

# GDB Debugger Tool for Microcontroller

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## ABSTRACT

Debugger is the most essential tool to assist programmer and increase productivity. This paper presents the list of features that are not available in GDB hardware debugger plug-in provided by Eclipse and proposes solution to have those features for debugging Infineon Microcontrollers. Features such as Reset method and Special Function Register view are not available in the GDB Eclipse plug-in. Also memory view in the debug perspective often fails to access certain memory ranges and does not display the selected memory locations.

## Keywords

GDB - GNU Project debugger;  
SFR - Special Function Register;  
DAVE - Digital Application Virtual Engineer

## 1. INTRODUCTION

This paper describes how the GDB hardware debugging plug in for DAVE (Digital Application Virtual Engineer) can be customised and improved. DAVE is a code generation tool used by Infineon. As per the requirements a GDB debugger was suggested for debugging Infineon microcontrollers.

GDB, the GNU Project debugger, allows you to see what is going on 'inside' another program while it executes -- or what another program was doing at the moment it crashed<sup>[1]</sup>.

GDB connects to an emulator via a TCP/IP connection. It can connect to every emulator for which GDB Server software is available.

## 2. LITERATURE SURVEY

Debugger is the most essential tool to assist programmer and increase productivity. The GDB hardware debugger provided by Eclipse although stable lacks a few features such as:

- The GDB debugger Eclipse plug-in does not have a method to reset the board being debugged. Without a direct reset button, the only way to reset the board is to restart debugging the project again.
- GDB Eclipse plug-in does not have a built in Special Function Register (SFR) viewer. There is no easy way to find the values of the special function

registers or to edit them without explicit write statements.

- The memory view in the debug perspective often fails to access certain memory ranges and does not display the selected memory locations.

## 3. PROBLEM STATEMENT

The GDB hardware debugger provided by Eclipse can be customised and improved to add the features it lacks [see Section 2.]

This paper describes how the GDB Eclipse plug-in can be customised to add features it is lacking for debugging Infineon Microcontrollers.

## 4. SOLUTION

For debugging, the SEGGER J-Link GDB server would be invoked. GDB Server is a remote server for GDB. When GDB runs in the GDB source directory, it will read a .gdb file. The .gdb file contains default setting information and additional monitor commands. GDB and GDB Server communicate via a TCP/IP connection, using the standard GDB remote serial protocol. The GDB Server translates the GDB monitor commands into J-Link commands<sup>[2]</sup>.

The GDB configuration default settings such as protocol version, host name, port number, etc., are changed as required by the J-Link GDB server.

The J-Link GDB server is invoked programmatically when the debug session starts. This can be done by looking for the installed J-Link GDB server and sending the target device name to the server.

The GDB perspective is customised to add the 'Reset' button and the SFR viewer. The SFR viewer "EmbSys Registers"<sup>[3]</sup> is an existing eclipse plug-in which is customised to add details of Infineon Microcontrollers. Fig 1 shows the customised GDB perspective.

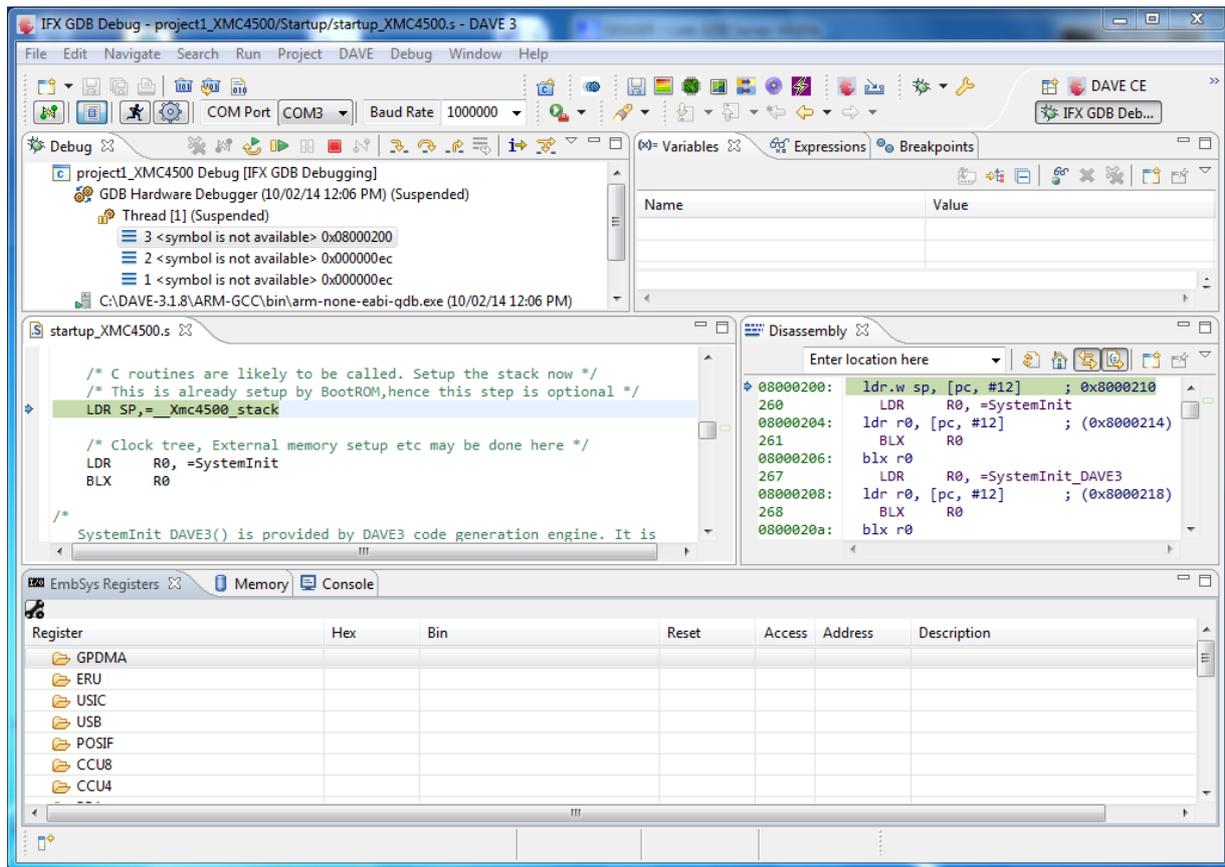


Fig 1: Snapshot of Customised GDB Perspective

#### 4.1 Reset Method

The GDB debugger Eclipse plug-in needed a reset button that allowed remote devices to be reset without having to be started again. Adding the reset button would allow the user to reset the target during the debug session. Fig 2 shows the 'Reset' button in the customised GDB Eclipse plug-in.

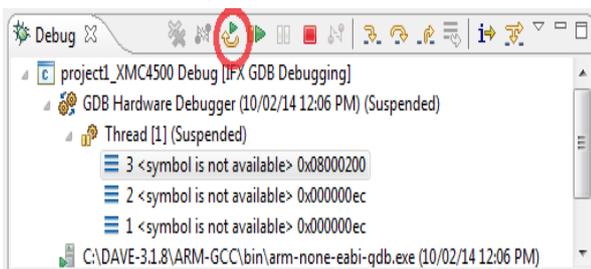


Fig 1: Snapshot of Reset button

#### 4.2 SFR Viewer

Adding SFR viewer would greatly help the user in viewing the register values without the need of explicit read functions. The values of the register can be viewed as the program executes. Hence SFR viewer 'EmbSys Registers' is added to

the GDB perspective. EmbSys Registers view is a tree which displays all the peripherals of the chosen target at the first level. Once the peripheral is expanded, all the resource groups under the peripheral would be visible. The registers belonging to a resource group can be viewed by expanding the resource group node. Details of the register such as Hexadecimal value, binary value, reset value, access permission (such as read-write, read only, etc.), address and description would be available (See Fig 3). Similar details of bit fields can also be viewed by expanding the corresponding register node (See Fig 3).

#### 4.3 Memory View

The GDB Eclipse plug-in memory view was throwing errors for certain ranges of addresses. The errors were thrown because of the following:

The Memory view automatically fetches data from enough addresses around the required address whenever the user scrolls. Therefore, at a boundary region, it automatically tries to fetch data from locations before it, thereby causing the read to fail.

To avoid this, fetch the location needed and not automatically fetch locations when scrolled.

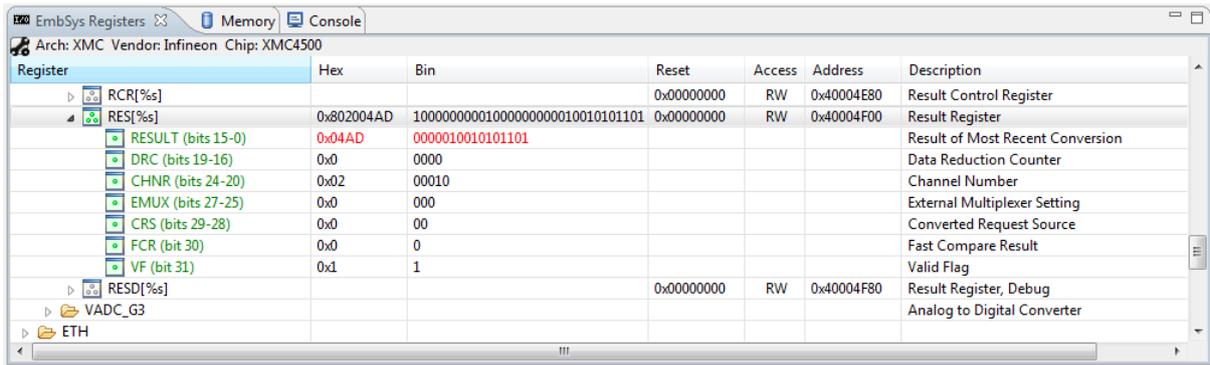


Fig 2: Snapshot of SFR View

## 5. CONCLUSION

In this paper list of features that are not available in GDB debugger Eclipse plug-in are described such as: No method to reset the board being debugged, there is no easy way to find the values of the special function registers or to edit them without explicit statements and the memory view in the debug perspective often fails to access certain memory ranges and does not display the selected memory locations.

In section 4 of the paper, customization of GDB Eclipse plug-in for debugging Infineon Microcontrollers by adding a 'Reset' button, adding SFR view and sort the memory issue is described.

Adding the reset button would allow the user to reset the target during the debug session. With the SFR view, the user can view the details of all the special function registers present in the target during the debug session.

## 6. ACKNOWLEDGMENT

We thank the experts, who have contributed towards development of the customised GDB Eclipse plug-in for Infineon Microcontrollers.

## 7. REFERENCES

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