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SuperH RISC engine C/C++ Compiler Package

APPLICATION NOTE: [IDE User's Guide] Project Setup Guide

This document explains how to use High-performance Embedded Workshop (herein as *Renesas IDE*) for convenient project setup.

Table of contents

1. Layered Projects

1.1 Overview of layered projects

In large-scale application development, applications are often developed using a library for each piece of functionality. This means that a project needs to be created for the application, and also for each library, resulting in multiple projects in the workspace.

Also, when an application and its libraries are developed at the same time, the library projects need to be built before the application project, because the library functions called by the application may have been updated. Renesas IDE allows project dependencies to be specified, to enable project layering and systematic builds.

When projects are given dependencies, and a project from which a dependency is specified (a parent project) is built, the project to which the dependency is specified (child project) is first checked for updates, and is built first if updated. Then, the parent project is built.

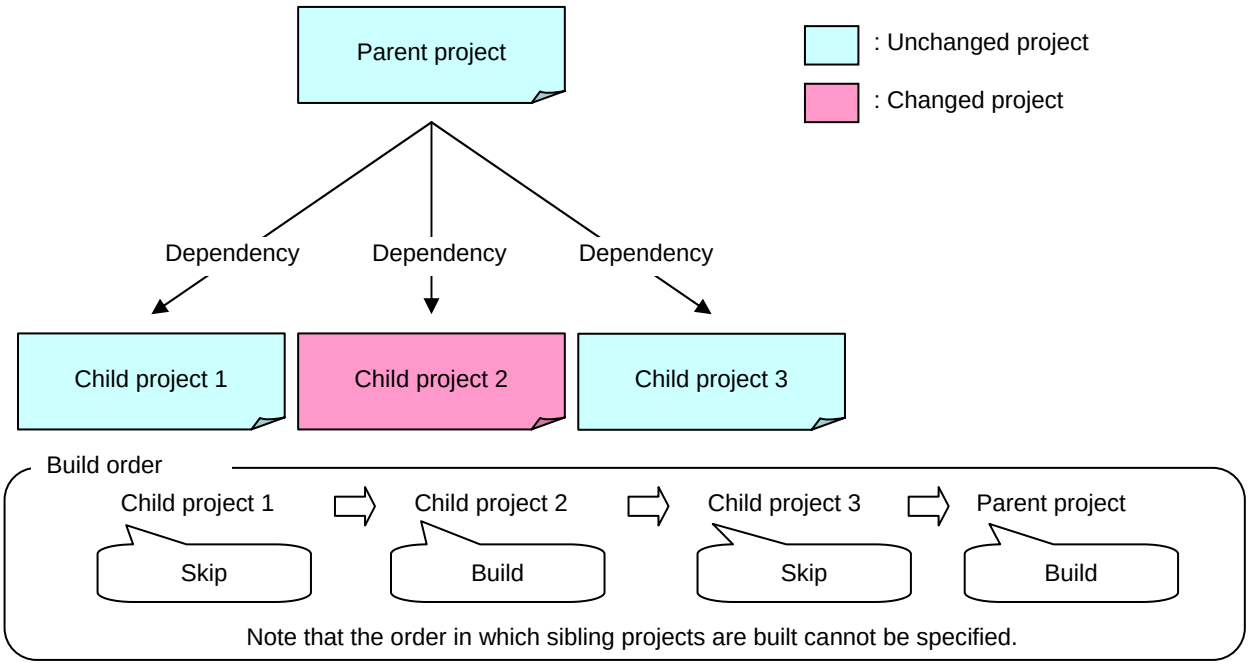

Figure 1-1

Note that the build order cannot be specified for sibling projects, and that a child project specified for another child project (a grandchild project) is not built when the parent project is built.

Also, when a child project is built before its parent project, the configuration used for the child project build is the same as that of the parent project. However, when a configuration only existing for a parent project is set, the configuration for the child project is the last configuration used for a child project.

1.2 Setting up layered projects

The following explains how to set up a layered project, starting with how to insert multiple projects into a workspace.

To insert a project into an existing workspace, from the **Project** menu, choose **Insert Project** to display the **Insert Project** dialog box. This dialog box allows a new project or an existing project to be inserted.

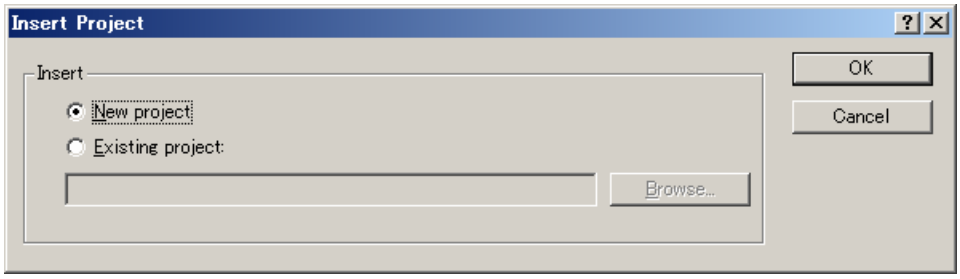

Figure 1-2

To create a library project, select **New project**, and then select **Library** for the project type.

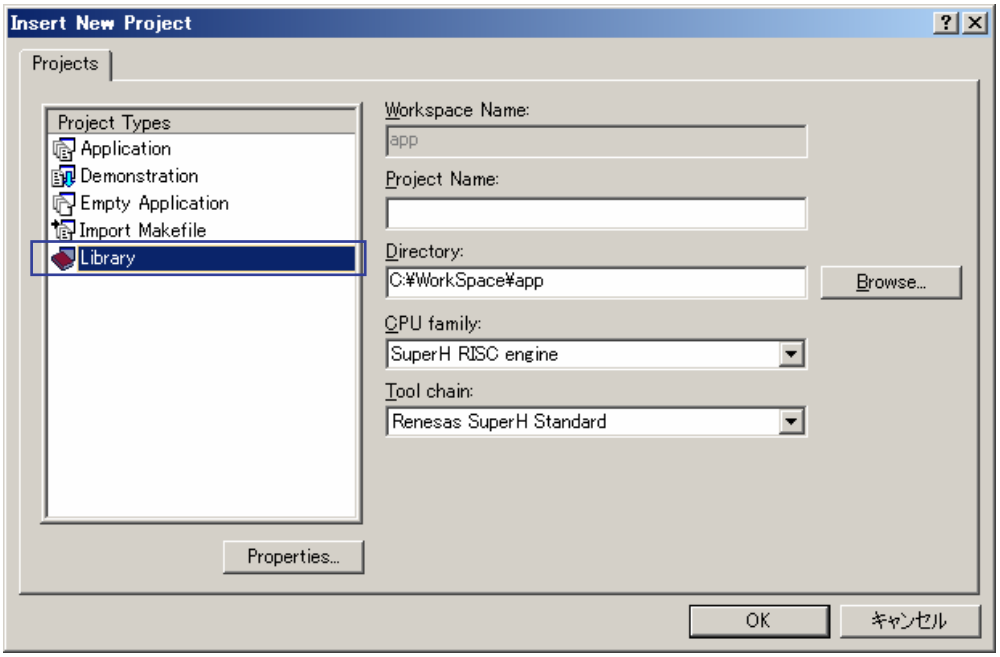

Figure 1-3

The following explains how to give dependencies to a project.

To give a project dependencies, from the **Project** menu, choose **Dependent Projects** to display the **Dependent Projects** dialog box. From the **Project** dropdown list, choose the project to use as the parent project. In the **Dependent projects** list, select the checkboxes for the projects to be used as child projects.

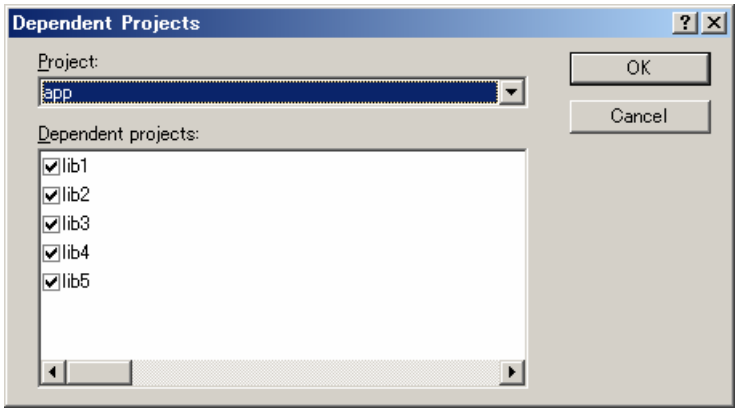

Figure 1-4

Note that if only the dependent project is specified, the library will not be entered into the linker, causing the following error to occur when the parent project is built:

```
L2310 (E) Undefined external symbol "symbol" referenced in "file"
```

When using a library in an application project, specify the library in the linker, in addition to the dependent project setting. Perform these settings as follows in the Renesas IDE.

From the **Build** menu, choose **SuperH RISC engine Standard Toolchain** to display the **SuperH RISC engine Standard Toolchain** dialog box. Then, select the **Link/Library** tab, and select **Input** for **Category**, and **Library files** for **Show entries for**, and click the **Add** button. In the displayed **Add library file** dialog box, specify the libraries to be linked.

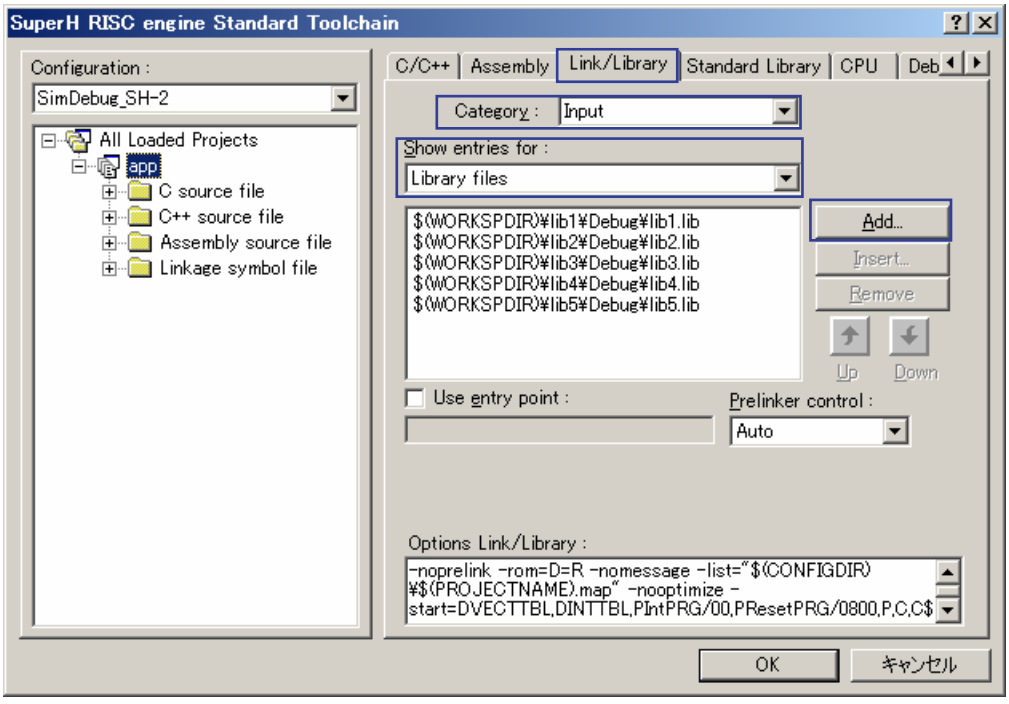

Figure 1-5

2. Project Types

2.1 Overview of project types

Project types can be created as project templates, and used to set the settings for the current project (including its file structure, options, configuration, custom build phase, and session). Created project types can be selected when a new project is created, in which case the settings of the source project are carried over to the new project. This allows replicated projects to be created. Project types can also be imported and exported to facilitate creation of replicated projects on other computers. This is useful when projects need to be derived due to application upgrades and revision upgrades.

Note:
When a project type is used to create a project, files outside the project directory are not replicated. The following warning is displayed before the New project type wizard dialog box is displayed:

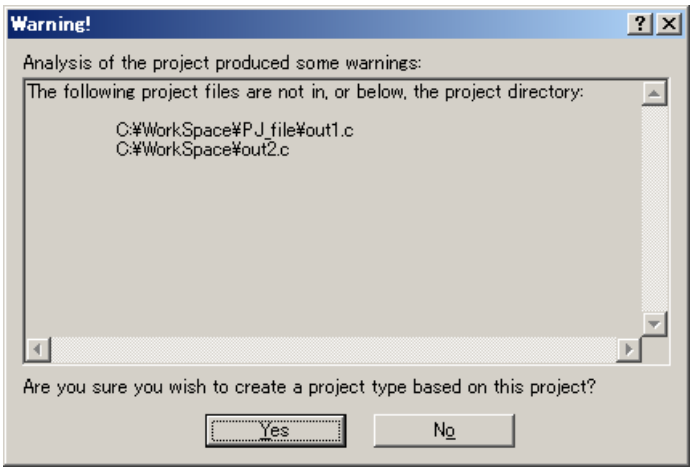

Figure 2-1

The following table lists the path information for files created using a project type.

Table 2-1 Information about Files Created Using a Project Type

Project from which the Project Type Was Created		Project Created Using the Project Type	
File Location	Path Information	File Replication	Path Information
Within the project directory	Absolute path	Replicated	Substituted with the absolute path of the replicated file.
Within the project directory	Relative path	Replicated	Substituted with the relative path from the replicated file project.
Outside the project directory	Absolute path	Not replicated	Unchanged from the original file path information.
Outside the project directory	Relative path	Not replicated	Substituted with the relative path from the project directory, as the files in the project directory.

2.2 Creating and deleting project types

To create a project type from a project, first activate the project from which the project type is to be created, and then save the workspace. Then from the **Project** menu, select **Create Project Type** to display the **New project type wizard - Step1** dialog box. In the **New project type wizard - Step1** dialog box, enter the name of the project type to be created, and click the **Finish** button.

Click the **Next** button to set the graphics and project type icon for the project generation wizard.

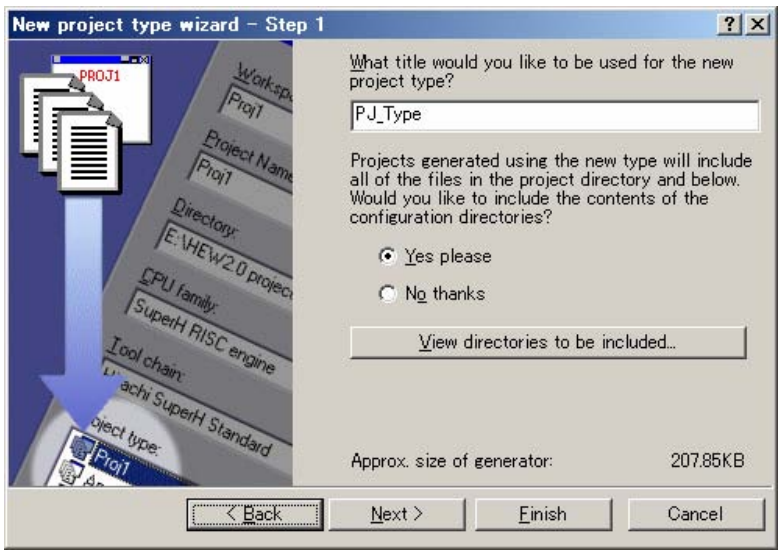

Figure 2-2

When a project type is created, it is displayed in the **Tools Administration** dialog box. When **Administration** is selected in the **Tools** menu, the **Tools Administration** dialog box is displayed. When the **Show all components** checkbox is selected in the **Tools Administration** dialog box, the created project type is displayed as **Project Generators - Custom** for the registered components.

To delete a created project type, close all workspaces, and then open the **Tools Administration** dialog box. In the **Tools Administration** dialog box, select the project type to be deleted, and then click the **Unregister** button.

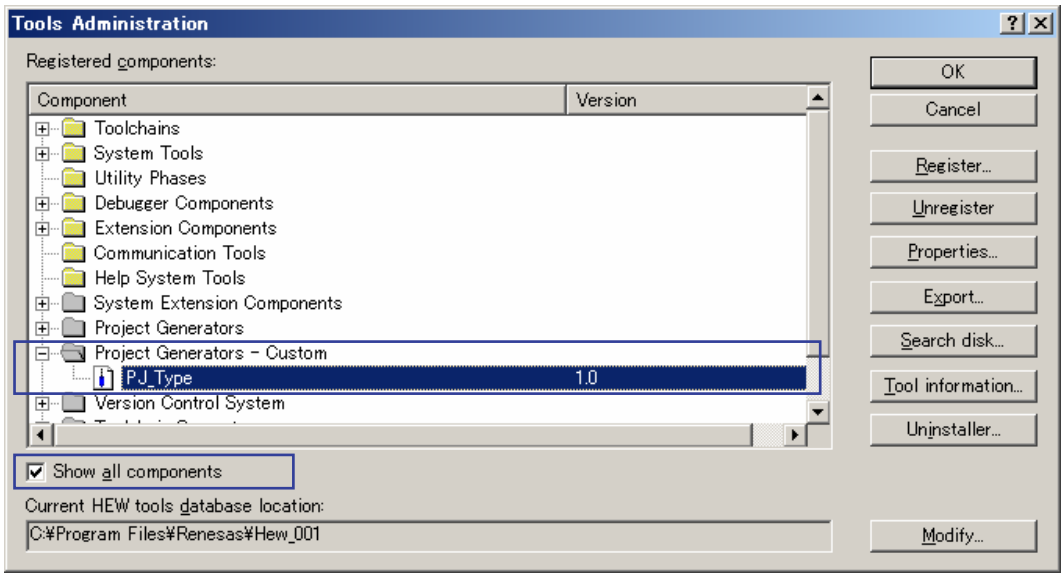

Figure 2-3

Created project types are listed in the **Project Types** list, in the dialog box for creating projects.

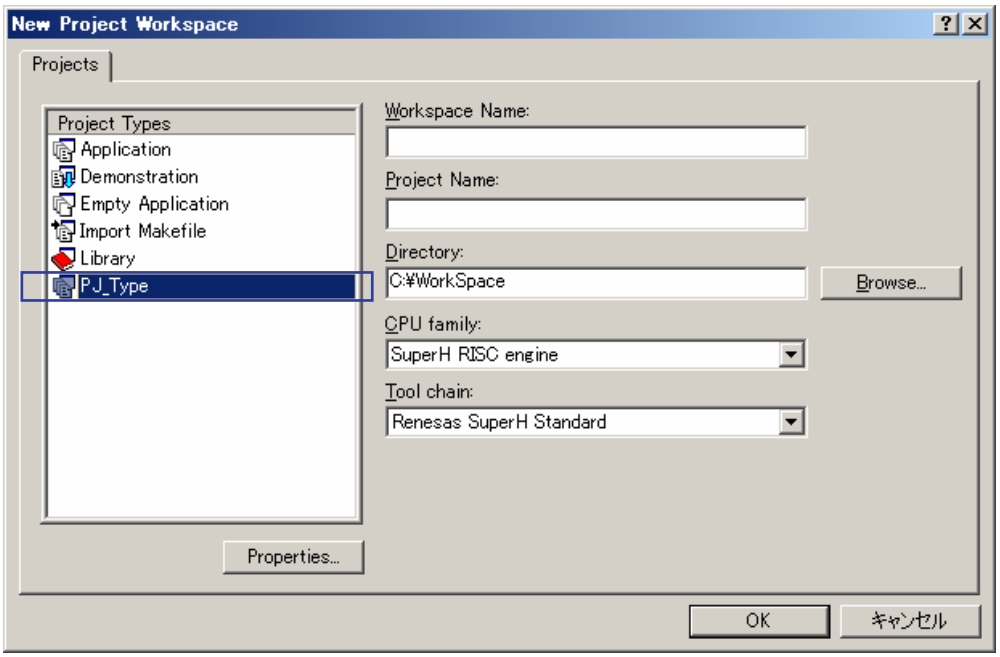

Figure 2-4

A project can be created from an added project type, to replicate the project from which the project type was created. In the **New Project Workspace** dialog box (Figure 2-4), select a created project type. The project created will have the same settings (except for the project name) as those for the project from which the project type was created. For example, the file configuration for a project created using a project type is as follows.

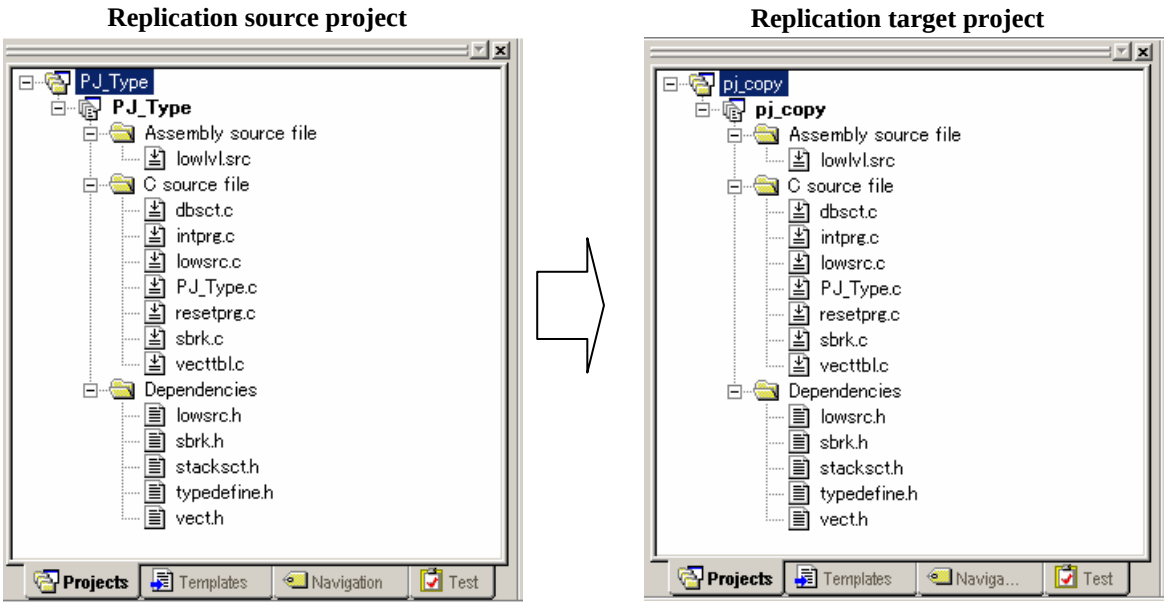

Figure 2-5

2.3 Exporting and importing project types

Project type export/import functionality allows project types to be used on computers other than that on which a project type was created. Once a project type is created on one computer, it can be exported to another. When export is performed, a `Setup.exe` file executable is created to add a project type. This file can then be executed on another computer to import the project type and allow the project type to be used on the computer.

2.3.1 Exporting project types

The following explains how to export a project type.

From the **Tools** menu, choose **Administration** to display the **Tools Administration** dialog box. In the **Tools Administration** dialog box, select the **Show all components** checkbox, to display the created project types in **Project Generators - Custom** for registered components. Select the project type to be exported, and click the **Export** button to display the **Export Custom Project Generator** dialog box. In the **Export Custom Project Generator** dialog box, specify a directory that is empty or does not exist for the directory export destination.

Figure 2-6

When the **Export** button is clicked, a set of installation files is created in the specified directory, including the `Setup.exe` file. For example, when a project type named `PJ_Type` is exported, the following files are generated in the specified directory.

Figure 2-7

2.3.2 Importing project types

The following explains how to import a project type.

Copy the set of installation files created in *2.3.1 Exporting project types*, including the `Setup.exe` file, to the computer to which import is to be performed. With Renesas IDE stopped, execute `Setup.exe` to display the **Install custom generator** dialog box. In the **Install custom generator** dialog box, specify the `HEW2.exe` file in the installation directory of the Renesas IDE to which imported is to be performed. Then, click the **Install** button to add the project type.

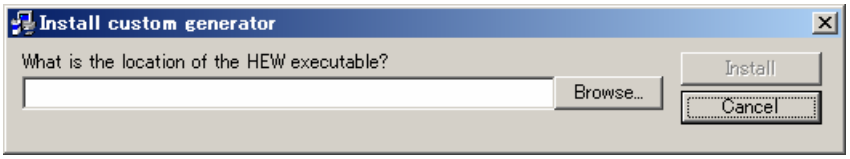

Figure 2-8

The added project type can be checked in the **Tools Administration** dialog box. From the **Tools** menu, choose **Administration** to display the **Tools Administration** dialog box. In the **Tools Administration** dialog box, select the **Show all components** checkbox to display the added project type in **Project Generators - Custom** for registered components.

Note that the toolchain used by the project from which the project type was created may not exist on the import destination computer in the following cases:

- The only toolchain available is one less recent than the creation source toolchain
  A warning window indicating that no compatible toolchain exists is displayed. The generated project will not be able to be built.

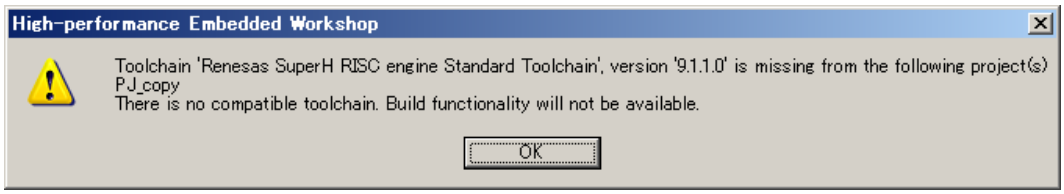

Figure 2-9

- The only toolchain available is one more recent than the creation source toolchain
  When a project is created from a project type, its toolchain can be upgraded.
  To upgrade a toolchain, from the **Toolchain missing** dialog box, select the checkbox for the project, and click the **OK** button. To skip toolchain upgrade, click the **Cancel** button. Note that in the latter case, the generated project will not be able to be built.

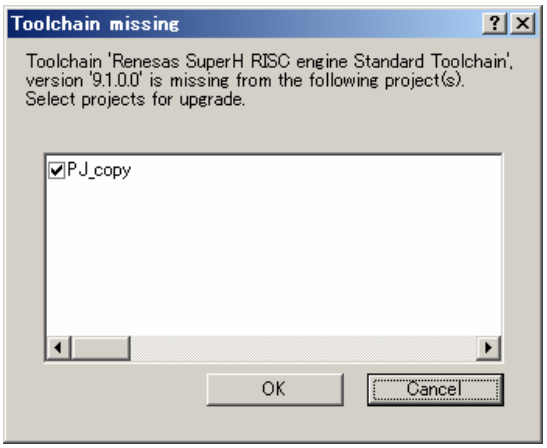

Figure 2-10

When a toolchain is upgraded, the **Change Toolchain Version** dialog box is displayed. Choose the appropriate toolchain and click the **OK** button.

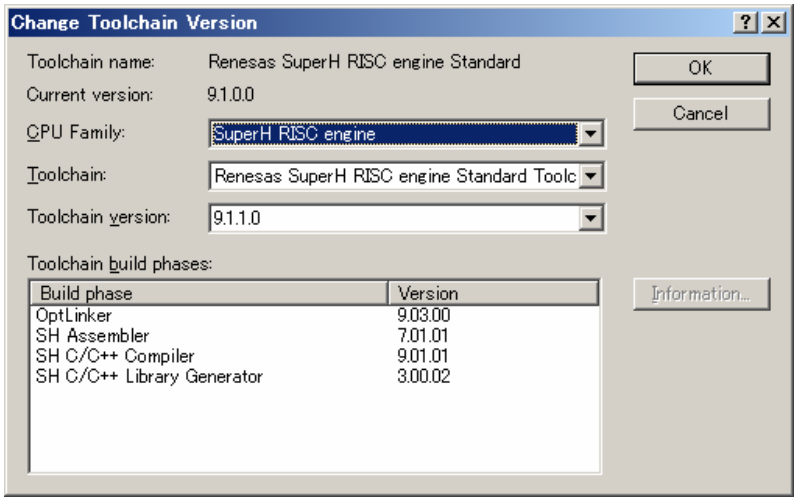

Figure 2-11

3. Exporting and Importing Makefiles

3.1 Makefile overview

The `make` command and makefiles are helpful for projects built using the command line.

Renesas IDE allows a makefile to be generated from a project, and can handle the GNU Make, NMake, and HMake makefile formats. HMake is installed in the installation directory when the Renesas IDE is installed. For details about HMake, see *High-performance Embedded Workshop V.4.02 User's Manual Reference - 13. HMAKE User Guide*. Those using GNU Make or NMake must provide each themselves.

3.2 Creating makefiles

To generate a makefile, from the **Build** menu, choose **Generate Makefile** to display the **Generate Makefile** dialog box. Click the **OK** button to generate the makefile with the specified makefile name, in the `make` directory of the workspace.

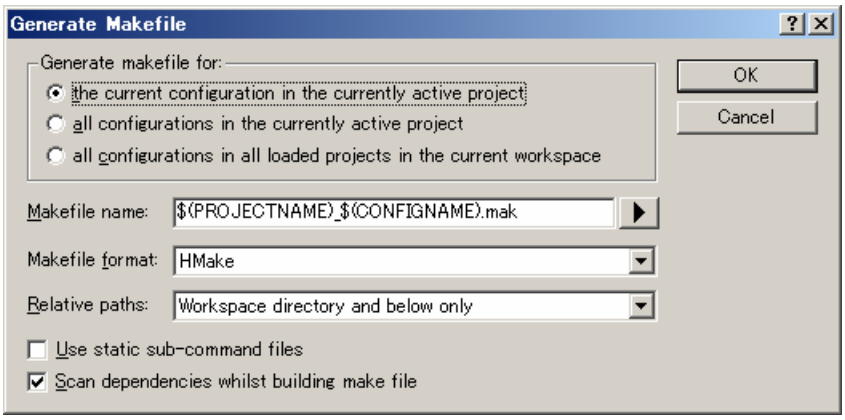

Figure 3-1

The items set are as follows:

- Select a makefile type in Generate makefile for.
  - the current configuration in the currently active project
  - all configurations in the currently active project
  - all configurations in all loaded projects in the current workspace
- Enter the file name in the MakeFile name edit box. To insert a placeholder, place the cursor at the position where you wish to insert the placeholder, click the placeholder button, and select Placeholder from the pop-up menu. The default makefile names are as follows.
  - When "the current configuration in the currently active project" is selected: $(PROJECTNAME)_$(CONFIGNAME).mak
  - When "all configurations in the currently active project" is selected: $(PROJECTNAME).mak
  - When "all configurations in all loaded projects in the current workspace" is selected:$(WORKSPNAME).mak
- Select a makefile format in the Makefile format drop-down list. HEW is capable of generating GNUMake, HMake and NMake compatible files.
- In the Relative paths drop-down list, select how directories within the makefile should expressed. “Workspace directory and below only” is the default option. See the table below for details.

Table 3-1 Path Information for the Relative Path Selection

Option	Workspace Directory and below	Outside the Workspace Directory
None	Absolute path	Absolute path
Workspace directory and below only	Relative path	Absolute path
All	Relative path	Relative path

- Selecting the **Scan dependencies whilst building make file** checkbox will execute a dependency scan before creation of a makefile. This checkbox is selected by default.

3.3 Executing "make"

3.3.1 Executing "make" on the command line

The following explains how to use a created makefile to execute the `hmake` command on the command line. To use `hmake`, when creating a makefile in Renesas IDE, select **HMake** for **Makefile format**.

`hmake` is used as follows. For details, see *High-performance Embedded Workshop V.4.02 User's Manual Reference - 13. HMAKE User Guide*.

- Command line syntax
  The command line syntax is as follows:
  `hmake` *makefile parameter-list*

  If the file is specified without an extension, `.mak` is appended.
- Parameters
  The following table lists the parameters that can be specified.

Table 3-2 Parameters that Can Be Specified for the hmake Command

Parameter	Functionality
/A	Execute all commands regardless of input/output file status. Equivalent to a Build All.
/N	Use status of input/output files to calculate what commands need to be executed (as normal) and then display the commands but do not execute them.
/?	Displays help info.
val=val	Defines a macro. Makefiles created by Renesas IDE can be specified as follows for build configuration and project specifications: • When a makefile for building multiple configurations is used, `CONFIG=`*configuration-name* can be specified to perform build for the specified configuration. • When a makefile for building multiple configurations is used, `PROJECT=`*project-name* can be specified to perform build for the specified project.

3.3.2 Executing "make" in Renesas IDE

The following explains how to perform builds using `make` in Renesas IDE.

To perform settings for builds using `make`, from the **Setup** menu, choose **Options**, and click the **Build** tab in the displayed **Options** dialog box. Select the **use makefile build system (for this workspace)** checkbox to perform builds using the makefile instead of using Renesas IDE.

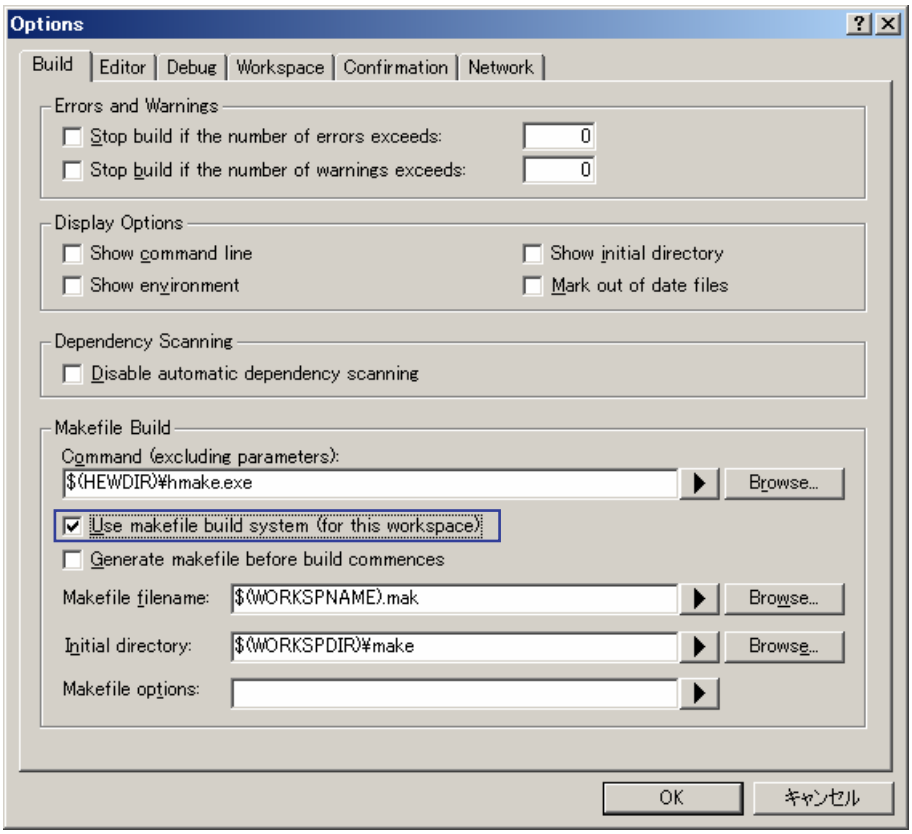

Figure 3-2

The following explains the settings other than for builds using a makefile:

- Enter the make tool name to execute the makefile in the **Command (excluding parameters)** edit box. The default is hmake ($(HEWDIR)\hmake.exe).
- While the **Generate makefile before build commences** checkbox is selected, the Renesas IDE will generate a makefile before executing the build. This means the makefile will always be up to date with the Renesas IDE project system.
- Enter the file name in the **MakeFile filename** edit box. The default file name is $(PROJECTNAME)_$(CONFIGNAME).mak.
- In the Initial directory edit box, enter the current directory where the makefile is to be executed. When this edit box is empty, the directory where the makefile specified in the **MakeFile filename** edit box is stored is assumed as the current directory.
- Enter the options for building the makefile in the **Makefile options** edit box.

3.4 Importing makefiles when creating a project

When a project is created, file information and option information can be analyzed from the makefile and imported into the project. Note that importing is not guaranteed for makefiles not generated by Renesas IDE, and that custom build phase information is not imported.

To import a makefile, select a project type in the dialog box for creating a project, select **Import Makefile**, and then click the **OK** button.

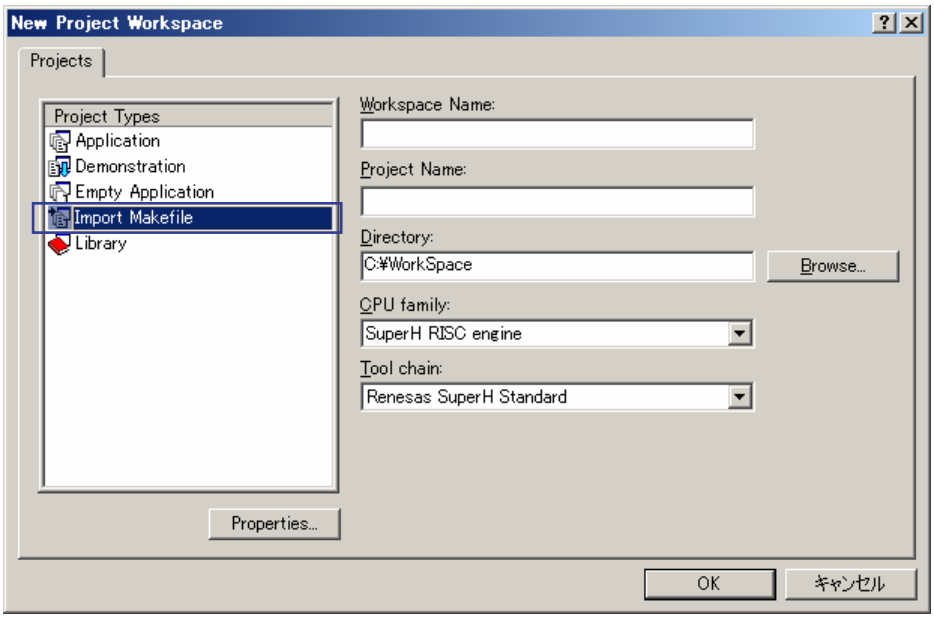

Figure 3-3

The **New Project** dialog box is displayed. For **Makefile path**, specify the makefile to be loaded. When the makefile is specified, the files registered in the makefile are displayed in the **Source files** list.

To import the compiler and other tool options, select the **Import options** checkbox.

Any unnecessary files can be deleted when selected and the **Remove** button is clicked, and files can be added by clicking the **Add** button. To redisplay the files registered in the makefile in the source file list, click the **Start** button. When the **Show file path** checkbox is selected, the names of the files in the source file list are displayed as absolute paths.

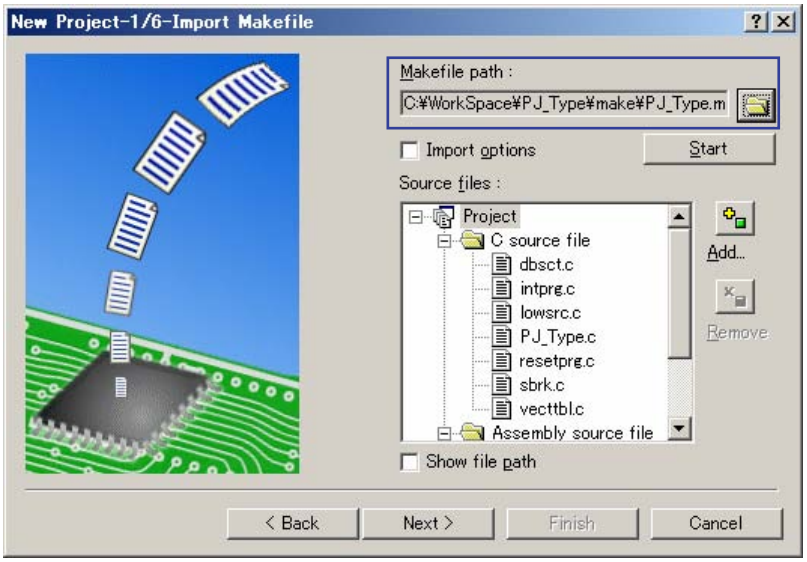

Figure 3-4

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