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LabVIEW™ RT

Version 5.1.2

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Introduction

LabVIEW RT combines the ease-of-use of LabVIEW with the power of real-time systems so you can generate deterministic applications using graphical programming. To create LabVIEW RT Virtual Instruments (VIs), you use a host PC or PXI system running a Windows operating system. You can create LabVIEW RT applications that run on the host PC the same way you do with LabVIEW for Windows. In addition, you can use the host PC to download VIs to the RT Engine on an RT Series device, where the VIs run in real time. LabVIEW RT 5.1.2 can target VIs to the RT Engine on PCI/PXI-7030 RT Series DAQ devices or PXI-8156B controllers.

LabVIEW RT 5.1.2 extends the capabilities of LabVIEW RT 5.1 and adds support for LabVIEW RT on the PXI-8156B controller. The Release Notes explain how to get started with LabVIEW RT and where to find additional information.

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The LabVIEW RT documentation consists of the following documents:

- *LabVIEW RT User Manual*
- *RT Series DAQ Device User Manual*
- *RT Series PXI/CompactPCI Controller User Manual*
- *LabVIEW RT Help*, available by selecting **Help»LabVIEW RT Help** in LabVIEW
- *Remote System Explorer Help*, available by selecting **Help»Help Topics** in Remote System Explorer

If you use LabVIEW RT with a PCI/PXI-7030 plug-in board, refer to the *RT Series DAQ Device User Manual* and the *LabVIEW RT User Manual* for more information about programming LabVIEW RT. If you use LabVIEW RT on a PXI-8156B controller, refer to the *RT Series PXI/CompactPCI Controller User Manual* and the *LabVIEW RT User Manual* for more information about programming LabVIEW RT.

Installation

To use LabVIEW RT with either the PCI/PXI-7030 plug-in board or a PXI-8156B controller, you first need to install LabVIEW RT on a Windows PC or PXI system. The Windows PC or PXI system serves as the host PC for LabVIEW RT applications. Refer to Chapter 2, *Installation*, of the *LabVIEW RT User Manual* for more information about installing LabVIEW RT and drivers such as NI-DAQ on the host PC.

If you use LabVIEW RT with a PXI-8156B controller, you also need to install Remote System Explorer on the host PC. You use Remote System Explorer to configure your PXI controller for use with LabVIEW RT. Refer to Chapter 2, *Installation and Configuration*, of the *RT Series PXI/CompactPCI Controller User Manual* for more information about installing Remote System Explorer.

NI-DAQ Compatibility

Because LabVIEW RT uses NI-DAQ on the host PC and in the RT Engine on RT Series DAQ devices, only certain versions of NI-DAQ are compatible with LabVIEW RT. Table 1 summarizes LabVIEW RT and NI-DAQ compatibility.

Table 1. Version Compatibility

LabVIEW RT Version	Compatible NI-DAQ Versions
5.1	6.5.2, 6.6
5.1.2	6.7

Examples

You develop real-time LabVIEW RT applications using the same functions used to develop applications in LabVIEW for Windows. LabVIEW RT includes two additional sets of functions that you can use in real-time applications. You can use shared memory functions in both host applications and RT Engine applications to communicate data using the shared memory on PCI/PXI-7030 real-time boards. You can use watchdog timer functions to access the watchdog timer hardware on PXI-8156B controllers in LabVIEW RT applications. Refer to *LabVIEW RT Help*, available by selecting **Help»LabVIEW RT Help**, for more information about the shared memory and watchdog timer functions.

You can find examples of real-time programming and control applications in the `\LabVIEW\Examples\RT` folder. These examples are grouped into the following VI libraries:

- `RT Communication.llb`
- `RT Control.llb`
- `RT Control (7030).llb`
- `RT Tutorial.llb`
- `RT Watchdog (PXI-8156B).llb`

RT Communication

These examples demonstrate how to communicate data between RT Engine VIs and host PC VIs. VI Server and TCP/IP examples can be used with the RT Engine on RT Series DAQ devices or PXI controllers. In addition, shared memory examples are provided that work only with the RT Engine on the RT Series DAQ devices.

RT Control

These examples demonstrate various PID control applications that you can run on the RT Series devices. The examples use VI Server and TCP/IP for communication and therefore you can use them with either PCI/PXI-7030 plug-in boards or PXI controllers.

RT Control (7030)

These examples are similar to the PID control examples in `RT Control.llb` but use shared memory to communicate with host PC VIs. These VIs may be used only with PCI/PXI-7030 plug-in boards.

RT Tutorial

These examples illustrate various techniques for programming real-time applications in LabVIEW RT. These include examples of VI priority settings, benchmarking utilities, and use of the LEDs on RT Series DAQ devices.

RT Watchdog (PXI-8156B)

These examples demonstrate how to use the watchdog timer functions to safely shutdown or restart a LabVIEW RT application if an application crashes. These examples only work on PXI-8156B controllers.

What's New in Version 5.1.2

This section contains information about new features in LabVIEW RT 5.1.2.

- LabVIEW RT 5.1.2 supports real-time LabVIEW RT applications running on PXI-8156B controllers. LabVIEW RT applications that run on the PXI controller can utilize any or all PXI DAQ boards, with NI-DAQ, installed in the PXI chassis.
- Remote System Explorer is a new utility that you use to configure LabVIEW RT on Ethernet-based RT Series devices, such as the PXI-8156B controller. Use Remote System Explorer to create LabVIEW RT boot disks, configure network settings for the controller, and install the LabVIEW RT software. Refer to the *RT Series PXI/CompactPCI Controller User Manual* for more information about using Remote System Explorer.
- Application Builder includes two new options for creating applications that run on the host. The first new option allows you to disable the **Select Target Platform** dialog box. The second new option allows you to automatically disconnect the host from applications that are targeted to RT Series devices. Refer to the *LabVIEW RT User Manual* for more information about building LabVIEW RT executables on the host PC.
- You can use Application Builder to embed applications on a PXI-8156B controller. You can configure the controller to launch the embedded LabVIEW RT application each time the PXI system is booted. Refer to Chapter 3, *LabVIEW RT Programming*, of the

RT Series PXI/CompactPCI Controller User Manual for more information about embedding applications on the PXI controller.

- In addition to setting normal LabVIEW preferences on the host PC, you can configure a set of Network Preferences that apply specifically to the RT Engine running on a PXI-8156B controller. Refer to Chapter 3, *LabVIEW RT Programming*, of the *RT Series PXI/CompactPCI Controller User Manual* for more information about network preferences.
- You now can change the LabVIEW RT target platform without exiting and relaunching LabVIEW RT on the host PC. Select **Operate»Switch Execution Target** to disconnect from the current target and invoke the **Select Target Platform** dialog box.
- The Functions Palette now includes a set of VIs that you can use in a LabVIEW RT application on the PXI-8156B controller to implement a hardware watchdog timer. The onboard hardware watchdog timer provides a safety measure for critical applications. Refer to *LabVIEW RT Help*, available by selecting **Help»LabVIEW RT Help**, and the examples found in `Examples\RT\RT Watchdog.llb` for more information about the watchdog timer VIs.

Known Issues

This section contains information about known issues with LabVIEW RT 5.1.2.

- RT Series DAQ boards may be incompatible with some dual-processor computers.
- If you use LabVIEW RT with a PXI-8156B controller, you need to ensure that the hard drive of the PXI controller is not formatted with NTFS. If your PXI controller has an NTFS system, you must convert the file system to FAT16 or FAT32 in order to use LabVIEW RT.
- You can change the attributes of front panel controls and indicators in LabVIEW programatically by using attribute nodes on a VI block diagram. When you target LabVIEW RT to an RT Series target, attribute nodes affect the front panel on the RT Development System on the host computer. However, if the RT Development System is disconnected from the RT Engine on the RT Series target and subsequently reconnected, the attributes previously set will no longer take effect on the reopened front panel.
- The LabVIEW RT PXI Series controller cannot use the internal SCXI control bus in a PXI/MXI-III system without modification to the PXISYS.INI file that resides on the RT Series PXI Controller. This is a resolvable issue that only affects users who have their chassis on the downstream side of the MXI-III bridge and want to use the internal

SCXI bus to control the SCXI modules. Refer to National Instruments email and telephone technical support resources to resolve this issue.

Refer to NI Web Support for all other issues.

Feature Not Documented in Manuals

The LabVIEW RT Engine that runs on the PXI-8156B controllers has a File Transfer Protocol (FTP) server. The FTP server gives users the ability to use any standard FTP utility for transferring files to and from the PXI-8156B hard drive. You must provide the correct password when opening a connection to the PXI controller if the configuration is locked in Remote System Explorer. For programmatic file transfer control in LabVIEW or LabVIEW RT, users can purchase and use the Internet Toolkit for LabVIEW. Refer to the National Instruments web site, `www.ni.com`, for more information about the Internet Toolkit.

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