Integrated Development Environment e² studio

How to use remote debugging with e² studio

Introduction

This application note shows how to debug the system which is connected to a remote PC with e² studio. It makes use of GDB for the remote debugging.

Contents

1. Remote debugging with e² studio

e² studio is an Eclipse-based integrated development environment. Eclipse uses GDB (GNU Debugger) as the debugger. GDB initiates debugging by communicating with a program called GDB server that is connected to the debug target. In case of e² studio, the program is usually debugged with the structure shown in Figure 1.

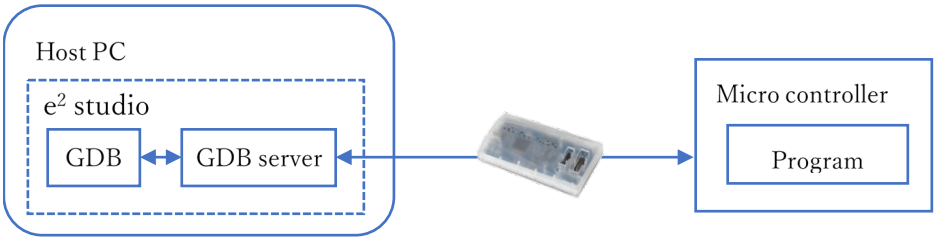

Figure 1. Example of using GDB and GDB Server with e² studio.

GDB can connect to GDB server, even if these are located on different PCs as shown in Figure 2[1].

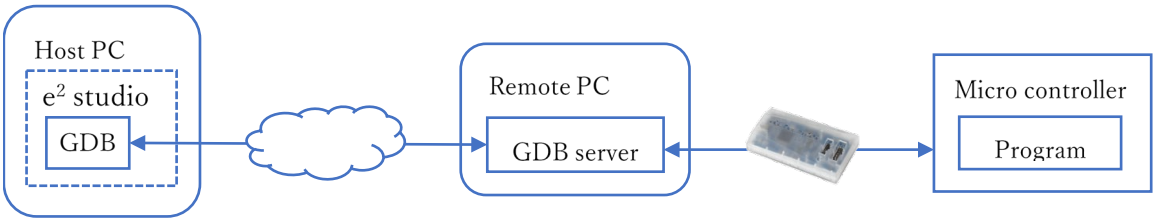

Figure 2. Example of connection to GDB server on the remote PC.

When connecting to a GDB server running on a remote PC by using e² studio, follow the procedure below:

1. Install e² studio to both host PC and remote PC.
2. Start GDB server on the remote PC.
3. Start e² studio on the host PC and connect to GDB server running on the remote PC.

1.1 Installation of e² studio to host PC and remote PC

Install e² studio on each of host PC and remote PC. Please use the same version of e² studio.

1.2 Starting GDB server on the remote PC

1.2.1 To confirm the location where GDB server for e² studio is stored

The GDB server used by e² studio is stored in the support folder of e² studio. The support folder can be opened by selecting [Help] -> [About e² studio] from the e² studio menu and clicking the "Installation Details" -> "Support Folders" -> "e² studio support area" link from the dialog box.

[1] To connect from GDB to GDB server, A GDB command 'target remote' or 'target extended-remote' is used (please refer to https://sourceware.org/gdb/onlinedocs/gdb/Connecting.html for more details). With this command, IP address and port number can be specified for the destination of the connection.

Therefore, even if the GDB server is running on a PC different from the host PC, GDB can connect to the GDB server on the remote PC running over the network by using the IP address and port number.

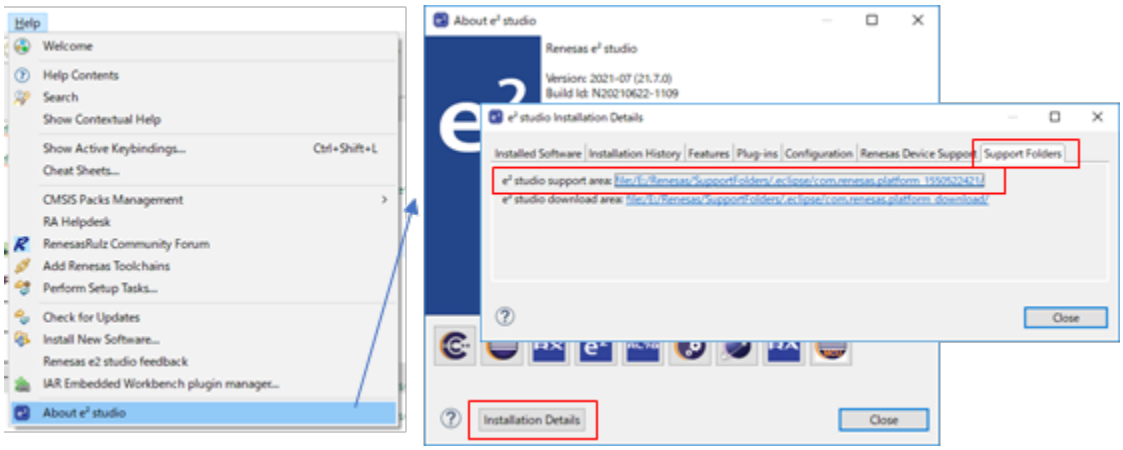

Figure 3 support folder of e² studio

The GDB server is stored in the “<support folder>\DebugComp\device family name” folder with the file name e2-server-gdb.exe.

1.2.2 Starting GDB server (e2-server-gdb)

To start GDB server, please open a console such as a command prompt, move the working folder to the folder confirmed in 1.2.1, and start GDB server (e2-server-gdb.exe). If there is no person at the remote PC side, connect to the remote PC from the host PC by remote desktop connection, etc., and start e2-server-gdb.exe on the remote PC.

When starting e2-server-gdb, you need to specify the options required for connection as parameters. For the parameter, please specify the option that is displayed on the “Renesas GDB server” console in the console view, when the debugging of e2 studio is started on the host PC or remote PC (Figure 4).

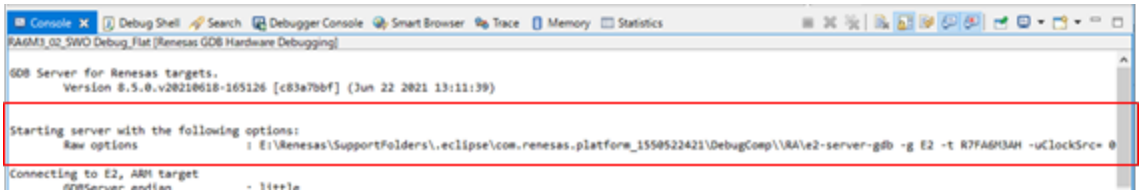

Figure 4. Console view of e² studio

When starting e2-server-gdb from the command prompt on Windows PC, the characters ‘|’ or ‘&’ included in the parameters must be escaped with ‘^’. Please add ‘^’ before the character.

If e2-server-gdb is started successfully, the message "Finished target connection" and the port number to be connected from GDB will be displayed on the console.

Figure 5. The display of the port number on Console

The port number is automatically determined by e2-server-gdb, but it can be specified explicitly by using the e2-server-gdb startup option ‘-p’. Please specify the port number with the option such as "-p port number".

Note: The IP address of the remote PC needs to be reachable from the host PC.

Note: The port numbers used by e² studio and GDB server need to be opened to the host PC. Other than the port used for the connection between GDB and GDB server, e² studio would use several ports. Please open the dynamic private port number (49152-65535) to the host PC.

1.3 Starting e² studio on the host PC

Start e² studio on the host PC.

When connecting to the GDB server running on the remote PC from e² studio started on the host PC, please specify the GDB server location to connect to in the debug configuration.

Open the debug configuration and select "Connect to remote GDB server" in GDB Connection Settings on "GDB Settings". Since you can specify “Host name or IP address” and “GDB port number”, please specify the IP address of the remote PC and the port number which GDB server is waiting the connection as shown in Figure 4.

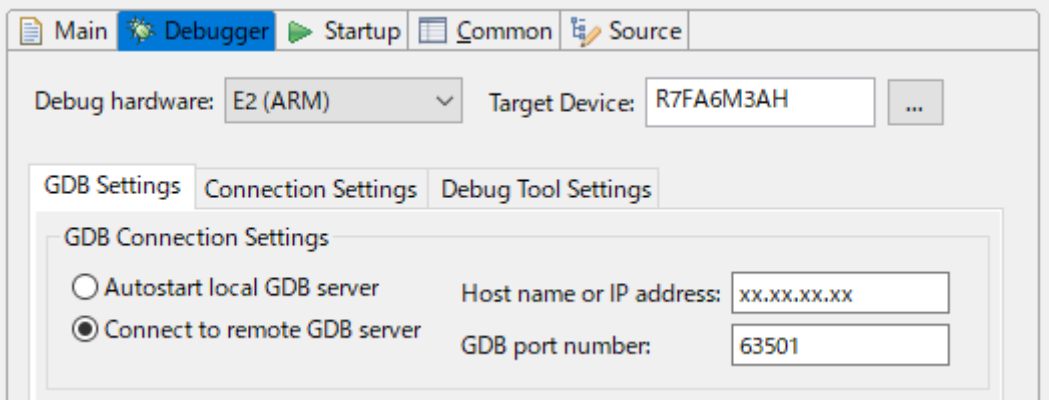

Figure 6. Setting of Debug Configurations

For the settings of "Connection Settings" and "Debug Tool Settings", please specify the same settings used when displaying the parameters in 1.2.2.

After setting as above and pressing “Debug” button, e² studio will try to connect to the GDB server running on the remote PC. Before pressing “Debug” button, please start the GDB server on the remote PC in advance and check that the message "Finished target connection" has been displayed.

If the connection from e² studio to the GDB server is successful, debugging of the microcontroller connected to the remote PC will start. When you disconnect the connection in e² studio, the connection with the GDB server on the remote PC will also be disconnected, and the GDB server will be finished.

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Sep.01.21	-	New creation

General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Precaution against Electrostatic Discharge (ESD)

   A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.
2. Processing at power-on

   The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.
3. Input of signal during power-off state

   Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.
4. Handling of unused pins

   Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.
5. Clock signals

   After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.
6. Voltage application waveform at input pin

   Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).
7. Prohibition of access to reserved addresses

   Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.
8. Differences between products

   Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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