LabVIEW™ FPGA Module Release and Upgrade Notes

Version 2011

This document contains instructions for installing the LabVIEW 2011 FPGA Module and related products, introduces new features, and provides information about upgrading from the previous version of LabVIEW. Refer to the resources listed at the end of this document for information about developing applications with LabVIEW and the FPGA Module.

Contents

System Requirements

The development computer is a PC or PXI/PXI Express system on which you install the LabVIEW development system and the LabVIEW FPGA Module. You can use this computer to compile FPGA VIs, but if the FPGA design or target requires more than 2 GB of memory,

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National Instruments recommends installing the LabVIEW FPGA compilation tools on a separate computer. This computer is referred to as the remote compile server.

The following sections provide information about requirements for both the development computer and the optional remote compile server.

Development Computer

The development computer must meet the following specifications.

- LabVIEW 2011 Full or Professional Edition (32-bit)
- 1.2 GHz Pentium processor or equivalent
- 11 GB additional disk space
- Memory[1]:
    - At least 2 GB of RAM for Virtex-5 and earlier FPGA targets
    - At least 4 GB of RAM for Virtex-6 and later[2] FPGA targets
- One of the following operating systems:
    - Windows 7[3]
    - Windows Vista (32-bit)
    - Windows Vista (64-bit with 32-bit LabVIEW installed)
    - Windows XP Pro (Service Pack 2 or 3)
    - Windows Server 2003 R2 (32-bit)[4]
    - Windows Server 2008 R2 (64-bit)
- FPGA device—You do not have to purchase an FPGA device in order to install the LabVIEW FPGA Module; however, the software is designed to program FPGA devices from NI.
- Device driver software—To program most devices with the LabVIEW 2011 FPGA Module, install the NI-RIO 4.0 driver software. Refer to the hardware documentation for different or additional requirements for a specific device.

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[1] Memory requirements vary according to both the FPGA target and the FPGA VI you create for that target. To determine your memory needs, monitor the memory usage of the xst.exe process in the Windows Task Manager.

[2] You must use a 64-bit OS to address 4 GB of RAM.

[3] The LabVIEW FPGA Module uses Xilinx compilation tools that do not officially support Windows 7. NI obtained permission from Xilinx to allow LabVIEW FPGA Module customers to use the tools on this platform, with the disclaimer that Xilinx will not be able to fix any bugs found that are specific to this platform. NI tested the Xilinx tools that the LabVIEW FPGA Module uses and did not find any issues. If you encounter problems with the Xilinx tools and Windows 7, you might need to compile using Windows XP or Vista. In such cases, you might want to install the Xilinx compilation tools on a separate computer. Refer to ni.com/info and enter the Info Code fpgakb1rcs for information about installing the compilations tools on a separate computer. NI will not be liable for any problems or issues related to the use of Xilinx tools with Windows 7.

[4] The LabVIEW FPGA Module does not support the Windows Server non-R2 editions.

Remote Compile Server

If you install the Xilinx compilation tools on a separate computer, that computer is the remote compile server and must meet the following specifications:

- 11 GB of disk space for the complete set of Xilinx compilation tools
- One of the following operating systems:
    - Windows XP Pro (Service Pack 2 or 3)
    - Windows Vista (32-bit)
    - Windows Vista (64-bit)

NI also offers the LabVIEW FPGA Compile Farm Toolkit and the LabVIEW FPGA Compile Cloud Service, both of which decrease your development time by offloading compiles to multiple computers. Refer to the National Instruments Web site at ni.com for information about these products.

Installation

The following sections provide information about installing the LabVIEW FPGA Module and related components.

📝 **Note**   If you are upgrading from a previous version of LabVIEW, you must install LabVIEW 2011 before you install the LabVIEW 2011 FPGA Module in order to mass compile existing VIs successfully. If you mass compile existing FPGA VIs before you install the LabVIEW FPGA Module, some FPGA-specific VIs might have mutation issues.

Installing the LabVIEW FPGA Module on a Development Computer

Complete the following steps to install LabVIEW and the FPGA Module.

1. Log in as an administrator or as a user with administrative privileges.
2. Insert the LabVIEW Platform DVD 1.

    To request additional LabVIEW 2011 Platform DVDs, refer to the National Instruments Web site. If you purchased this product with an NI Software Suite or NI Product Bundle, use the installation media that shipped with your purchase to install this product.

💡 **Tip**   If the installer does not start automatically, double-click setup.exe from the media to launch the installer.

3. Follow the instructions on the screen to install and activate the following software:
    - **LabVIEW**
    - **FPGA Module**

- **Compilation Tools**—Refer to your hardware documentation for information about the FPGA in your device and install the appropriate set of tools.

  - **Compilation Tools for Devices other than Virtex-II**—Install these compilation tools on the development computer to create simulation exports, configure the IP Integration Node, or use the Configuring CLIP wizard.

  - (Optional) **Compilation Tools for Virtex-II FPGA Devices**—Install these compilation tools only if your FPGA device contains a Xilinx Virtex-II or Virtex-II Pro FPGA.

- (Optional) **FPGA Compile Farm Toolkit**—Use the FPGA Compile Farm Toolkit to distribute FPGA VI compiles across multiple remote computers. You have a temporary license for a 30-day evaluation of this product. During this period, you can compile two FPGA VIs simultaneously. After the evaluation period expires, you can compile one FPGA VI at a time.

- (Optional) **Real-Time Module**—Use the LabVIEW Real-Time Module to program the deterministic OS on NI PXI, NI PXI Express, NI CompactRIO, and NI Single-Board RIO devices. You have a temporary license for a 30-day evaluation period of this product.

- **Device Drivers**—NI-RIO 4.0 is the device driver software for most FPGA targets. Refer to your hardware documentation for information about additional or different device drivers you need.

In addition to installing program files and documentation in the LabVIEW directory, the installer also puts files from Xilinx in the `x:\NIFPGA` directory, where x is the drive on which you installed LabVIEW. Xilinx is third-party software that the LabVIEW FPGA Module uses to compile FPGA VIs into code that runs on an FPGA target.

Installing the Compilation Tools on a Separate Computer

Refer to `ni.com/info` and enter the Info Code `fpgakb1rcs` for information about installing the Xilinx compilation tools on a computer that is not the development computer.

Activating the LabVIEW FPGA Module

The LabVIEW FPGA Module relies on licensing activation. You have a temporary license for a 30-day evaluation period that includes both the FPGA Module and the Xilinx tools that the FPGA Module uses. When the evaluation period expires, you must activate a valid FPGA Module license to continue using the FPGA Module. Activating the FPGA Module license also activates the license for the Xilinx tools.

Use the NI License Manager, available by selecting **Start»All Programs»National Instruments»NI License Manager**, to activate NI products. Refer to the *National Instruments License Manager Help*, available by selecting **Help»Contents** in the NI License Manager, for more information about activating NI products.

Version 2011 Features and Changes

The LabVIEW 2011 FPGA Module includes the following new features. Refer to the *LabVIEW Help*, available by selecting **Help»LabVIEW Help** in LabVIEW, for more information about these features.

Improvements to Cycle-Accurate Simulation

The following sections provide information about improvements made to cycle-accurate simulation.

Support for ISim

You now can use Xilinx ISim, included with the Xilinx compilation tools on the LabVIEW Platform DVD, to simulate FPGA designs.

Support for LabVIEW-Based Test Benches

You now can simulate an FPGA design using a test bench that LabVIEW creates.

Improvements to IP

The following sections provide information about the improvements made to IP you use to create FPGA VIs.

FPGA-Derived Clocks in Component-Level IP

You now can create FPGA-derived clocks from external clocks in component-level IP (CLIP).

Batch Configuration of IP Integration Node Files

LabVIEW 2011 brings the following improvements to the IP Integration Node:

- You now can set the simulation behavior for multiple synthesis files simultaneously.
- You now can set the data type for multiple input and output terminals simultaneously.

Xilinx CORE Generator IP

You now can include Xilinx CORE Generator IP in FPGA VIs. These functions are available on the **Xilinx Coregen IP Functions** palette. LabVIEW displays only the functions that the FPGA target supports.

Accessing DSP48E1 Slices on Virtex-6 FPGAs

You now can access a DSP48E1 slice of a Xilinx Virtex-6 FPGA target by adding a DSP48E1 function to the block diagram. This function is available on the **Functions** palette at **FPGA Math & Analysis»High Throughput Math»Basic Elements**. You also can use this function to access a DSP48E slice on a Virtex-5 FPGA.

Support for the FPGA Compile Cloud Service

If you purchased a subscription to the FPGA Compile Cloud Service, you can compile FPGA VIs in the cloud, freeing resources on your development computer for other tasks.

Specify the location of FPGA VI compilations by selecting **Tools»Options**, selecting the FPGA Module page from the **Options** dialog box, and navigating to the **Compile Server** section.

Improving the Performance of Feedback Nodes

For Feedback Nodes in FPGA VIs, you now can specify whether the compiler places the multiplexer before or after the register. You also can let the compiler decide the optimal placement. This feature gives you another way to meet the timing objectives of your application.

To see these options, right-click a Feedback Node, select **Properties**, and click the **FPGA Implementation** tab.

Tracking a 3-Phase Signal

Use the 3-Phase Phase-Locked Loop Express VI to track a 3-Phase signal. This Express VI is available on the **Functions** palette at **FPGA Math & Analysis»Control**.

Upgrade and Compatibility Issues

The following sections provide information about upgrading from the LabVIEW 2010 FPGA Module to the LabVIEW 2011 FPGA Module. Refer to previous editions of the *LabVIEW FPGA Module Release and Upgrade Notes*, available on ni.com, for changes in previous versions of the FPGA Module.

> **Note** Upgrading the LabVIEW FPGA Module requires upgrading to a new version of the Xilinx compilation tools. This upgrade can change the timing or resource utilization characteristics of FPGA VIs you developed in previous versions or cause these VIs to fail to compile. NI recommends you test all FPGA designs after upgrading.

VIs that Contain Math & Analysis VIs and Functions

The Butterworth Filter and Notch Filter Express VIs with the **reset** terminal unwired or wired to a constant reset on first call when run on an FPGA target. In addition, these Express VIs use slightly more FPGA logic resources than in previous versions.

The Backlash and Friction VIs now avoid saturation and truncation in intermediate computations. Therefore, these VIs might produce different results than in previous versions.

VIs that Contain an IP Integration Node

If you open a VI saved in a previous version of LabVIEW that contains an IP Integration Node, you must regenerate support files for the IP. To complete this task, select **Tools»FPGA Module»Regenerate Support Files for IP Integration Nodes** in LabVIEW 2011. Follow the on-screen instructions to generate the support files for LabVIEW 2011.

> **Note** LabVIEW might not be able to update all support files; in this situation, re-add the IP Integration Node to the VI and generate the support files for the new node.

VIs that Contain a Feedback Node

Existing VIs that you open in LabVIEW 2011 leave the placement of the multiplexer up to the compiler, which preserves existing behavior. Refer to the *Improving the Performance of Feedback Nodes* section for information about changing this behavior.

Known Issues

Refer to the National Instruments Web site at `ni.com/info` and enter the Info Code `LVFPGA2011KI` to access the known issues for the LabVIEW 2011 FPGA Module.

Where to Go from Here

NI provides many resources to help you succeed with your NI products. Use the following resources as you start exploring LabVIEW and the FPGA Module.

Related Documentation and Examples

Use the following resources to learn more about using LabVIEW and the FPGA Module.

- **Context Help Window**—Available by pressing <Ctrl-H>. This window provides brief descriptions of VIs, functions, and dialog boxes along with a link to more detailed information.

- **LabVIEW Help**—Available by selecting **Help»LabVIEW Help** in LabVIEW. Browse the **FPGA Module** book in the **Contents** tab for an overview of the FPGA Module and hardware-specific information. Browse the **FPGA Interface** book in the **Contents** tab for an overview of the FPGA Interface information.

- **Hardware Documentation**—Refer to the documentation that came with the FPGA target hardware for information about that hardware. The documentation might be installed on disk instead of printed.

- **Examples**—The driver software for many FPGA targets includes corresponding examples. Refer to the specific hardware documentation for information about whether the FPGA target you use comes with corresponding examples.

  You can start with an existing example and use it as a starting point for developing FPGA VIs and host VIs. From LabVIEW, launch the NI Example Finder by selecting **Help»Find Examples**. Browse the examples by directory or by task.

National Instruments Web Site

Refer to ni.com/fpga for the latest NI Developer Zone articles, examples, and support information for the FPGA Module.

Refer to ni.com/info and enter the Info Code fpgatrn to access online training for the FPGA Module.

Support

The National Instruments Web site is your complete resource for technical support. At ni.com/support you have access to everything from troubleshooting and application development self-help resources to email and phone assistance from NI Application Engineers.

National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world to help address your support needs. For telephone support in the United States, create your service request at ni.com/support and follow the calling instructions or dial 512 795 8248. For telephone support outside the United States, visit the Worldwide Offices section of ni.com/niglobal to access the branch office Web sites, which provide up-to-date contact information, support phone numbers, email addresses, and current events.