Universal Probe

IDE Connection Manual

Eclipse Edition

No. E090965-02

Table of Contents

NOTES

Thank you for purchasing the "Universal Probe" from Sohwa & Sophia Technologies. Correctly understand notes and other information in this document before using this product.

1. A permission from the Japanese government is required when exporting the product and technologies described in this document to which the "Foreign Exchange and Foreign Trade Act" applies or bringing them out of Japan.
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4. The contents of this document are subject to change without notice.
5. The specifications in this document may lead to different results depending on your environment or measurement conditions.
6. Note that we bear no responsibility for consequence of operating this product.
7. "Operating Precautions" in this document are important notes to prevent damage on users and third parties as well as assets and to use the product safely and correctly. Be sure to read these precautions before using this product.
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Operating Precautions

Failure to observe the following precautions may lead to human death or severe injury.

 **Do**	Avoid supplying voltage out of the range specified in the specifications of this product. Supplying the voltage out of the range may cause damage or fire.
 **Do**	When using the target equipped with the ground terminal, ensure that the ground terminals of the target and peripheral equipment are connected. Failure to do so may cause an equipment failure or electric shock. Avoid connecting the ground terminal to the gas pipe. This causes a fire or explosion.
 **Don't**	Do not transport this product with equipment connected. In particular, hold the plug when removing or inserting the cable. Failure to do so may damage the cable, causing a fire or electric shock.
 **Don't**	Observe the following points when handling the cable. Do not damage, process, forcibly bend, twist, pull, putting any object on or heat the cable, moving the cable close to the heating device, or touch the cable with a wet hand. Failure to observe these precautions may cause a fire or electric shock. If the cable is damaged, stop using it.
 **Don't**	When you hear thunders, do not touch the power plug. This causes an electric shock. If the product seems to be damaged by lightning strike, stop using it.
 **Don't**	Do not let a staple, clip or other metal items enter into the product. This may cause a fire or failure.
 **Don't**	Do not use or leave the product in direct sunlight, near heating devices, in an extremely hot or cold environment, under hard vibrations, in dusty area with a large amount of metal dust or oily dust, or noisy area full of spike noise. Do not apply a strong shock to the product.
 **Do not disassemble**	Do not disassemble, alter or repair the product. This may cause a fire or electric shock.
 **No wetting**	Do not use the product at a place where there is liquid or at a humid place such as bathroom or in vicinity to glasses. This may cause an electric shock. If liquid enters into this product, immediately turn it off and stop using it.
 **Caution**	Touching the energized product for a long time may cause low-temperature burns. Do not use this product covering with comforter or other cloth.
 **Pull out the plug.**	Immediately turn the power off if unusual smell, noise, smoke or fire is detected or if the product is or may be damaged due to a fall or strong shock. Continuing to use it may lead to a serious accident. Stop using the product.

Abbreviations, Terms and Conventions

This section describes the abbreviations, terms and conventions used in this document.

- About numeric values ... All the numeric values are positive unless otherwise specified.
- K (capital letter) ... Represents 2^{10}=1024. (Example: 16 K=16384)
- k (small letter) ... Represents 1000. (Example: 1 kHz=1000 Hz)
- [xxxxx] ... Represents the window title, xxxxx.
- <xxxxx> ··· Represents the item named xxxxx in the window.

The annotations and notes used in this document are as shown in Figure 1.

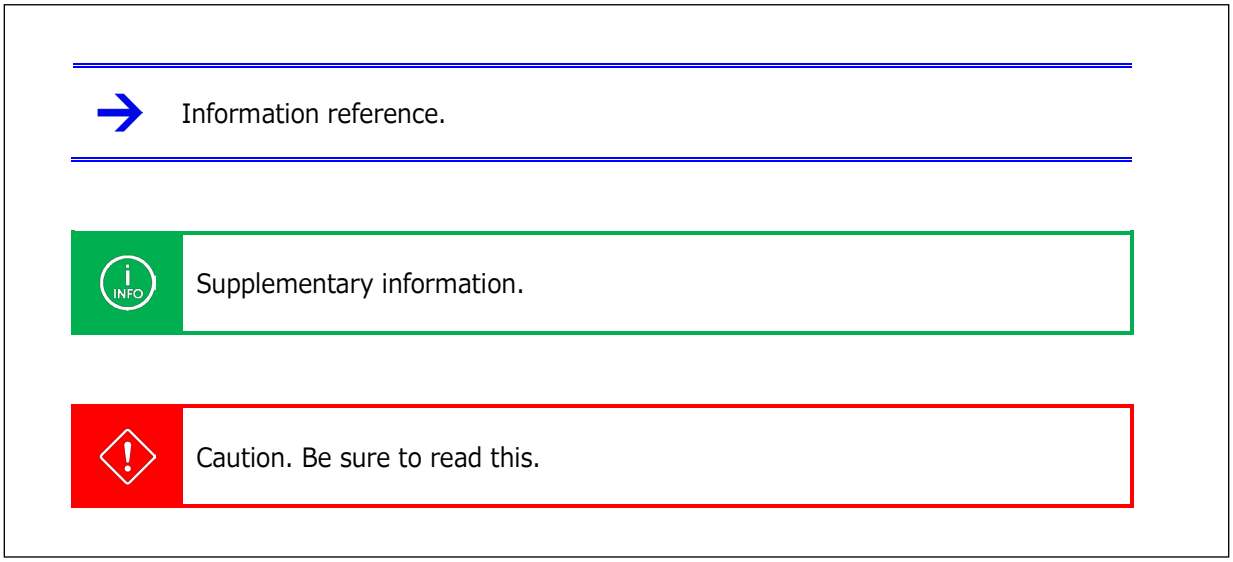


Figure 1

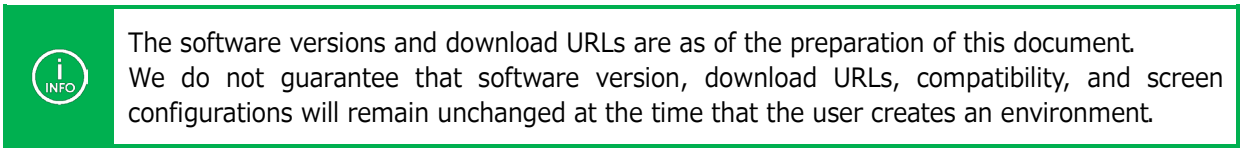
The abbreviations and terms are as shown in Table 1.

Table 1

Abbreviations and terms	Description
This product	Universal Probe including accessories.
Probe	Universal Probe itself.

1. Creating an Eclipse Environment

This chapter describes how to create an ARM CPU environment on a Windows PC based on Eclipse and GNU Tools for ARM Embedded Processors.



1.1. System Requirements

The following system is required to run this software.

- PC running Microsoft Windows 7 or later
- CPU: 1GHz or faster (depending on the requirements of the used OS)
- Memory: 1GB or larger (depending on the requirements of the used OS)
- HDD: At least 500 MB available free hard disk space.
- OS: Windows 7 or later (32bit or 64bit versions are supported)
- One or more empty USB 2.0 ports

1.2. Necessary Software

To create a development environment in which Eclipse is used, the following software is required.

Table 2

Software name	Download URL
Java	www.java.com
Eclipse	https://www.eclipse.org/downloads/
GNU ARM Eclipse Plug-ins	(Download is carried out within Eclipse.)
GNU Tools for ARM	https://launchpad.net/gcc-arm-embedded/+download
MSYS	http://sourceforge.net/projects/mingw/files/Installer/
OpenOCD	http://www.freddiechopin.info/en/download/category/4-openocd

1.3. Installing Software

Depending on the PC you use, you may need administrative rights to install software.

1.3.1. Installing Java

1) Download the Java installer from the following URL.

www.java.com

2) Double-click the downloaded file and then click the Install> button.

Figure 2

If you do not agree with the provisions of the license agreement, click Cancel.

3) When the installation is completed, click the Close button.

Figure 3

4) Java has now been installed.

1.3.2. Installing Eclipse

1) Access the following URL.

https://www.eclipse.org/downloads/

2) Download Eclipse IDE for C/C++ Developers.
Select 32 bit or 64 bit, depending on the OS installed on your PC.

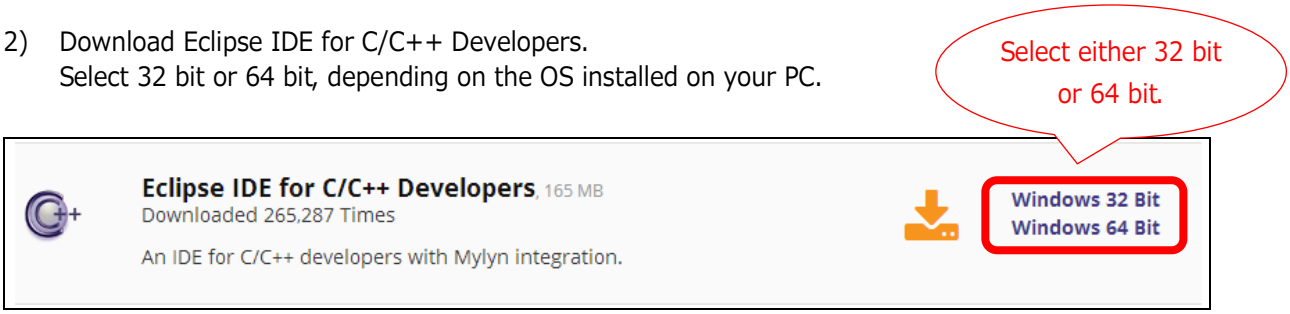


Figure 4

3) Unzip the downloaded zip file.

4) Eclipse has now been installed.

1.3.3. Installation of GNU ARM Eclipse Plug-ins

1) Open the folder that has been unzipped from the Eclipse zip file and run eclipse.exe.

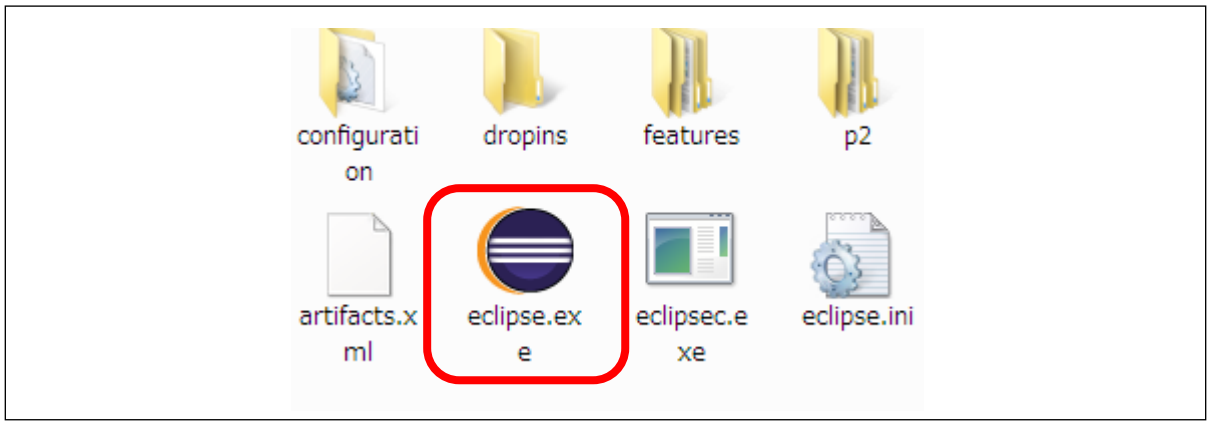


Figure 5

2) Specify the folder that you will use as Workspace and click the OK button.

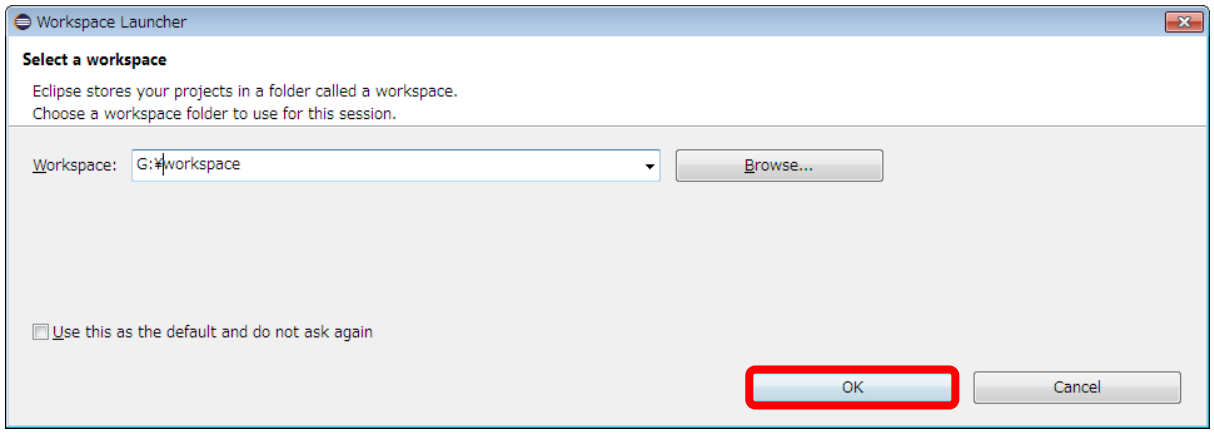


Figure 6

3) Select "Help" → "Install New Software..." from the menu.

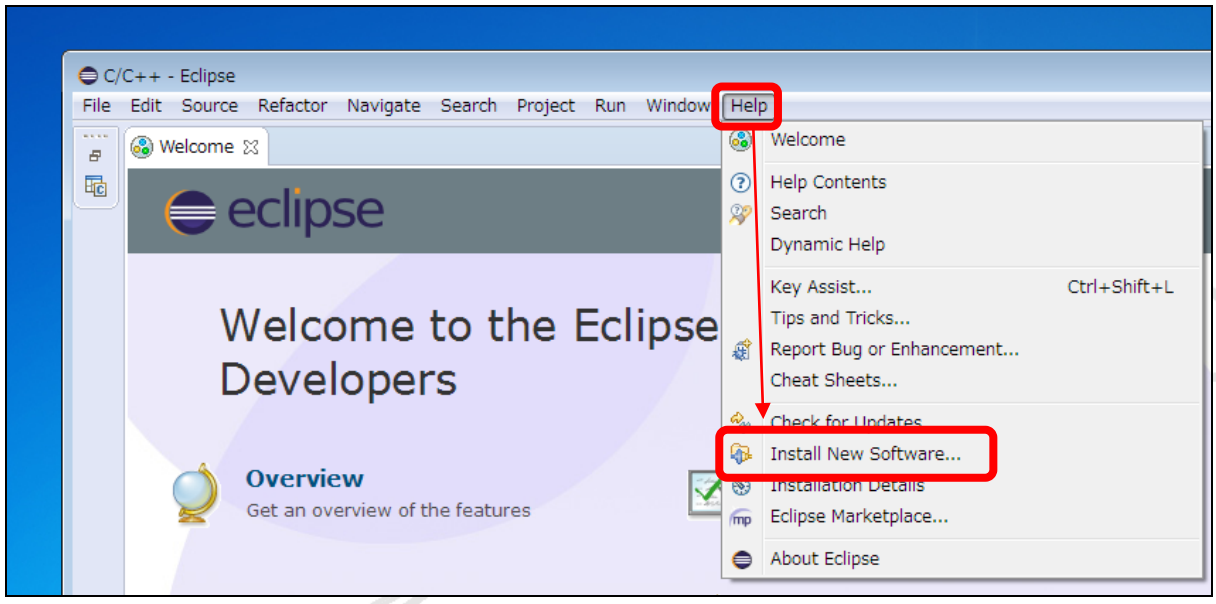


Figure 7

4) Click the Add button.

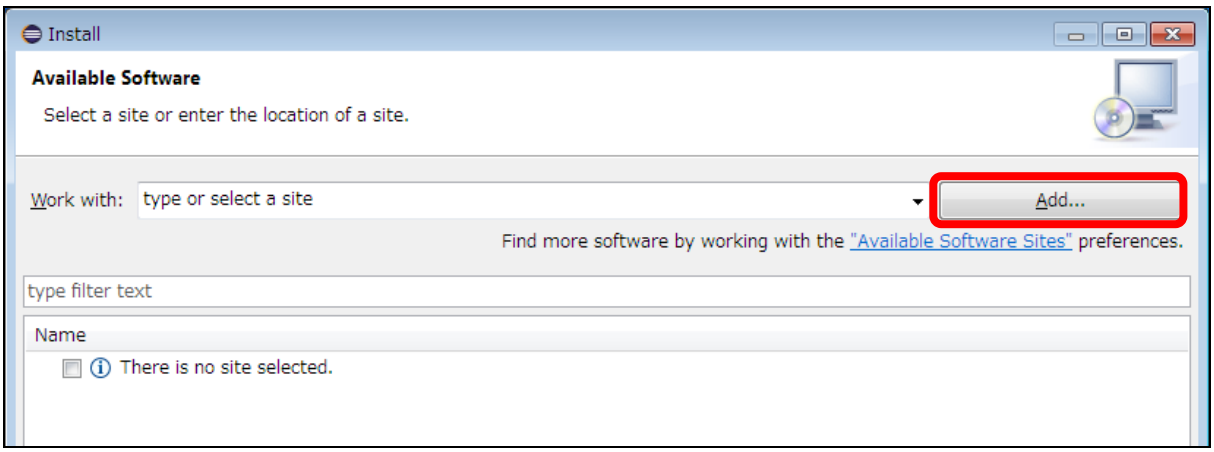


Figure 8

5) Enter the following text and click the OK button.

Name : GNU ARM Eclipse Plug-ins
<Location> : **http://gnuarmeclipse.sourceforge.net/updates**

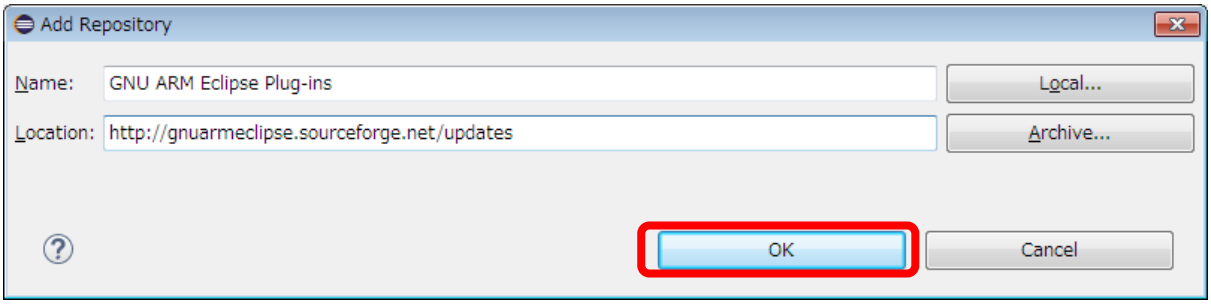


Figure 9

6) GNU ARM C/C++ Cross Development Tools will be displayed in the list. Select the checkbox and click the Next> button.

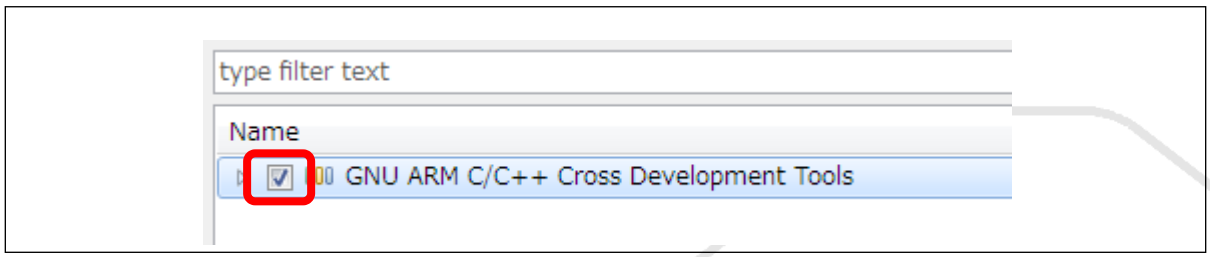


Figure 10

7) Items to be installed will be displayed. Check them and click the Next> button.

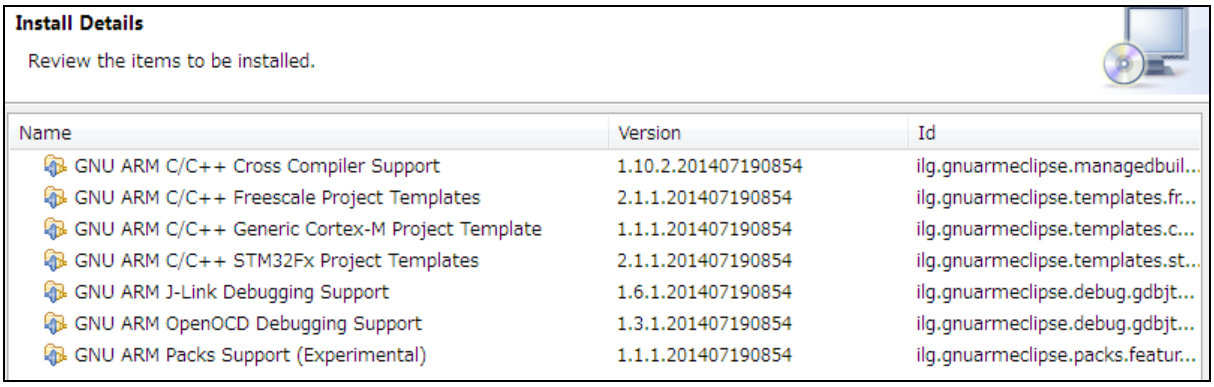


Figure 11

8) The Eclipse Foundation Software User Agreement will be displayed. If you accept its terms, select "I accept the terms of the license agreement" and click the Finish button.

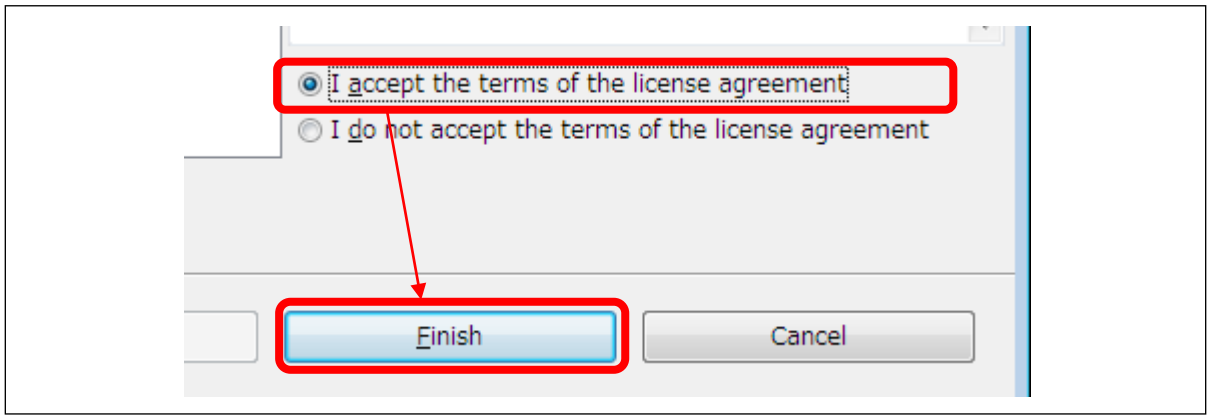


Figure 12

If you do not agree with the contents of the license agreement, cancel the installation.

9) Installation will start. Wait until the installation finishes.

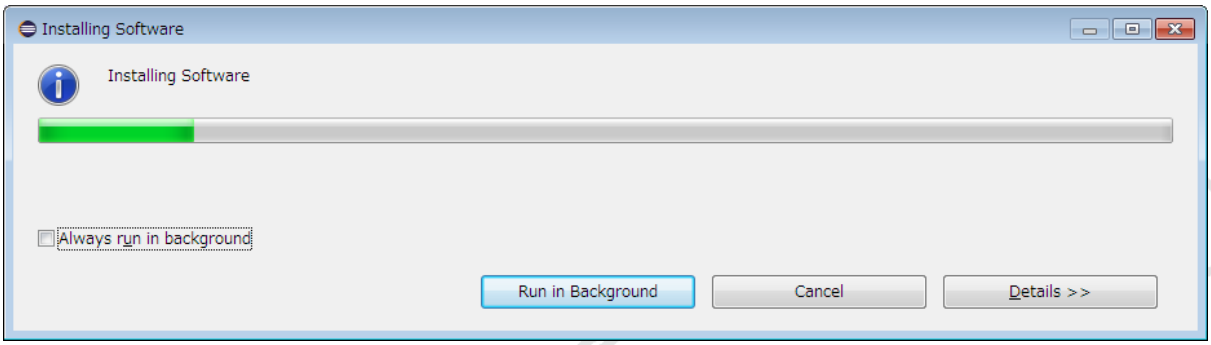


Figure 13

10) If a warning dialog box saying "You are installing software that contains unsigned content." is displayed, click the OK button.

Figure 14

11) You will be prompted to restart Eclipse. Click the Yes button.

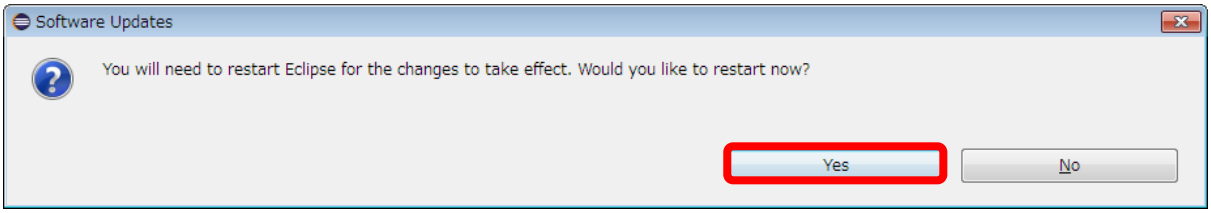


Figure 15

12) You will be prompted to check Workspace again. Confirm that the folder indicated on the window is the same folder as selected in Step 2) and click the OK button.

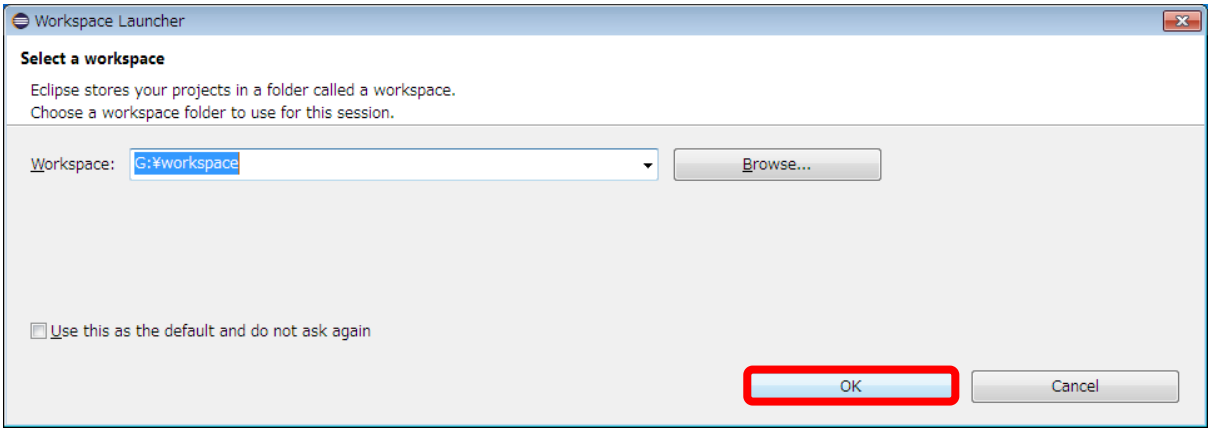


Figure 16

13) Select "Help" → "Installation Details" from the Eclipse menu, and confirm that the plug-in you checked in Step 7) has been installed.

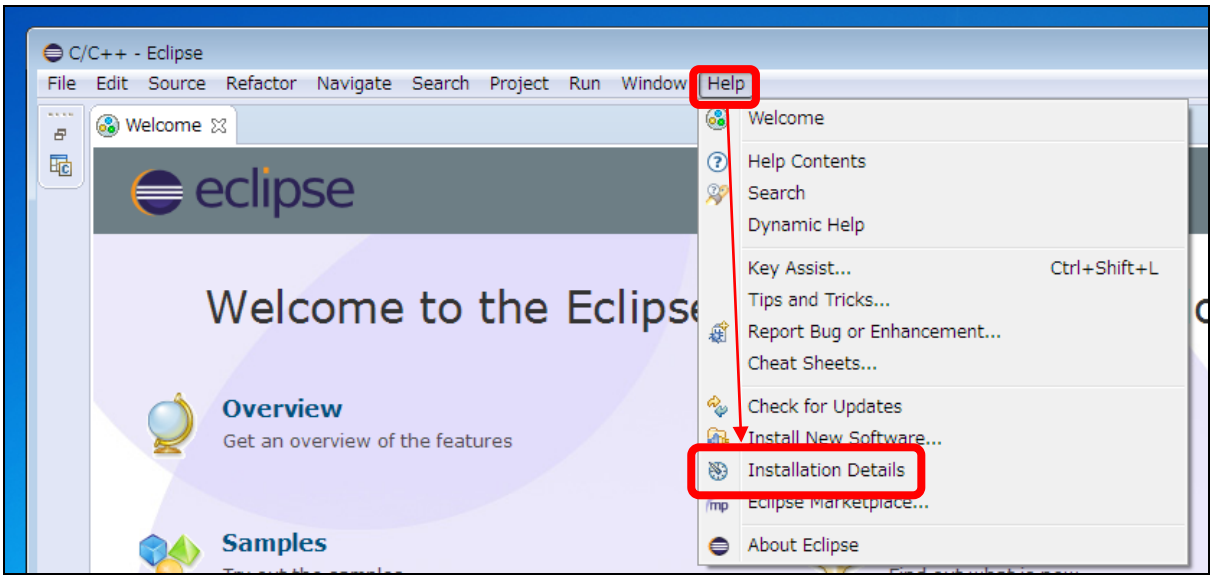


Figure 17

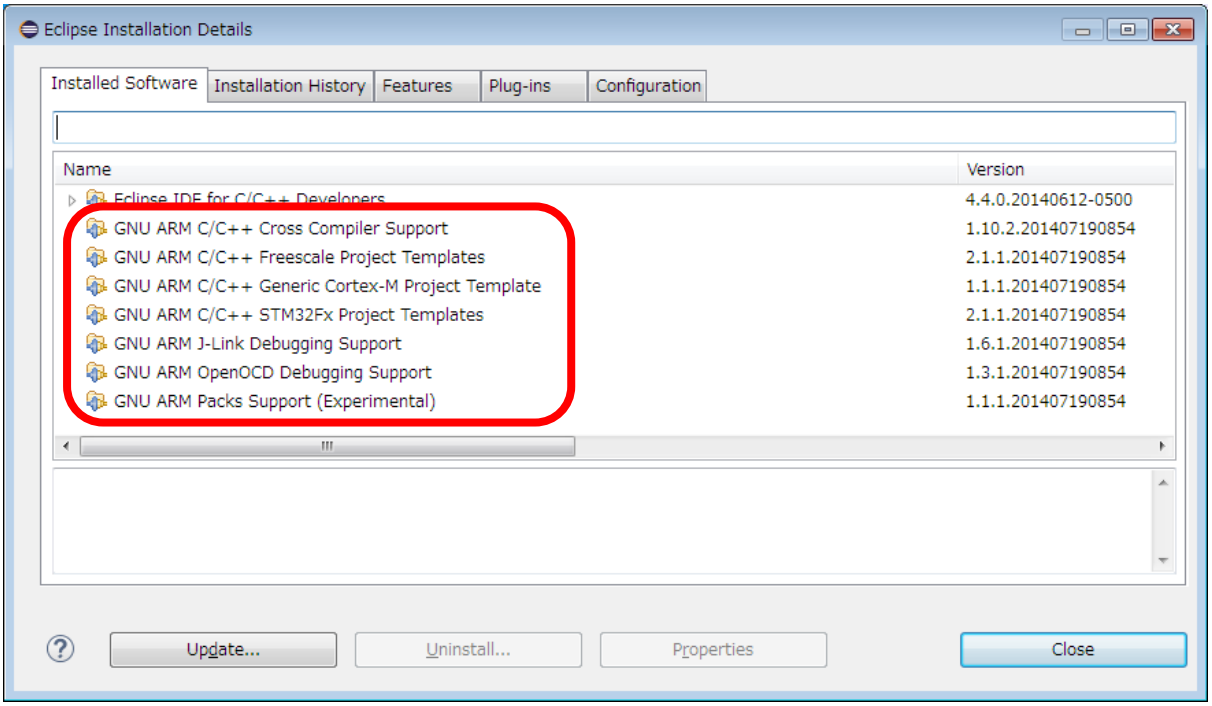


Figure 18

14) GNU ARM Eclipse Plug-ins have now been installed.

1.3.4. Installation of GNU Tools for ARM Embedded Processors

1) Access the following URL.

https://launchpad.net/gcc-arm-embedded/+download

2) Download Windows Installer.

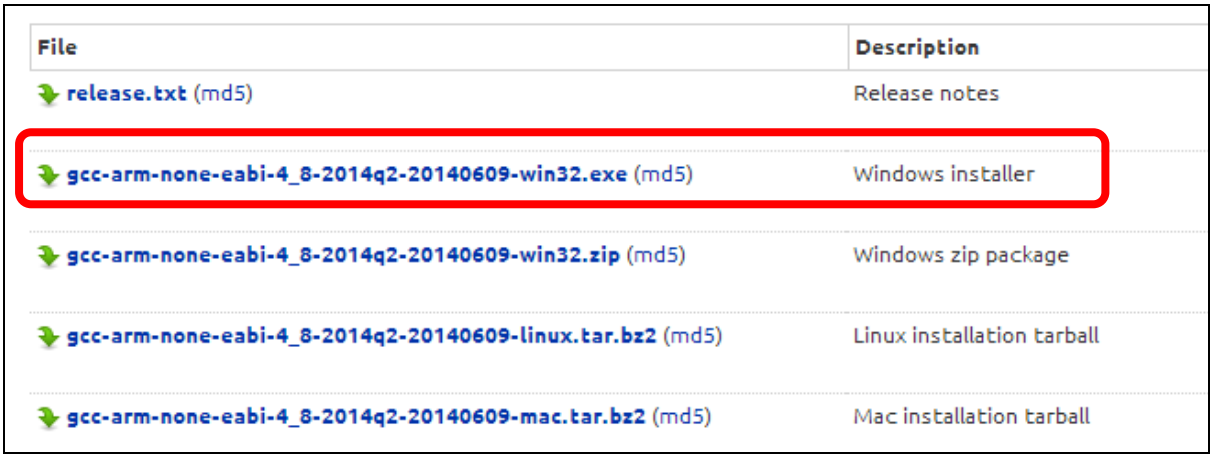


Figure 19

3) Run the downloaded file.

4) The Language Selection dialog box will open. Select "English" and click the OK button.

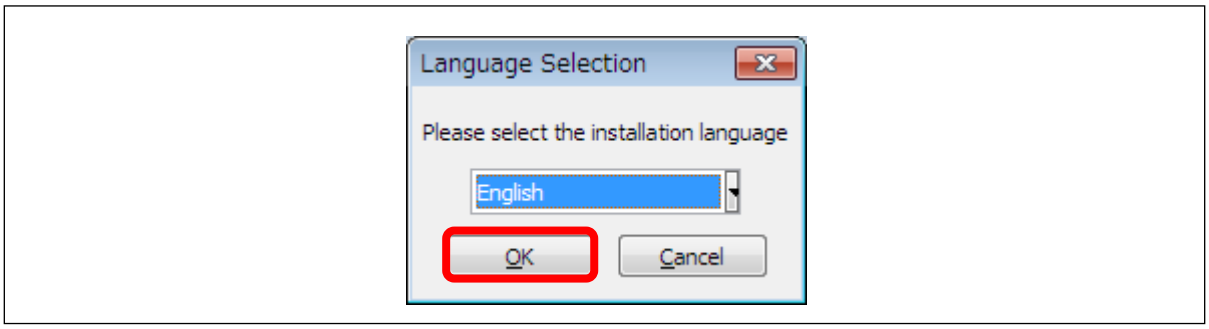


Figure 20

5) You will be asked whether you want to install the software. Click the Yes button.

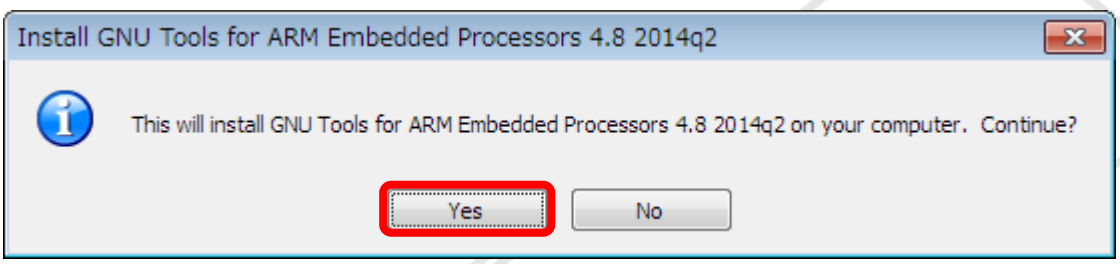


Figure 21

6) Click the Next> button.

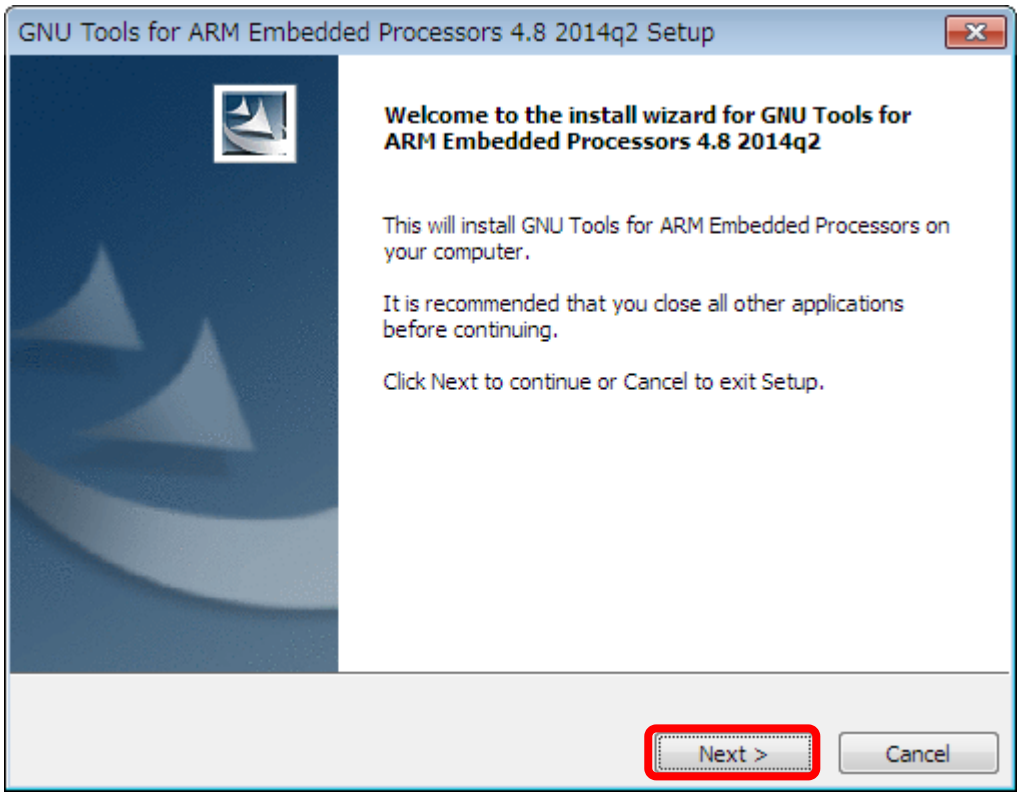


Figure 22

7) You will be prompted to accept the terms of the license. If you accept them, select the "I accept the terms of the license agreement" checkbox and click the Next> button.

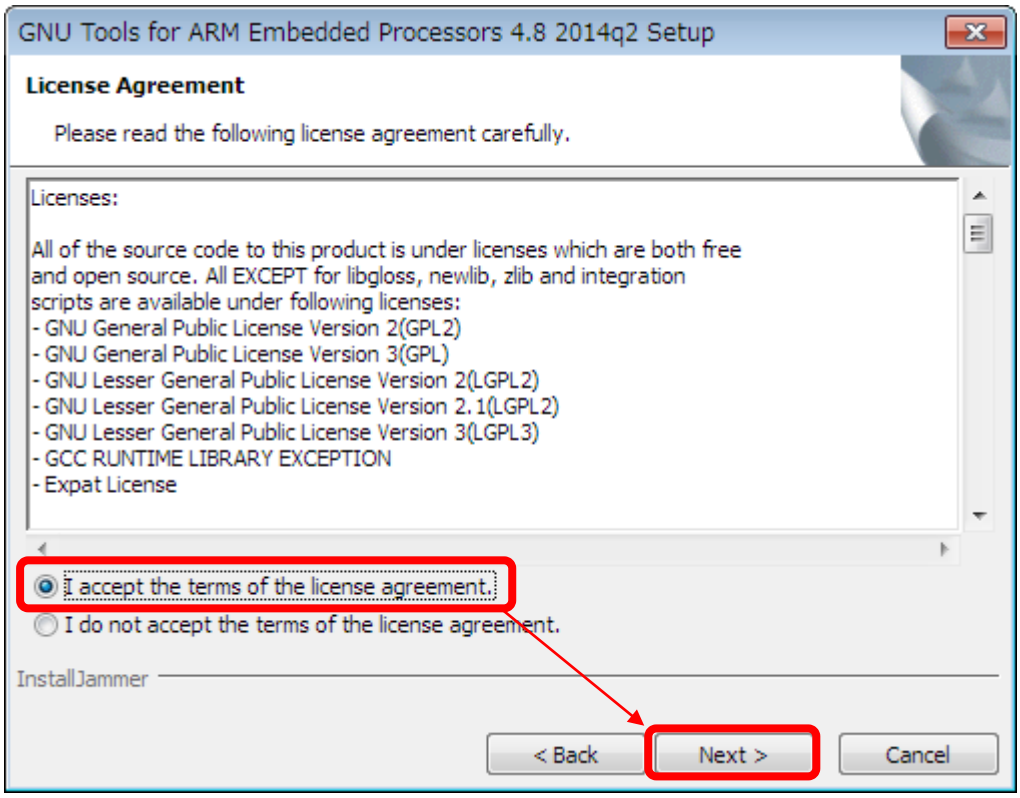


Figure 23

If you do not agree with the contents of the license agreement, cancel the installation.

8) Select the installation destination directory and click the Next> button.

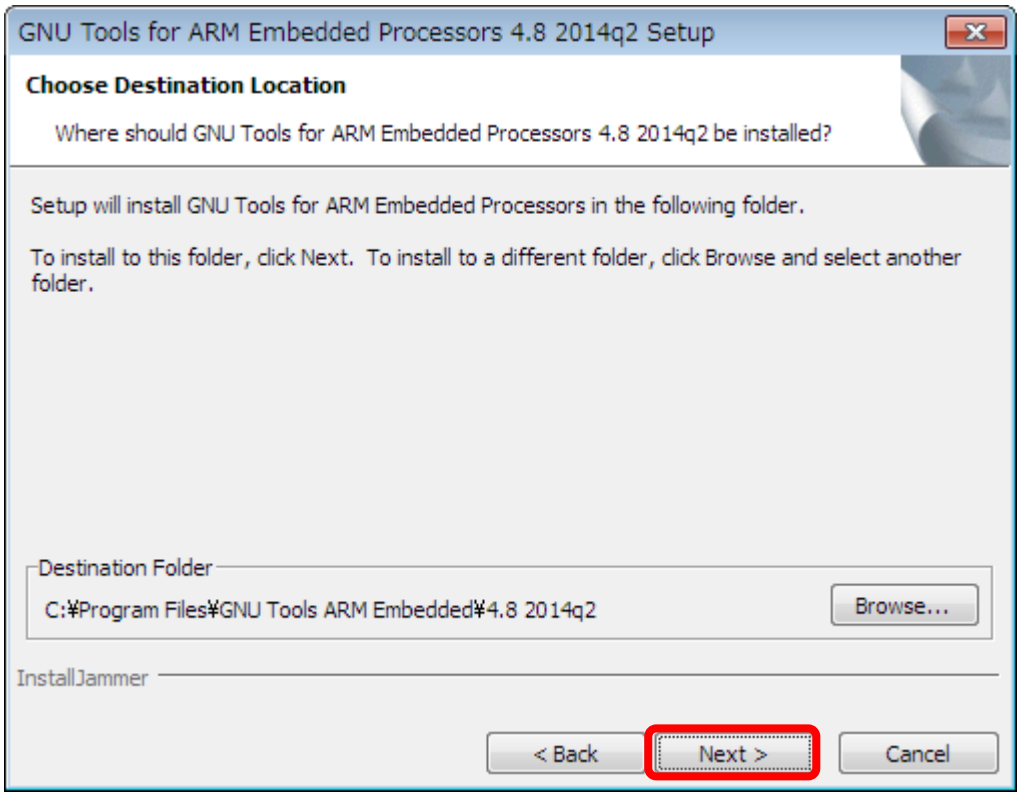


Figure 24

9) You will be asked whether you want to copy the files. Click the Next> button.

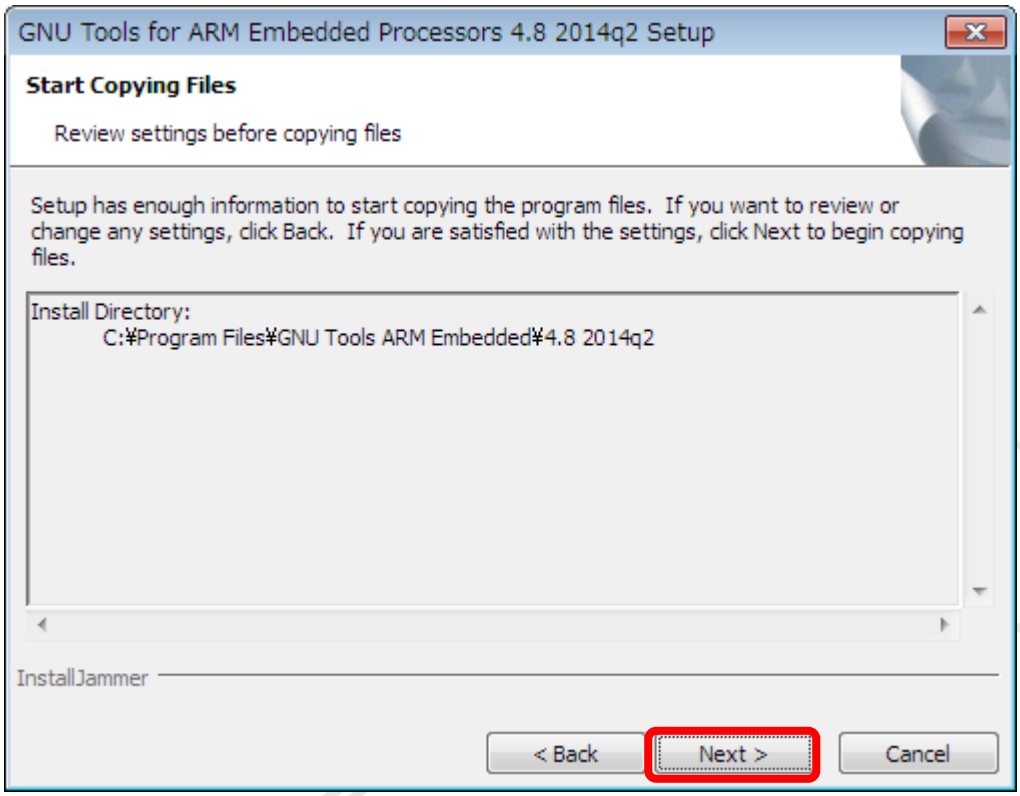


Figure 25

10) File copying will start. Wait until it finishes.

11) When the file copying finishes, click the Finish button.
If you do not need to have the actions indicated in the dialog box executed, unselect all the checkboxes.

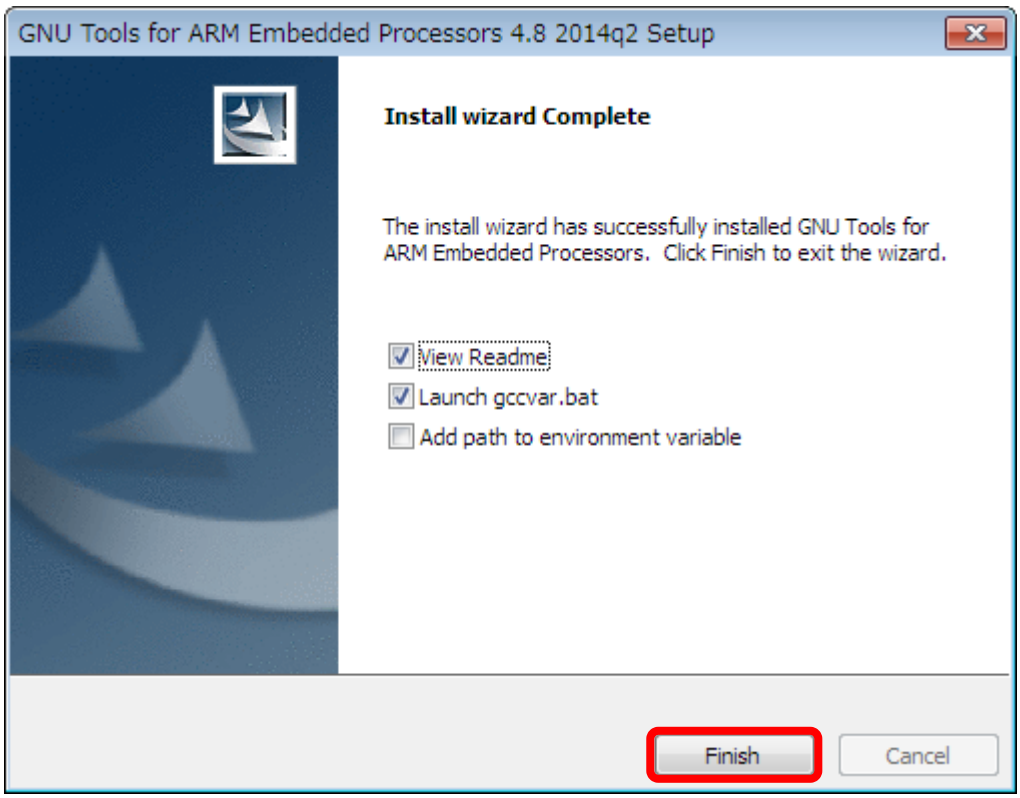


Figure 26

12) GNU Tools for ARM Embedded Processors has now been installed.

1.3.5. Installing MSYS

1) Access the following URL.

http://sourceforge.net/projects/mingw/files/Installer/

2) Download mingw-get-setup.exe.

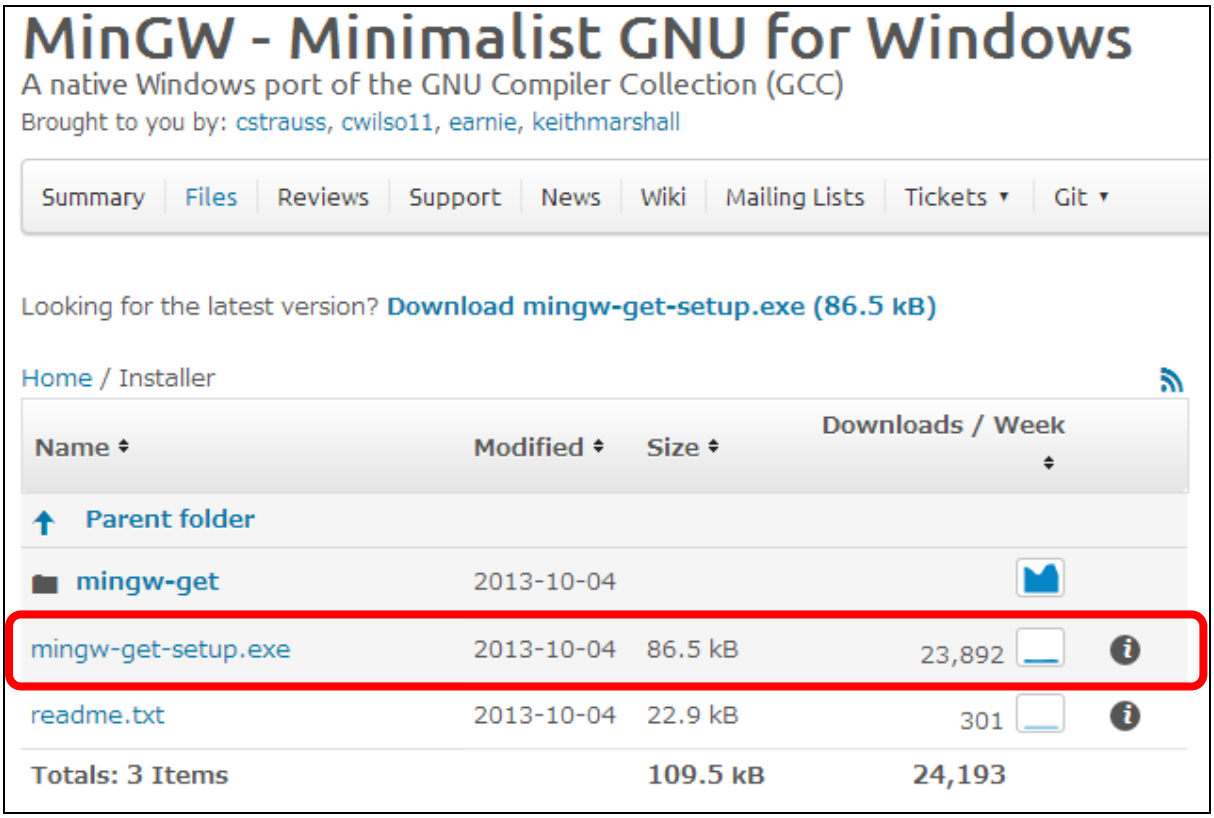


Figure 27

3) Run the downloaded file.

4) Check the provisions of the license. If you accept them, click the Install button.

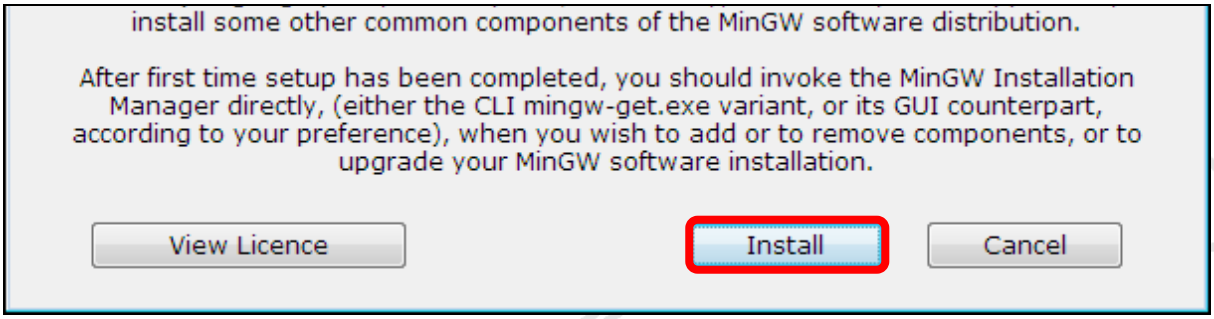


Figure 28

If you do not agree with the contents of the license agreement, cancel the installation.

5) Select the installation destination and User Interface Options, and click the Continue button.

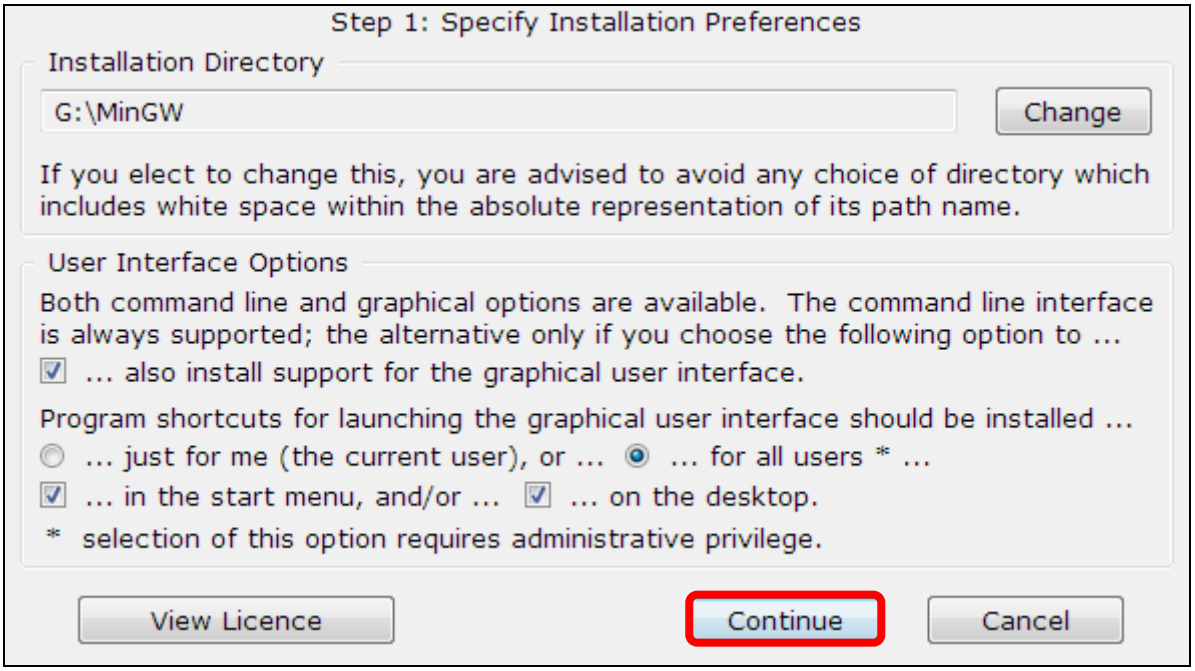


Figure 29

6) The download and installation will start. Wait until the installation finishes.

7) When the download and installation finish, click the Continue button.

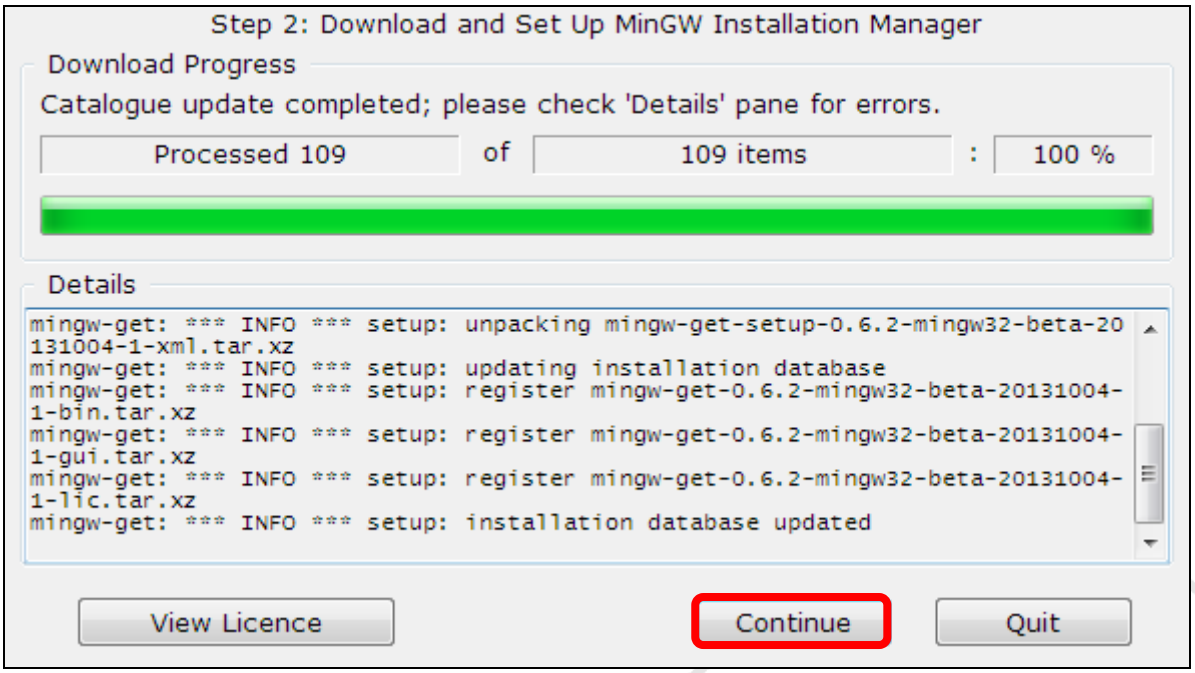


Figure 30

8) In the left column of the MinGW Installation Manager window, select "All Packages" → "MSYS" → "MSYS Base System."

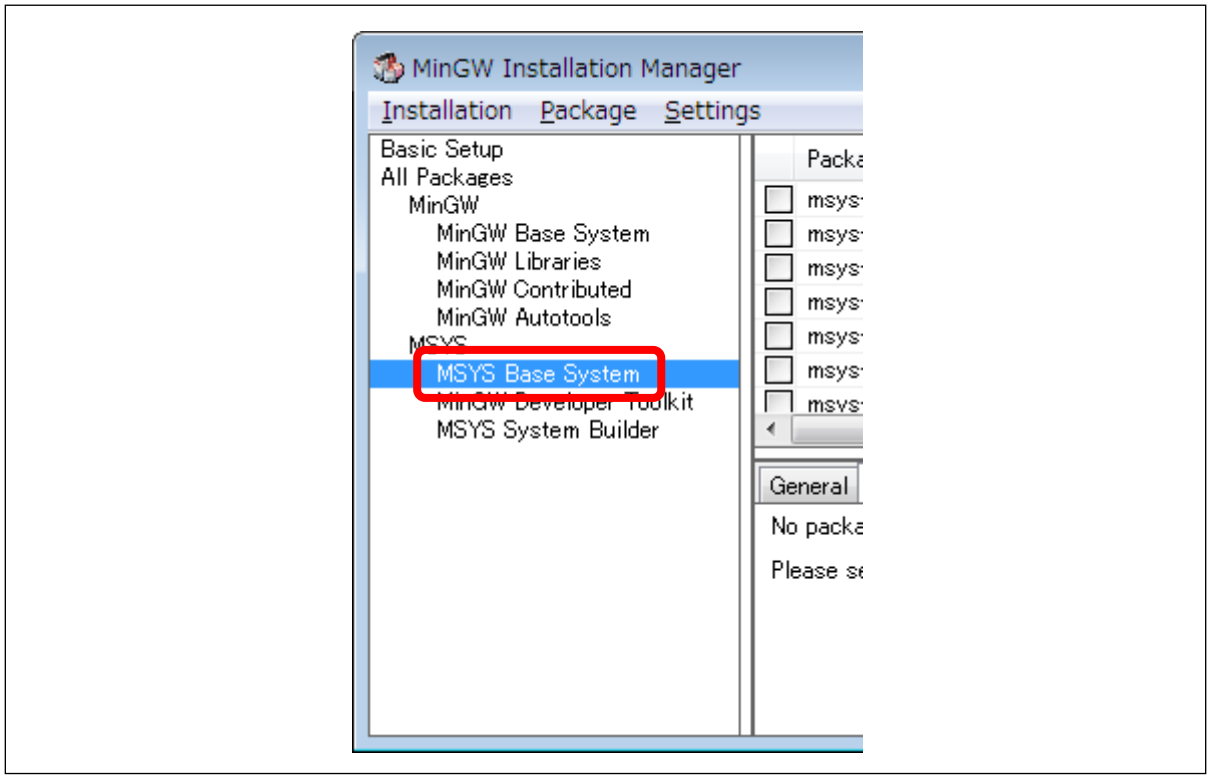


Figure 31

9) Select msys-bash and msys-make, whose Class is bin.
When you select these checkboxes, other Packages are also selected at the same time. Do not change them.

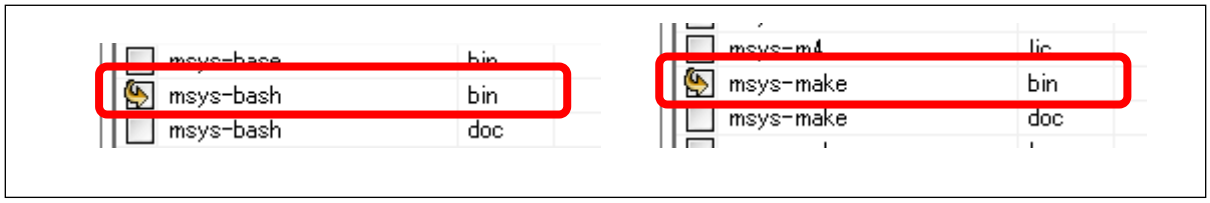


Figure 32

10) Select "Installation" → "Apply Changes" from the menu bar.

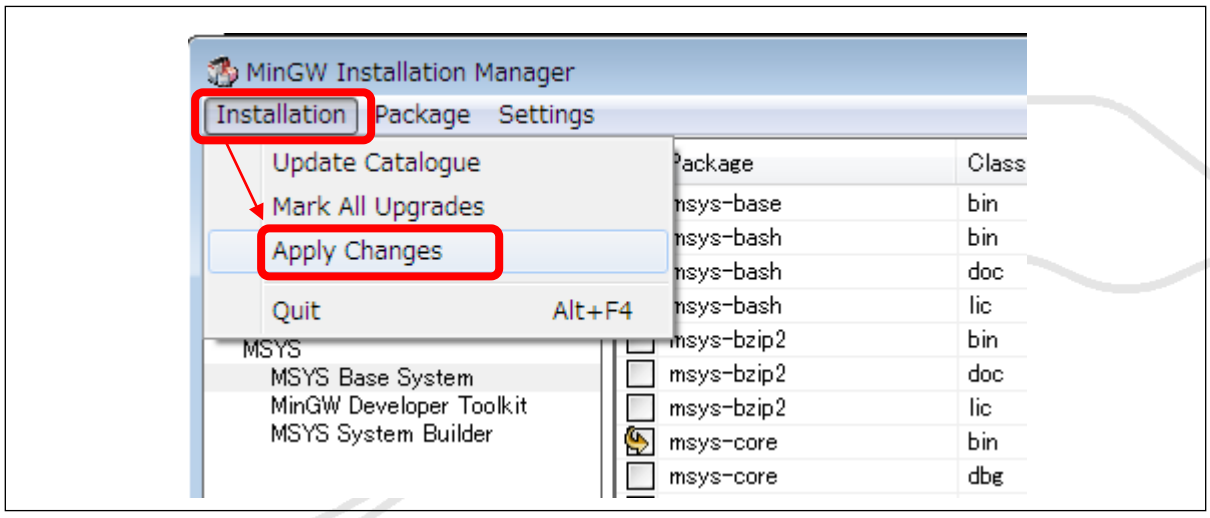


Figure 33

11) Click the Apply button in the displayed window.

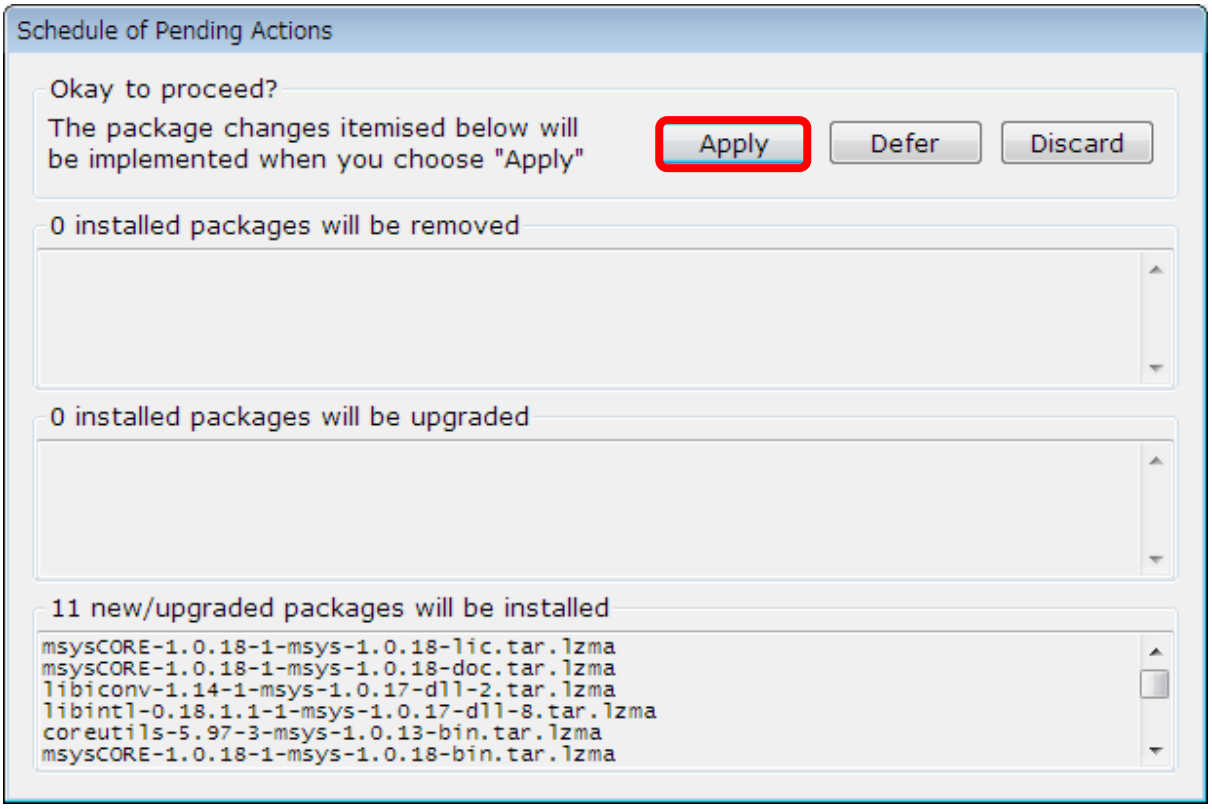


Figure 34

12) Confirm that "All changes were applied successfully" is displayed and then click the Close button.

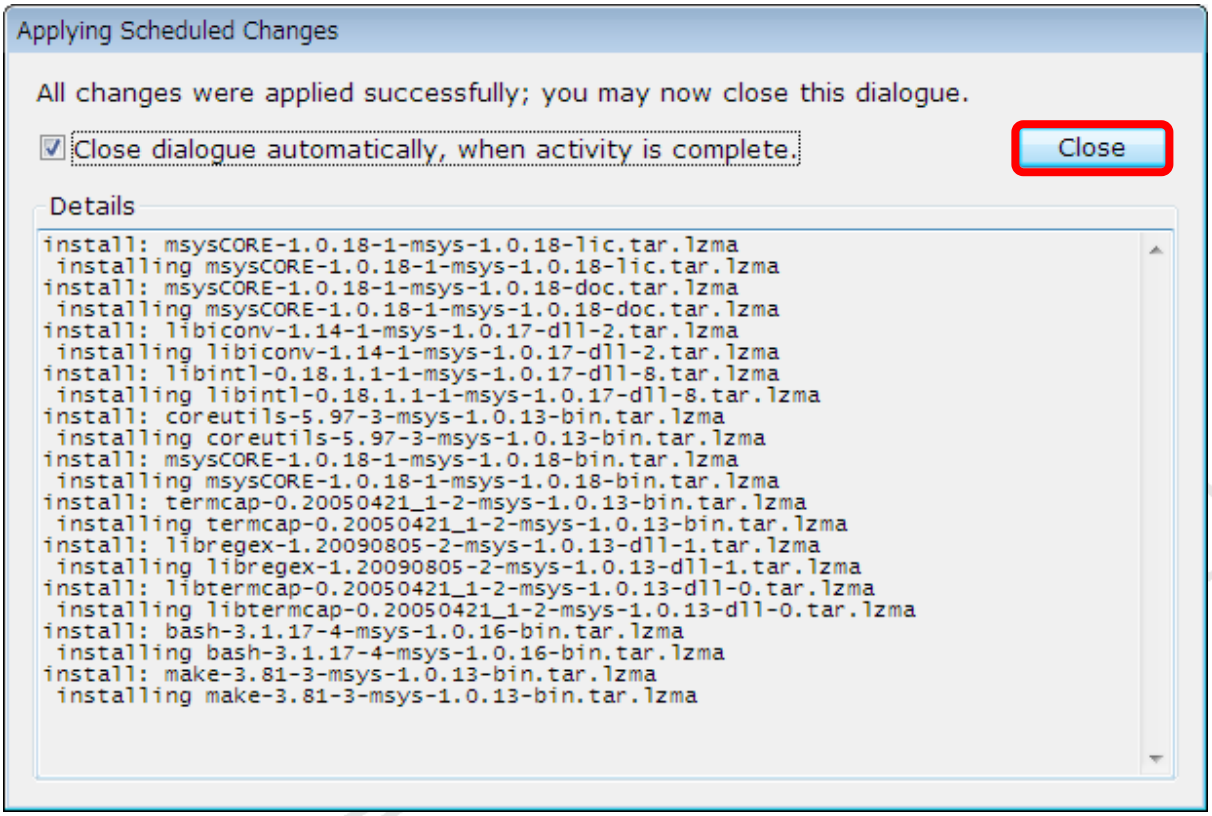


Figure 35

13) Close the MinGW Installation Manager window.

14) MSYS has now been installed.

1.3.6. Installation of OpenOCD

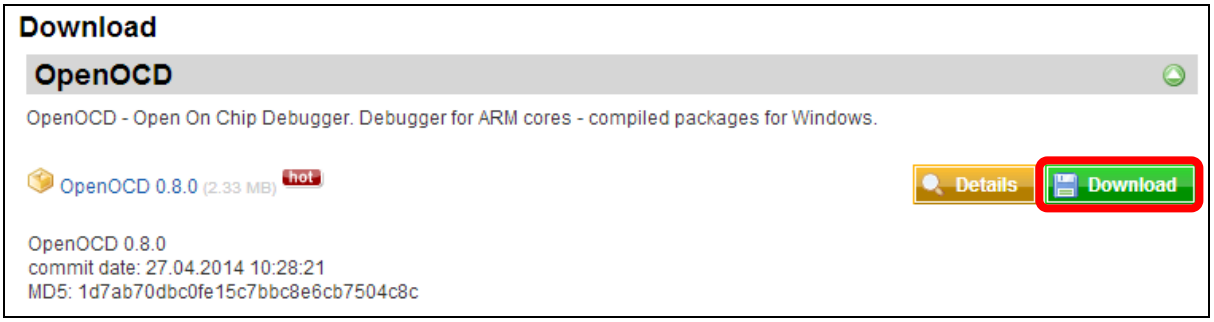
To unzip the OpenOCD download file, separate software that can unzip the 7-Zip format is required. Install that software in advance.

http://www.7-zip.org/

1) Access the following URL.

http://www.freddiechopin.info/en/download/category/4-openocd

2) Download OpenOCD 0.8.0.



3) Unzip the downloaded file in 7-Zip format.

4) Copy the unzipped folder (openocd-0.8.0) to the root folder of the C drive (C:¥).

5) OpenOCD has now been installed.

2. Procedures for Debugging in Eclipse

To perform debugging using Eclipse, you need to rewrite the firmware for the probe with "CMSIS-DAP Firmware" by using the Firmware Selector in advance.
For details, refer to "Universal Probe Software Users Manual - Firmware Selector".

2.1. Launching Eclipse

1) Run "eclipse.exe."

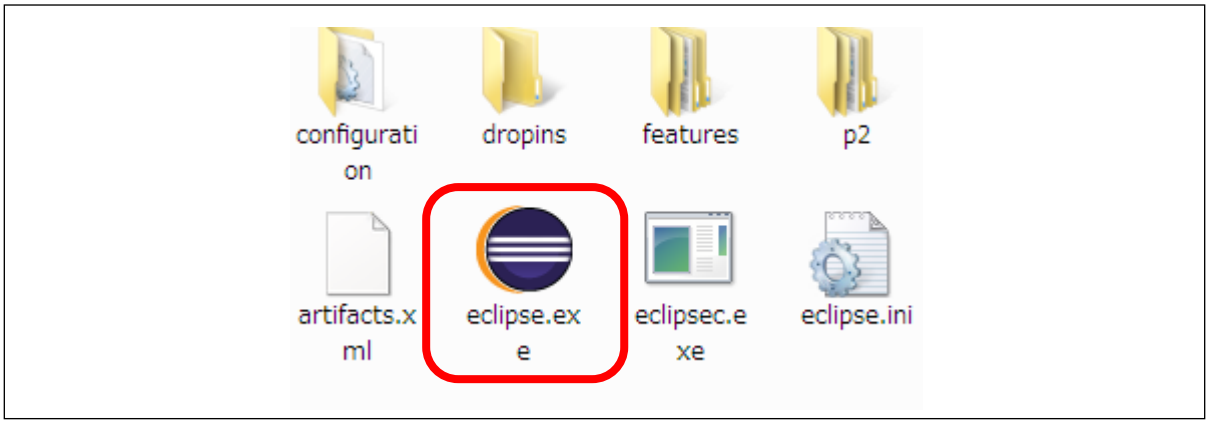


Figure 36

2) Specify the folder to be used as Workspace and click the OK button.

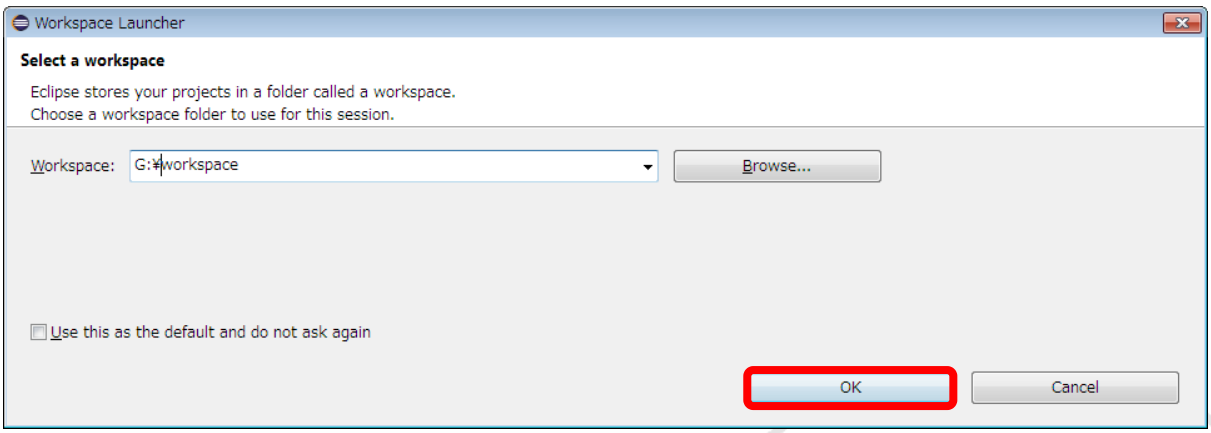


Figure 37

2.2. Importing a Project

To import a project into Eclipse, the following files are necessary: ●●●.zip and ●●●.launch.
(Here, a project called Blinky is used as an example.)

1) When Eclipse is launched, select "File" → "Import" from the menu.

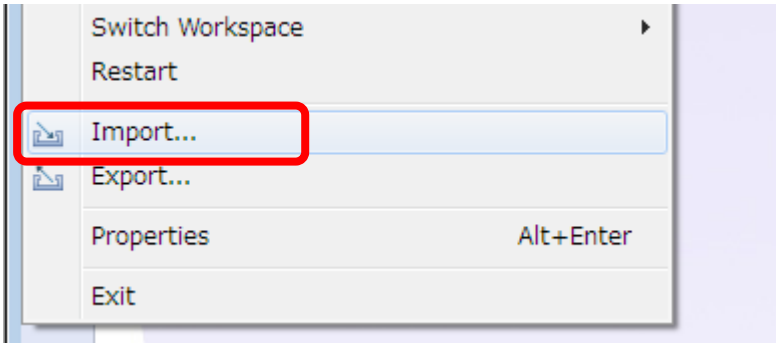


Figure 38

2) Open "General," select "Existing Projects into Workspace," and click the Next> button.

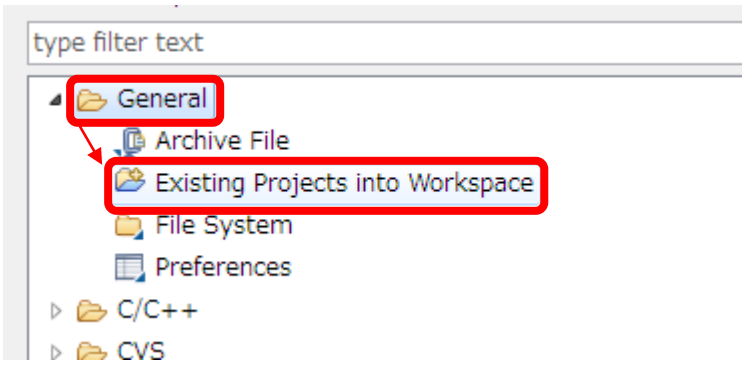


Figure 39

3) Select the "Select archive file" radio button and click the Browse button.

4) Select the Zip file for the project you want to import. In this case, select "Blinky.zip."

5) When you have finished making your selection, the following is displayed in the dialog box. Click the Finish button.

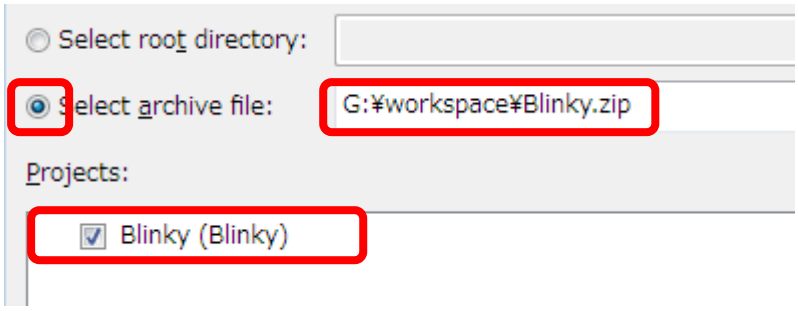


Figure 40

6) Once the import is completed, the screen display returns to the screen that was displayed when Eclipse was launched.

7) Select "File" → "Import" from the menu again.

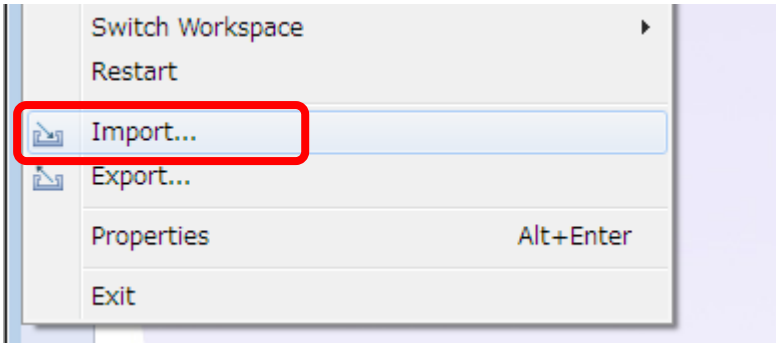


Figure 41

8) Open "Run/Debug," select "Launch Configurations," and click the Next> button.

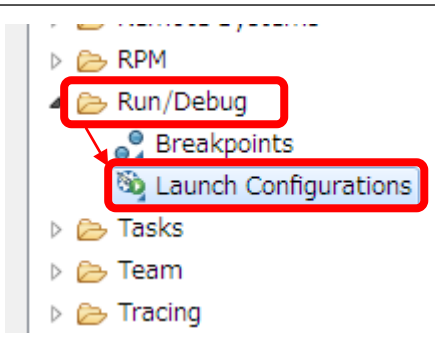


Figure 42

9) Click the Browse button and select the folder in which "Blinky Debug.launch" is stored.

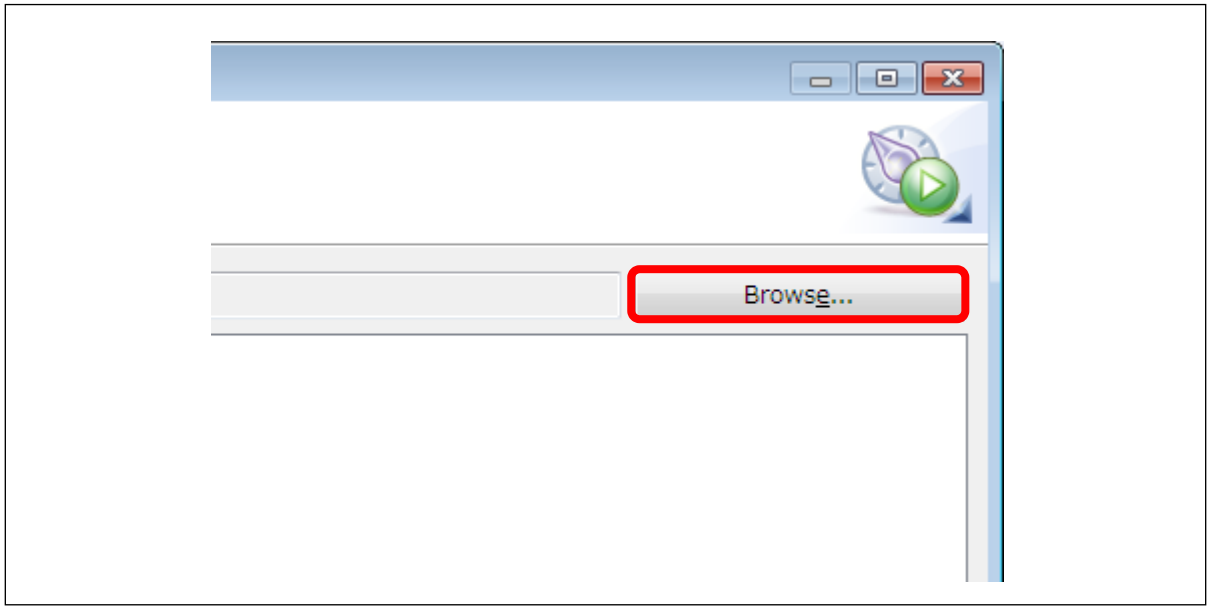


Figure 43

10) Clicking the folder containing "Blinky Debug.launch" displays "Blinky Debug.launch" in the right column of the window. Select its checkbox and click the Finish button.

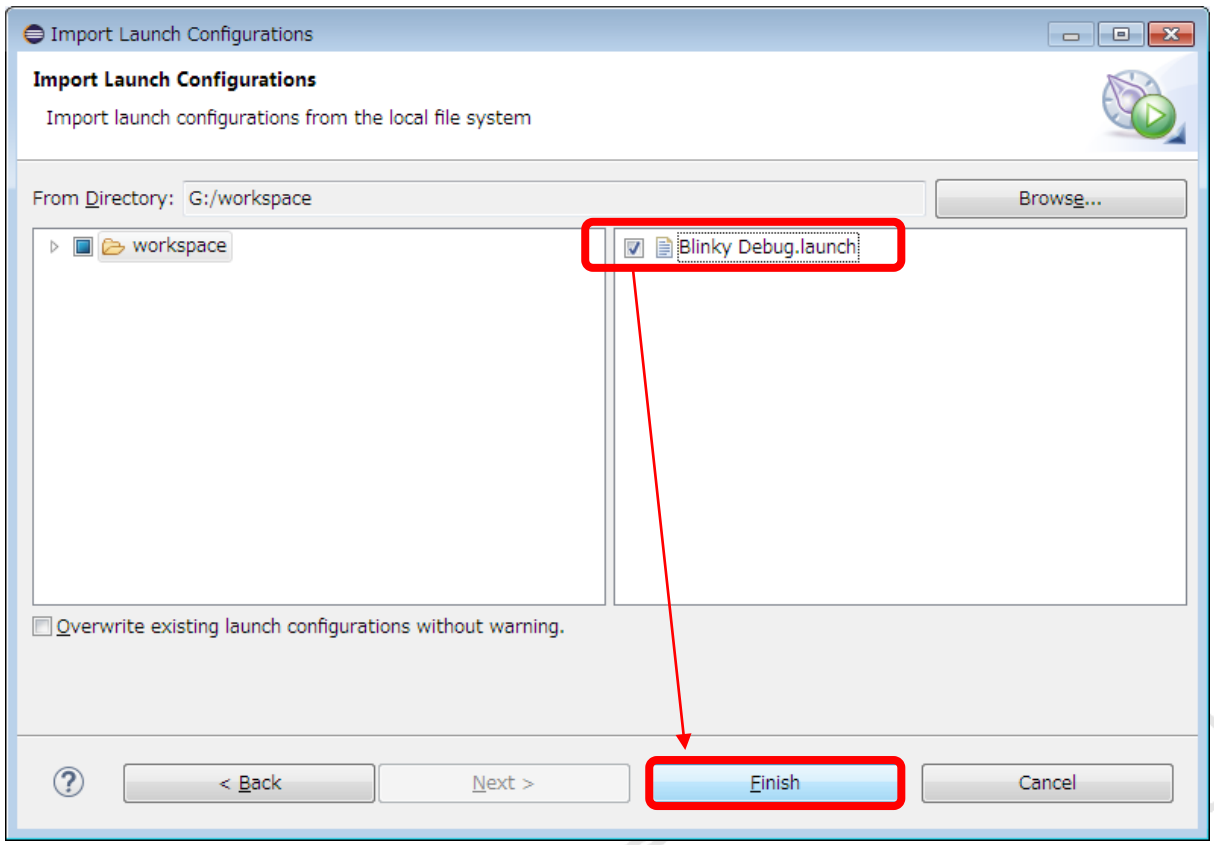


Figure 44

2.3. Connecting Probe

After starting up Eclipse, connect the probe to the PC.
Then, connect the probe to the target using the flat cable that comes with the probe.

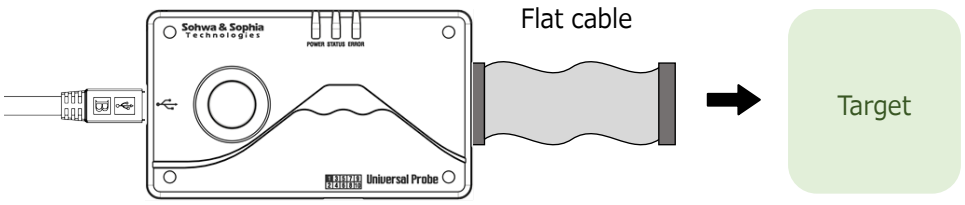


Figure 45

For details of the use of the probe, refer to "Universal Probe Hardware Users Manual".

2.4. Launching the Debugger

1) Select Window → "Open Perspective" → "Debug" from the menu.

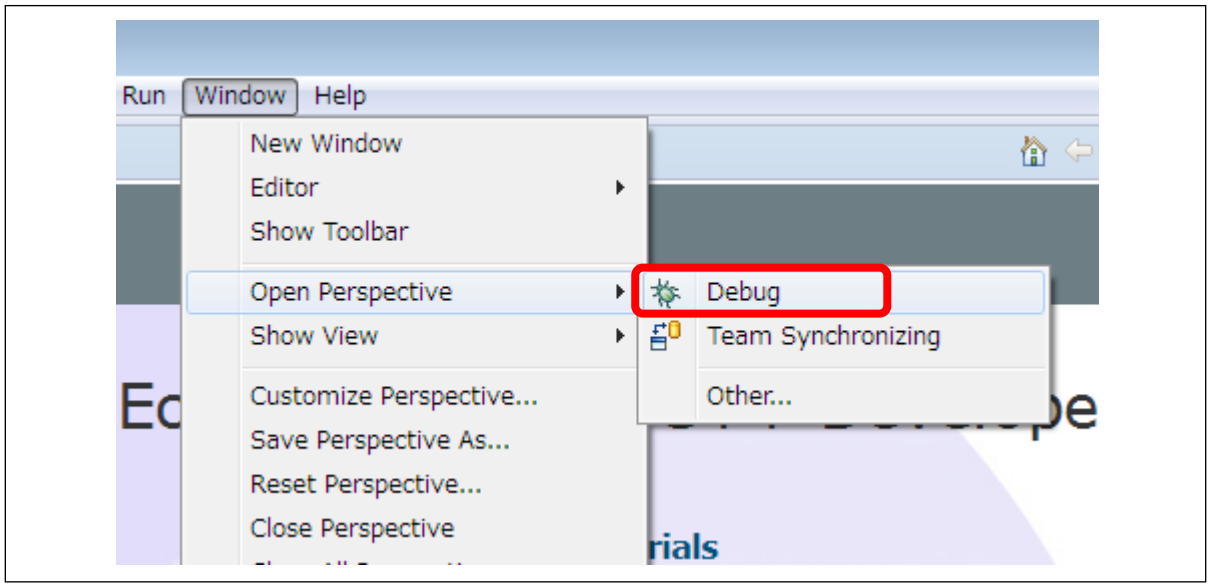


Figure 46

2) Click "X" on the Welcome tab to display Debug Perspective.

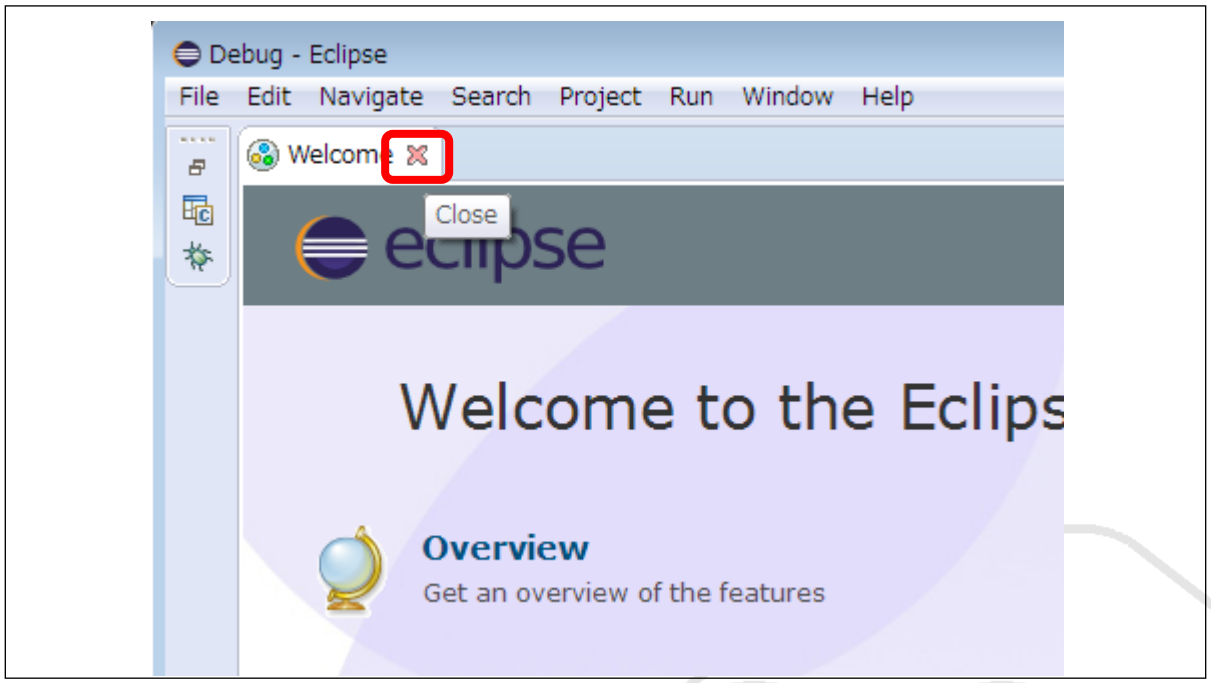


Figure 47

3) The window shown below will be displayed.

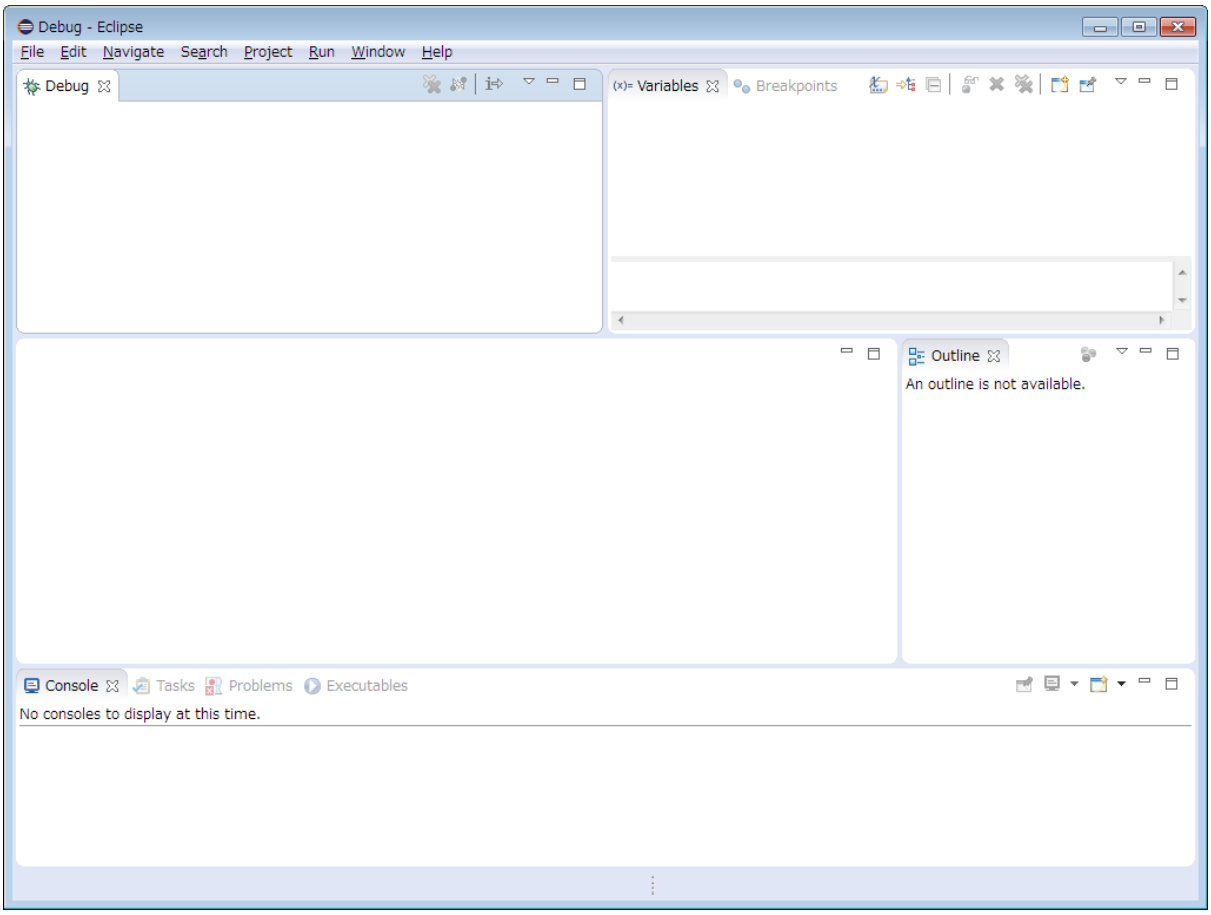


Figure 48

4) Select "Run" → "Debug Configurations..." from the menu.

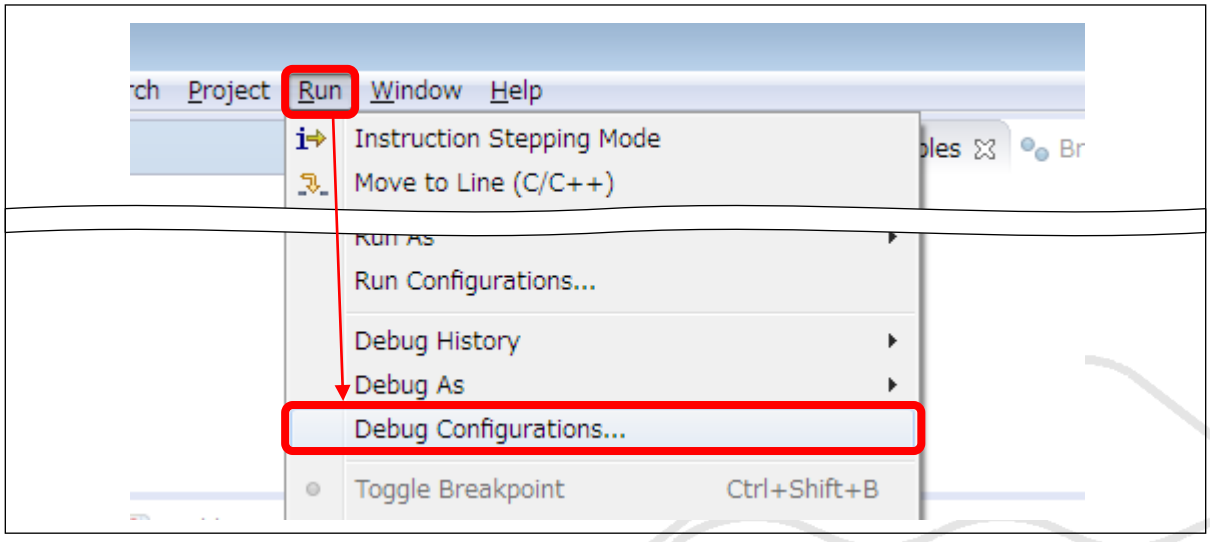


Figure 49

5) Enter "Blinky" in the "type filter text" text box.
When this text is entered, "Blinky Debug" is displayed. Select it and click the Debug button.

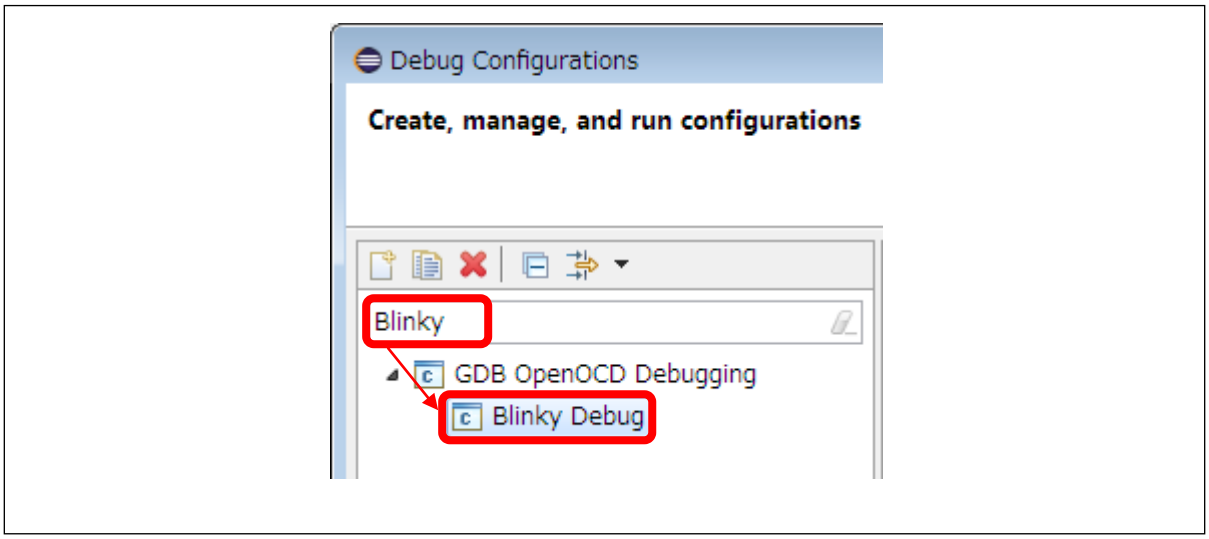


Figure 50

6) Build will be executed once and the download and the debugger will start.
A sample log recorded when the debugger normally started is shown below.

Table 3

```
Open On-Chip Debugger 0.8.0 (2014-04-28-08:39)
Licensed under GNU GPL v2
For bug reports, read
        http://openocd.sourceforge.net/doc/doxygen/bugs.html
Info : only one transport option; autoselect 'cmsis-dap'
Info : CMSIS-DAP:  SWD  Supported
Info : CMSIS-DAP:  JTAG Supported
Info : CMSIS-DAP:  Interface Initialised (SWD)
cortex_m reset_config sysresetreq
Info : add flash_bank kinetis pflash.0
Info : add flash_bank kinetis pflash.1
Info : add flash_bank kinetis pflash.2
Info : add flash_bank kinetis pflash.3
adapter speed:  1000 kHz
Info : SWCLK/TCK = 0 SWDIO/TMS = 0 TDI = 0 TDO = 0 nTRST = 1 nRESET = 1
Info : DAP_SWJ Sequence (reset:  50+ '1' followed by 0)
Info : CMSIS-DAP:  Interface ready
Info : clock speed 1000 kHz
Info : IDCODE 0x2ba01477
START...
END...
Info : k60.cpu:  hardware has 6 breakpoints, 4 watchpoints
Info : accepting 'gdb' connection from 3333
undefined debug reason 7 - target needs reset
START...
END...
target state:  halted
target halted due to debug-request, current mode:  Thread
xPSR:  0x01000000 pc:  0x000004b0 msp:  0x1fff0468
-event reset-init occured
semihosting is enabled
START...
END...
target state:  halted
target halted due to debug-request, current mode:  Thread
xPSR:  0x01000000 pc:  0x000004b0 msp:  0x1fff0468, semihosting
```

3. Troubleshooting

3.1. Program “make” not found in PATH

1) Check the path to MinGW in the PC environment variable and correct it.
When a project is imported, the PC path where the project was created is also imported unchanged.
Change this path.

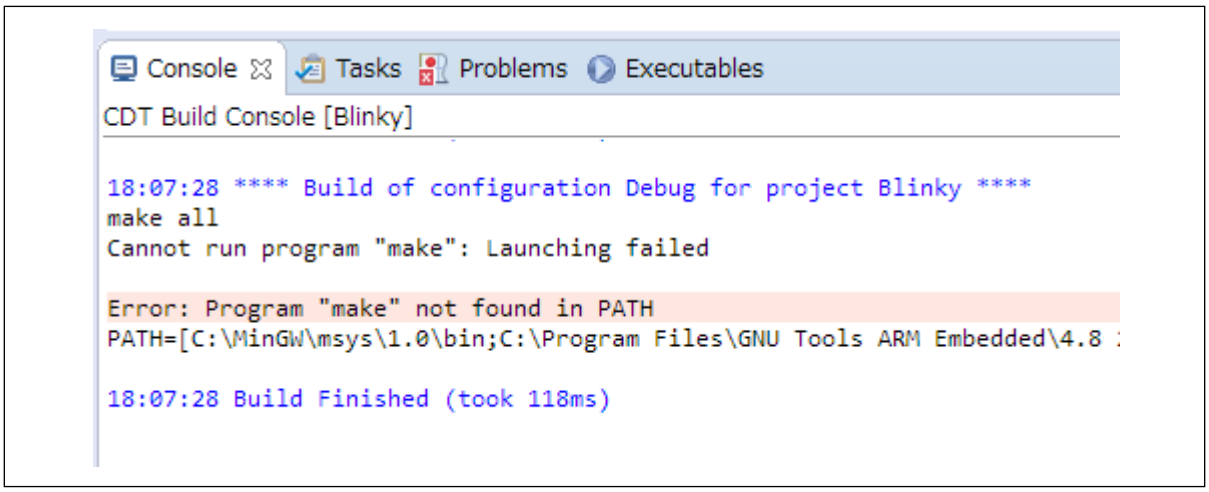


Figure 51

2) To change the path, select "Windows" → "Perspective" → "C/C++" from the Eclipse menu and display the tree of the project. Right-click the uppermost level of the project tree and select "Properties."

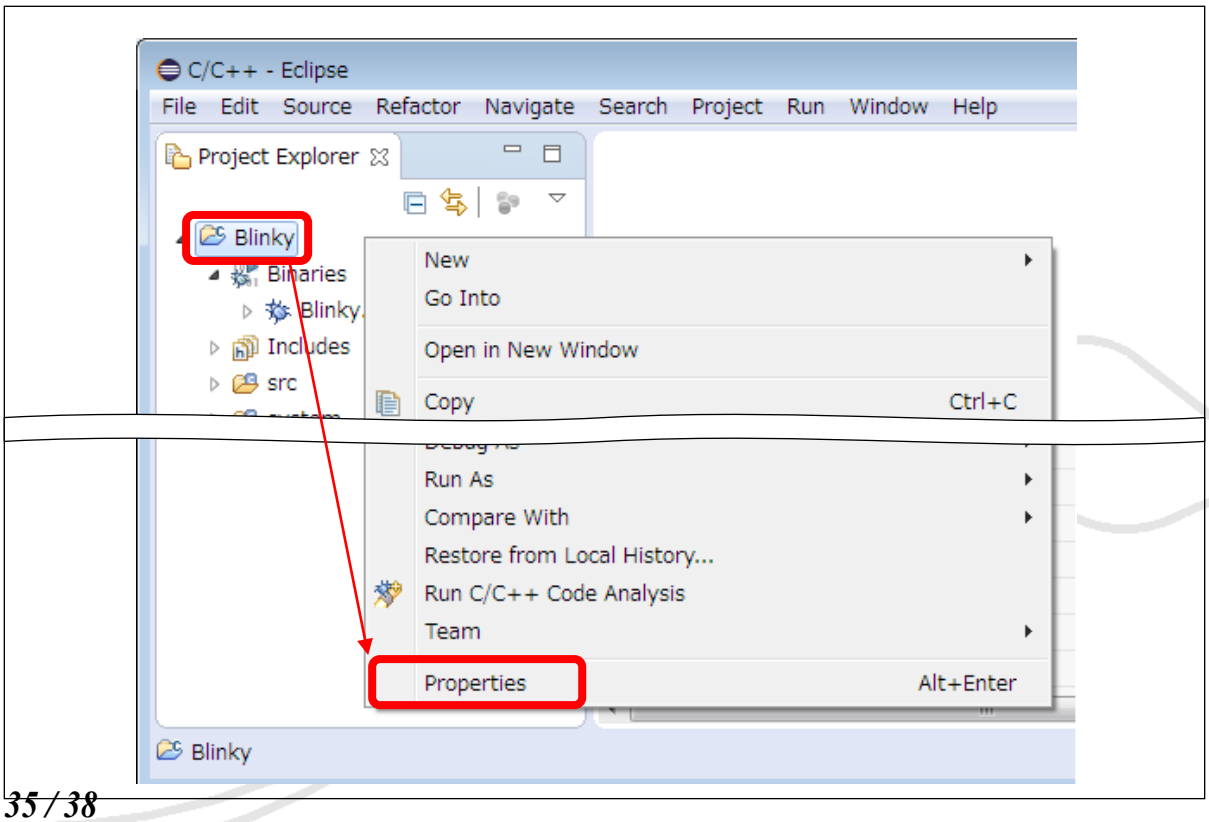
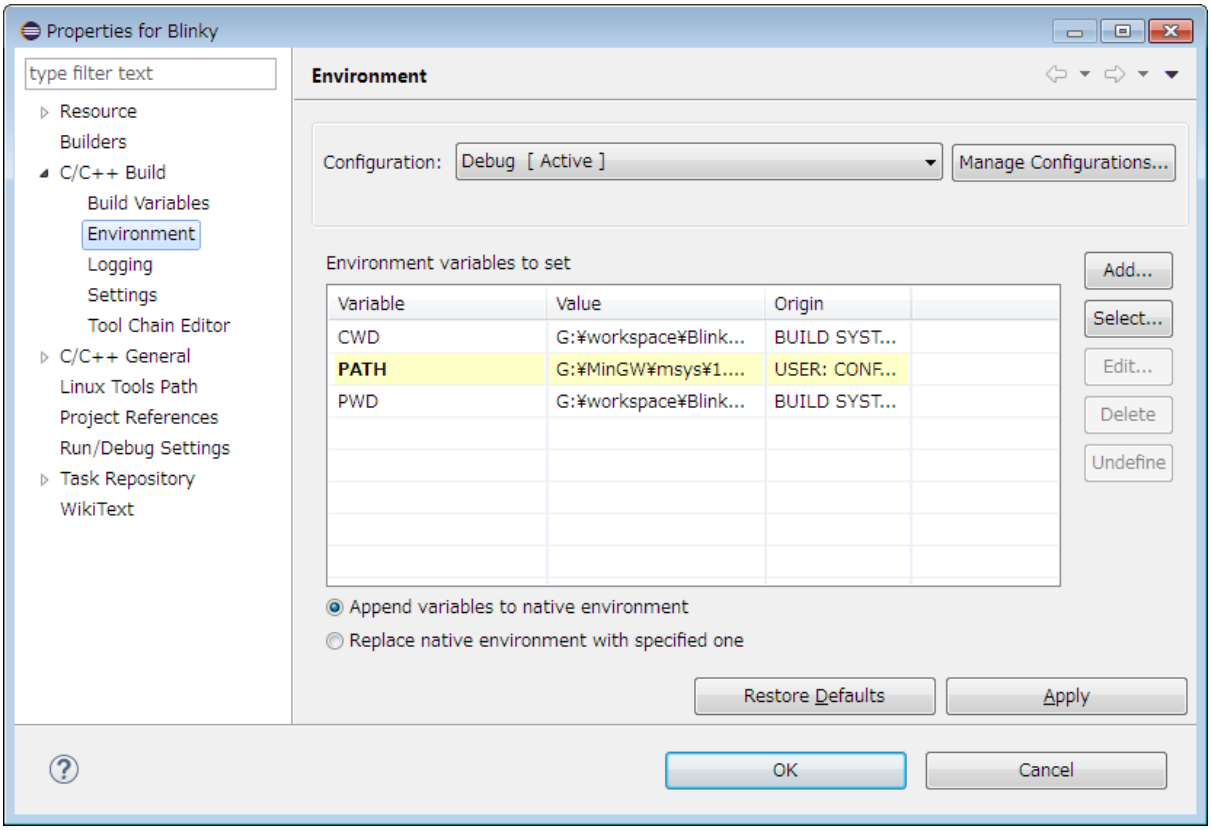


Figure 52

3) Select "C/C++ build" → "Environment" in the left column of the Property for xxxxx window. Change the contents of PATH according to the PC you are using.



Revision History

Ver. No.	Revision date	Contents of revision
01	09/14/2014	Initial Release.
02	11/17/2014	Correction of typographical errors.

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