

Introduction

This document describes the software debuggers that can be used to effectively debug Excalibur™ devices via the ByteBlasterMV™ or MasterBlaster™ download cable from Altera®. The debuggers interface to the target via JTAG, using either a stub or a remote debug interface. The procedure for connecting to Excalibur devices is given below for the following debuggers:

- Insight
- AXD—the ARM® extended debugger
- XRAY

Before starting the debugger, the Excalibur device must have been pre-configured using either boot-from-flash or boot-from-passive-serial modes. Configuring the device involves initializing the processor subsystem (i.e., setting up the memory map), loading the software application code, and initializing the FPGA.



Refer to the *EPXA10 Development Kit Getting Started User Guide* for information on configuring Excalibur devices.

Insight



EXCALIBUR™

The GNUPro toolkit from Red Hat Corporation incorporates the Insight graphical debugger. The debugger interfaces with the GNU debugger stub (**gdbstub**) provided by Altera in the Quartus® II software, version 2.1 or higher. The Altera-supplied stub runs on a host PC; it allows application code to be debugged on Excalibur devices using JTAG.



The GNU debugger stub referenced in the Red Hat manual *GNUPro Toolkit User's Guide for Altera ARM and ARM/Thumb Development* is RedBoot, a monitor program that is installed with the GNUPro Toolkit.



Follow the steps below to set up the Insight debugger:

1. In a Command Prompt window, start up the GNU debugger stub; type:

```
<Quartus installation directory>\bin\gdbstub␣
```

2. Start Insight; in the Command Prompt window, type:

```
<GNUPro installation directory>\bin\arm-elf-gdb.exe
```
3. In the Insight debugger window, choose **Open** (File menu), browse to the desired `<filename>.elf` file and click **Open**.
4. Choose **Connect To Target** (Run menu) and in the Target Selection dialog box specify the following:
 - **Target:** Remote TCP
 - **Port:** 9999
 - **Download Program** (under **More Options**): turn off
5. Click **OK**.



Insight and **gdbstub** communicate via the TCP protocol using the conventional port 9999. By using the `-port` argument, you can direct **gdbstub** to use a different port.

You can now proceed with debugging your application code.



Refer to the *GNUPro Toolkit User's Guide for Altera ARM and ARM/Thumb Development* manual for further details. Refer to the *EPXA10 Development Kit Getting Started User Guide* for an example of debugging with GDB Insight.

AXD

The ARM Development Suite (ADS) tools include the AXD debugger, which you can use to debug targets via an RDI connection. The RDI is the standard application interface between ARM processors and ARM-supported debuggers. AXD connects via **Altera-RDI.dll**, which is provided with the Quartus II software or the Excalibur utilities.

Follow the steps below to set up the AXD debugger:

1. Start AXD; choose **Start>Programs>ARM Developer Suite> AXD Debugger** (Start menu).
2. Choose **Configure Target** (Options menu) in the AXD debugger window.
3. If Altera-RDI is listed as a target, select it, and click **OK** to connect to the processor subsystem.

If Altera-RDI is not listed as a target, add it by performing the following steps:

- a. Click **Add** in the Choose Target dialog box and browse to the *<Quartus Installation Directory>\bin* directory.
 - b. Select **Altera-RDI.dll** and click **Open**.
 - c. Click on **Altera-RDI** in the Choose Target dialog box.
 - d. Click **Configure** to set the Endianness and click **OK**.
 - e. Click **OK** to connect to the processor subsystem.
4. Choose **Load Debug Symbols** (File menu) in the AXD debugger window and browse to the desired *<filename>.elf* file.
 5. Click **Open**.

You can now proceed with debugging your applications. For more information on AXD, refer to the *ARM Developer Suite - Debuggers Guide*.

XRAY for Excalibur

XRAY, from Mentor Graphics®, is a host-based, source-level debugging tool that helps you debug your target applications through an RDI connection. The RDI is the standard application interface between ARM processors and ARM-supported debuggers. XRAY for Excalibur connects via **Altera-RDI.dll**, which is provided with the Quartus II software or the Excalibur utilities.

Follow the steps below to connect the XRAY debugger to an Excalibur target:

1. Start XRAY by choosing **Start>Programs>XRAY>XRAY for Excalibur Devices**.

The XRAY for Excalibur installation includes a board file, **rdi.brd**, that is configured to connect the debugger to an Excalibur development board automatically through the ByteBlasterMV or MasterBlaster download cable.

2. Type **reset** at the Code Command window to reset the target board.
3. Choose **Load File to Target** (Debug menu) in the Code window and browse to the desired *<filename>.elf* file.
4. Click **Load Symbols Only** in the Load File to Target dialog box and click **Open**.

Downloading Software Images Through a Debugger



You can now proceed with debugging debugging your application code.

Refer to the *XRAY for Excalibur User's Guide* for more information on the debugging applications with the XRAY debugger.

The previous sections describe the steps to debug application code that has already been pre-loaded into the target's memory. To download a software image into the target's memory through a debugger, the processor subsystem must already be configured (i.e., the memory map has already been set up) and be executing an application code that just branches to itself.



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