.12 provides team testing that allows multiple users to test a single software. Team project can be deployed on Team Testing Server and imported and tested by multiple users. The results of tests by multiple users can be checked on Team Testing Dashboard.

The projects that support team testing include:

- C/C++ projects
- RTV C/C++ projects

✻ Target C/C++ projects or RTV target C/C++ projects don’t support team testing.

Term

This paragraph describes the terms you need to know to use in the Team Testing feature.

- Team Testing Server (team server): The server on which the project to be shared with others is up
- Local: CT the user is working on
- Team projects: Projects that can be uploaded to Team Testing Server and shared with others
- Resources
  - Configuration Resources: Settings information that make up the project (such as project properties)
  - Shared resources: Test resources shared by all users, including tests, stubs, fault injections, and class code
- Revision: History of modifications to the team project which is in the server. The revision starts at 1 when a project is created and increases with each commit.
- Commit: Reflecting local changes and test results onto the server
- Update: Reflect the latest changes of server into the local
- Conflict: When the resource to be updated has local modifications.

Features

CT 2023.12 provides the following team testing features:

- Install CT Team Testing Server
- Execute CT Team Testing Server
- Preferences
- Team Project
  - Create a team project
  - Properties of team projects
  - Import team project
  - Convert team project
- Commit
- Update

- Team test
    - Import team test
    - Delete team test

31.1. Install CT Team Testing Server

Installation requirements

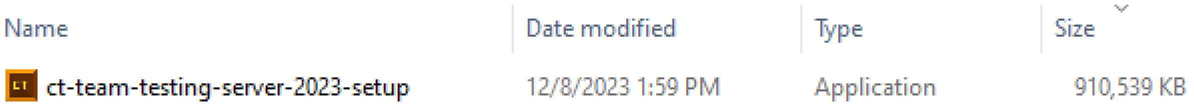
	Minimum Specifications	Recommended Specifications
OS	Microsoft Windows 7 (64bit)	Microsoft Windows 10 (64bit)
CPU	Intel Core i5 3470 (4-core or more)	Intel Core i7 9700 (8-core or more)
RAM	4GB	16GB
Storage	HDD 100GB	SSD 500GB

Supported OSes are Windows 7, 10, 11 and Ubuntu 20.04.

Install Team Testing Server

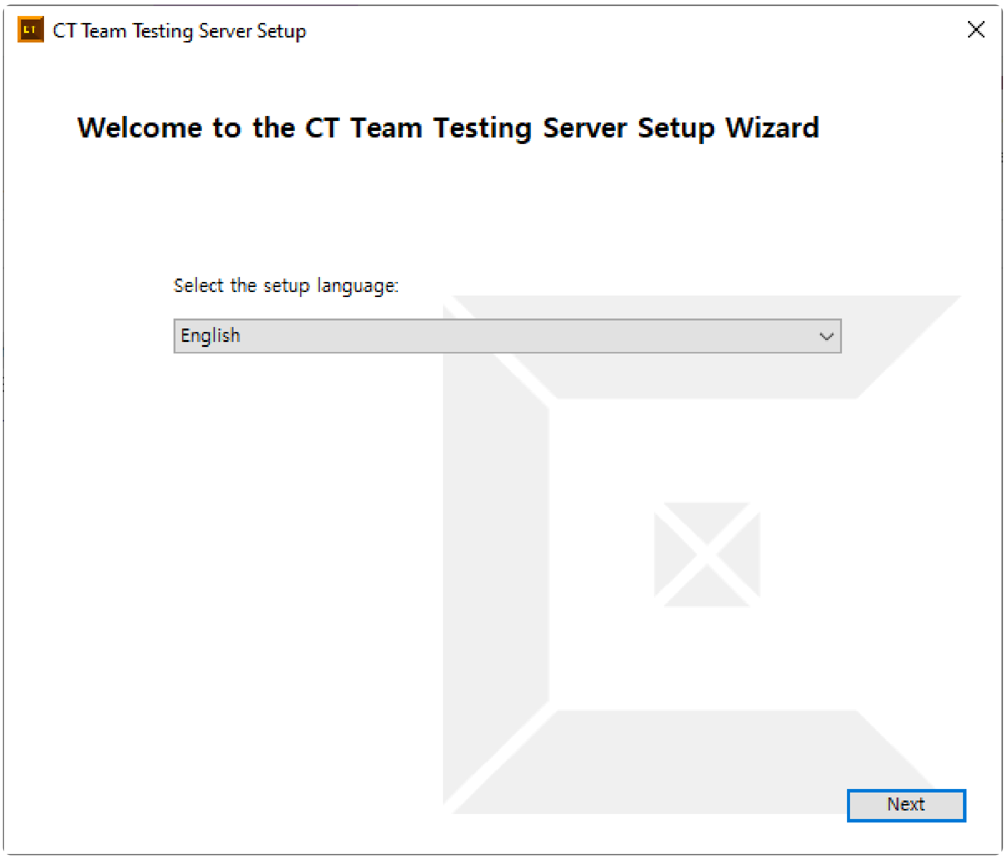
Here's how to install Team Testing Server using the install package.

1. Execute the `ct-team-testing-server-xxxx-setup.exe` file.



Name	Date modified	Type	Size
ct-team-testing-server-2023-setup	12/8/2023 1:59 PM	Application	910,539 KB

2. Select the setup language and Click [Next]



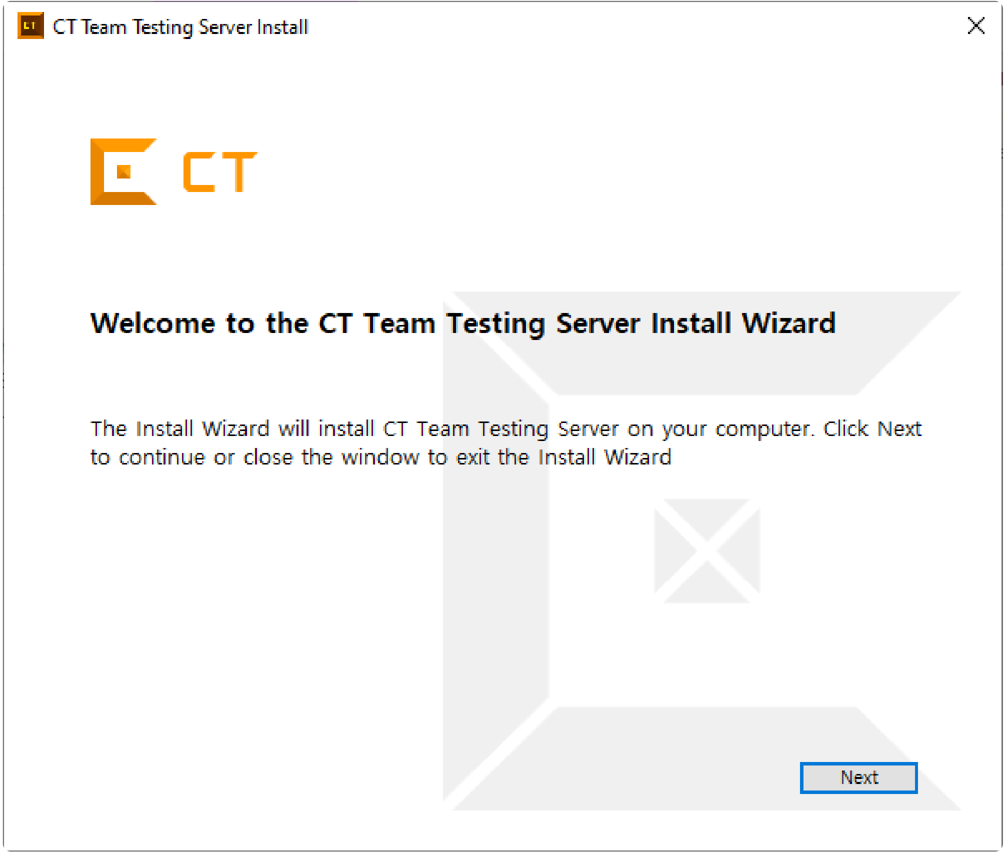
CT Team Testing Server Setup

Welcome to the CT Team Testing Server Setup Wizard

Select the setup language:

English

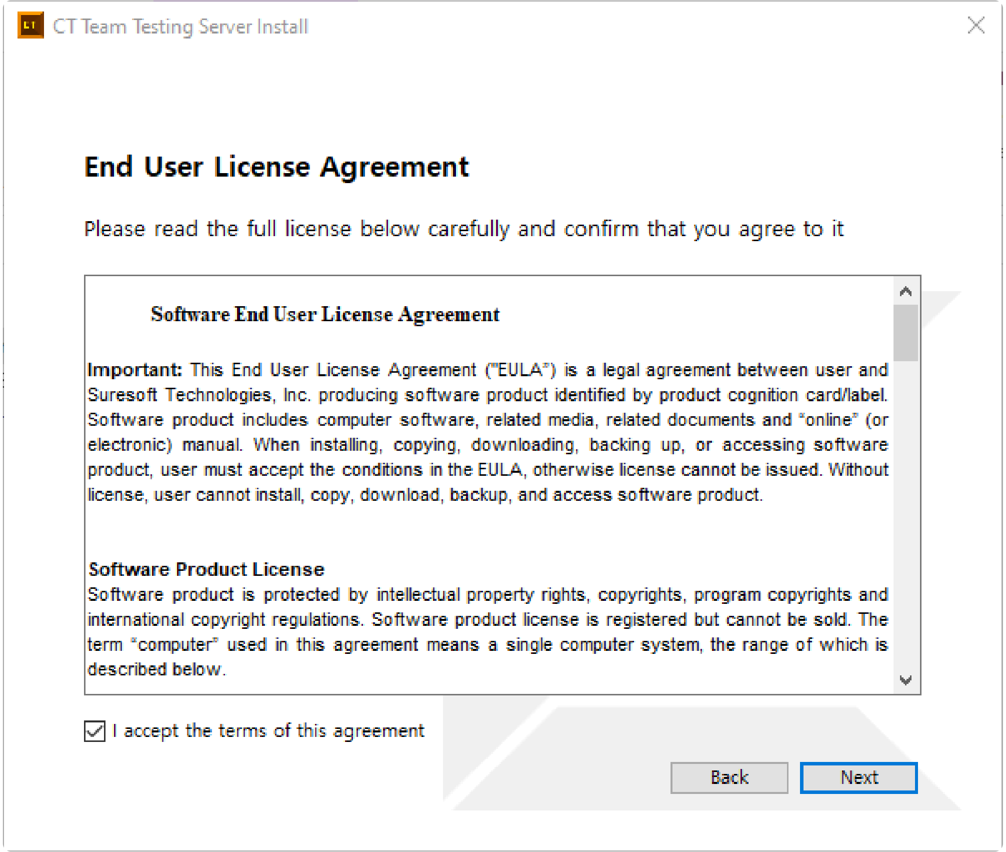
3. The installation wizard runs and collects installation information. Click [Next].



Welcome to the CT Team Testing Server Install Wizard

The Install Wizard will install CT Team Testing Server on your computer. Click Next to continue or close the window to exit the Install Wizard

4. Agree to the End-User License Agreement and click [Next].



End User License Agreement

Please read the full license below carefully and confirm that you agree to it

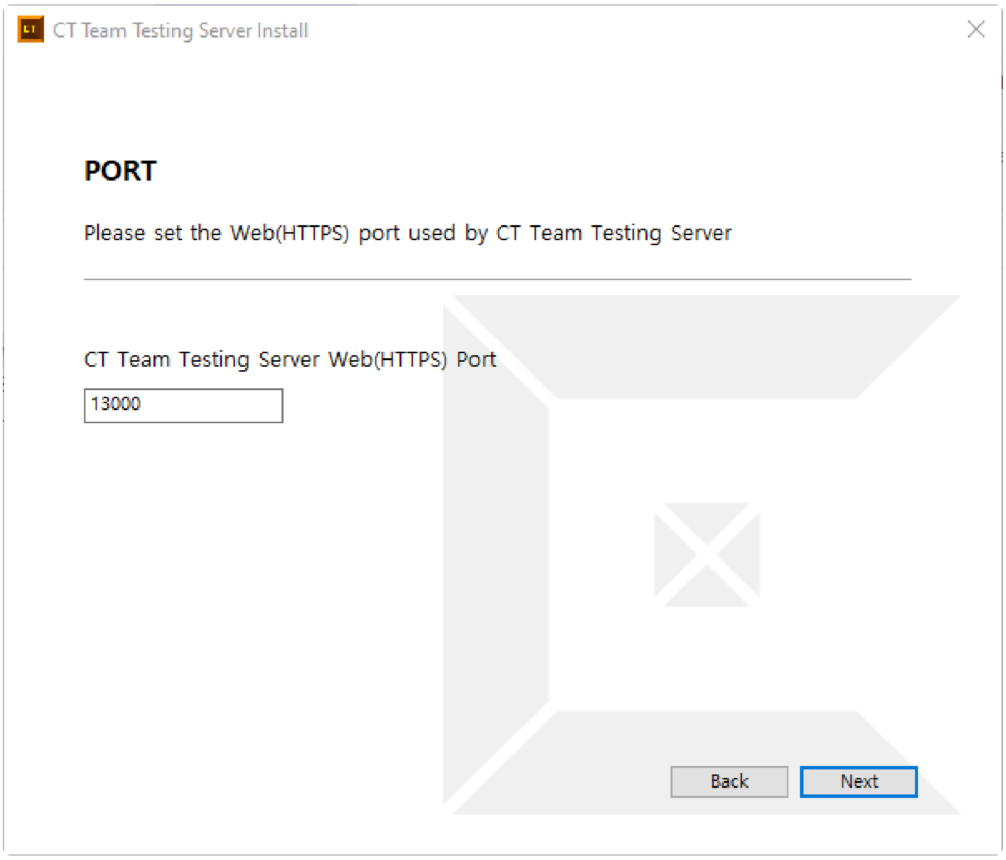
Software End User License Agreement

Important: This End User License Agreement ("EULA") is a legal agreement between user and Suresoft Technologies, Inc. producing software product identified by product cognition card/label. Software product includes computer software, related media, related documents and "online" (or electronic) manual. When installing, copying, downloading, backing up, or accessing software product, user must accept the conditions in the EULA, otherwise license cannot be issued. Without license, user cannot install, copy, download, backup, and access software product.

Software Product License
Software product is protected by intellectual property rights, copyrights, program copyrights and international copyright regulations. Software product license is registered but cannot be sold. The term "computer" used in this agreement means a single computer system, the range of which is described below.

☑ I accept the terms of this agreement

5. Enter the web port to use in Team Testing Server and click [Next]. The default is `13000`.



CT Team Testing Server Install

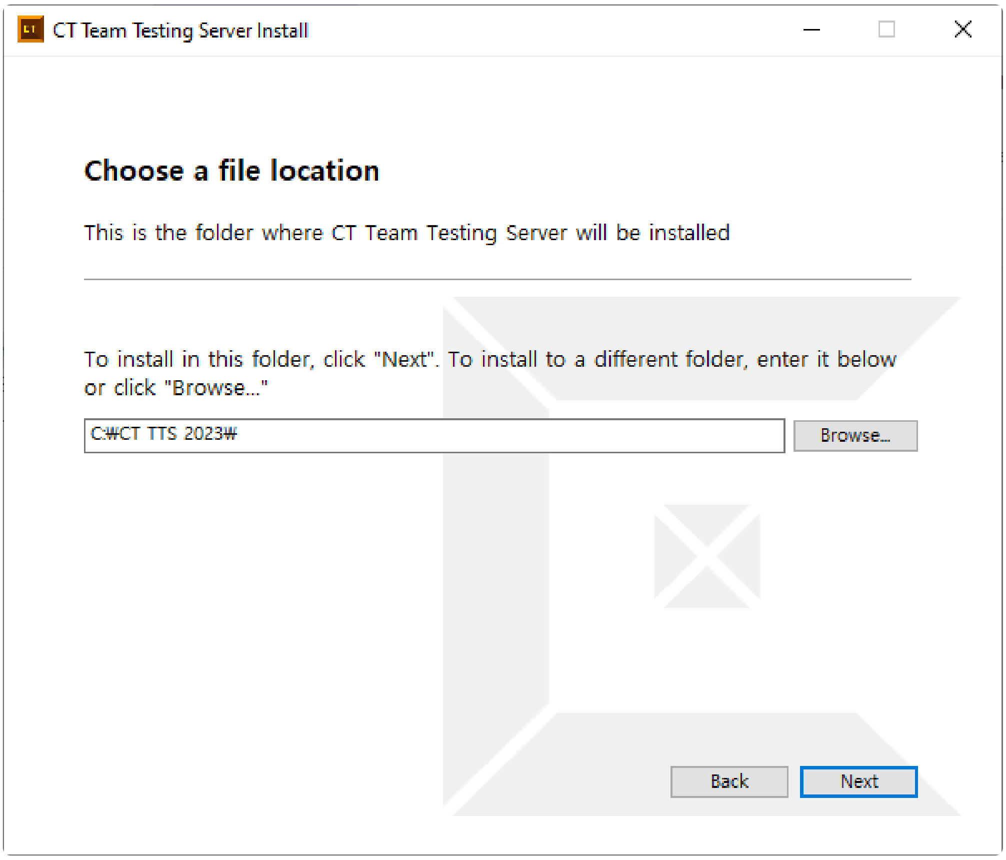
PORT

Please set the Web(HTTPS) port used by CT Team Testing Server

CT Team Testing Server Web(HTTPS) Port

13000

6. Set the path to install Team Testing Server and click [Next].



CT Team Testing Server Install

Choose a file location

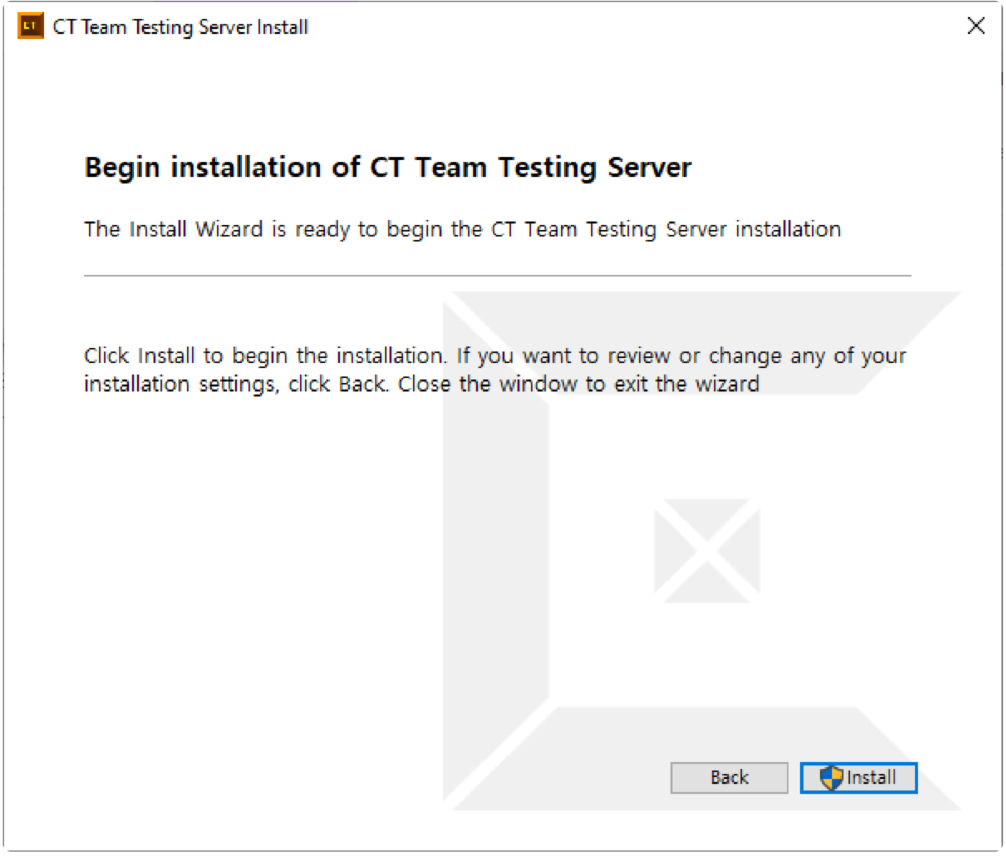
This is the folder where CT Team Testing Server will be installed

To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse..."

C:₩CT TTS 2023₩

! Cannot install Team Testing Server on paths that contain non-English languages.

7. We have gathered all the information necessary for installation. Click [Install].



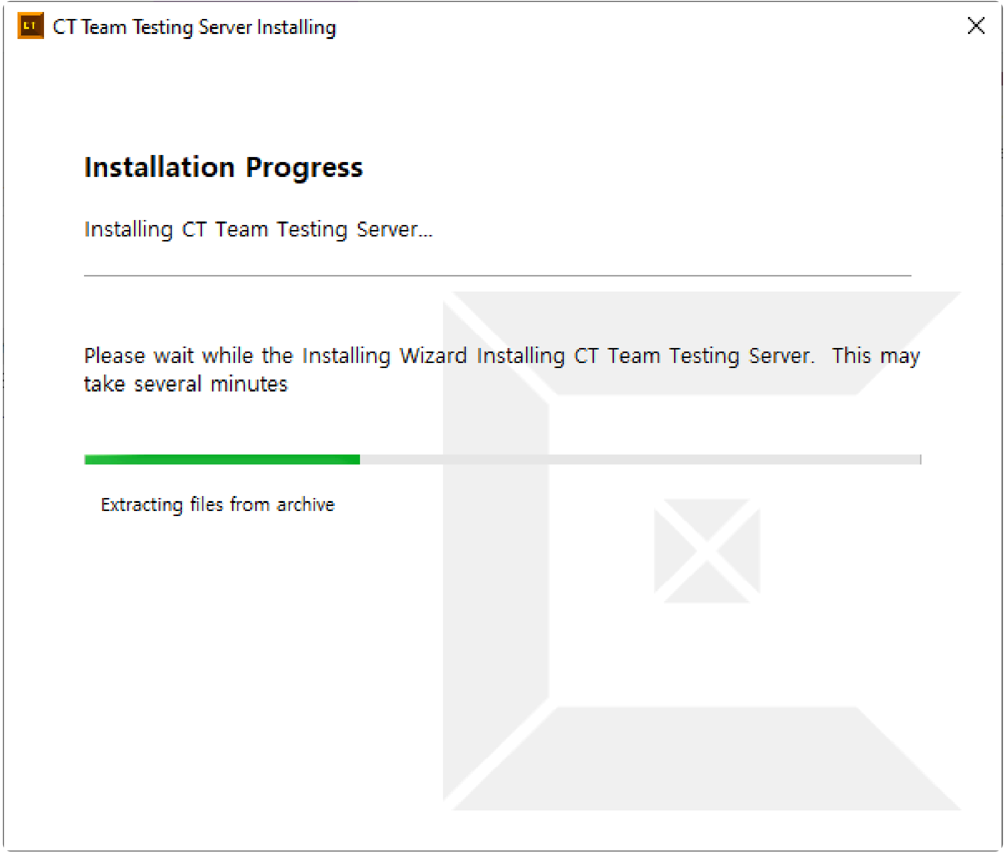
CT Team Testing Server Install

Begin installation of CT Team Testing Server

The Install Wizard is ready to begin the CT Team Testing Server installation

Click Install to begin the installation. If you want to review or change any of your installation settings, click Back. Close the window to exit the wizard

8. Team Testing Server is installed



CT Team Testing Server Installing

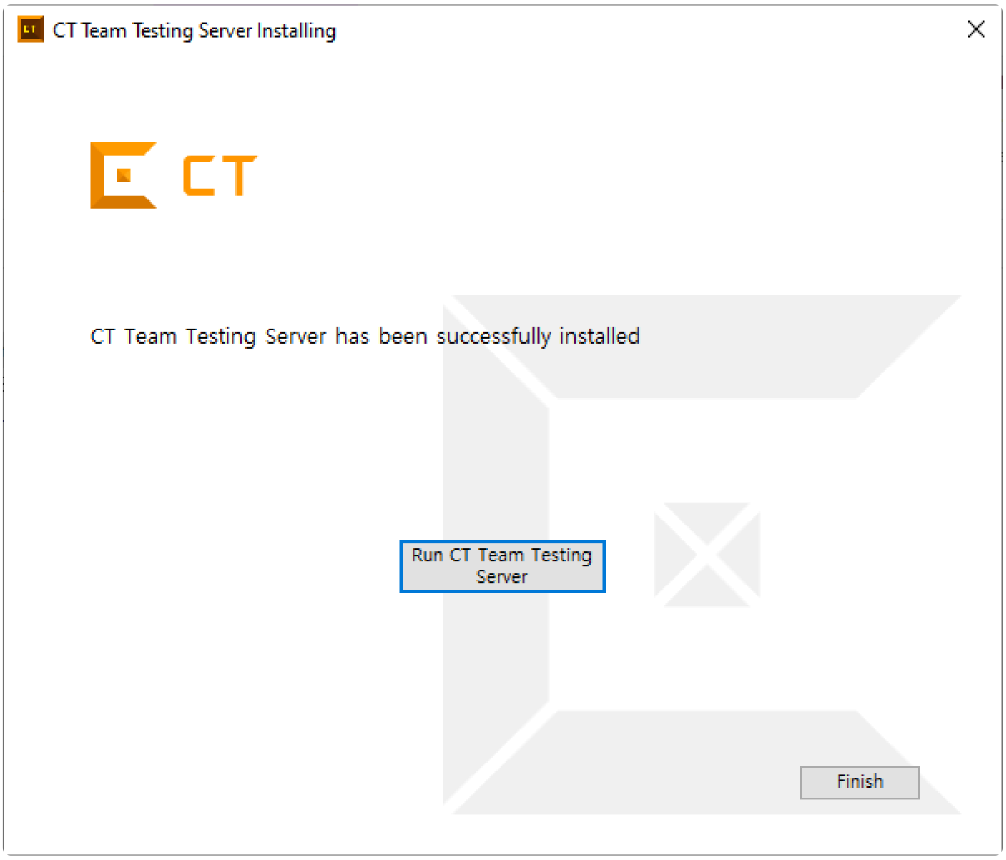
Installation Progress

Installing CT Team Testing Server...

Please wait while the Installing Wizard Installing CT Team Testing Server. This may take several minutes

Extracting files from archive

9. Click [Run CT Team Testing Server] to run Team Testing Server immediately after installation is complete, or click [Finish] to end the installation.



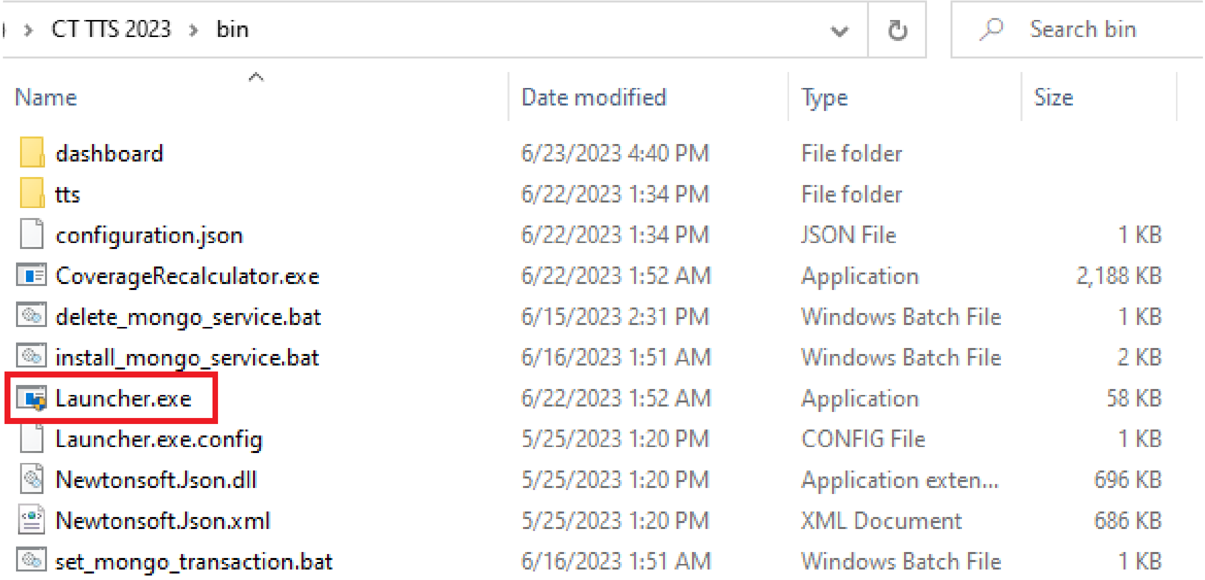
CT Team Testing Server Installing

CT Team Testing Server has been successfully installed

31.2. Execute CT Team Testing Server

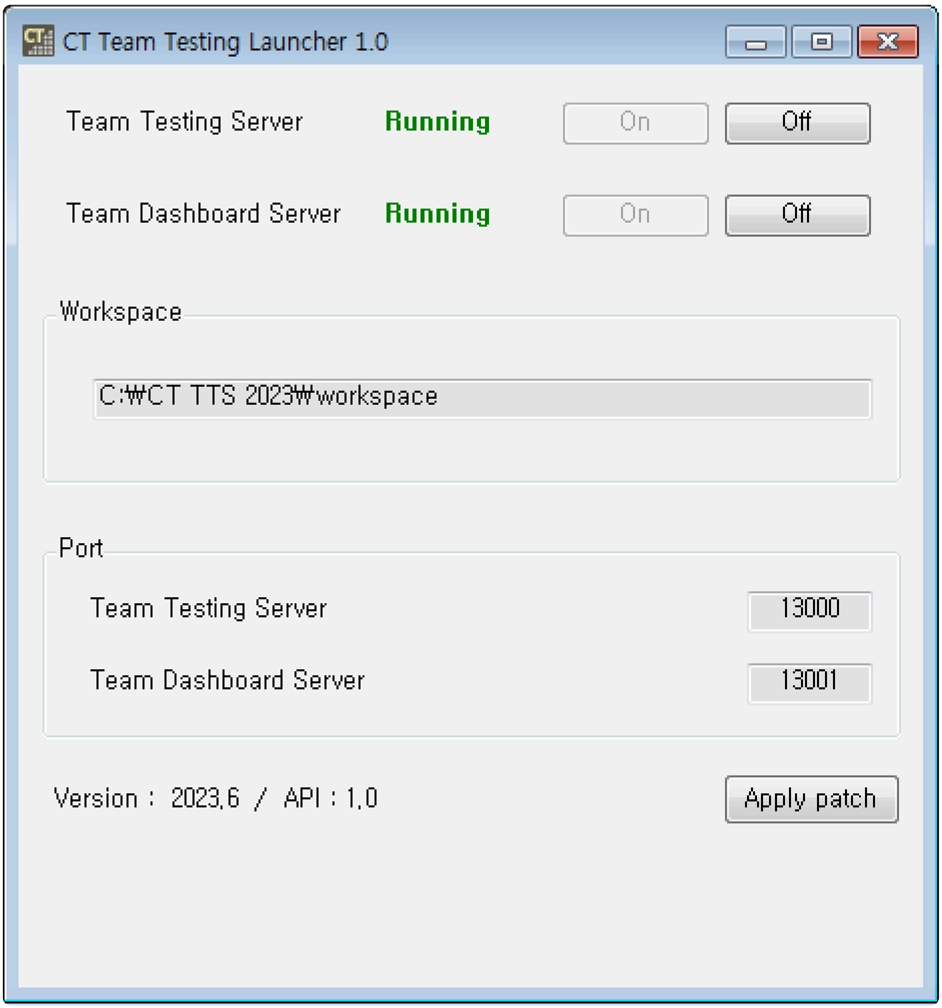
Execute Launcher

Use `{install path}\bin\Launcher.exe` to turn Team Testing Server and Team Testing Dashboard server on/off or change their settings.



Name	Date modified	Type	Size
dashboard	6/23/2023 4:40 PM	File folder	
tts	6/22/2023 1:34 PM	File folder	
configuration.json	6/22/2023 1:34 PM	JSON File	1 KB
CoverageRecalculator.exe	6/22/2023 1:52 AM	Application	2,188 KB
delete_mongo_service.bat	6/15/2023 2:31 PM	Windows Batch File	1 KB
install_mongo_service.bat	6/16/2023 1:51 AM	Windows Batch File	2 KB
Launcher.exe	6/22/2023 1:52 AM	Application	58 KB
Launcher.exe.config	5/25/2023 1:20 PM	CONFIG File	1 KB
Newtonsoft.Json.dll	5/25/2023 1:20 PM	Application exten...	696 KB
Newtonsoft.Json.xml	5/25/2023 1:20 PM	XML Document	686 KB
set_mongo_transaction.bat	6/16/2023 1:51 AM	Windows Batch File	1 KB

Execute servers



CT Team Testing Launcher 1.0

Team Testing Server Running

Team Dashboard Server Running

Workspace

C:₩CT TTS 2023₩workspace

Port

Team Testing Server 13000

Team Dashboard Server 13001

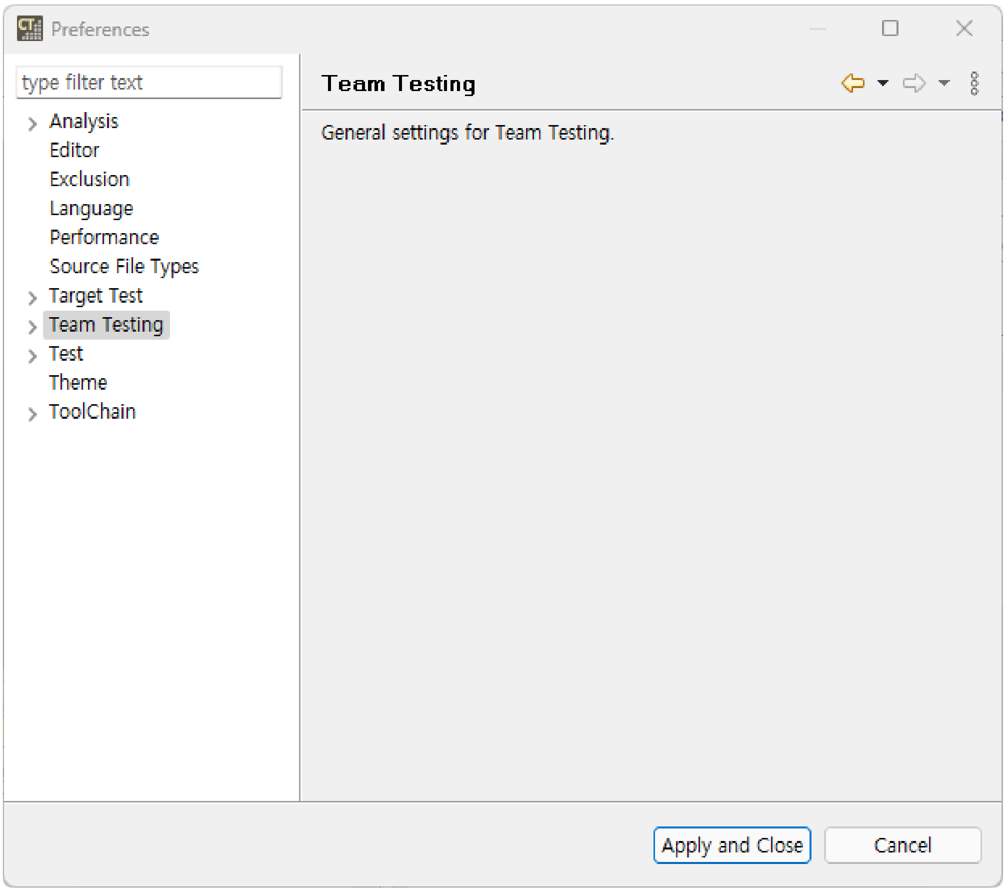
Version : 2023.6 / API : 1.0

- Execute the Launcher to turn Team Testing Server and Team Testing Dashboard server on/off. You can manually turn them on and off using the [On]/[Off] button.
- Check the version of Team Testing Server in [Version] and click the [Apply patch] button to apply the patch.

> ✻ The servers will be restarted after applying the patch.

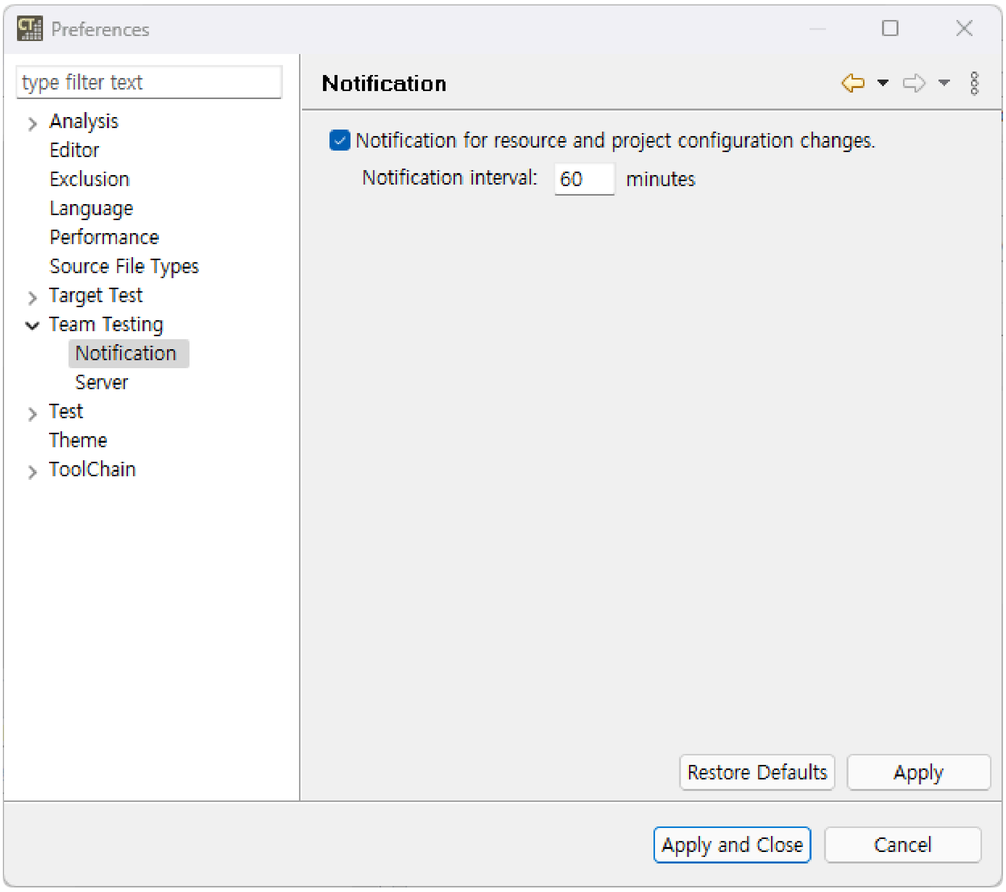
31.3. Preferences

Enter team test information in [Preferences] > [Team Testing] before creating or importing a team project.



General settings for Team Testing.

Notification

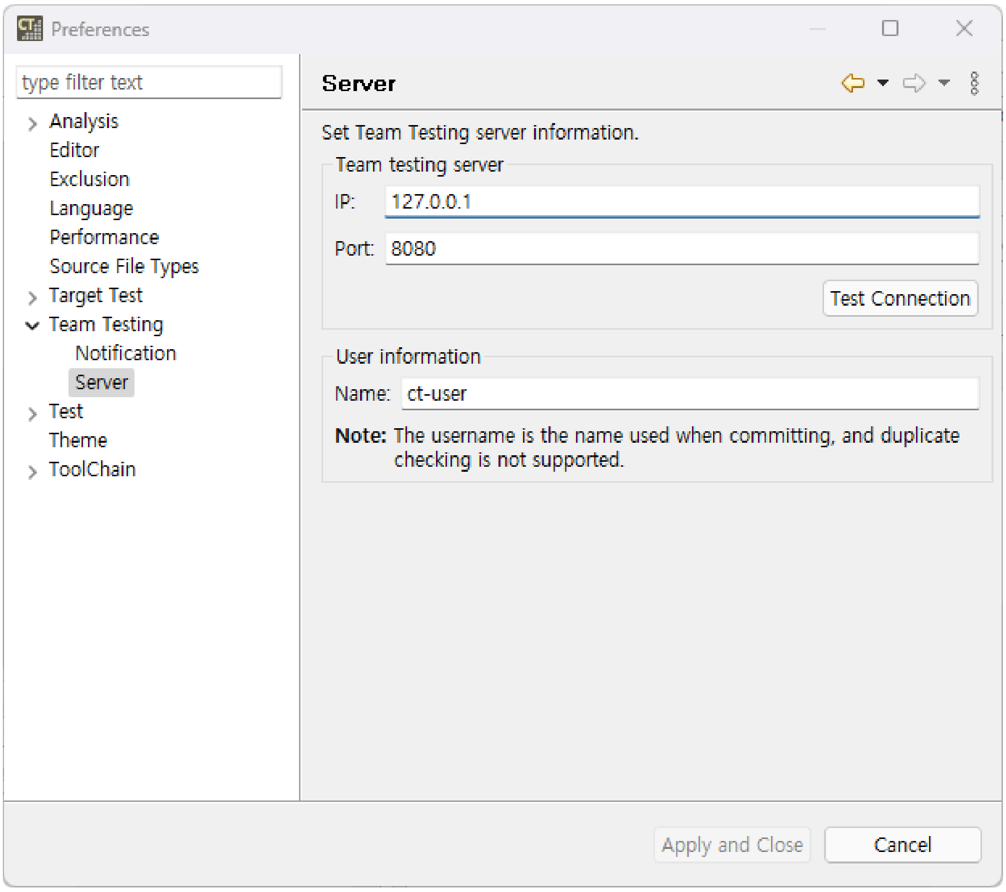


☑ Notification for resource and project configuration changes.

Notification interval: 60 minutes

- Select whether to display a notification when there is an update to the team project and set the notification interval.
- Notification period defaults to 60 minutes and should be set to at least 5 minutes.

Server



Set Team Testing server information.

Team testing server

IP: 127.0.0.1

Port: 8080

User information

Name: ct-user

Note: The username is the name used when committing, and duplicate checking is not supported.

- Team Testing Server: Enter the IP and port of the Team Testing Server. Click Test Connection to verify your connection with the server after entering server information.
- User Information: Enter the name to be used in Team Testing Server.

31.4. Team Project

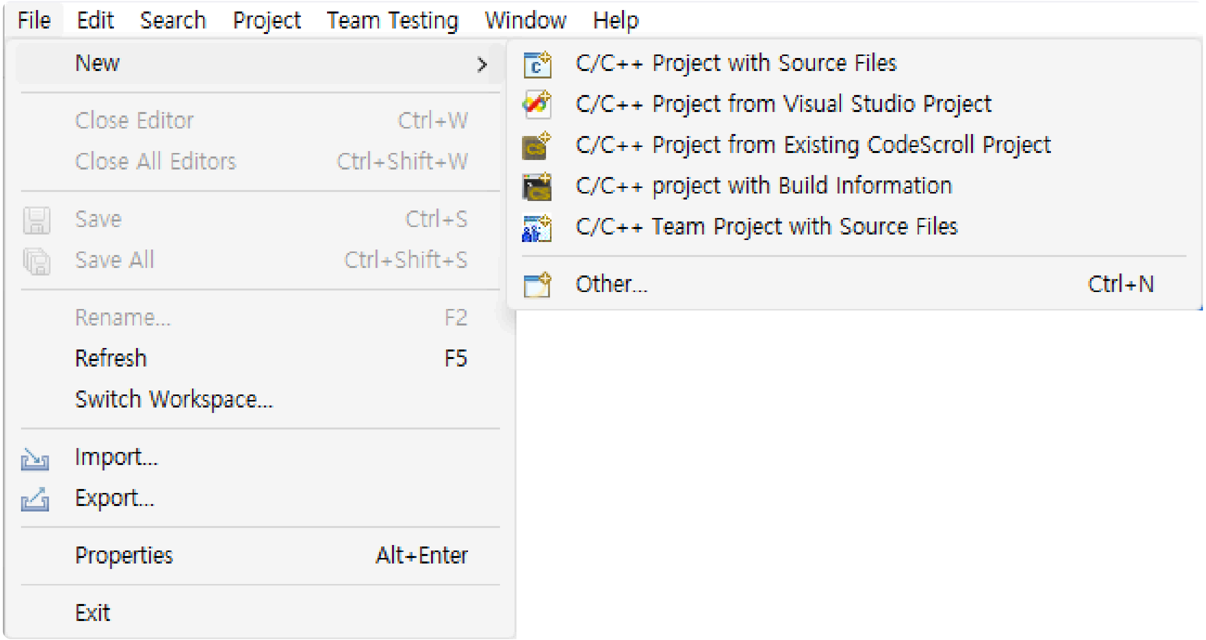
CT 2023.12 provides the following features to use team projects.

- Create a team project
- Properties of team projects
- Import team project
- Convert team project

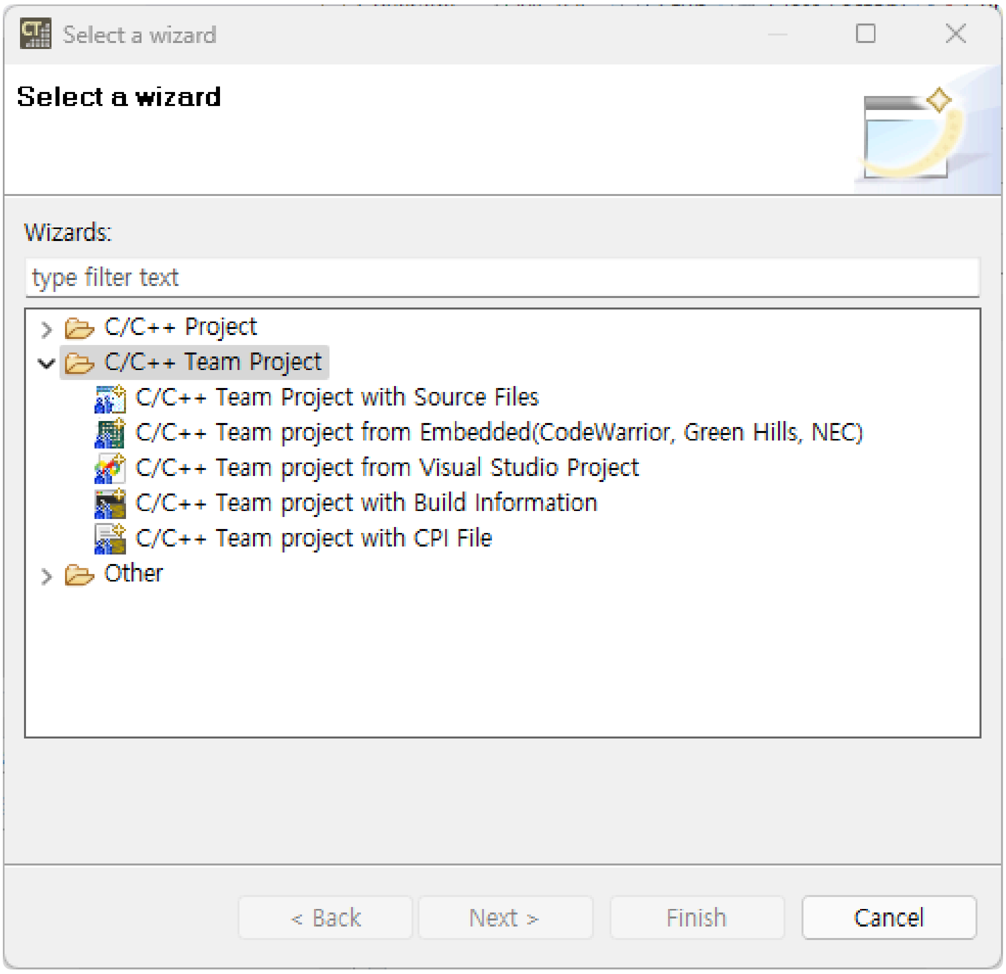
31.4.1. Create a team project

You need to create a project on the server to test one project with other users.

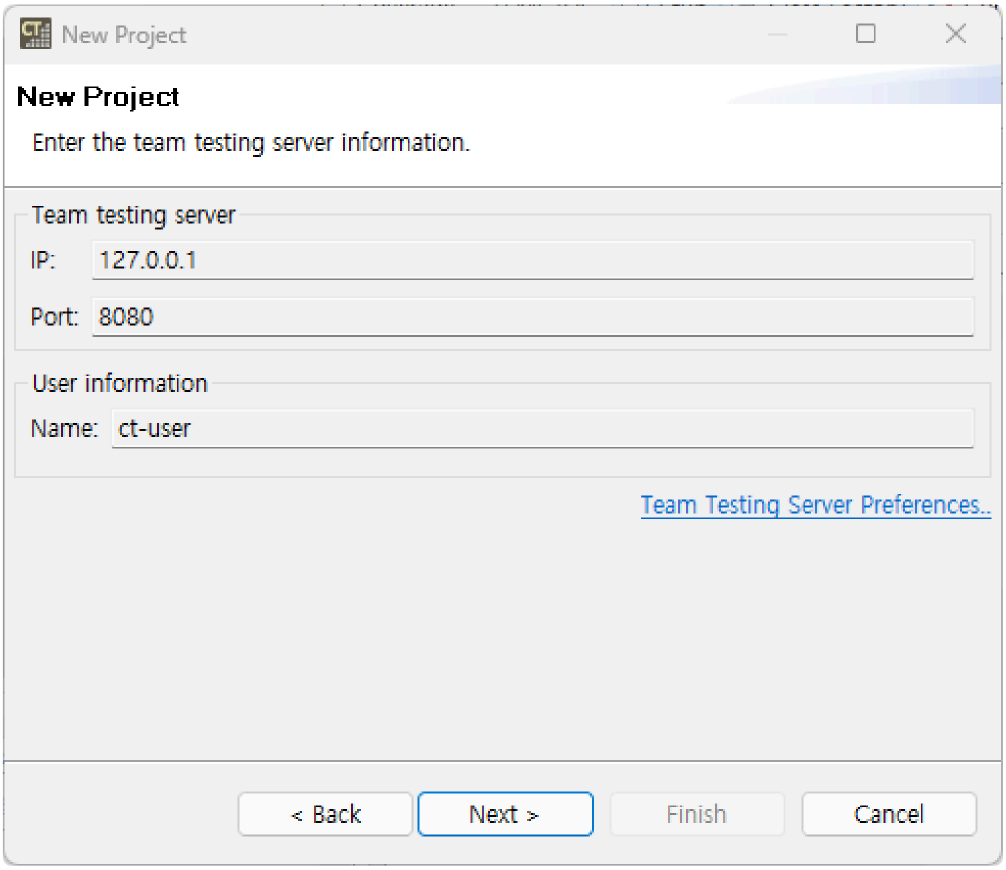
1. Run [New Project] wizard to create a team project. Select [File] > [New] or click the shortcut icon.


File
Edit
Search
Project
Team Testing
Window
Help
New
Close Editor Ctrl+W
Close All Editors Ctrl+Shift+W
Save Ctrl+S
Save All Ctrl+Shift+S
Rename... F2
Refresh F5
Switch Workspace...
Import...
Export...
Properties Alt+Enter
Exit
C/C++ Project with Source Files
C/C++ Project from Visual Studio Project
C/C++ Project from Existing CodeScroll Project
C/C++ project with Build Information
C/C++ Team Project with Source Files
Other... Ctrl+N

2. In the [Create Project] wizard, select the team project to create and click [Next].


Select a wizard
Select a wizard
Wizards:
type filter text
C/C++ Project
C/C++ Team Project
C/C++ Team Project with Source Files
C/C++ Team project from Embedded(CodeWarrior, Green Hills, NEC)
C/C++ Team project from Visual Studio Project
C/C++ Team project with Build Information
C/C++ Team project with CPI File
Other
< Back
Next >
Finish
Cancel

3. After checking the team testing server and user information entered in the preferences, click [Next]. You can edit the Team Testing Server and user information by clicking [Team Testing Server Preferences…].



New Project

Enter the team testing server information.

Team testing server

IP: 127.0.0.1

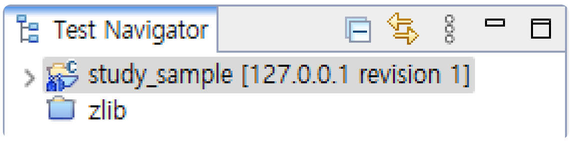
Port: 8080

User information

Name: ct-user

4. The subsequent process is the same as creating a general project. Please refer to [Create a Project] or [Create a RTV Project] in this document.

5. You can check the server IP and revision of the created team project in the [Test Navigator] view.

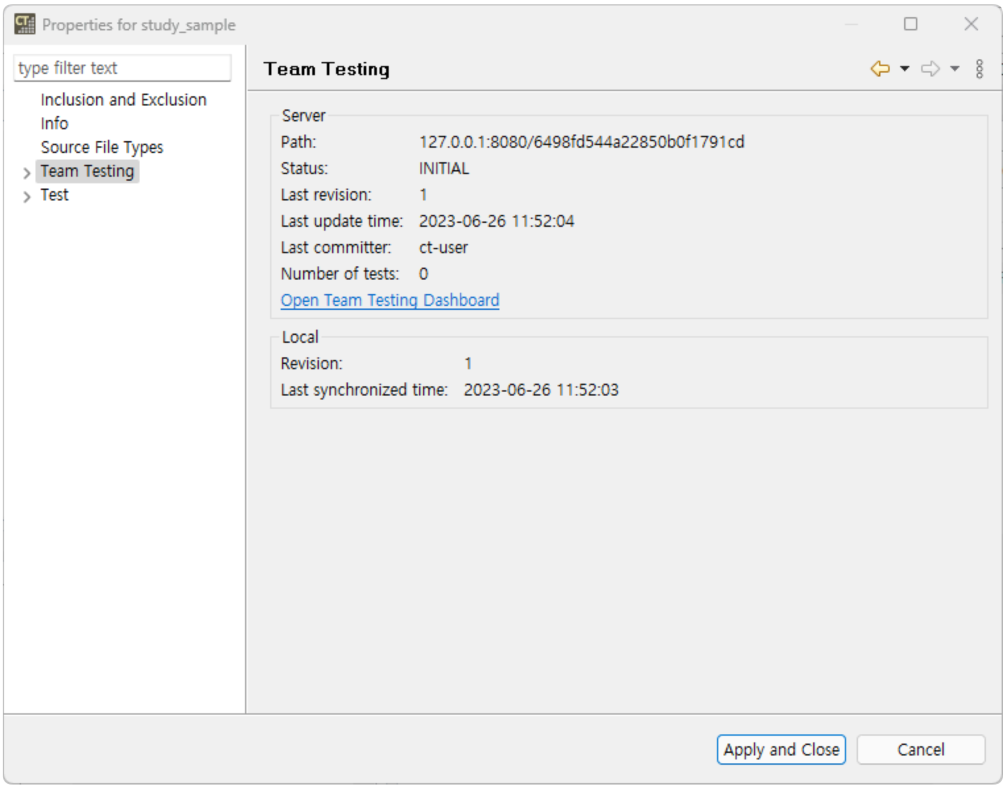


31.4.2. Properties of team projects

Information about a team project can be viewed in the Project Properties page.

Team Testing

Team Testing page provides project information of the server and local.



Server
Path: 127.0.0.1:8080/6498fd544a22850b0f1791cd
Status: INITIAL
Last revision: 1
Last update time: 2023-06-26 11:52:04
Last committer: ct-user
Number of tests: 0
Open Team Testing Dashboard

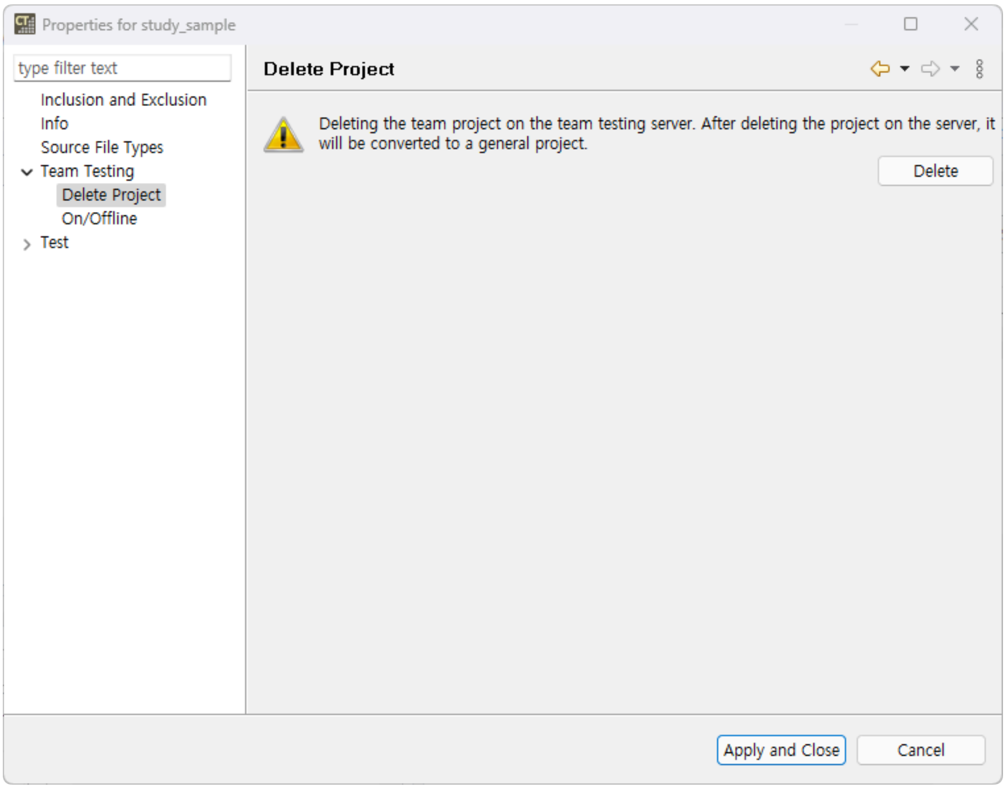
Local
Revision: 1
Last synchronized time: 2023-06-26 11:52:03

- You can check server information.
- You can check project information in the dashboard by clicking [Open Team Testing Dashboard]. For more information about Team Testing Dashboard, please refer to the [CT Team Testing Dashboard] page in this document.
- You can check the revision and last update time of local.

Delete Project

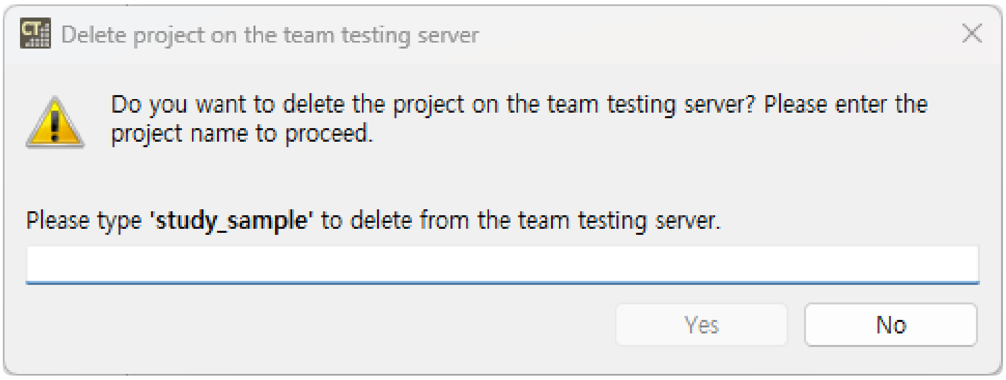
You can delete team projects on the server. When you delete a project on the server, the local team project is converted to a general project.

1. Click [Delete] in [Team Testing] > [Delete Project].



Deleting the team project on the team testing server. After deleting the project on the server, it will be converted to a general project.

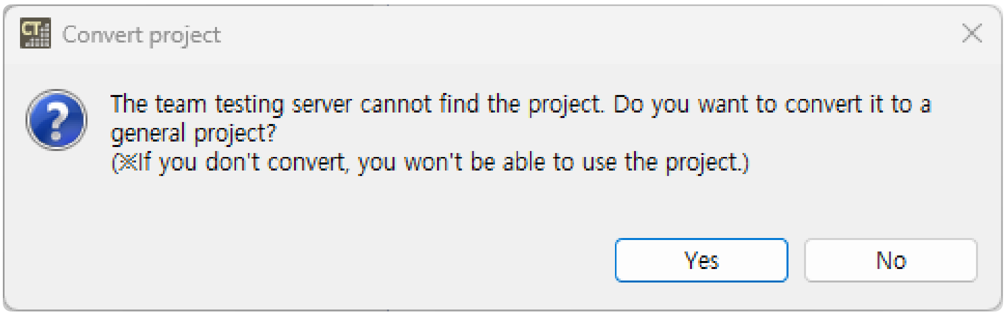
2. If you click [Yes] after entering the project name, the project will be deleted from the server.



Do you want to delete the project on the team testing server? Please enter the project name to proceed.

Please type '**study_sample**' to delete from the team testing server.

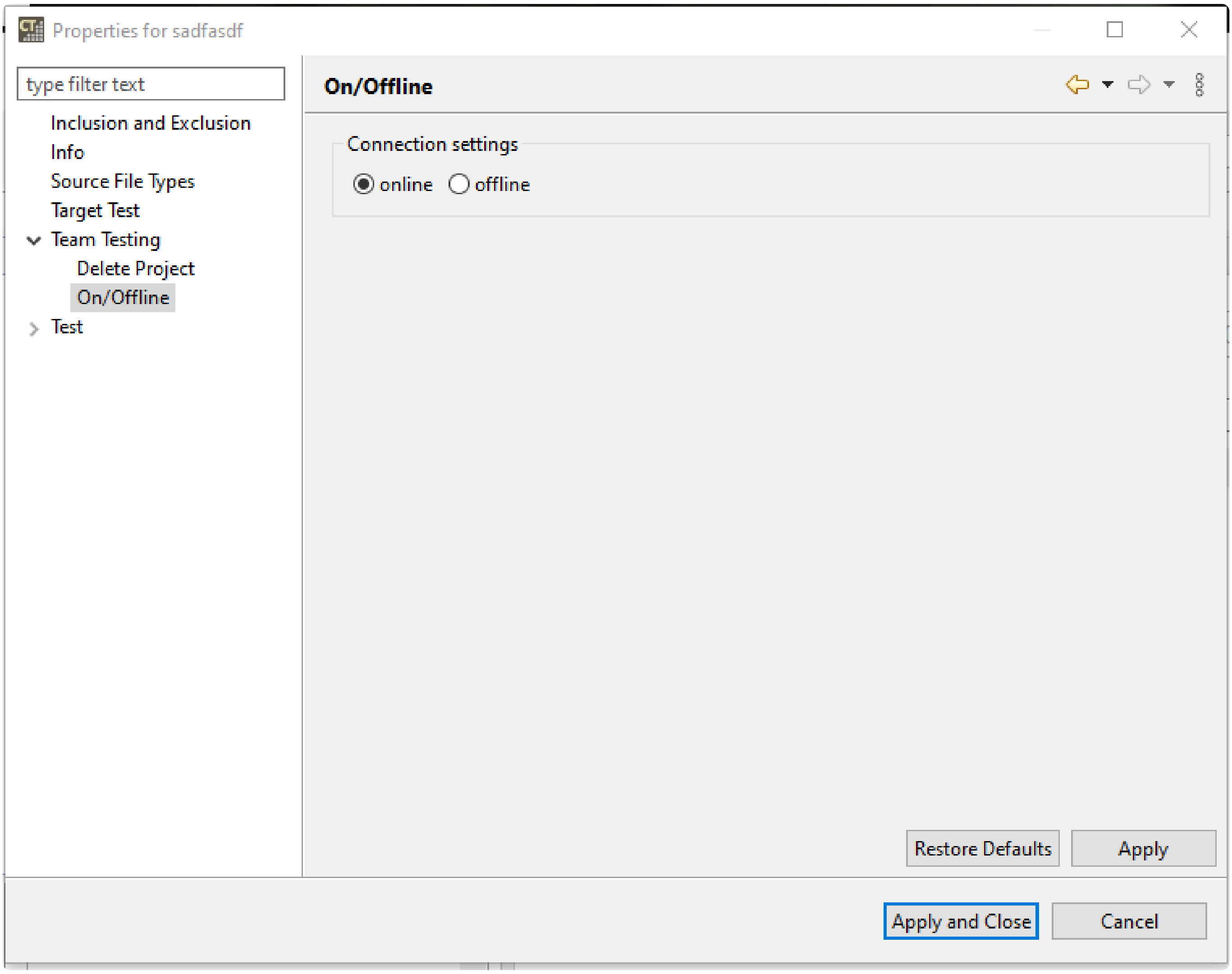
3. If there are other users connected with the deleted project, those users' projects will be converted to general projects.



The team testing server cannot find the project. Do you want to convert it to a general project?
(※If you don't convert, you won't be able to use the project.)

On/Offline

You can choose to connect to the server or not. For more information on on/offline property, please refer to [On/Offline Mode] page on User Guides 2023.12.



Connection settings

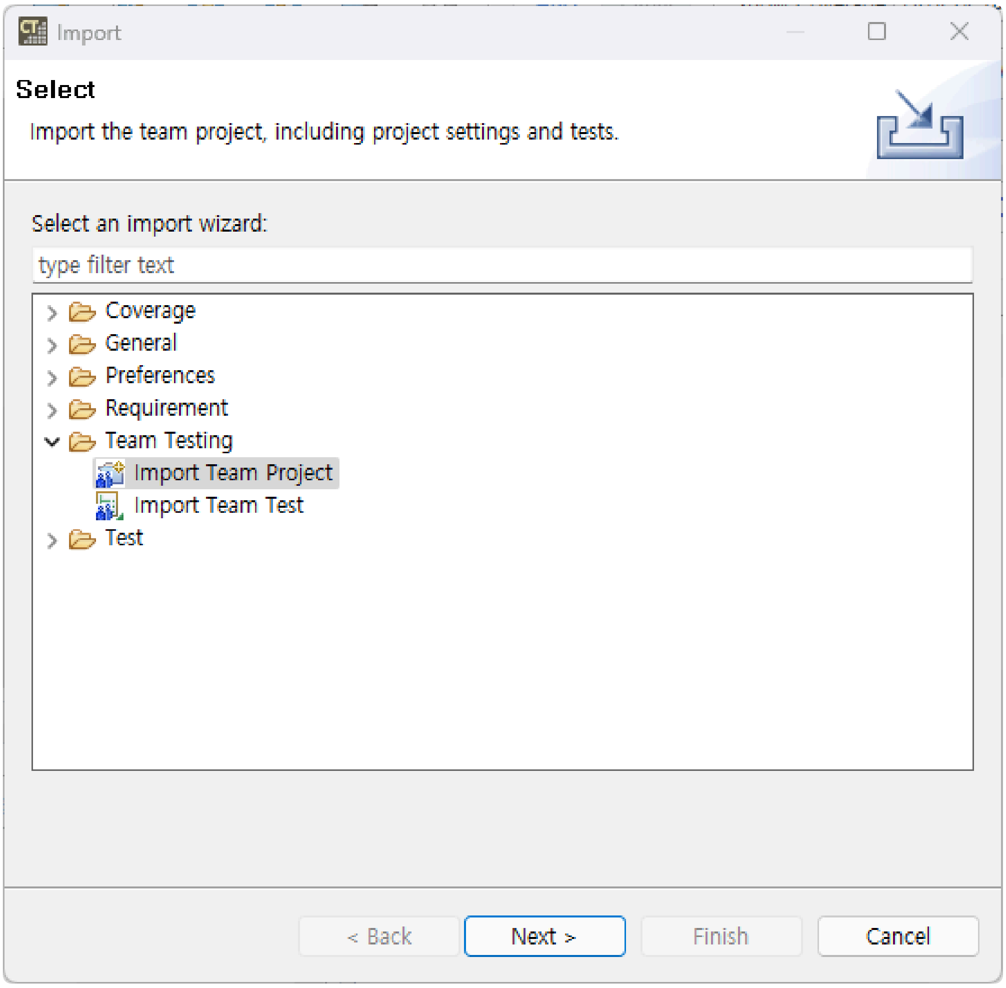
● online ○ offline

- When set offline, some team testing features are unavailable.
    - Auto-commit after test run
    - Project update notification

31.4.3. Import team project

You can import projects that other users have uploaded to team server. When importing team project, all resources in the project except tests are imported to the latest revision. To import tests, please refer to the [Import team test] page in this document.

1. In the Import wizard, select [Team Testing] > [Import Team Project] and click [Next].



Import

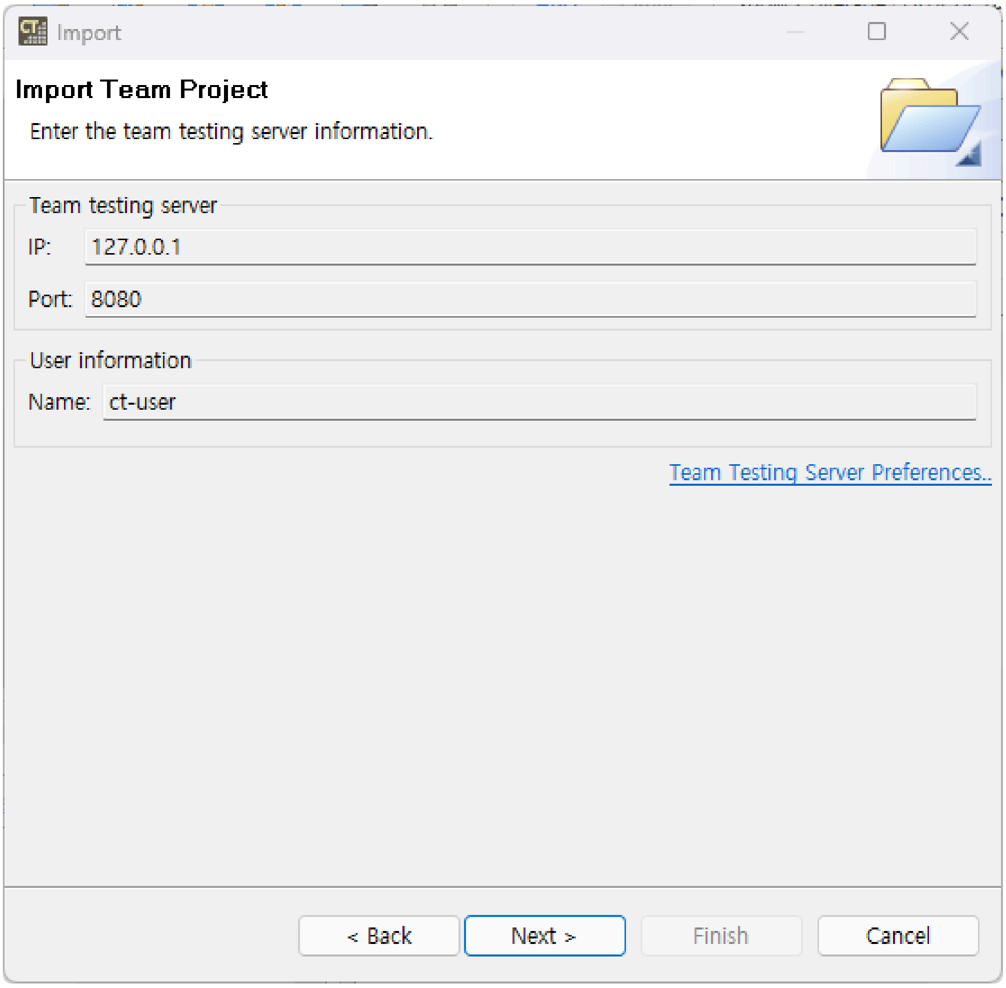
Select

Import the team project, including project settings and tests.

Select an import wizard:

type filter text

2. Check or enter the Team Testing Server information, then click [Next].



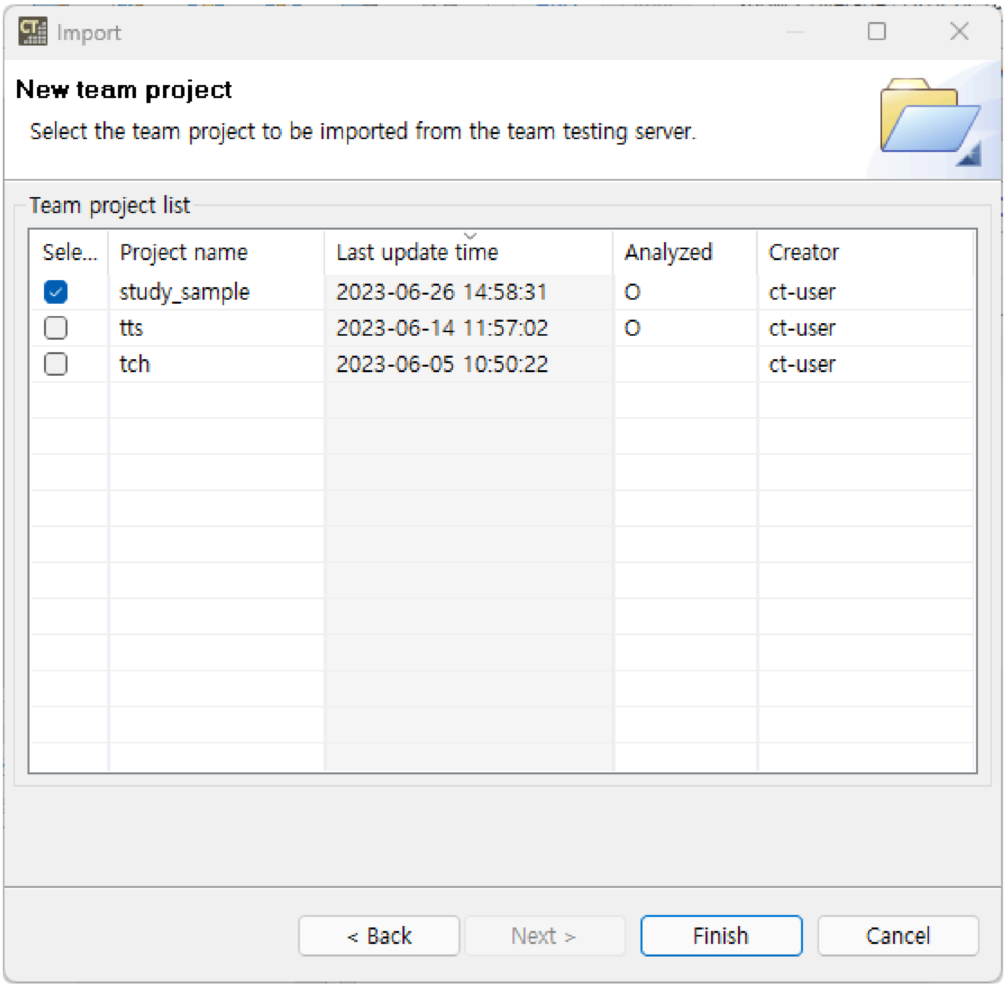
IP: 127.0.0.1

Port: 8080

Name: ct-user

- You can enter Team Testing Server information on the preference page by selecting [Team Testing Server Preferences…].

3. Select the project to import from the list of team projects on the server, then click [Finish]. The list is sorted by last updated time.



New team project

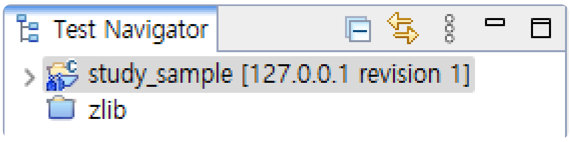
Select the team project to be imported from the team testing server.

Team project list

Sele...	Project name	Last update time	Analyzed	Creator
☑	study_sample	2023-06-26 14:58:31	O	ct-user
□	tts	2023-06-14 11:57:02	O	ct-user
□	tch	2023-06-05 10:50:22		ct-user

✻ If a project with the same name as the team project you are importing already exists on local, please rename the existing project before importing the team project.

4. You can check the server IP and revision of the imported team project in the [Test Navigator] view.



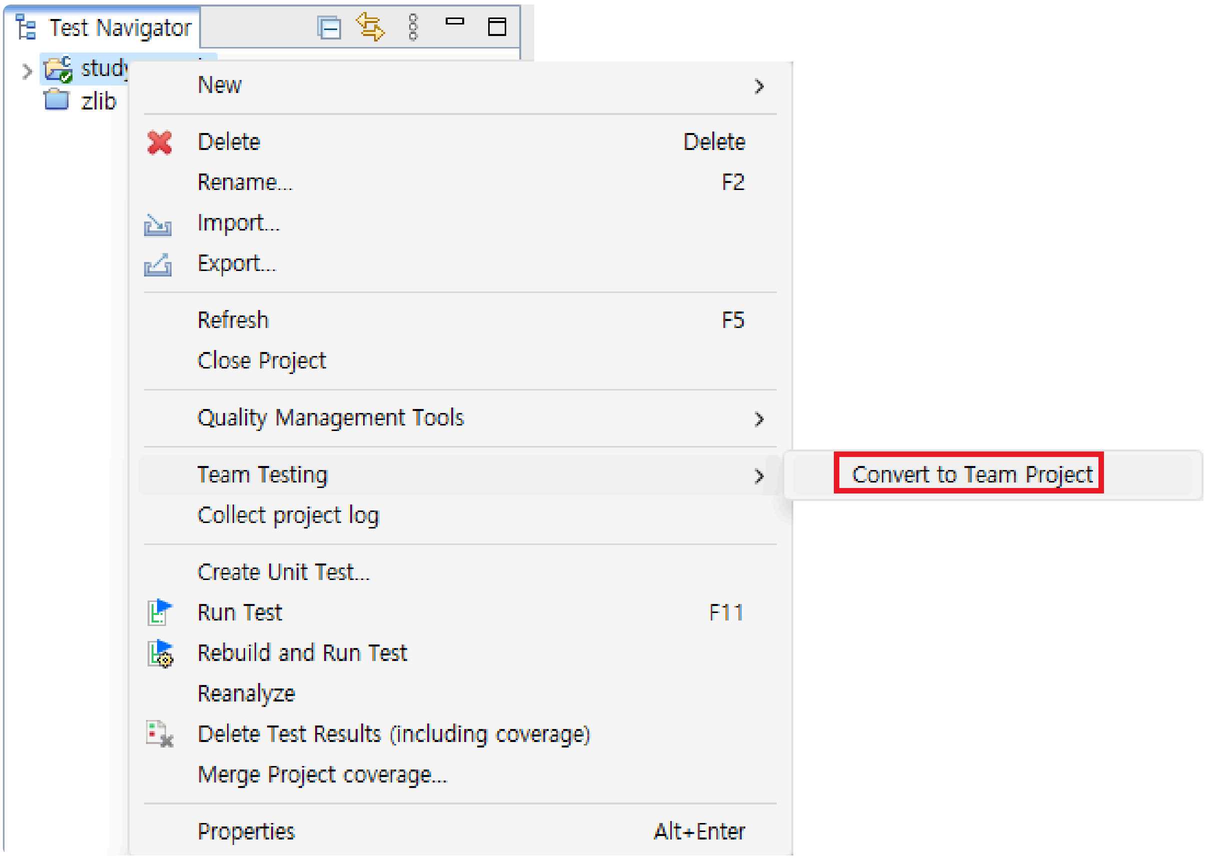
study_sample [127.0.0.1 revision 1]
zlib

31.4.4. Convert team project

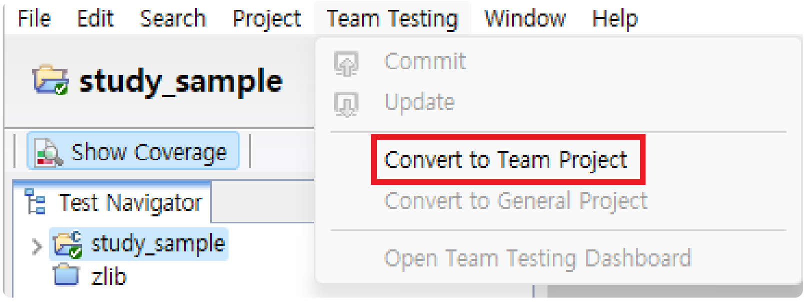
You can convert a general project to a team project or a team project to a general project. When converting to a team project, all resources and tests of the current project are uploaded to the team server.

Convert a general project to a team project

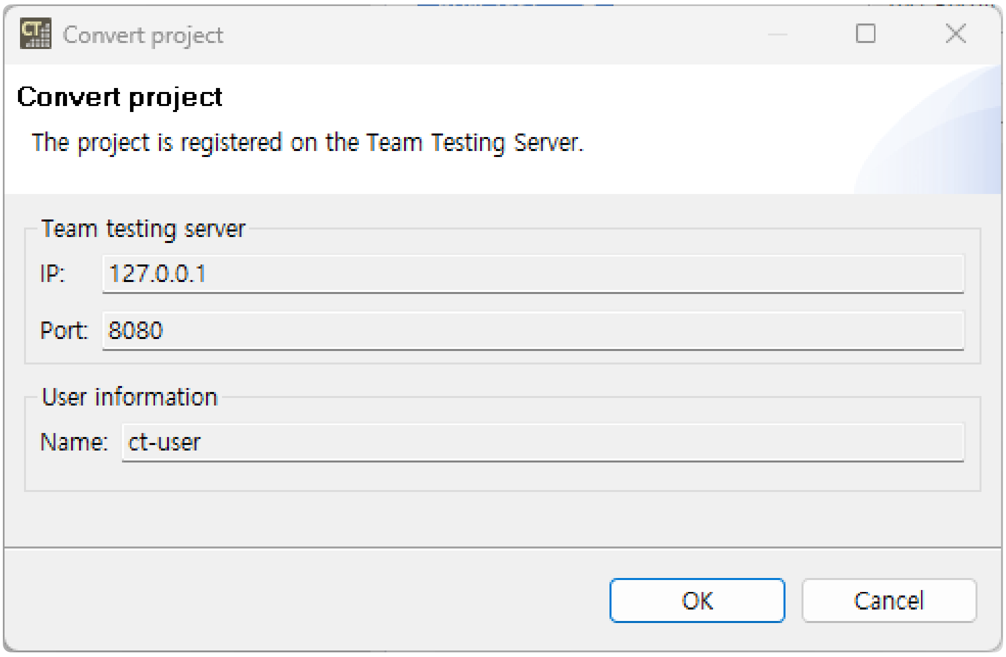
1. Select [Convert to Team Project] using one of the two methods below.
   - In the [Test Navigator] view, right-click the project you want to convert and choose [Team Testing] > [Convert to Team Project].



   - Select [Team Testing] > [Convert to Team Project] from the top menu, after selecting the project to be converted in the [Test Navigator] view,


File Edit Search Project Team Testing Window Help
study_sample
Show Coverage
Test Navigator
study_sample
zlib
Commit
Update
Convert to Team Project
Convert to General Project
Open Team Testing Dashboard

2. Check the server information on which the project will be uploaded and user information.


Convert project

Convert project

The project is registered on the Team Testing Server.

Team testing server

IP: 127.0.0.1

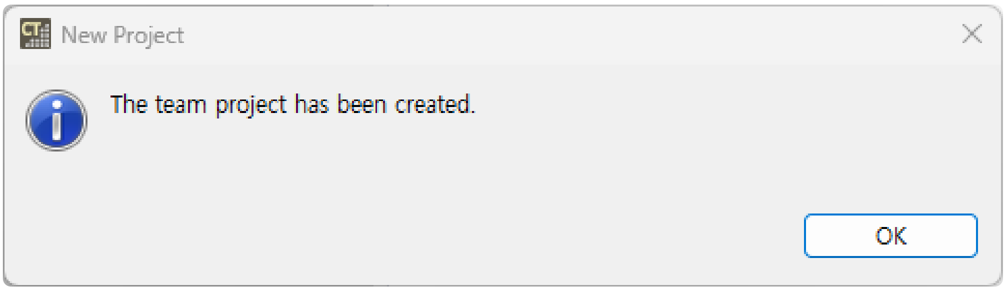
Port: 8080

User information

Name: ct-user

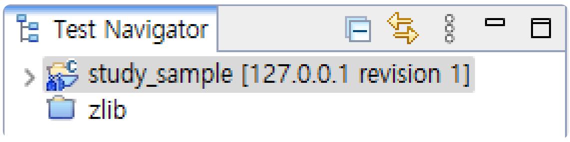
For how to change server information and user information, please refer to the Preferences page of this document.

3. Project conversion is complete.


New Project

The team project has been created.

4. You can check the server IP and revision of the converted team project in the [Test Navigator] view.


Test Navigator

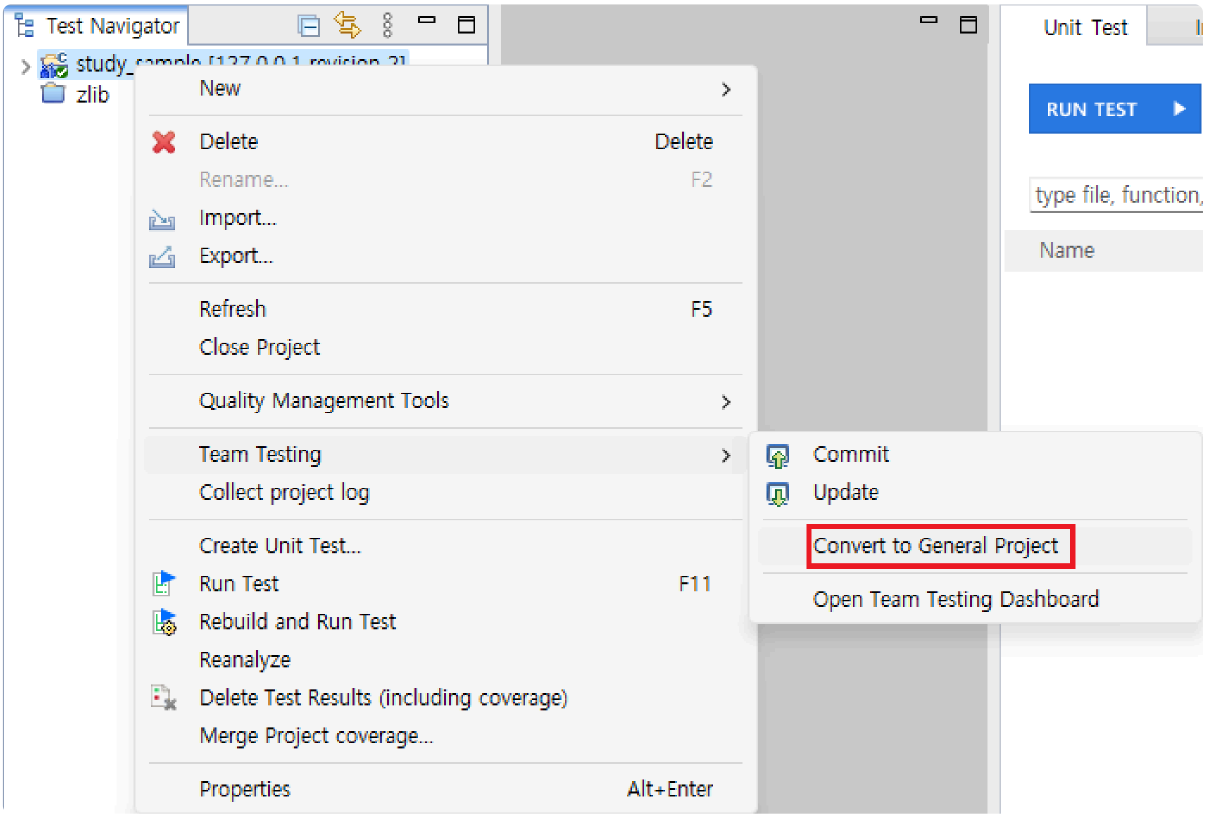
study_sample [127.0.0.1 revision 1]

zlib

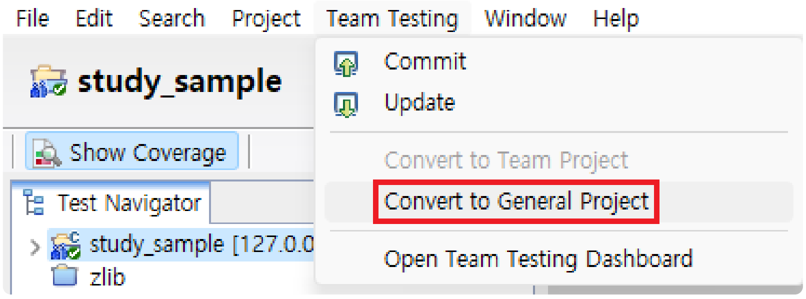
Convert a team project to a general project

When you no longer want to connect a team project with a server, you can convert it to a general project. Converting to a general project does not delete the team project from the server. Select [Convert to General Project] using one of the two methods below.

- In the [Test Navigator] view, right-click the team project you want to convert and select [Team Testing] > [Convert to General Project].



- After selecting the team project to be converted in the [Test Navigator] view, select [Team Testing] > [Convert to General Project] from the top menu.

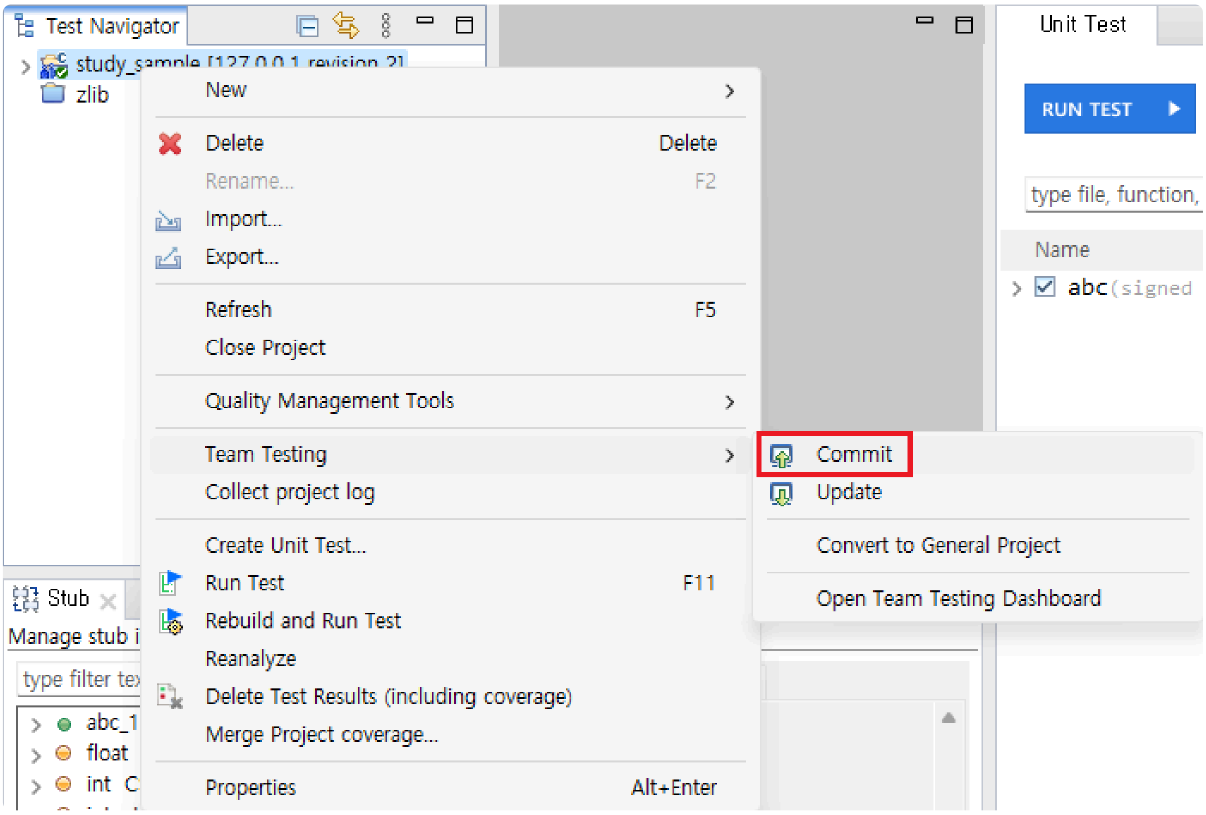

File Edit Search Project Team Testing Window Help
study_sample
Show Coverage
Test Navigator
study_sample [127.0.0
zlib
Commit
Update
Convert to Team Project
Convert to General Project
Open Team Testing Dashboard

31.5. Commit

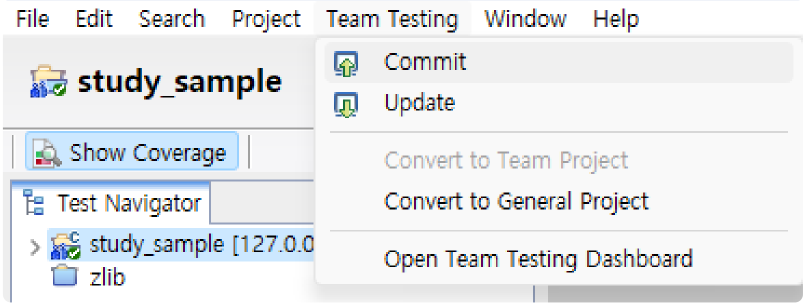
You can use the [Commit] feature to reflect what users have done locally to the team server. In order to commit, the revision on the server must be the same as the local revision. If the server and local revisions are different, an update dialog may appear.

Manual commit

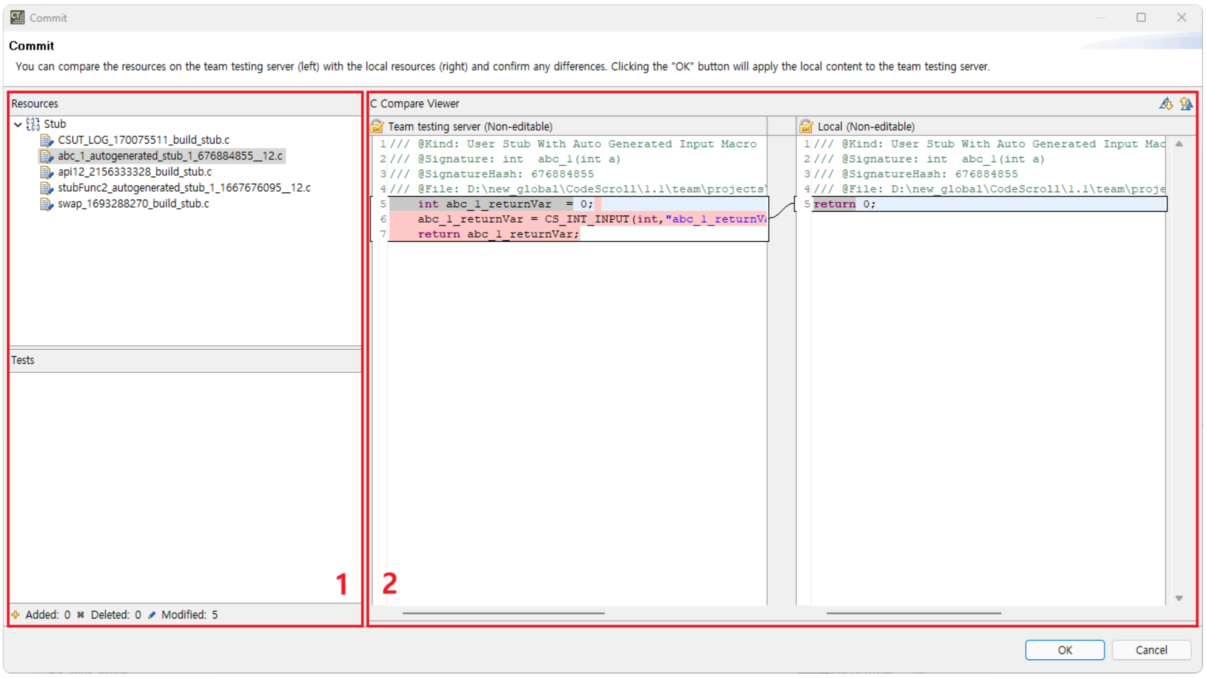
1. Commit manually by choosing one of the two methods below.
   - In the [Test Navigator] view, select [Team Testing] > [Commit] from the project's context menu.



   - Select [Team Testing] > [Commit] at the top of the tool.


File Edit Search Project Team Testing Window Help
study_sample
Show Coverage
Test Navigator
study_sample [127.0.0
zlib
Commit
Update
Convert to Team Project
Convert to General Project
Open Team Testing Dashboard

2. After checking the contents to be committed in the Commit dialog, click the [OK] button.



Commit

You can compare the resources on the team testing server (left) with the local resources (right) and confirm any differences. Clicking the "OK" button will apply the local content to the team testing server.

Resources

- Stub
  - CSUT_LOG_170075511_build_stub.c
  - abc_1_autogenerated_stub_1_676884855__12.c
  - api12_2156333328_build_stub.c
  - stubFunc2_autogenerated_stub_1_1667676095__12.c
  - swap_1693288270_build_stub.c

Tests

Added: 0 Deleted: 0 Modified: 5

C Compare Viewer

Team testing server (Non-editable)

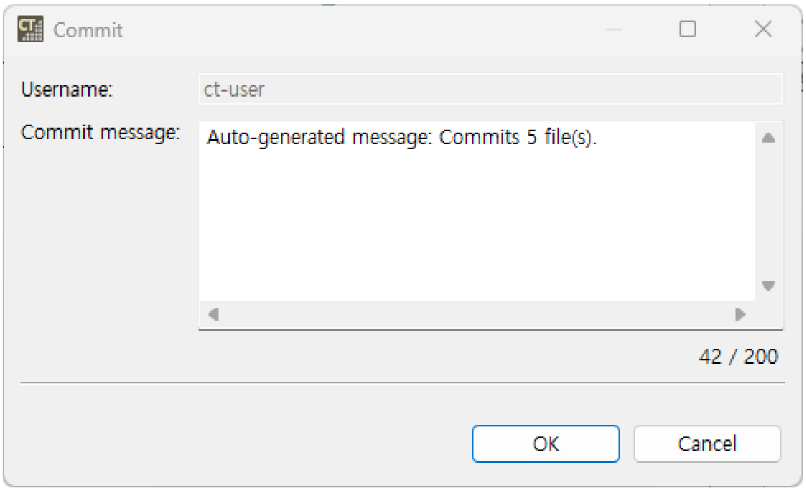
```
/// @Kind: User Stub With Auto Generated Input Macro
/// @Signature: int  abc_1(int a)
/// @SignatureHash: 676884855
/// @File: D:\new_global\CodeScroll\1.1\team\projects\
    int abc_1_returnVar  = 0;
    abc_1_returnVar = CS_INT_INPUT(int,"abc_1_returnVa
    return abc_1_returnVar;
```

Local (Non-editable)

```
/// @Kind: User Stub With Auto Generated Input Mac
/// @Signature: int  abc_1(int a)
/// @SignatureHash: 676884855
/// @File: D:\new_global\CodeScroll\1.1\team\proje
return 0;
```

- In section 1, you can check the resources and tests to be committed.
  - Resources or tests that have been added, deleted, or modified are marked with ✚, ✖, or ✎, respectively.
- In section 2, you can compare the server contents (left) with the local contents (right) to be committed.
  - Server contents and local contents cannot be modified.

3. After entering the commit message, press the [OK] button to proceed with the commit.



Commit

Username: ct-user

Commit message: Auto-generated message: Commits 5 file(s).

42 / 200

✻ This can take a long time if you have a lot of data to commit.

Automatic commit

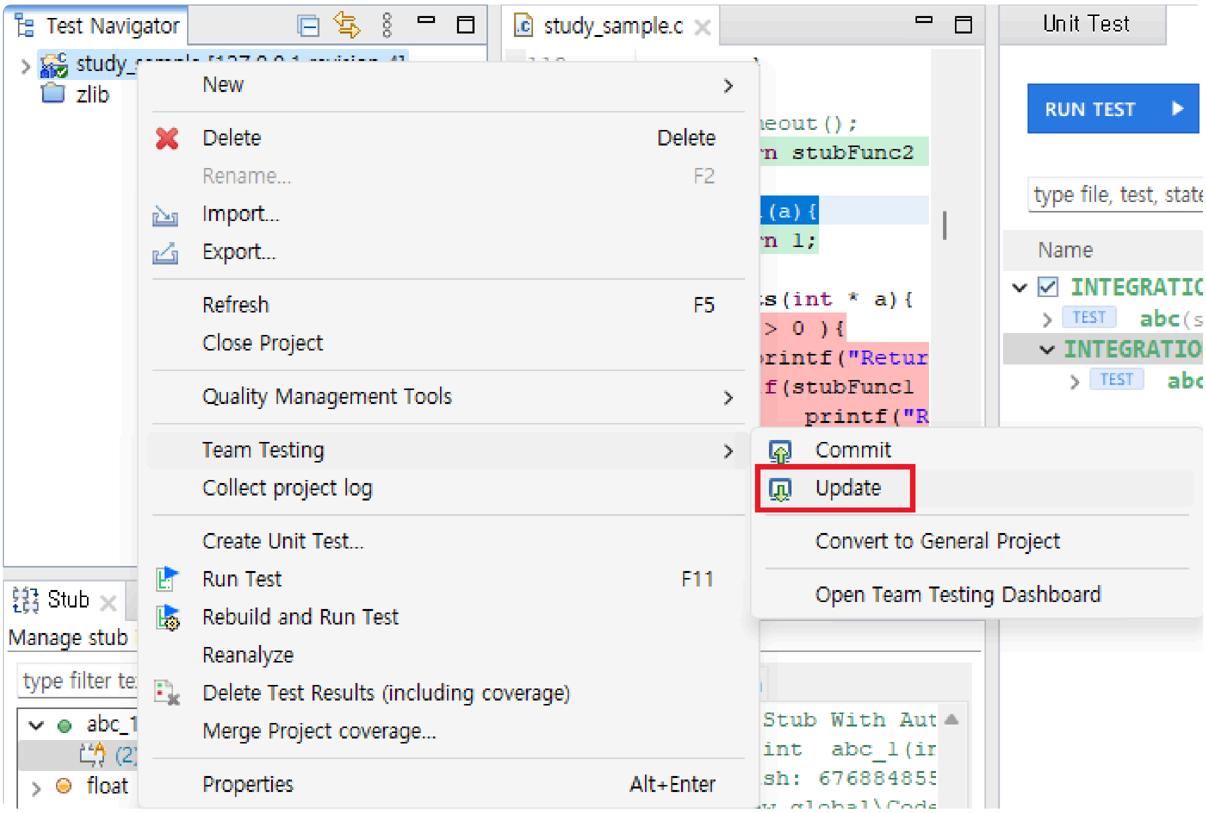
After running the tests, the project’s changes and test results are automatically committed. When committing automatically, the commit dialog does not appear.

31.6. Update

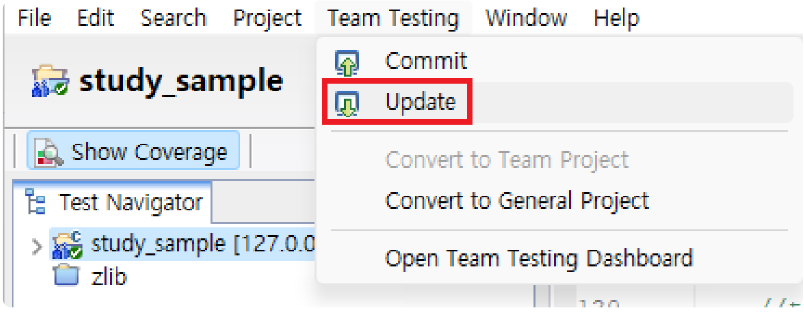
You can use the [Update] feature to update your local contents with the latest contents of the server.

Manual Update

1. Update manually by choosing one of the two methods below.
   - In the [Test Navigator] view, select [Team Testing] > [Update] from the project's context menu.



   - Select [Team Testing] > [Update] at the top of the tool.


File Edit Search Project Team Testing Window Help
study_sample
Show Coverage
Test Navigator
study_sample [127.0.0
zlib
Commit
Update
Convert to Team Project
Convert to General Project
Open Team Testing Dashboard

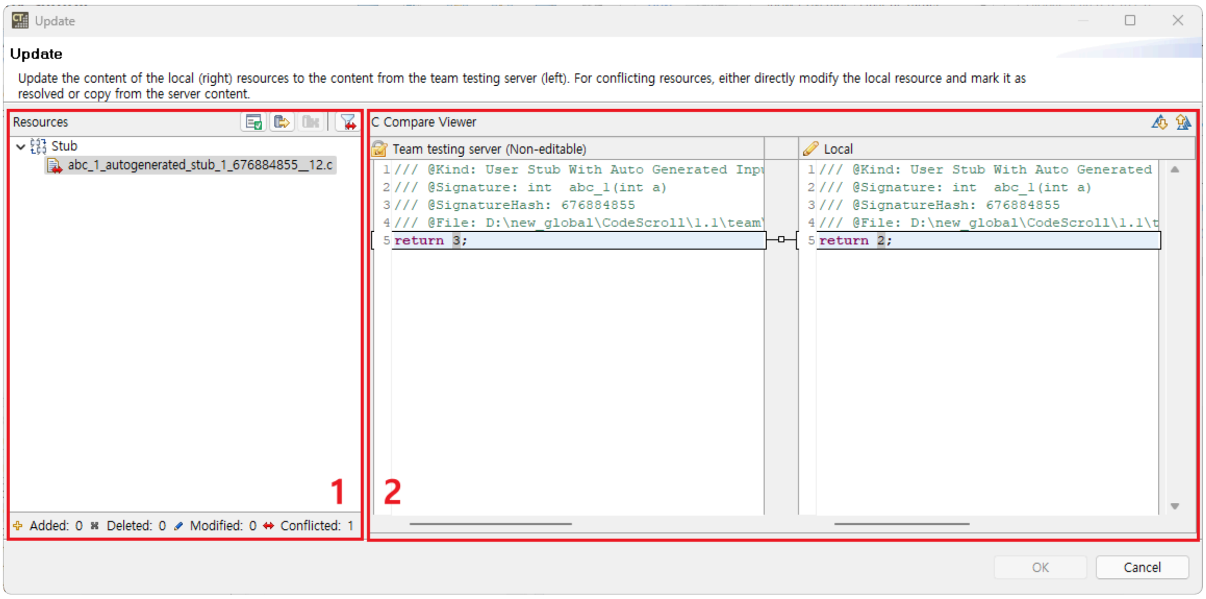
2. An update dialog appears when there are changes in the contents, when there are conflict resources, or when shared resources connected with tests change. Otherwise, updates are automatically reflected. The update dialog is described in the [Conflict management] section.

Automatic update

In order to synchronize the test environment with other users, the local revision and the server revision must always be kept the same. If the local revision is not the latest, the results of the test cannot be guaranteed and the local work cannot be uploaded to the server. CT 2023.12 periodically updates to keep the local revision up to date. Update notifications appear periodically, and revisions are additionally checked before using features that require a connection to the server, such as commits.

Conflict management

If resources you modified locally have also been changed on the server, crashes occur when updating. CT 2023.12 provides conflict management feature to resolve conflicts and reflect updates.


Update
Resources
Stub
abc_1_autogenerated_stub_1_676884855__12.c
C Compare Viewer
Team testing server (Non-editable)
Local
1
2
OK
Cancel

Update

Update the content of the local (right) resources to the content from the team testing server (left). For conflicting resources, either directly modify the local resource and mark it as resolved or copy from the server content.

```
/// @Kind: User Stub With Auto Generated Inpu
/// @Signature: int  abc_1(int a)
/// @SignatureHash: 676884855
/// @File: D:\new_global\CodeScroll\1.1\team\
return 3;
```

```
/// @Kind: User Stub With Auto Generated
/// @Signature: int  abc_1(int a)
/// @SignatureHash: 676884855
/// @File: D:\new_global\CodeScroll\1.1\t
return 2;
```

✚ Added: 0 ✖ Deleted: 0 ✎ Modified: 0 ↔ Conflicted: 1

- When all resource conflicts are resolved, the [OK] button becomes active.
- Section 1 shows a list of resources and tests that caused conflicts during the update.
  - Resources or tests that have been added, deleted, modified, or conficted are marked with ✚, ✖, ✎, or ↔, respectively
  - Resources with resolved conflicts are marked with ☑ and resources copied to the server contents are marked with ⇨ .

Toolbar icon	Description
Mark as resolved	Resources marked as resolved are saved on the server with contents of local resources.
Copy all from server to local	It is saved as the contents of server resources. Assets marked for copying all from server to local are non-editable. You can also right-click an asset to enable it.
Cancel copy	Undo a copy from server to local, and change the local resource to editable.
Show only conflict resources	Filter only conflict resources.

- In section 2, you can compare the server contents (right) and the local contents (left).
  - Marked as ✎ if editable and 🔒 if not.
  - If you modify the local contents and mark it as resolved, the modified local contents is

reflected in the project.

31.7. Team test

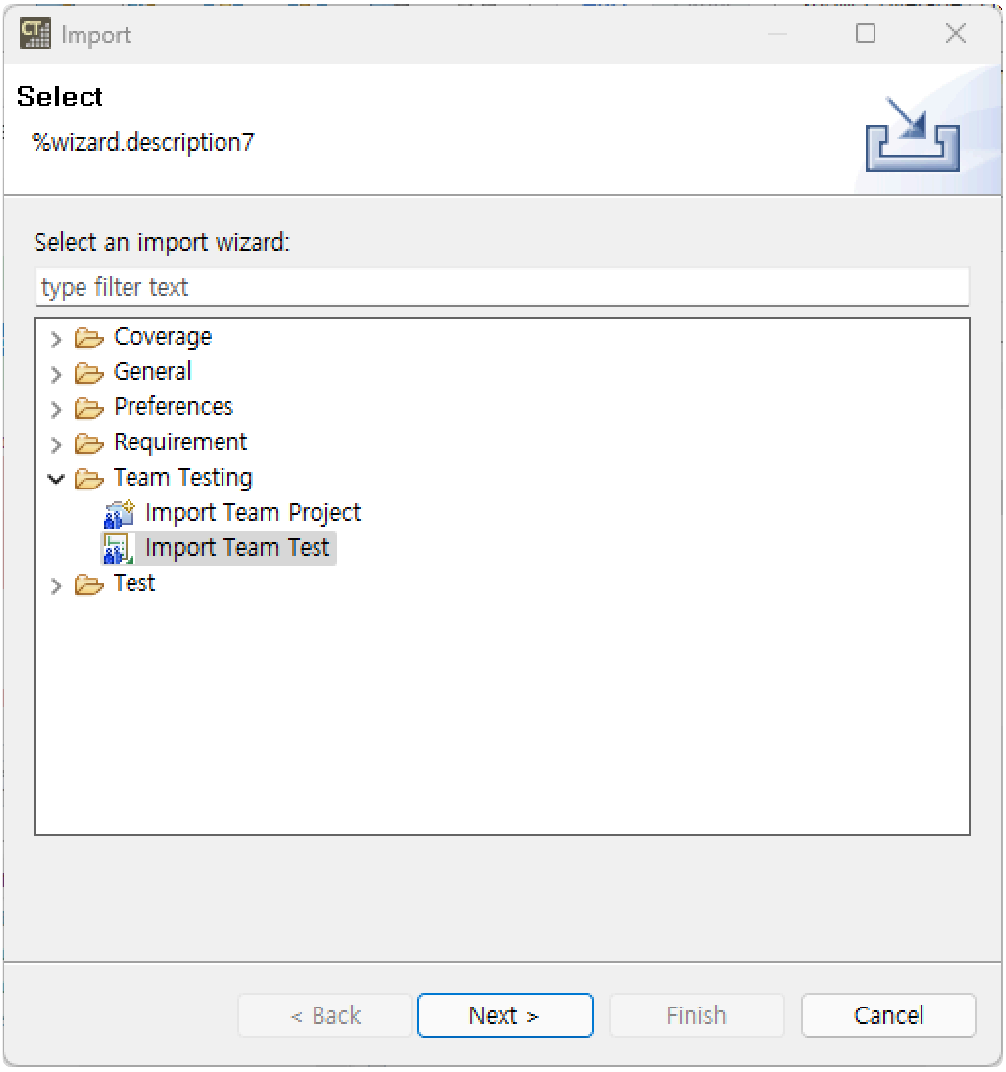
CT 2023.12 provides several features for testing in team projects.

- Import team test
- Delete team test

31.7.1. Import team test

You can import tests other users have uploaded to Team Testing Server.

1. In the [Import] wizard, select [Team Testing] > [Import Team Tests] and click [Next].



Import

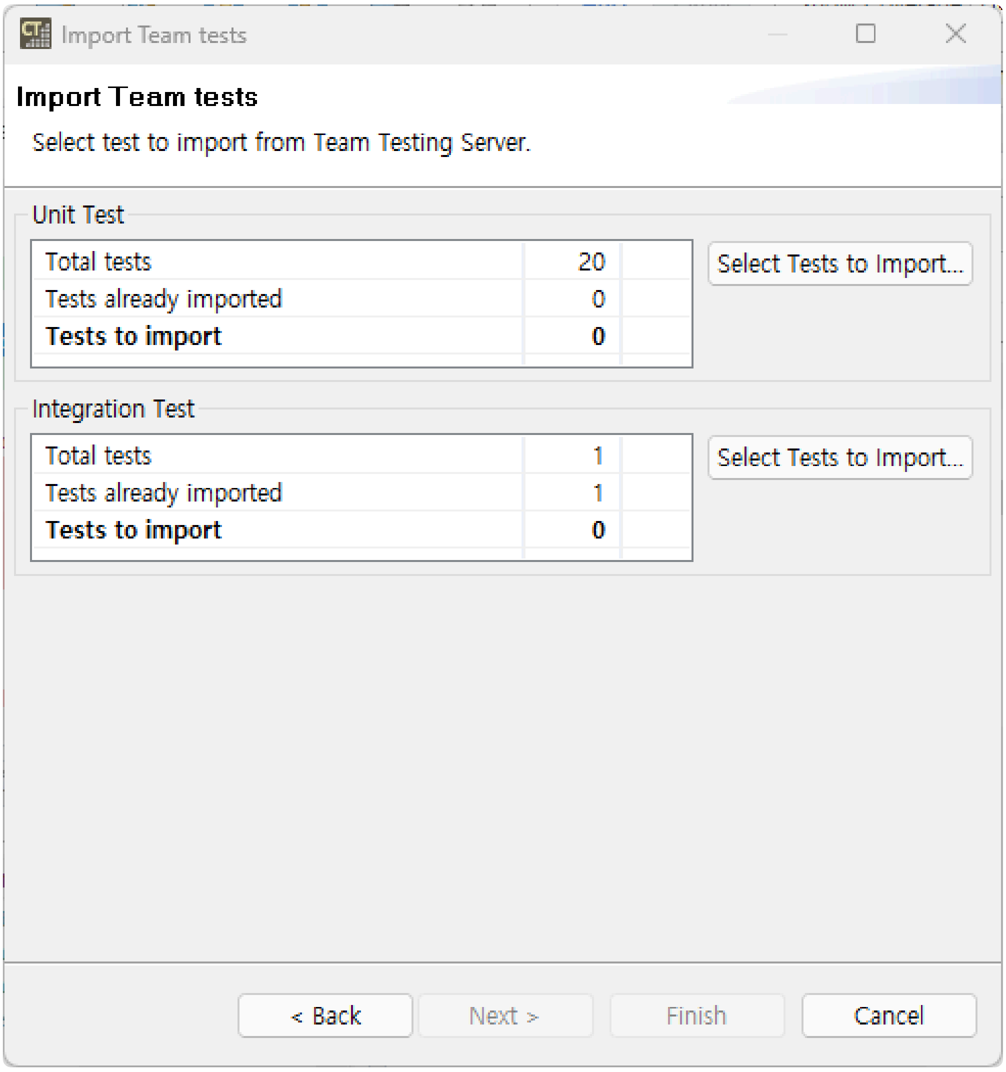
Select

%wizard.description7

Select an import wizard:

type filter text

2. Click the [Select tests to import…] button to select the tests to import from the Team Testing Server, then click [Finish].



Import Team tests

Select test to import from Team Testing Server.

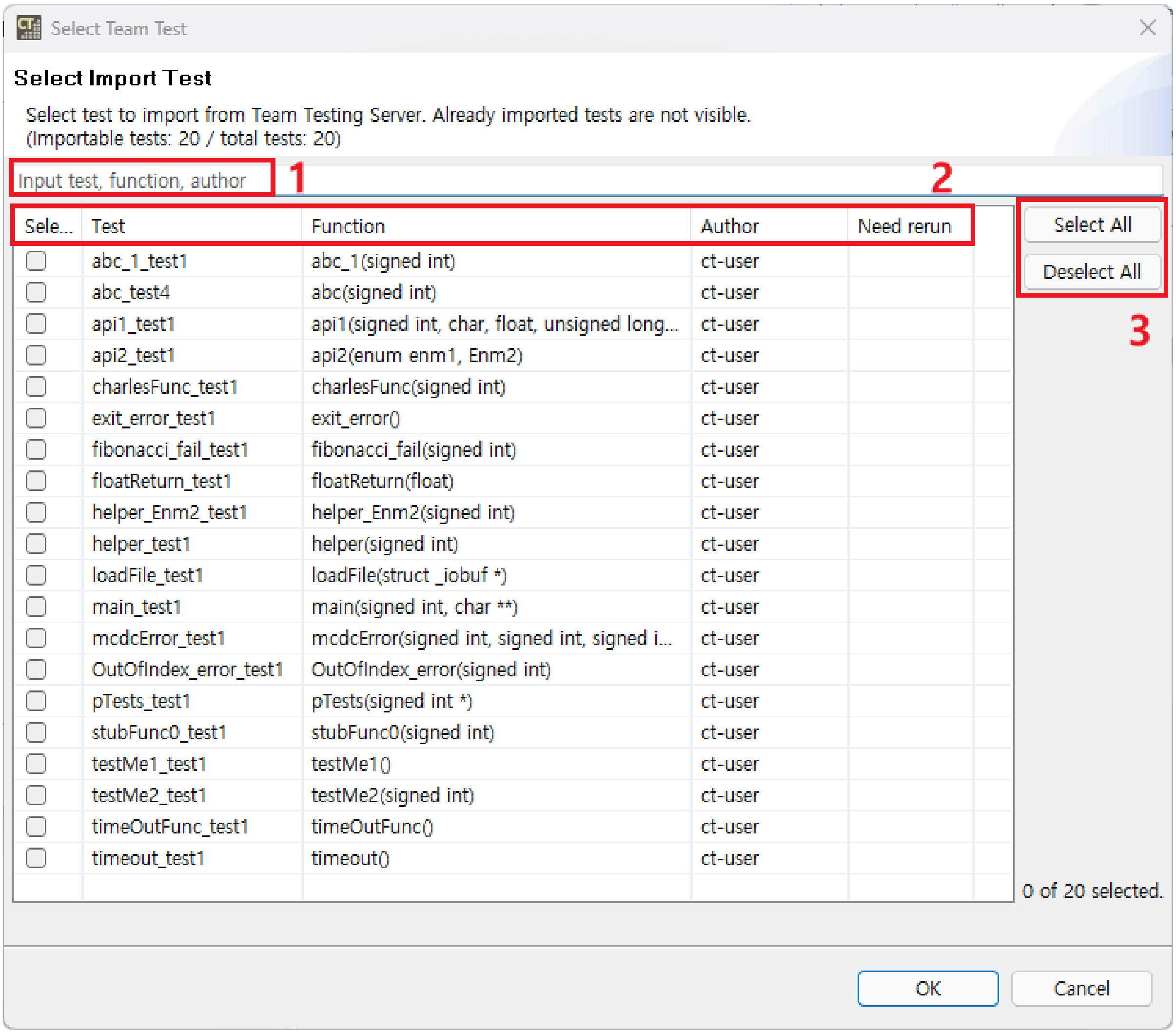
Unit Test

Total tests	20
Tests already imported	0
Tests to import	**0**

Integration Test

Total tests	1
Tests already imported	1
Tests to import	**0**

- Click the [Select Tests to Import…] button to select the tests to import from the Team Testing Server, then click [OK].



Select Import Test

Select test to import from Team Testing Server. Already imported tests are not visible.
(Importable tests: 20 / total tests: 20)

Input test, function, author

Sele...	Test	Function	Author	Need rerun
□	abc_1_test1	abc_1(signed int)	ct-user	
□	abc_test4	abc(signed int)	ct-user	
□	api1_test1	api1(signed int, char, float, unsigned long...	ct-user	
□	api2_test1	api2(enum enm1, Enm2)	ct-user	
□	charlesFunc_test1	charlesFunc(signed int)	ct-user	
□	exit_error_test1	exit_error()	ct-user	
□	fibonacci_fail_test1	fibonacci_fail(signed int)	ct-user	
□	floatReturn_test1	floatReturn(float)	ct-user	
□	helper_Enm2_test1	helper_Enm2(signed int)	ct-user	
□	helper_test1	helper(signed int)	ct-user	
□	loadFile_test1	loadFile(struct _iobuf *)	ct-user	
□	main_test1	main(signed int, char **)	ct-user	
□	mcdcError_test1	mcdcError(signed int, signed int, signed i...	ct-user	
□	OutOfIndex_error_test1	OutOfIndex_error(signed int)	ct-user	
□	pTests_test1	pTests(signed int *)	ct-user	
□	stubFunc0_test1	stubFunc0(signed int)	ct-user	
□	testMe1_test1	testMe1()	ct-user	
□	testMe2_test1	testMe2(signed int)	ct-user	
□	timeOutFunc_test1	timeOutFunc()	ct-user	
□	timeout_test1	timeout()	ct-user	

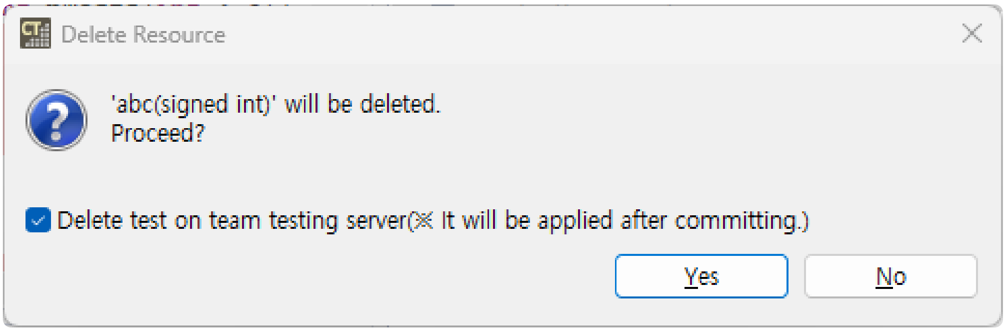
0 of 20 selected.

- Unit tests can check name, signature of the function, author, and need rerun for each test, and integration tests can check name, author, and need rerun for each test

1. Search by test, function, or author name.
2. Select a column head to sort by test, function, author, or need rerun.
3. Select/deselect all functions with the [Select All] and [Deselect All] buttons.

31.7.2. Delete team test

There are two ways to delete tests from a team project.



'abc(signed int)' will be deleted.
Proceed?

☑ Delete test on team testing server(※ It will be applied after committing.)

- Deleting test on Team Testing Server
  - When deleting by checking the [Delete test on Team Testing Server] checkbox, it is added to the list of deletion targets on the server and deleted locally. Tests added to the list for deletion are deleted from the server after committing.
- Delete test on local
  - When deleting by unchecking the [Delete test on Team Testing Server] checkbox, the test will not be deleted from the server. Tests deleted on local can be imported again using the [Import Team Test] feature.

32. CT Team Testing Dashboard

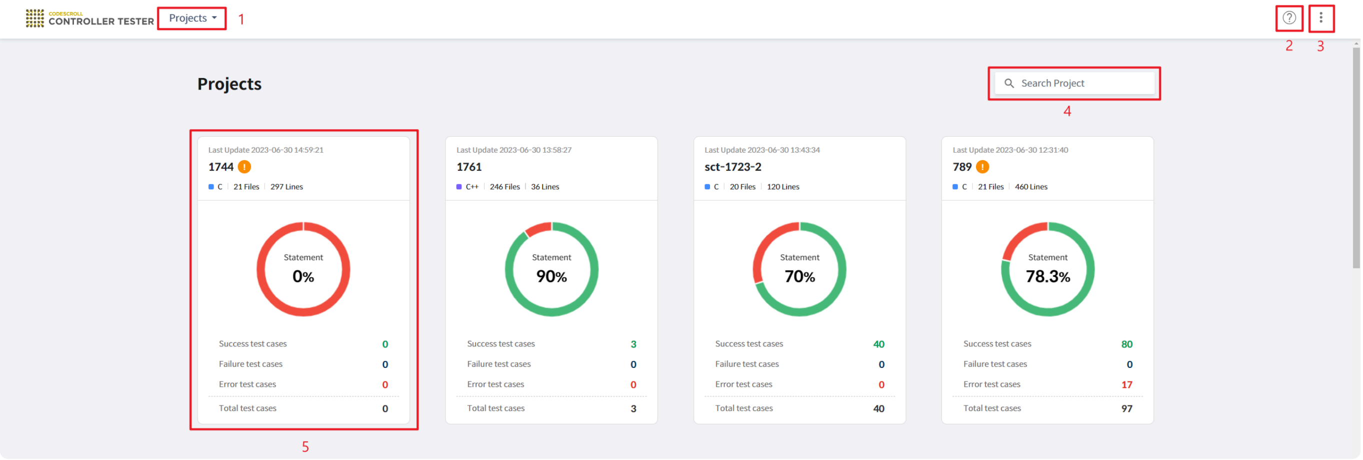
Team Testing Dashboard provides information in a web formmat, including status of team projects, coverage information, and the last update time.

The information provided by the Team Testing Dashboard includes the following:

- Main page
- Project information page

32.1. Main page

The main page displays the projects on the team server in the order of the most recent updates. Newly uploaded information can be reflected by refreshing the page.



Last Update 2023-06-30 14:59:21
1744 !
C | 21 Files | 297 Lines
Statement 0%
Success test cases 0
Failure test cases 0
Error test cases 0
Total test cases 0

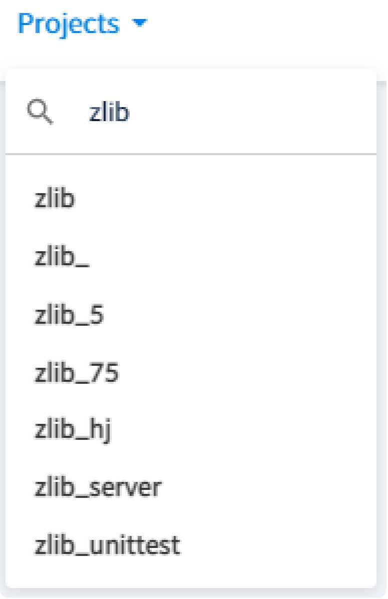
Last Update 2023-06-30 13:58:27
1761
C++ | 246 Files | 36 Lines
Statement 90%
Success test cases 3
Failure test cases 0
Error test cases 0
Total test cases 3

Last Update 2023-06-30 13:43:34
sct-1723-2
C | 20 Files | 120 Lines
Statement 70%
Success test cases 40
Failure test cases 0
Error test cases 0
Total test cases 40

Last Update 2023-06-30 12:31:40
789 !
C | 21 Files | 460 Lines
Statement 78.3%
Success test cases 80
Failure test cases 0
Error test cases 17
Total test cases 97

1. Project dropdown

Team Testing Dashboard provides the team project list in a dropdown format. Project search is available, and clicking on a project navigates to the project information page.

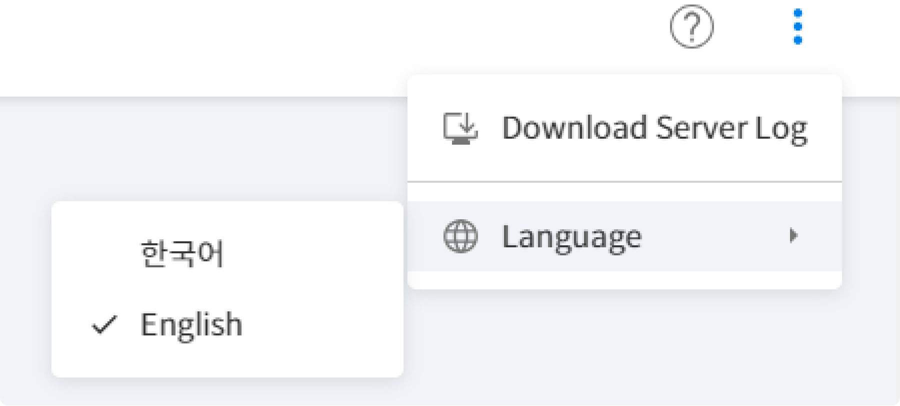


2. Help

Team Testing Dashboard Provides a manual page for the Team Testing Dashboard.

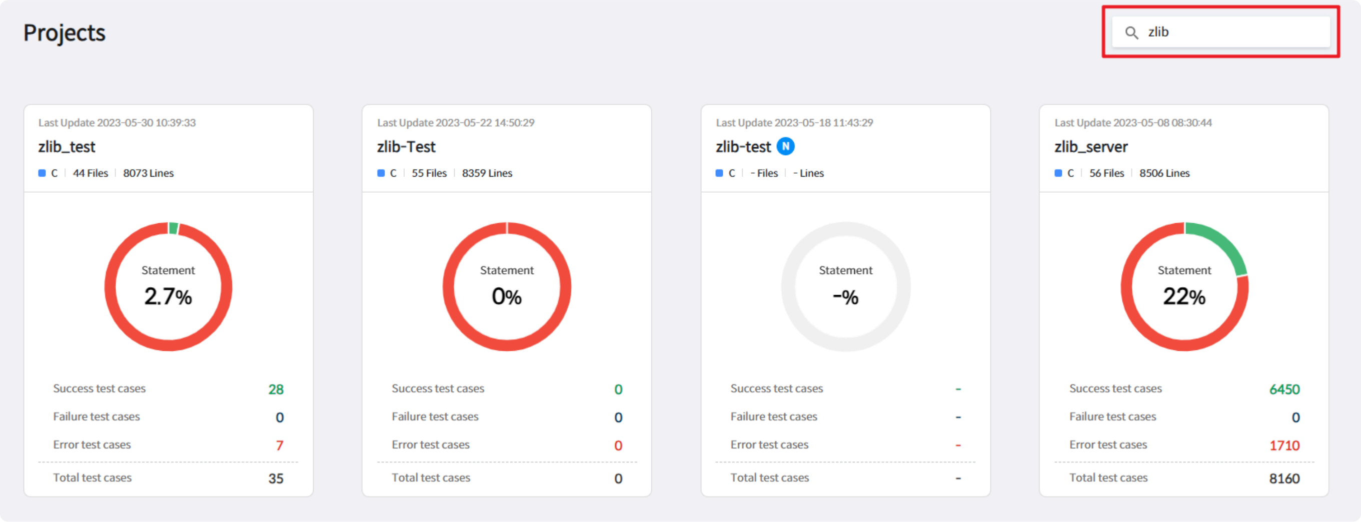
3. More

Team Testing Dashboard Provides features for downloading server logs and changing language settings.



4. Search Bar

Search Bar provides the feature to search for project names.



Last Update 2023-05-30 10:39:33
zlib_test
C | 44 Files | 8073 Lines
Statement 2.7%
Success test cases 28
Failure test cases 0
Error test cases 7
Total test cases 35

Last Update 2023-05-22 14:50:29
zlib-Test
C | 55 Files | 8359 Lines
Statement 0%
Success test cases 0
Failure test cases 0
Error test cases 0
Total test cases 0

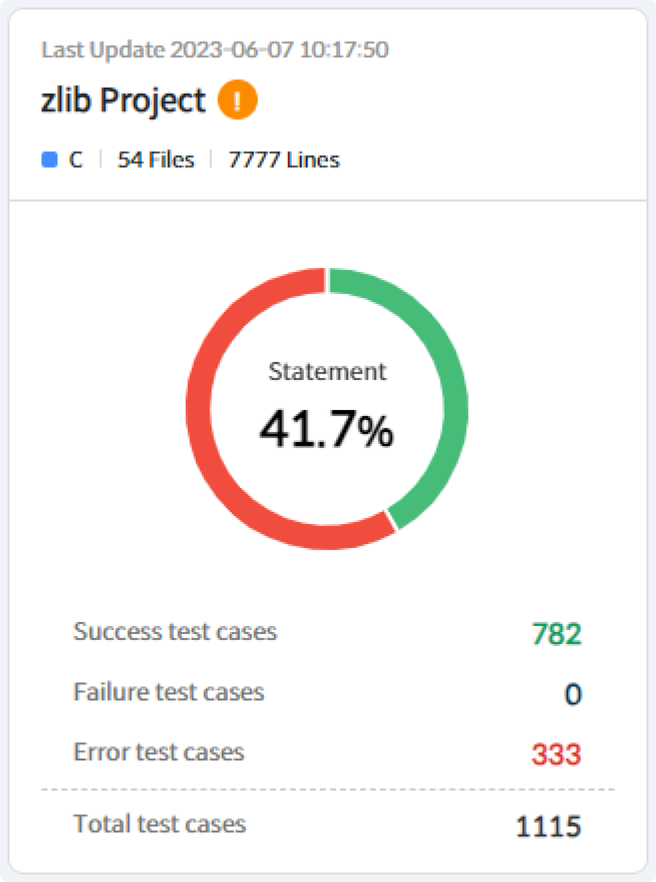
Last Update 2023-05-18 11:43:29
zlib-test N
C | - Files | - Lines
Statement -%
Success test cases -
Failure test cases -
Error test cases -
Total test cases -

Last Update 2023-05-08 08:30:44
zlib_server
C | 56 Files | 8506 Lines
Statement 22%
Success test cases 6450
Failure test cases 0
Error test cases 1710
Total test cases 8160

5. Project Card

Project Card shows information such as the project’s last update, project name, development languages, file count, total lines, coverage, and test case information.

- If analysis information has never been committed to the project, an `N` mark is displayed next to the project name.
- If a test needs to be re-run due to changes in project configuration, an `!` mark will be displayed next to the project name.
- The representative coverage of the card can be changed through the settings in the [Project Information Page].



Last Update 2023-06-07 10:17:50

zlib Project

C | 54 Files | 7777 Lines

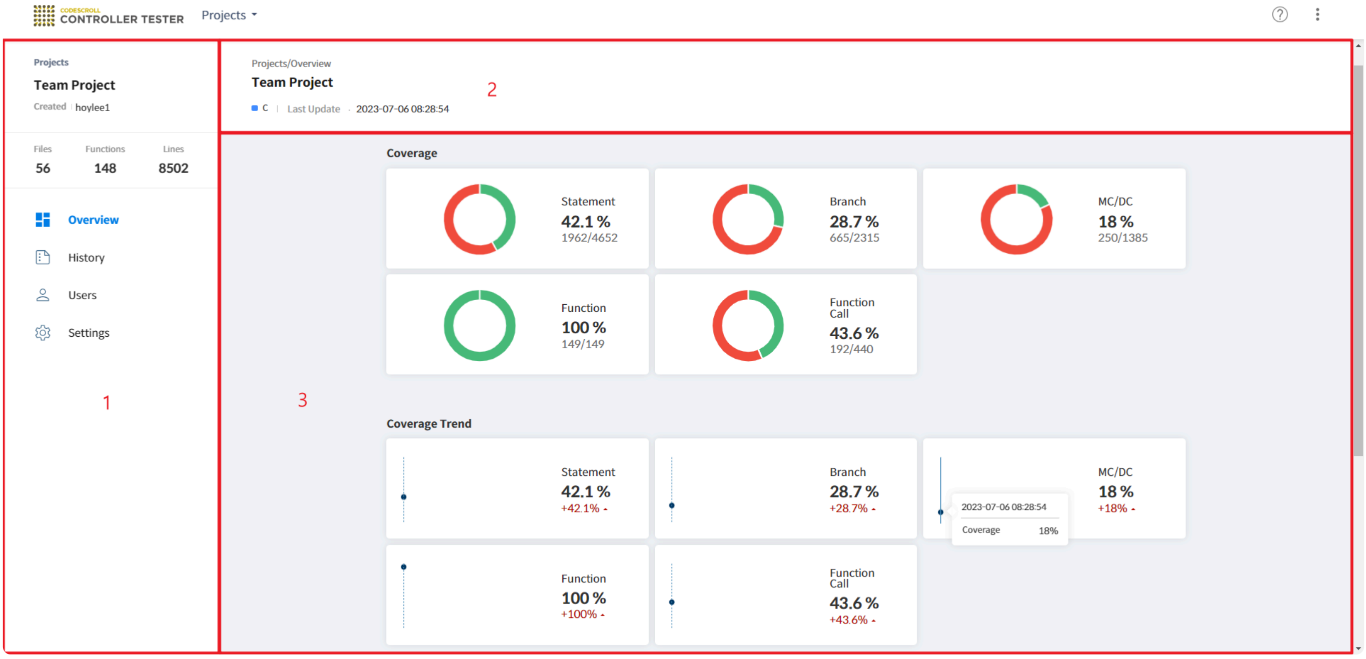
Statement 41.7%

Success test cases	782
Failure test cases	0
Error test cases	333
Total test cases	1115

For more detailed information about tests that need to be rerun, refer to [Tests Needing Rerun] in the [Project Information Page – Overview].

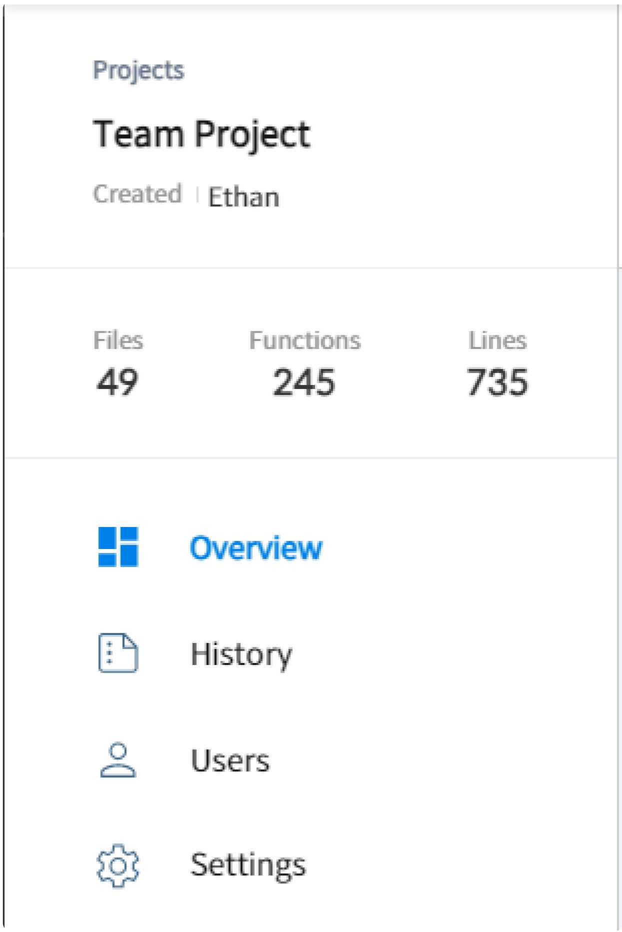
32.2. Project Information Page

The project information page provides detailed information and test results of the project in both text and graph formats.



1. Sidebar Section

The sidebar area contains a summary of the project information, and the main content area displays an Overview, History, User List, and Settings in a tab format, which can be selected.



Projects

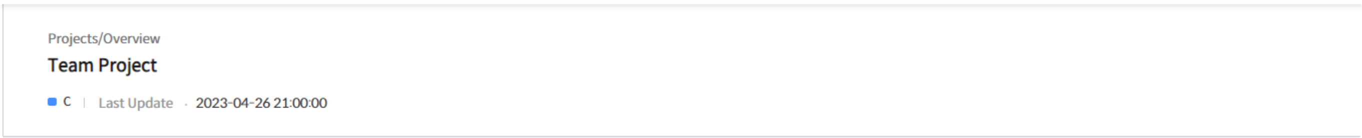
Team Project

Created | Ethan

Files	Functions	Lines
49	245	735

2. Main Content Header Section

The Main Content Header Area displays the main topic of the content along with the project’s name, language, and the last update time.



Projects/Overview

Team Project

■ C | Last Update · 2023-04-26 21:00:00

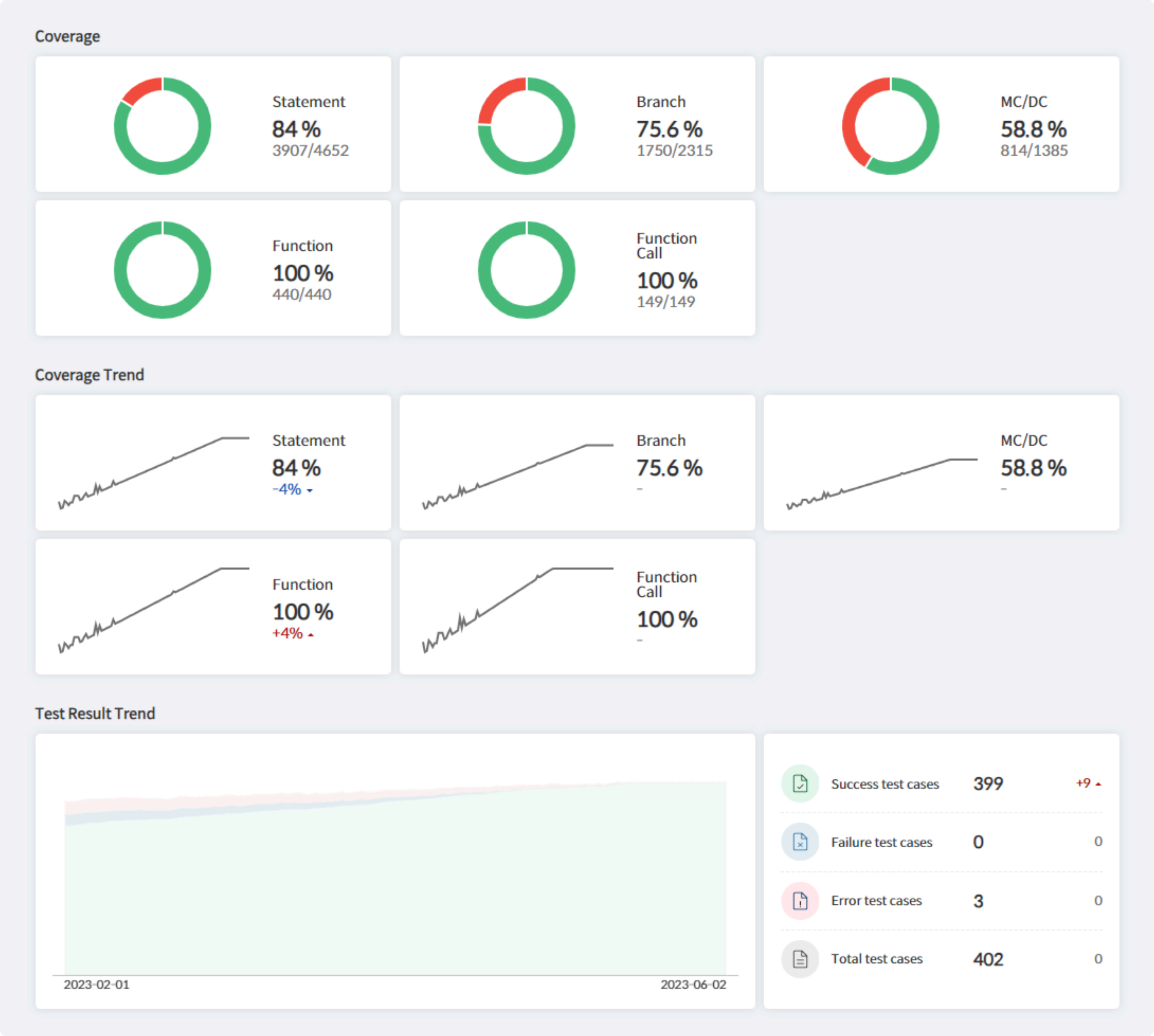
3. Main Content Section

The Main Content Area provides detailed information about the project. There are four types of content: Overview, History, User List, and Settings.

- Overview
- History
- User List
- Settings

32.2.1. Overview

The overview provides information on coverage, coverage trends, and test result trends.



Coverage

Statement 84 % 3907/4652

Branch 75.6 % 1750/2315

MC/DC 58.8 % 814/1385

Function 100 % 440/440

Function Call 100 % 149/149

Coverage Trend

Statement 84 % -4% ▾

Branch 75.6 % -

MC/DC 58.8 % -

Function 100 % +4% ▴

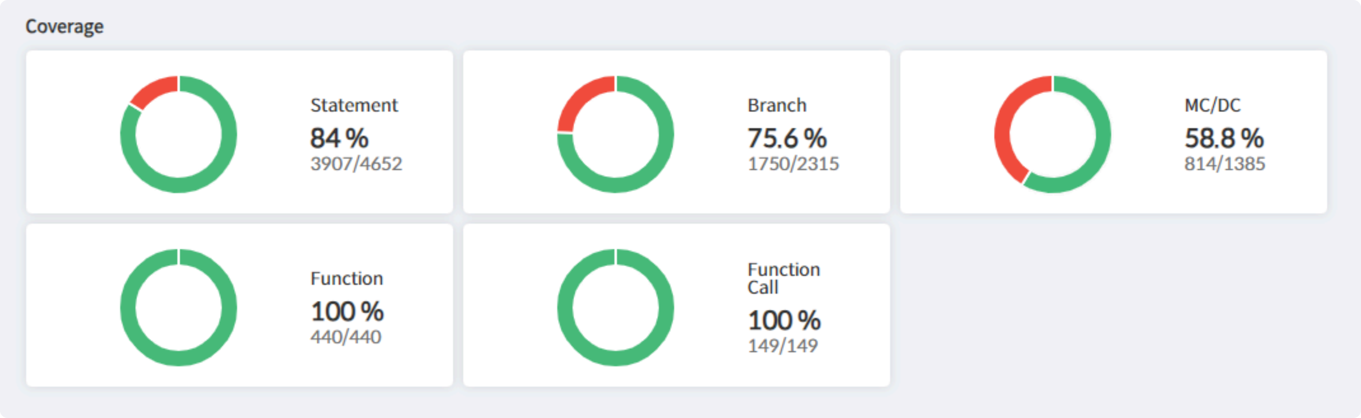
Function Call 100 % -

Test Result Trend

Success test cases	399	+9 ▴
Failure test cases	0	0
Error test cases	3	0
Total test cases	402	0

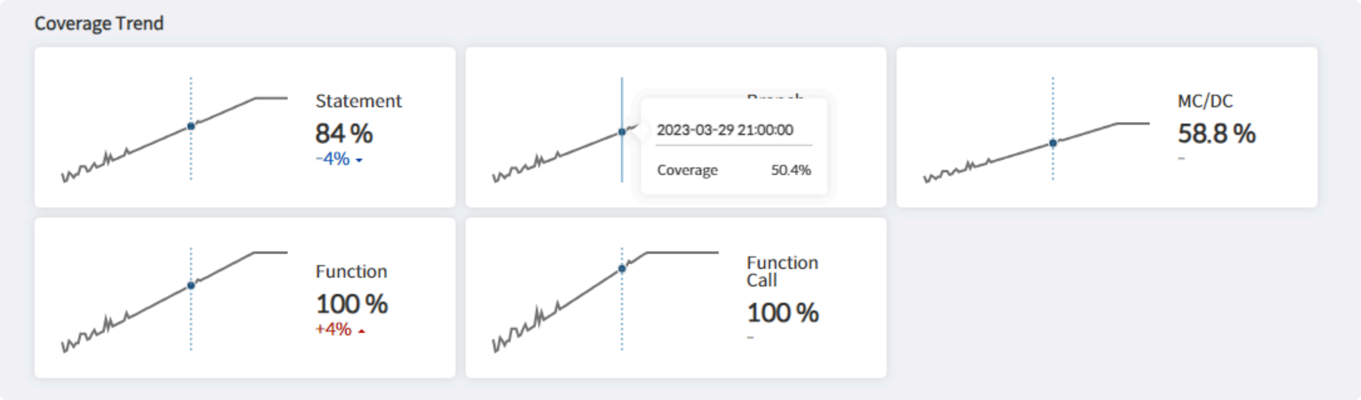
Coverage

The project’s current statement, branch, MC/DC, function, and function call coverage values are displayed in percentage form. The denominator of the percentage represents total coverage, while the numerator represents achieved coverage.



Coverage Trend

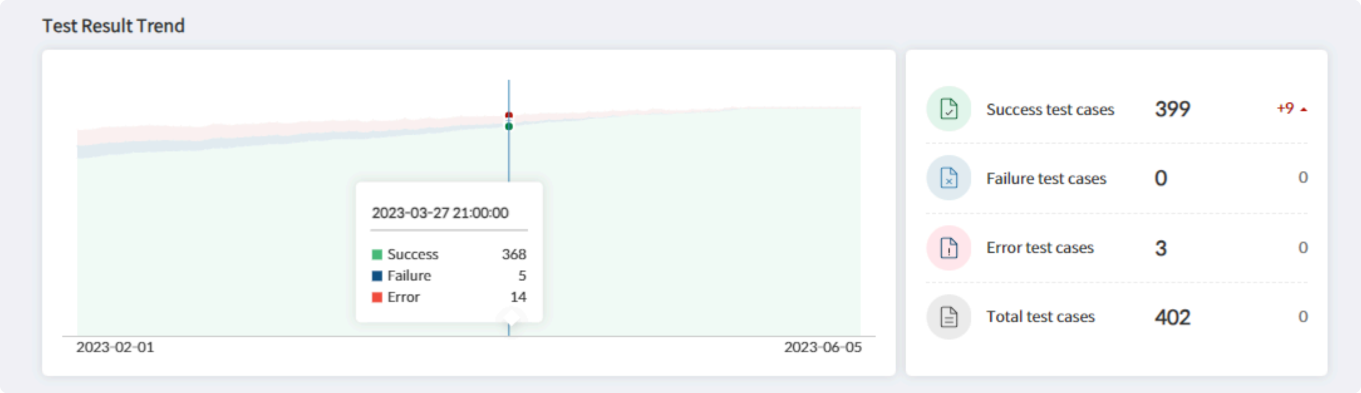
Coverage trends by date are presented in the form of a graph.



- By placing the mouse over the graph, the coverage for a specific date can be checked
- By hovering the mouse over the graph, the coverage for a specific date can be checked.
- The trend display range can be changed by adjusting the test result trend display period on the [Settings] page.

Test Result Trend

Test result trends by date are provided in the form of a graph.

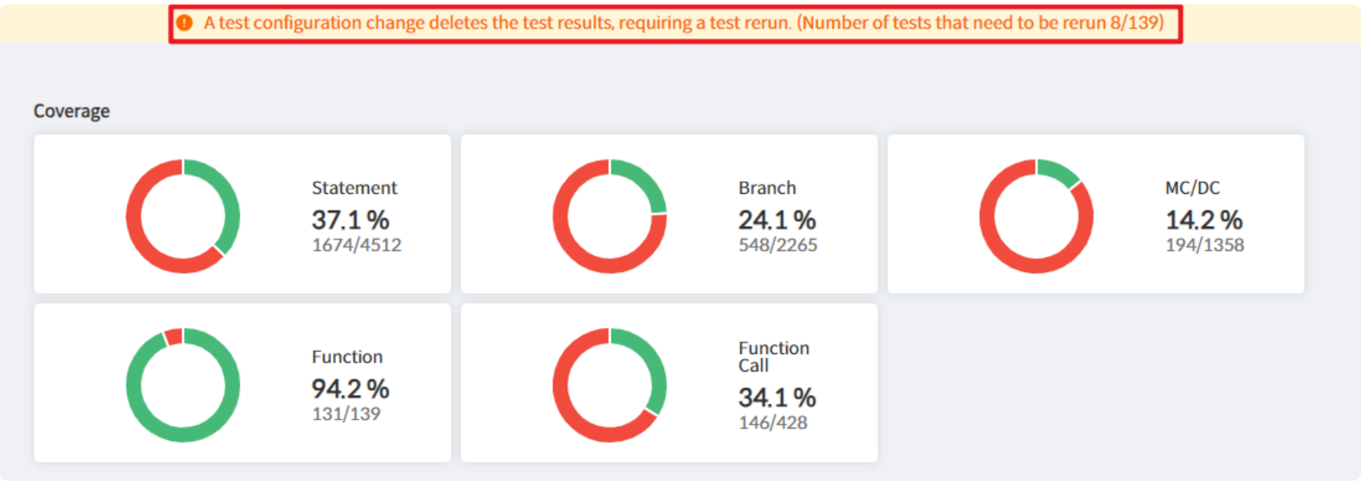


- By placing the mouse over the graph, the test results for a specific date can be checked
- On the right side of the graph, it provides the amount of change compared to the previous day.

- The trend display range can be changed by adjusting the test result trend display period on the [Settings] page.

Tests Needing Re-execution

When there are tests that require re-execution, a warning appears at the top stating, “A test configuration change deletes the test results, requiring a test rerun” By rerunning the test that was deleted the previous test results by test changes, the dashboard will display accurate coverage information. Test results are deleted in the following two cases.

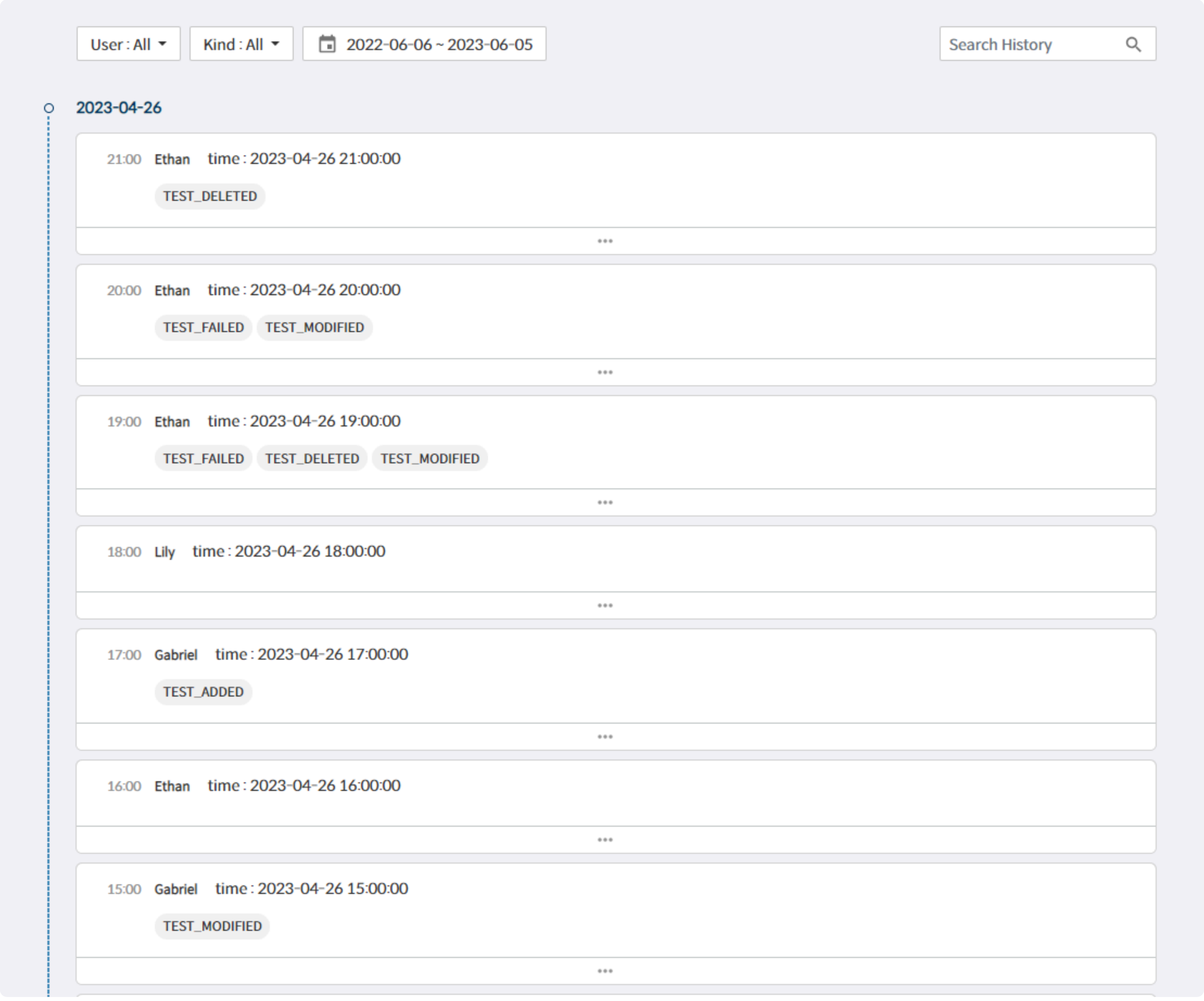


A test configuration change deletes the test results, requiring a test rerun. (Number of tests that need to be rerun 8/139)

- When you commit changes to a resource, the test results and coverage associated with that resource are deleted.
- When the project configuration is changed, all test results and coverage are deleted.

32.2.2. History

History page provides the commit history of the project.



2023-04-26

21:00 Ethan time : 2023-04-26 21:00:00
TEST_DELETED

20:00 Ethan time : 2023-04-26 20:00:00
TEST_FAILED TEST_MODIFIED

19:00 Ethan time : 2023-04-26 19:00:00
TEST_FAILED TEST_DELETED TEST_MODIFIED

18:00 Lily time : 2023-04-26 18:00:00

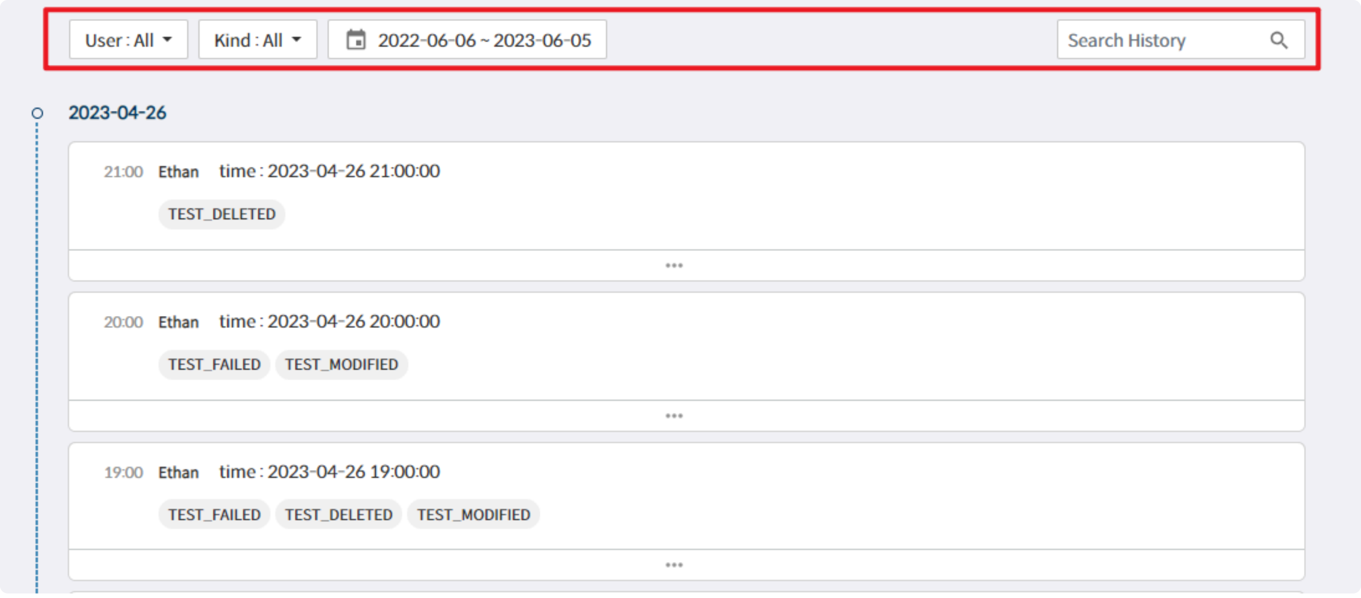
17:00 Gabriel time : 2023-04-26 17:00:00
TEST_ADDED

16:00 Ethan time : 2023-04-26 16:00:00

15:00 Gabriel time : 2023-04-26 15:00:00
TEST_MODIFIED

Filter and search

The history page provides filtering for user, category, and date, along with a commit message search feature.



User : All ▾
Kind : All ▾
2022-06-06 ~ 2023-06-05
Search History

2023-04-26

21:00 Ethan time : 2023-04-26 21:00:00
TEST_DELETED

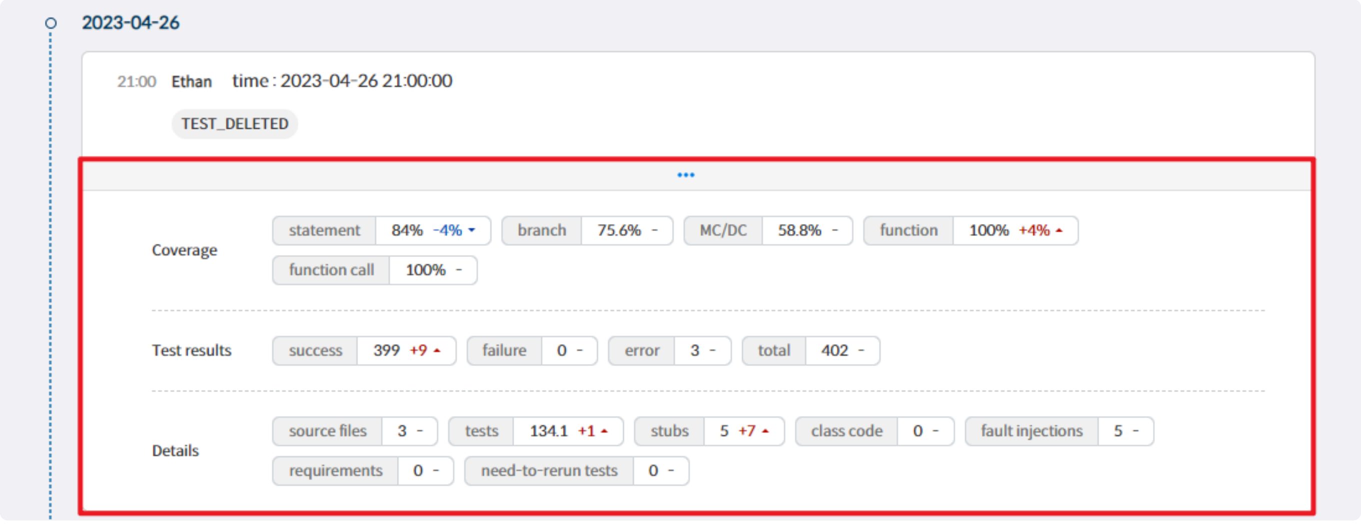
20:00 Ethan time : 2023-04-26 20:00:00
TEST_FAILED TEST_MODIFIED

19:00 Ethan time : 2023-04-26 19:00:00
TEST_FAILED TEST_DELETED TEST_MODIFIED

- Clicking on the kind label in the commit history allows for filtering by the corresponding label within the kind.

Commit history

Expand the commit history to check the details of the commit.



2023-04-26

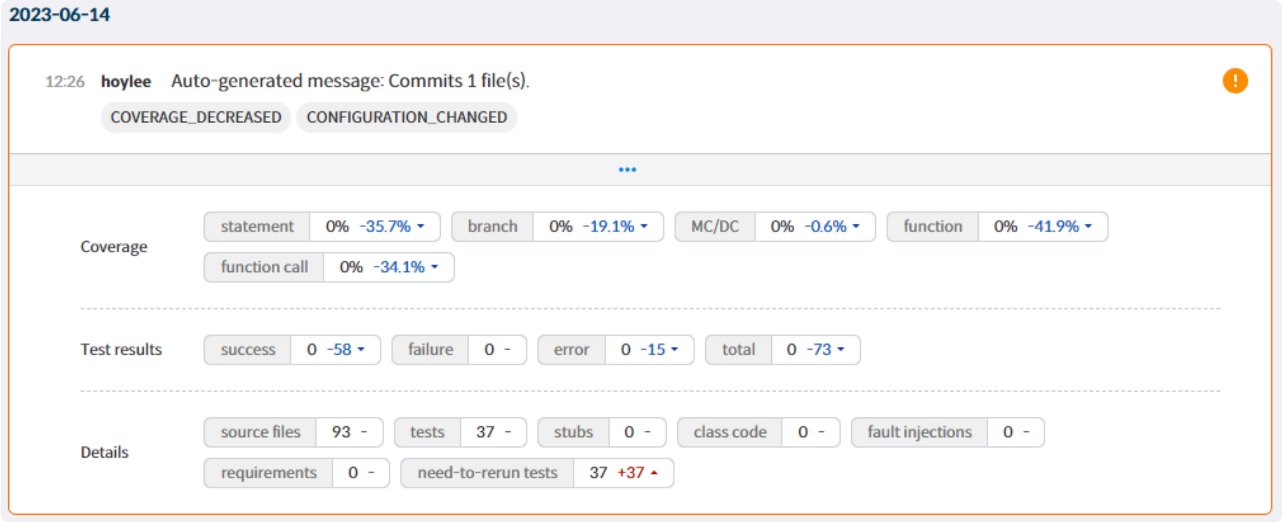
21:00 Ethan time : 2023-04-26 21:00:00
TEST_DELETED

Coverage
statement 84% -4% ▾
branch 75.6% -
MC/DC 58.8% -
function 100% +4% ▴
function call 100% -

Test results
success 399 +9 ▴
failure 0 -
error 3 -
total 402 -

Details
source files 3 -
tests 134.1 +1 ▴
stubs 5 +7 ▴
class code 0 -
fault injections 5 -
requirements 0 -
need-to-rerun tests 0 -

- In the details, coverage, test results, resource information, and changes in figures due to the commit are provided.
- When resource changes lead to an increase in tests requiring re-execution, the related commit history is highlighted with an orange border.



2023-06-14

12:26 **hoylee** Auto-generated message: Commits 1 file(s).

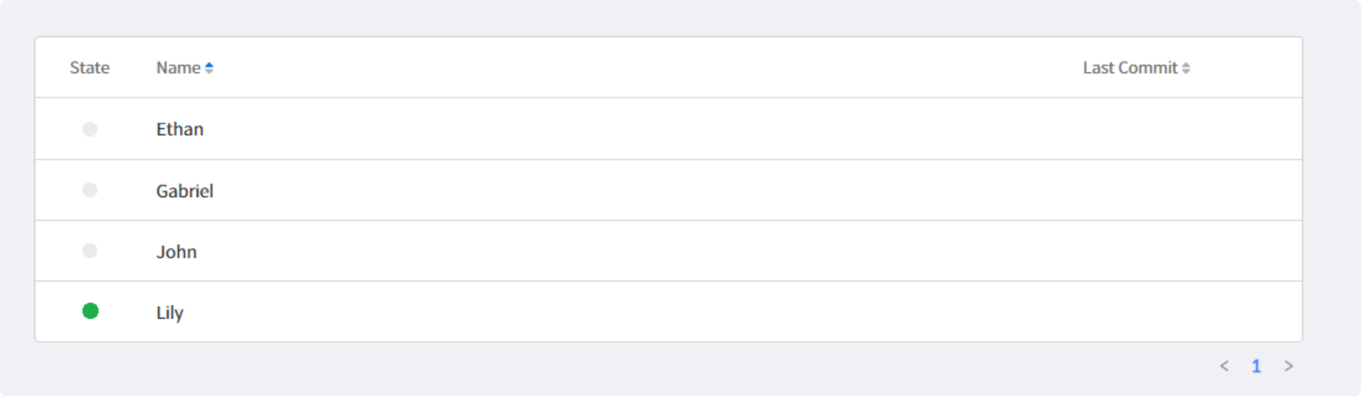
COVERAGE_DECREASED CONFIGURATION_CHANGED

...

Coverage	statement 0% -35.7% ▾ · branch 0% -19.1% ▾ · MC/DC 0% -0.6% ▾ · function 0% -41.9% ▾ · function call 0% -34.1% ▾
Test results	success 0 -58 ▾ · failure 0 - · error 0 -15 ▾ · total 0 -73 ▾
Details	source files 93 - · tests 37 - · stubs 0 - · class code 0 - · fault injections 0 - · requirements 0 - · need-to-rerun tests 37 +37 ▴

32.2.3. User List

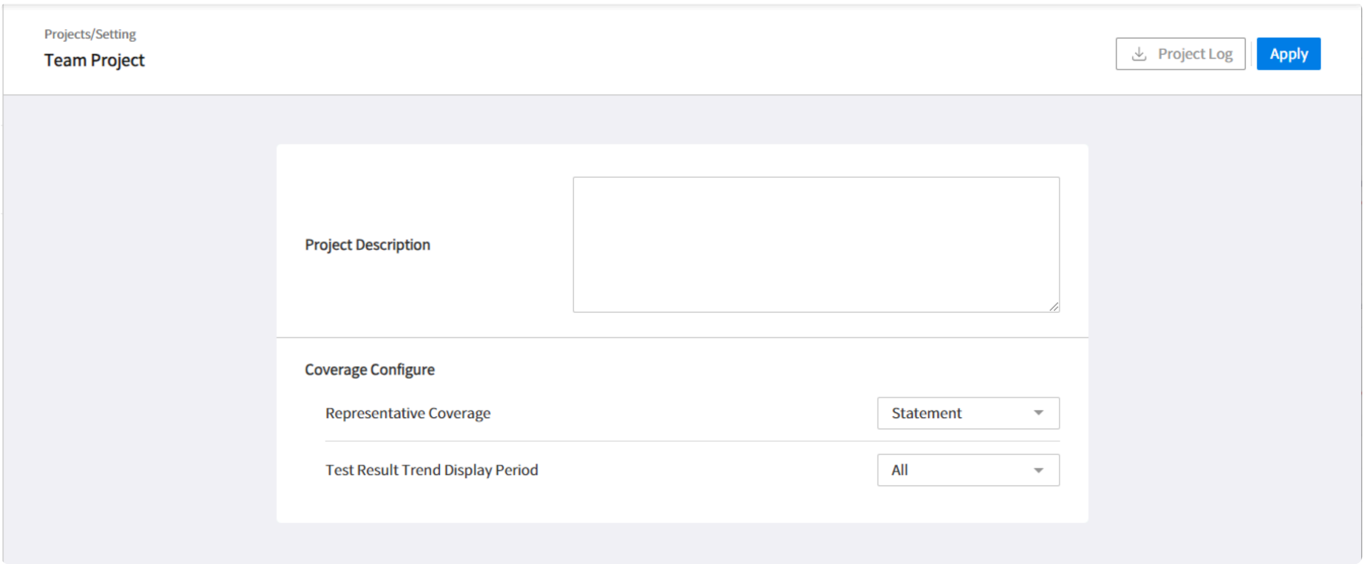
The user list provides information on who is participating in the team project. Connection status and the last commit time can be checked.



State	Name	Last Commit
●	Ethan	
●	Gabriel	
●	John	
●	Lily	

32.2.4. Settings

The settings page provides features for Project description, coverage Configure, and Project log download.



Projects/Setting

Team Project

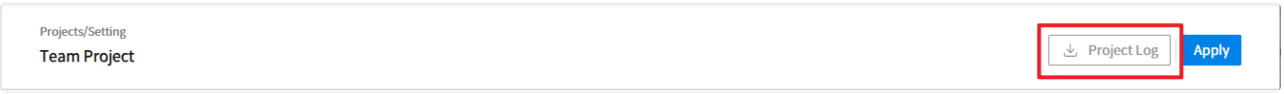
Project Description

Coverage Configure

Representative Coverage: Statement

Test Result Trend Display Period: All

- After changing the project settings, click the [Apply] button in the upper right corner.
- The default value for representative coverage is Statement coverage, and the default value for the test result trend display period is All.
- By clicking the [Project Log] button in the upper right corner, the server log of the project can be downloaded.



Projects/Setting

Team Project

33. EULA(End-User License Agreement)

Software End User License Agreement

Important: This End User License Agreement ("EULA") is a legal agreement between the user (individual or organization) and Suresoft Technologies, Inc. ("SureSoft Tech") which is the manufacturer the software products ("Software product" or "Software") identified by the product identification card or recognition label attached to this EULA. The software product includes computer software, related media, related documents, and "online" or electronic manual. When installing, copying, downloading, backing up, accessing or using the software product, the user must accept the terms of use in the EULA; if the user does not accept the terms of use in EULA, the user may not be licensed for the software product. Unless the user is licensed to use the software product, the user cannot install, copy, download, backup, access or use this software product.

Software Product License

The Software product is protected by intellectual property rights as well as copyrights, program copyrights, and international copyright regulations. The term "computer" used in this agreement means a single computer system, the range of which is described below.

1. License Grant

The EULA grants the user the following rights.

Software Installation and Use. Except for those clearly explained in the EULA, only one copy of software product can be installed, used, accessed, executed or interacted ("execution") on the computer. To install, use or execute the software product on two or more computers, the user must obtain the legal license(s) that corresponds to the number of computers regardless of the interaction of software used or executed on each computer.
Backup Copy. When there is no software product backup copy on the computer, the user can create a single backup copy that corresponds to the computer software part of the software product. The backup copy can be used for the purpose of recording. To create a single backup copy, a backup utility can be used. Except for those clearly stated in this EULA, the user may not make copies of the software product including documents provided with the software product.

2. Other Rights and Limits

Computer or Single Computer System. The Software product's license is applied only to a single computer system. If the single computer system has multiple CPUs, it is considered as a single computer system only when these CPUs are installed to one circuit board and the structure is the symmetric central processing structure that shares one system bus.

Choose language versions. When the software product is included in one or more language versions, it is allowed to use only one language version.
Reverse engineering limitations. De-compilation and decomposition. The user cannot decompile or decompose software the product using reverse-engineering.

Component separation. The software product is allowed as a single product. Users cannot separate the components to use in one or more computers.
Lease. The Software product cannot be leased or lent.
Right Transfer of software product. The user may permanently transfer all rights as part of the sale of hardware or right transfer according to this EULA, it is regarded that the recipient has accepted the terms of use in this EULA.
Expiration. When the user violates the terms and conditions in the EULA, without infringing other rights, Suresoft Technologies can make user's rights expire according to the terms and conditions in this EULA. In such a case, the user must discard all the duplicates and composing parts, including software product that has been already installed.
Registered Trademark. The EULA doesn't grant any rights related to the registered trademark and service trademark of the software manufacturer, the computer manufacturer, and other related suppliers.
Upgrade. If the software product is upgraded via Suresoft Technologies, the terms of use in the EULA are still valid for the upgraded software and it cannot be separated to use in one or more computers.

3. Copyright

Every right and intellectual propriety right (including all the image, figure, animation, video, audio, music, text, and applet of the software product) of the software product, the enclosed manual, and every copy of the software product are the property of software manufacturer or supplier. All rights and intellectual property rights for the contents that are not built-in the software product but are accessible through the use of the software product are the property of the Company, and this EULA does not grant any rights for such use. When software product includes the manual in a file, only one copy of that file can be printed. The documents accompanied by the software product cannot be copied. All the rights that are not clearly stated are the property of the corresponding software manufacturer and supplier.

4. Double Media Software Product

The Software product can be delivered in one or more media. Regardless of the received media's type or size, only one media can be used in the computer. Other media cannot be executed on another computer. Except for the case of transferring rights permanently (as described above), the user cannot lease or lend the other media or transfer the right to other users.

5. Guarantee

The Software product's guarantee on quality follows the attached warranty. If there is no separate warranty enclosed, Suresoft Technologies guarantees that there was no defect during the production process if it has been normally used for one year from the day of purchase. This does not mean that the software product has no error, and does not exclude the possibility that unexpected result may appear when using the product. Except for the cases where it is clearly stated in the separate warranty agreement, Suresoft Technologies is not liable not only for the inaccuracy, error or defect of the software product but also for the loss and damage produced from these. Suresoft Technologies doesn't take any responsibility for the third party's claims for damage or the user's claims for damage to the third party. The Limited warranty statement, mentioned in the EULA, is still valid even though the user notified Suresoft Technologies or its official representative in advance of the possibility mentioned above.

6. Export limitation

The right transfer of the software product can be carried out only within Korea, and it cannot be exported to other countries.

7. JAVA Support

The Software product includes the support of programs written in JAVA. JAVA technology is not designed as an online control device, or not made, used or sold in dangerous environments that need to error preventive function, such as nuclear facility, aircraft navigation, aircraft control, medicine, medical system, and weapon system that can cause death, injury, or critical physical/environmental damage.

Caution

The product name or trade name mentioned in this document and related document are the trademarks or registered trademarks of the Company having the copyright for the product. The software described in this document is provided according to the usage agreement and non-disclosure agreement.

The software may only be used or copied according to the terms of use in this Agreement.