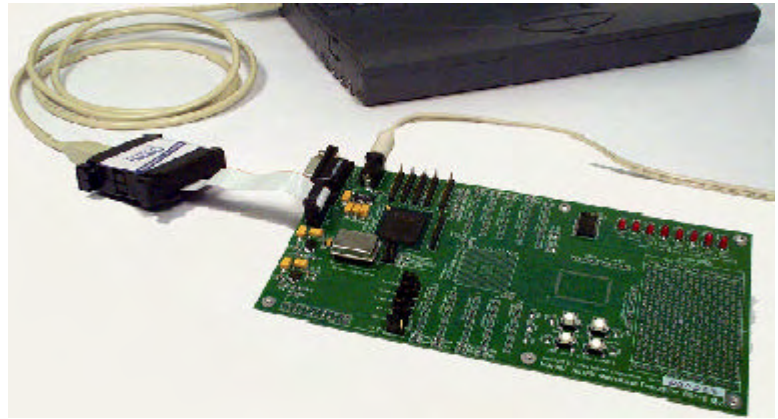


EMUL-PPC-PC

Getting Started Guide

Version 1.0



EMUL-PowerPC™


Getting Started Guide

Edition 1

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Product Notes

Warranty Information

The debugger hardware is sold with a one-year warranty starting from the date of purchase. The defective component under warranty will either be repaired or replaced at ICE Technology's discretion.

Seehau software is sold with no warranty, and upgrades can be obtained by contacting support at support@icetech.com.

We make no other warranties, express or implied, including, but not limited to the implied warranties of merchantability and fitness for a particular purpose. In no event will ICE Technology be liable for consequential damages.

European CE Requirements

We have included the following information in order to comply with European CE requirements.

User Responsibility

The in-circuit debugger application, as well as all other unprotected circuits need special mitigation to ensure Electromagnetic Compatibility (EMC).

The user has the responsibility to take required measures in the environment to prevent other activities from disturbances from the debugger application according to the user and installation manual.

If the debugger is used in a harsh environment (field service applications for example), it is the user's responsibility to control that other activities cannot be disturbed in such a way that there might be risk for personal hazard/injuries.

Special Measures for Electromagnetic Emission Requirements

To reduce the disturbances to meet conducted emission requirements it is necessary to place a ground plane on the table under the JTAG cable and the connected processor board. The ground plane shall have a low impedance ground connection to the host computer frame. The insulation sheet between the ground plane and circuit boards shall not exceed 1mm of thickness.

System Requirements

CAUTION

Like all Windows applications, the Seehau software requires a minimum amount of free operating system resources. The recommended amount is at least 40%. (This is only a guideline. This percentage might vary depending on your PC.) If your resources are dangerously low, Seehau might become slow, unresponsive or even unstable. If you encounter any of these conditions, check your free resources. If they are below 40%, reboot and limit the number of concurrently running applications. If you are unable to free at least 40% of your operating system resources, contact your system administrator or Nohau Technical Support at support@icetech.com.

The following are minimum system requirements:

- Pentium 200MHz (Pentium III or faster is recommended)
- USB Port
- Windows 2000 or XP
- Random Access Memory (RAM)
 - For Windows 2000/XP: 256 MB

Warnings



To avoid damage to the debugger hardware or to your target, do not connect the debugger to your target when the target power is on.



Do not apply power to your system unless you are sure the target adapter is correctly oriented. Failing to do so can cause damage to your target.

About This Guide

The EMUL-PowerPC is a PC-based hardware debugger for the PowerPC™core, available for the Virtex™-II Pro FPGA platforms from Xilinx®. This guide helps you to get started with the basics of setting up, configuring, and running the SeeHau software and debugger.

The *EMUL-PowerPC Getting Started Guide* is intended for both novice and advanced users. This guide introduces the following tasks:

- Installing and configuring the SeeHau software
- Installing the debugger hardware
- Starting the hardware and SeeHau software
- Shutting down SeeHau

To download an electronic version of this guide, do the following:

1. Open Nohau's home page at www.icetech.com.
2. Click **Publications/Documents**.
3. Click **Nohau Manuals**.
4. Scroll down to EMUL-PowerPC. Then select EMUL-PowerPC to download a PDF version of this guide.



Overview of the EMUL-PowerPC Emulator System

Hardware

The basic hardware for the EMUL-PowerPC debugger system is the EMUL-PC/USB-JTAG. At present, EMUL-PowerPC supports the Virtex-II Pro FPGA platforms.

Refer to Chapter 2, “Installing the Hardware” for a detailed hardware information overview.

Software

The debugger is configured and operated by the SeehauPPC user interface. Seehau is a high-level language user interface that allows you to perform many useful tasks, for example:

- Editing code in the Source Window and building projects using the Nohau Project Manager and the supplied PowerPC GNU tools, in addition to the powerpc-eabi-gcc compiler, powerpc-eabi-as assembler and powerpc-eabi-ld loader/linker platform supplied by Xilinx.
- Loading code, running, stopping, stepping programs based on the PowerPC GNU tools. Additional documentation for programming the PowerPC core is available from Xilinx. This special version of the assembler outputs in ELF format is specifically for the Nohau debugger. Contact Nohau Technical Support if you have questions at support@icetech.com.
- Modifying and viewing memory contents including general purpose registers.
- Setting multiple software/hardware breakpoints.
- Set a trigger and display the trace.

2

Installing the Hardware

USB Driver

When installing the USB device, you must install the SeehauPPC software first before connecting the Nohau hardware (Refer to Chapter 3, “Installing the Seehau Software”). This allows the computer to recognize the proper driver for the hardware. The USB option is not supported by Windows '95 or NT 4.

The USB drivers are loaded as part of the Seehau software installation. The driver is located in the root directory of the installation CD. After installation, the driver is also located in the SeehauPPC subdirectory on your hard drive (C:\Nohau\SeehauPPC\). The system software should find and load the USB driver without your intervention.

Power Supply

The EMUL–PC/USB–JTAG uses power supplied by both the USB cable (<250mW) and the target board (<10mA). The power supplied by the target board drives output signals of the EMUL–PC/USB–JTAG through a 10-pin serial debug connector to the target board.



Figure 1. EMUL–PC/USB–JTAG

Note

The EMUL–PC/USB–JTAG is powered from the target. This allows the hardware to operate with a wide range of target voltages.

Along with the JTAG hardware, we provide two adaptors for the Xilinx JTAG port. You can either choose the JTAG PIII or the JTAG-PIV connector. The following diagram shows the signal layout of the connector:

Pin	Name	Description
1	/TRST	Test Reset
2	/TMS	Test mode select
3	GND	Ground
4	TCK	Test clock
5	Reserved	Reserved
6	Reserved	Reserved
7	/SRST	System reset
8	TDI	Test data input
9	Vdd	Power
10	TDO	Test data output

Installation Instructions

Refer to Figure 2 for a diagram of the connectors while following the installation instructions.

1. Make sure your target is powered off.
2. Plug the 10-pin EMUL–PC/USB–JTAG serial debug connector onto your target’s 10-pin header. This connector supplies the signals needed to communicate with the EMUL–PC/USB–JTAG.
3. Power on your target.

Note

Exit Seehau and shut down the power to the target when the target is not in use. The red wire indicates pin one on the 10-pin serial debug connector.

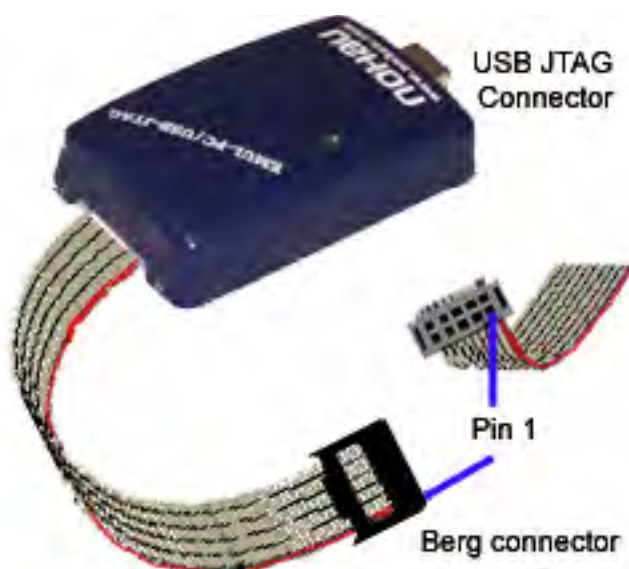


Figure 2. EMUL-PowerPC/USB-JTAG with the 10-Pin Serial Debug Connector

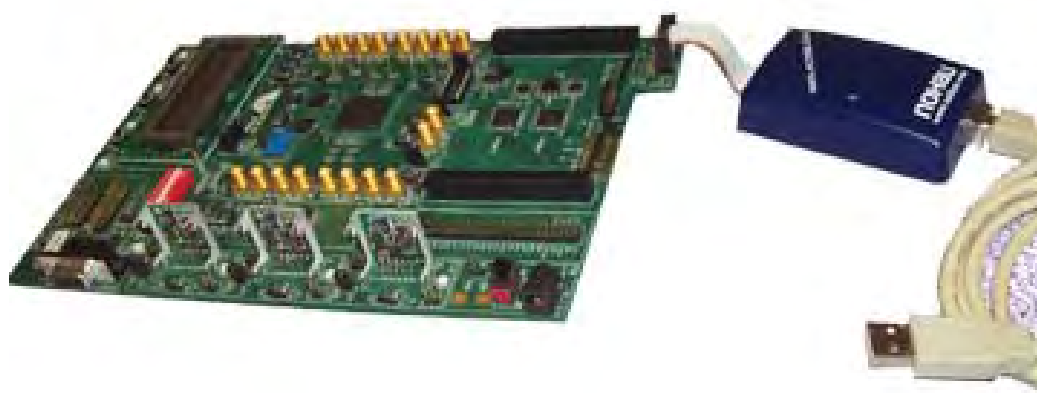


Figure 3. Connections for the USB Cable and the Red Wire Pin 1

3 Installing the Seehau Software

Installing the Seehau Software From the CD

To install the SeehauPPC software, do the following:

1. Locate your SeehauPPC CD and insert the CD into your CD ROM drive. The installation process will start automatically.
2. Click **Install Seehau Interface for EMUL-PowerPC** and follow the instructions that appear on your screen.

If the installation does not start automatically, you might have your Windows Autorun feature disabled. You will then need to do one of three things:

- Use Windows Explorer and navigate to the CD root directory. Double-click **Autorun.exe**. The Windows Install Shield will start the installation process.
- Right-click on the CD ROM symbol while running Windows Explorer and select **AutoPlay** to start the installation process.
- From the taskbar, select **Start**, then **Settings**. Click on **Control Panel**, then **Add/Remove Programs**, and then **Install**. The installation process will start when you select the correct path to the CD.

Installing the PowerPC EDK Software From the Xilinx EDK CD

In order to build programs using the Nohau Project Manager, you need to install the PowerPC EDK software as follows:

1. Locate your EDK CD and insert the CD into your CD ROM drive. The installation process will start automatically.
2. Click **Install the PowerPC EDK** and follow the instructions that appear on your screen.

If the installation does not start automatically, you might have your Windows Autorun feature disabled. You will then need to do one of three things:

- Use Windows Explorer and navigate to the CD root directory. Double-click **Autorun.exe**. The Windows Install Shield will start the installation process.
- Right-click on the CD ROM symbol while running Windows Explorer and select **AutoPlay** to start the installation process.
- From the taskbar, select **Start**, then **Settings**. Click on **Control Panel**, then **Add/Remove Programs**, and then **Install**. The installation process will start when you select the correct path to the CD.

Downloading and Installing the Seehau Software From the Internet

1. Go to the Nohau web site (<http://www.icetech.com>). Click **Downloads**. The Nohau Software Downloads page opens.
2. Click **Current Seehau Software**. The Seehau Software Status page opens.
3. Locate the EMUL-PowerPC product listing. There will be two listings, one for documentation and one for software.
4. Click **Information and Download (Seehau)**.
5. Review the information on the page.
6. Click **Yes I Want to Download**. A Customer Information Form page opens. Complete this form, then click **Proceed**. (You have the option to download more than one product.) A verification page opens with the information you have just entered. If all information is correct, select **SEND** at the bottom of the page. A message will open that verifies your information has been sent.
7. Click **Go to Download**. The **Available Download Areas** page opens.
8. Click either option for a download site. The Nohau Software Updates page opens.
9. Click the EMUL-PowerPC link.
10. Click the PowerPC.exe link. The application will start downloading. Remember which directory has this downloaded file.
11. Following the download, go to the directory, which has the downloaded file. Click the PowerPC.exe file and follow the installation instructions.

After installing the Seehau software, the **Setup Complete** dialog boxes appears that allows you to view the Readme.txt file and/or launch the SeehauPPC configuration.

Note

You must launch the SeehauPPC configuration before running the Seehau software.

4 Configuring the Seehau Software

Selecting to Automatically Start the Seehau Configuration Program

After installing Seehau, it is recommended that you automatically start the Seehau Configuration program. Do the following steps before starting Seehau:

1. From the **Setup Complete** dialog box, select **Launch SeehauPPC Configuration**.
2. Click **Finish**.

If you do not select to automatically start the Seehau Configuration Program, do the following:

From the **Start** menu, select **Programs**.

Select **SeehauPPC**. Then click **Config** to open the **Emulator Configuration** window displaying the **Connect** tab (Figure 4).

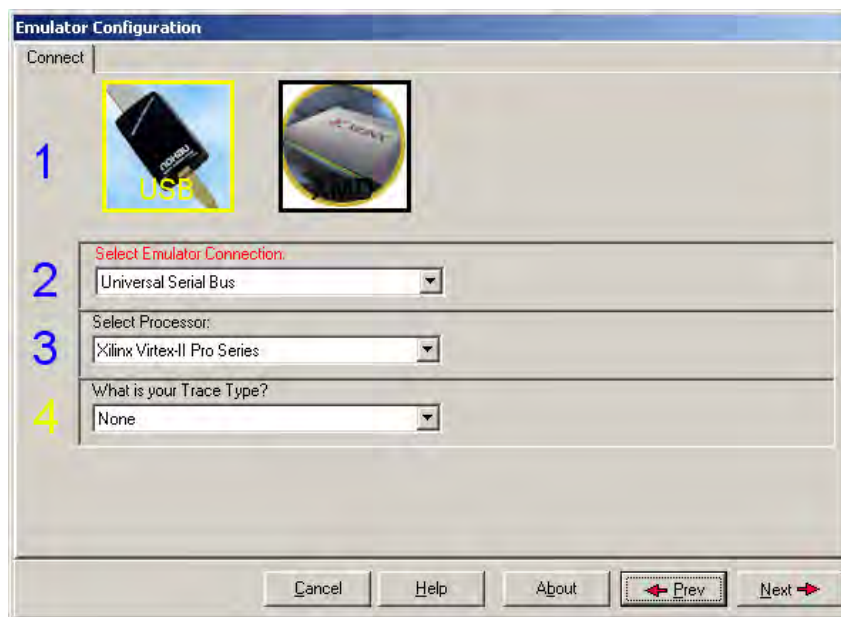


Figure 4. Emulator Configuration Window Displaying the Connect Tab

Note

You do not need the hardware connected at this time

Configuring the Communications Interface

Connect Tab

The graphical user interface for this tab is divided into four regions. Do the following in each region:

1. Region 1—**Communications Interface**:
Displays the USB communications interface for the Nohau debugger hardware or the Xilinx Parallel Cable option.
2. Region 2—**Select Emulator Connection**:
No action required. The default is **Universal Serial Bus**.
3. Region 3—**Select Processor**:
The default is **Xilinx Virtex-II Pro Series**, however you can use the drop down list to choose the best one that suits your board. If you cannot find the item you want, contact Nohau technical support at support@icetech.com.
4. Region 4—**What is your Trace Type?**:
Select **Trace (None)**. The default is **None**. *(Currently under development)*
5. Click **Next**. The **Hdw Config** tab opens (Figure 5).

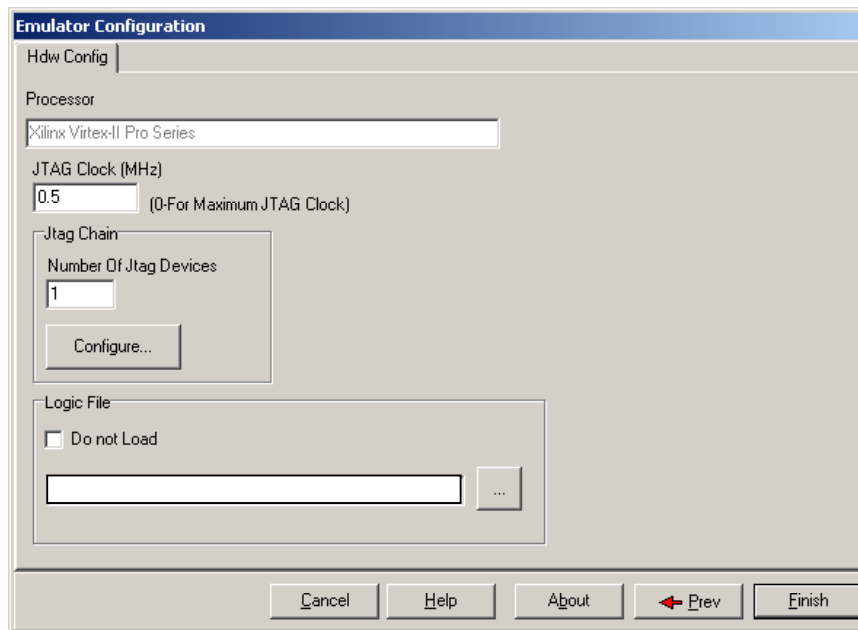


Figure 5. Emulator Configuration Window Displaying the Hdw Config Tab

Hardware Configuration Tab

The initial configuration settings are read from the Startup.bas file when the debugger initializes. After the initial startup and configuration of Seehau, the configuration parameters are saved in the Startup.bas file (located in the Macro subdirectory). The next time the emulator is started, the configuration parameters are read in from the Startup.bas file and compared with the default parameters on the chip.

- **Processor:** Shown for reference only. This is the selected processor. If you need to change the pod type, click **Prev**.
- **Delay after Reset(ms):** Used to set the length of time Seehau asserts reset.
- **Reset High:** Used to set the type of reset configured in the PowerPC core. The default is active high.
- **JTAG Chain:** Used to configure the JTAG chain setup so that Seehau can talk to the PowerPC core in the current scan chain. The Seehau Software will attempt to automatically detect and configure this option (See Figure 6).

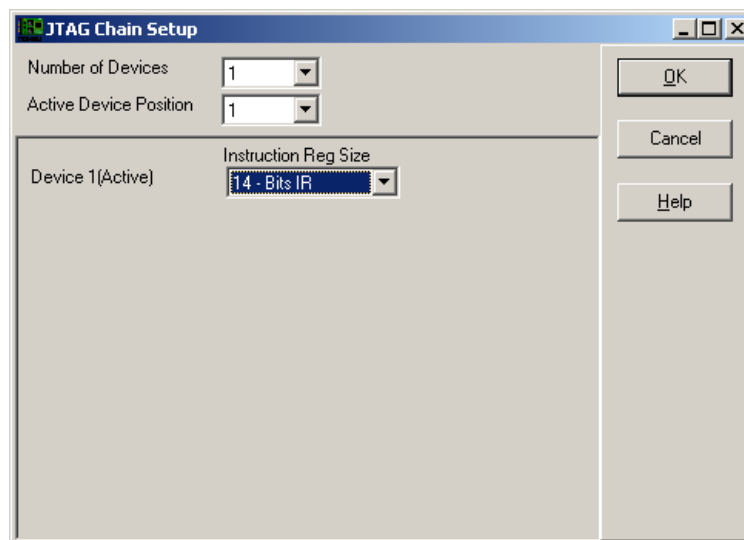


Figure 6. Emulator Configuration Window Configure JTAG Chain Button

- **Number of Devices:** Used to set the total number of devices in the scan chain
- **Active Device Position:** Used to set where the PowerPC core is in scan chain relationship.
- **Device (x) Bypass:** Used to set the “Instruction Register length” of each device in the chain.

Seehau can automatically detect the devices in the scan chain, if it can recognize all those devices. The detection result is shown as the default value in the input control. However, if Seehau cannot recognize all those devices, you have to input them manually.

- **Logic File:** Used to configure the initial bit stream to be loaded into the FPGA (Used for Xilinx FPGAs).

When you click **Finish**, Seehau starts to load. For more information about starting Seehau, see the “Starting Seehau” section at the end of this chapter.

Configuring the Emulator Options From Within Seehau

From Seehau, open the **Emulator Configuration** window. From the **Config** menu select **Emulator**.

The Emulator Configuration window contains two tabs. When selected, each tab allows you to set the following options:

- | | |
|--------------------|-----------------------------------|
| Hdw Cfg: | Set up emulator hardware options. |
| Misc Setup: | Select reset options. |

Buttons Common to All Tabs

- **OK:** Saves the settings for the tab and exits the dialog box.
- **Apply:** Saves the settings for the tab.
- **Cancel:** Exits without saving the settings for the dialog box.
- **Help:** Displays the Seehau Help file.
- **Refresh:** Allows you to retrieve and view the current emulator hardware configuration settings.

Hardware Configuration Tab

- **Processor:** Shown for reference only. This is the selected processor. If you need to change the pod type, click **Prev**.
- **Delay after Reset(ms):** Used to set the length of time Seehau asserts reset.
- **Reset High:** Used to set the type of reset configured in the PowerPC core. The default is active high.
- **JTAG Chain:** Used to configure the JTAG chain setup so that Seehau can talk to the PowerPC core in the current scan chain. (See Figure 6).
- **Logic File:** Used to configure the initial bit stream to be loaded into the FPGA.

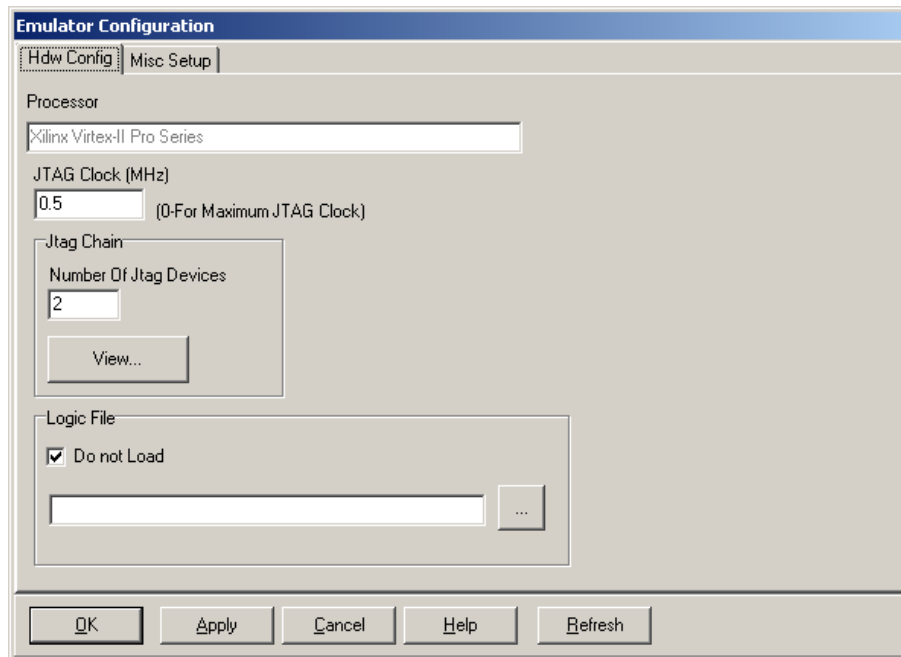


Figure 7. Emulator Configuration Window Displaying the Hdw Config Tab

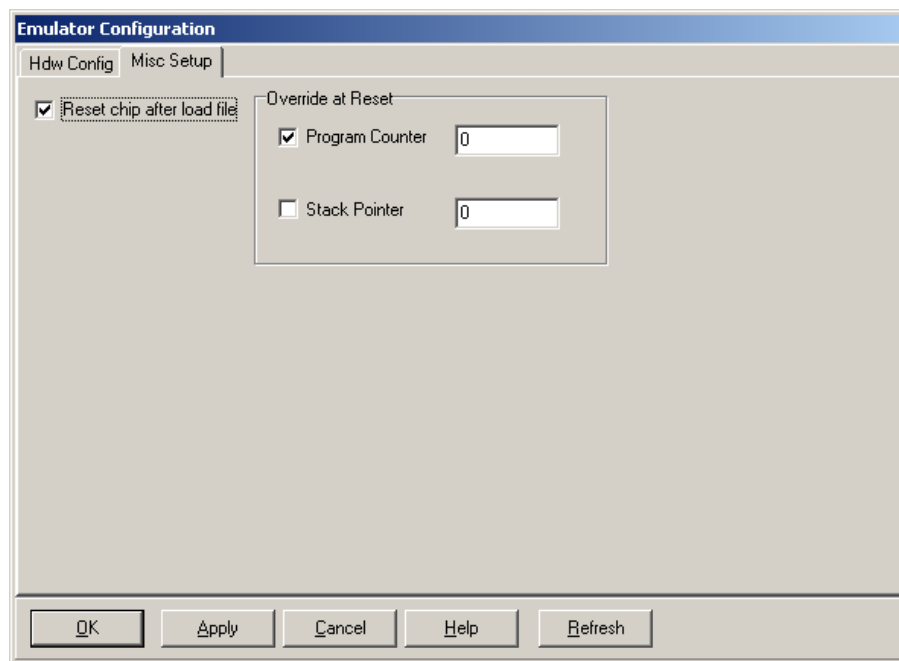


Figure 8. Emulator Configuration Window Displaying the Misc Setup Tab

Miscellaneous Setup Tab

The **Misc Setup** tab () is accessible only after the initial software configuration.

- **Reset chip after load file:** Sets the PowerPC core to issue a reset after the code is loaded.
- **Override at Reset**
 - The **Program Counter** option selects the value that the program counter will be set to after a reset. Enter the program counter value in the box.
 - The **Stack Pointer** option selects the value that the stack pointer will be set to after a reset. Enter the stack pointer value in the box.



WARNING

When powering down, turn off the target first and then unplug the EMUL-PC/USB-JTAG or power off your PC.

Starting Seehau

Demo Mode

1. Double-click the Demo icon. The Seehau main window opens (Figure 9). Seehau will load its configuration from the Startup.bas file. Notice that the word macro is displayed in red at the bottom of the main window while Startup.bas is running.
2. When the software startup is complete, you can position and resize the main window to your preference. At this time, you will need to load code.
3. To open new windows, from the **New** menu click a window option.

Non-Demo Mode

To start Seehau, in the non-demo mode do the following:

1. Double-click the **SeehauPPC** icon. The Seehau main window opens (Figure 9). Seehau will load its configuration from the Startup.bas file. Notice that the word macro is displayed in red at the bottom of the main window while Startup.bas is running.
2. When the software startup is complete, you can position and resize the main window to your preference. At this time, you will need to load code.
3. To open new windows, from the **New** menu click a window option.

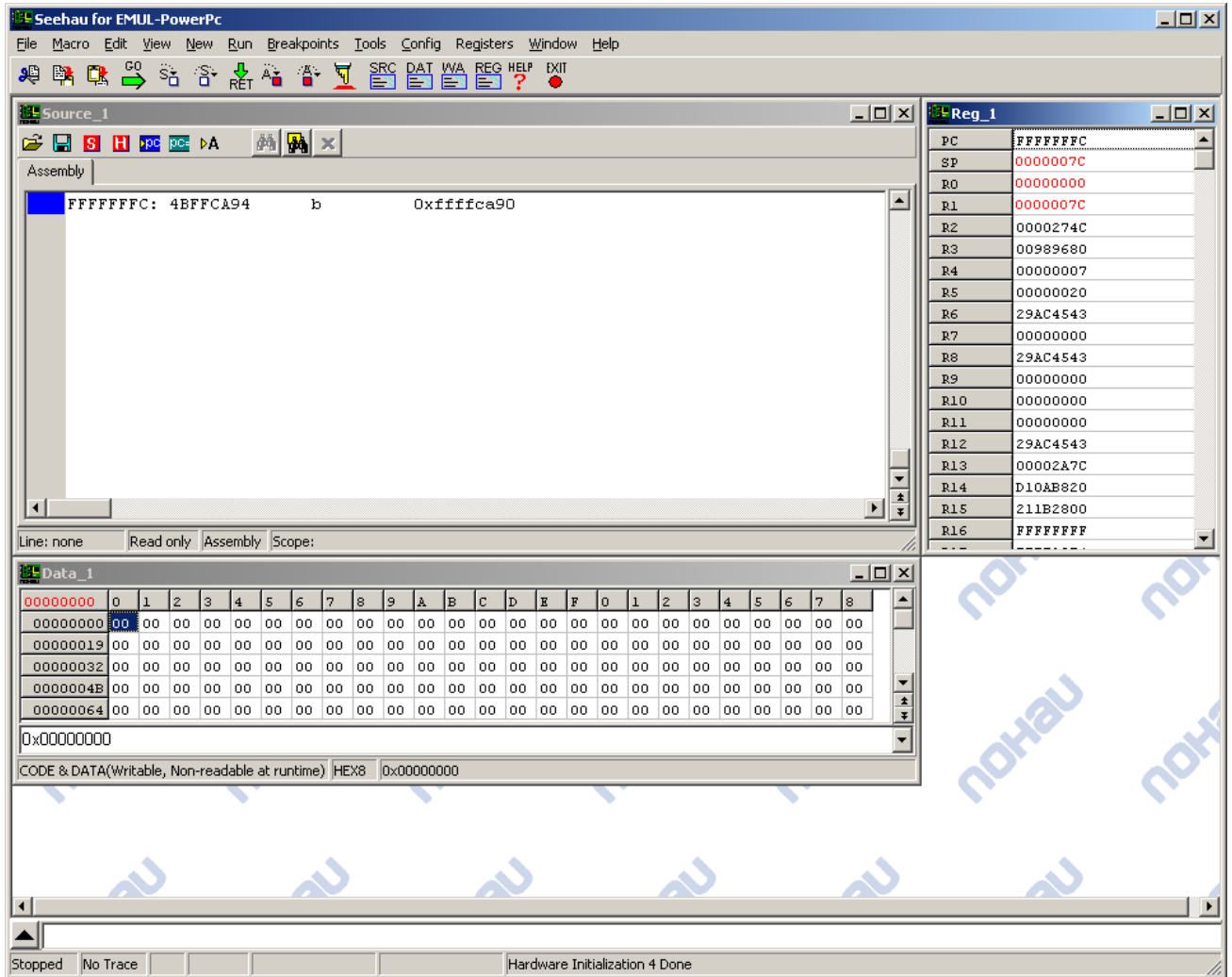


Figure 9. SeeHau for EMUL-PowerPC

5 Running Program Examples

We provide a sample C program example called `led_blink` located at:
`C:\Nohau\SeehauPowerPC\Examples\led_blink.out`

Start Seehau by following the instructions in the “Starting Seehau” section in Chapter 4. Then do the following to run the test program:

1. Resize the windows on your screen, but do not add the **Watch** window.
2. From the **File** menu select **Load Code**. The **Open** dialog box opens (Figure 10).
3. Select one of the program example files for your controller.

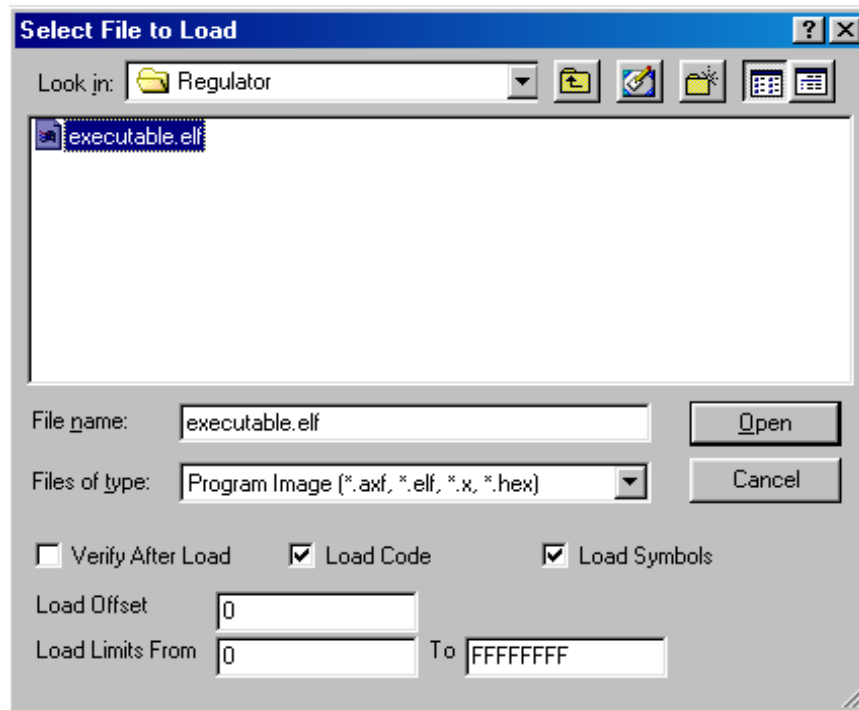
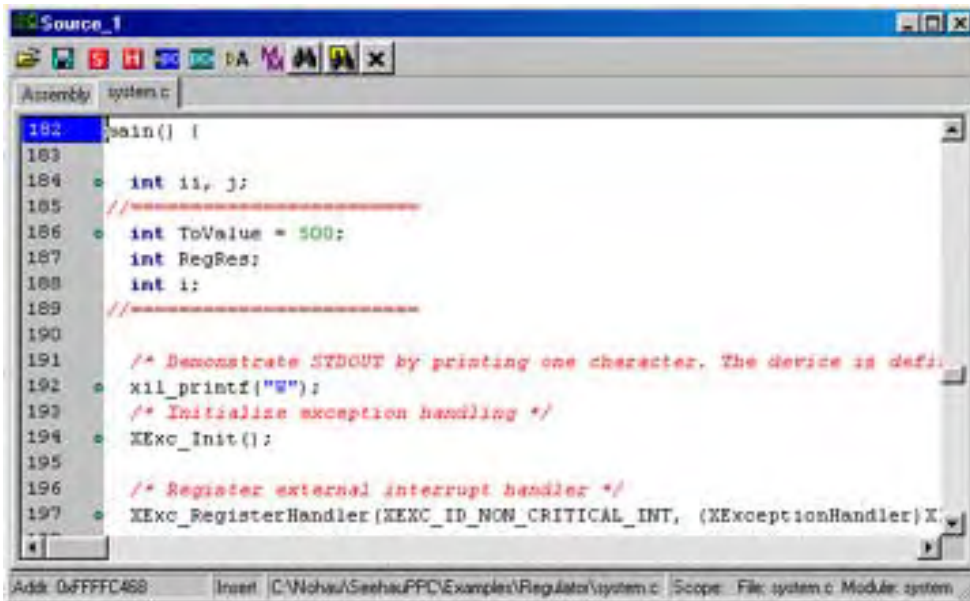


Figure 10. Open Dialog Box Displaying the Program Example Directories



```

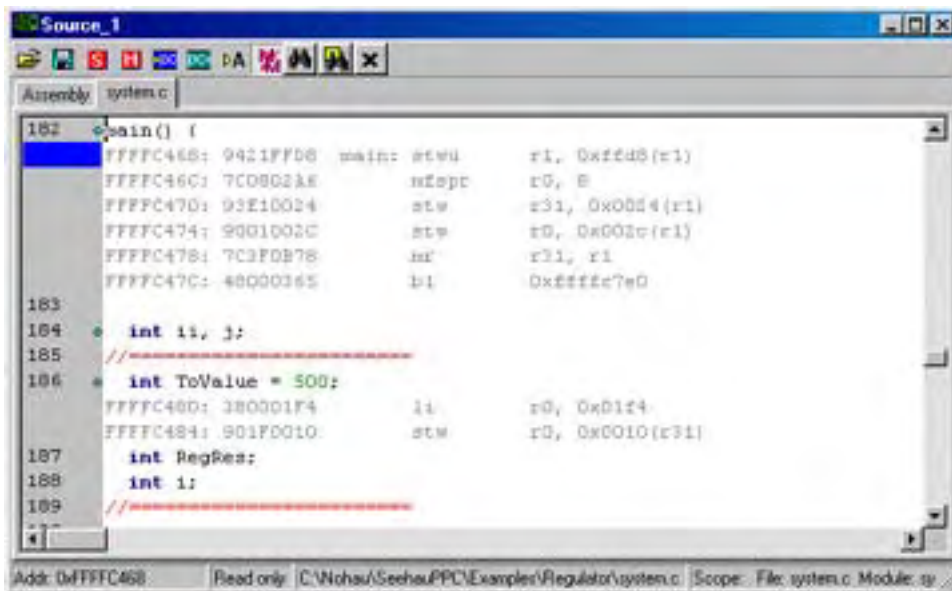
Source_1
Assembly system.c
182 main() {
183
184     int i1, j;
185     //=====
186     int ToValue = 500;
187     int RegRes;
188     int i;
189     //=====
190
191     /* Demonstrate STDOUT by printing one character. The device is defini
192     xil_printf("W");
193     /* Initialize exception handling */
194     XExc_Init();
195
196     /* Register external interrupt handler */
197     XExc_RegisterHandler(XEXC_ID_NON_CRITICAL_INT, (XExceptionHandler)X

```

Addr: 0xFFFFC468 | Insert: C:\Nohau\SeehauPPC\Examples\Regulator\system.c | Scope: File: system.c Module: system

Figure 11. Program Example in Source Only

4. Highlight the program example file and click **Open**. The source file automatically displays the program example in source only (Figure 11).
5. To single-step in mixed mode, click the Assembly Step Into or Step Over button. You will see the assembly code mixed in with the associated source lines (Figure 12).
6. To single-step in source only mode, first click the Source window. Select the **led_blink.c** tab. Right-click to verify that mixed mode is cleared. Then point to the **Setting** sub-menu item, and select **Lock Tabs**.



```

Source_1
Assembly system.c
182 main() {
183     00000000: 9421FFD8 main: stwu    r1, 0x1fd8(r1)
184     00000001: 7C0802AE mfspt    r0, B
185     00000002: 93E10024 stw     r31, 0x0024(r1)
186     00000003: 9001002C stw     r0, 0x002c(r1)
187     00000004: 7C3F0B78 mr      r31, r1
188     00000005: 48000365 bl      0xfffffc7e0
189
190     00000006: 380001F4 li      r0, 0x01f4
191     00000007: 901F0010 stw     r0, 0x0010(r31)
192
193     int i1, j;
194     //=====
195     int ToValue = 500;
196     int RegRes;
197     int i;
198     //=====

```

Addr: 0xFFFFC468 | Read only: C:\Nohau\SeehauPPC\Examples\Regulator\system.c | Scope: File: system.c Module: system

Figure 12. Program Example in Mixed Mode

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