

## LabVIEW Real-Time Application Development Course

### Overview

The LabVIEW Real-Time course delivers hands-on training for developing robust, reliable, and deterministic measurement and control systems. At the end of the course, you will be able to implement a LabVIEW Real-Time system. This course is the fastest way to learn robust system architectures, real-time programming techniques, and time-saving development tips.

**Duration** – Three Days

### Audience

- LabVIEW Real-Time Module users preparing to develop applications to target RT series real time hardware
- Users developing deterministic closed-loop control systems or maximizing reliability of measurement systems
- Users developing applications for deployment in industrial environments or remote locations
- Users and technical managers evaluating LabVIEW Real-Time or NI Developer Suite in purchasing decisions

### Prerequisites

- LabVIEW Basics, or equivalent experience

### NI Products Used During the Course

- LabVIEW Professional Development System, Version 8.0
- LabVIEW Real-Time Module
- LabVIEW Execution Trace Toolkit
- RT Series Compact FieldPoint System
- RT Series PXI Embedded Controller
- E-Series DAQ board
- DAQ Signal Accessory

### REGISTRATION

Register online at [ni.com/training](http://ni.com/training) or call (800) 890-2062 • Fax: (512) 683-9300  
[info@ni.com](mailto:info@ni.com)

Outside North America, contact your local NI office. Worldwide Contact Info: [ni.com/global](http://ni.com/global)

NI can also hold this class onsite at your facility.

### Ordering Information 910733-xx

-01 NI Corporate or Branch, -11 Regional, -21 Onsite

### After attending this course you will be able to:

- Determine if a real-time solution is appropriate for a given problem
- Choose the best target hardware for a given real-time application
- Implement a deterministic and reliable application
- Understand how to reduce the jitter in a real-time application
- Choose an appropriate communication method
- Benchmark your application
- Deploy your application

### Suggested Next Courses

- LabVIEW Intermediate
- LabVIEW Advanced Application Development
- Data Acquisition and Signal Conditioning
- LabVIEW FPGA

## LabVIEW Real-Time Application Development Course Outline

### Day 1: Design

#### Introduction to Real-Time

This lesson introduces the concepts of real-time development. You will learn how to determine whether an application requires a real-time operating system or a standard operating system. You will also learn about the hardware architecture of a LabVIEW Real-Time system. Topics include:

- Real-time concepts including determinism and jitter
- Real-time operating systems
- Real-time hosts and targets
- RT input and output hardware

#### Configuring your hardware

This lesson describes how to setup real-time hardware and software. You also learn about the LabVIEW project and its relation to Real-Time targets. You will receive hands-on experience in configuring both a PXI system and a Compact FieldPoint system. Topics include:

- Overview of hardware setup and installation
- Configuring RT targets in Measurement and Automation Explorer
- Using the LabVIEW Project
- Configuring Real-Time targets through the LabVIEW Project
- Running VIs on a Real-Time target

#### Real-Time Architecture

This lesson describes how to design a real-time application. You will learn about the general architecture of a real-time application, multithreading, methods for passing data between threads, and how to improve the determinism of an application. Topics include:

- Multithreading
- Understanding and using priority levels
- Using sleep to ensure processor time
- Determining which methods to use to pass data between threads
- Memory management
- Functions that are not supported in a real-time environment

### Day 2: Implementation

#### Timing Applications and Acquiring Data

During this lesson, you will implement the data acquisition and timing portion of a real-time application. You will learn about control theory, using software to time an application and using hardware to time an application. Topics include:

- Simple event response in an application
- Using software for timing including the timed loop
- Using hardware for timing

## Communication

During this lesson, you will implement the communication portion of a real-time application. You will learn about communicating with an application on a real-time target from the host computer. You will also learn about various communication techniques such as front panel communication, network-published shared-variables, TCP, UDP and VI Server. Topics include:

- Communicating with applications on an RT target
- Choosing a network communication protocol
- Programming efficient and reliable network communication
- Using LabVIEW Wizards to generate communication code

## Day 3: Verify and Deploy

### Verifying your application

This lesson introduces methods for verifying the application, timing and memory behavior of your application. You will apply these methods to a real-time application. Topics include:

- LabVIEW debugging tools
- Using the RT System Manager
- Using the VI Analyzer
- Benchmarking your application
- Verifying overall behavior with the Trace tool

### Deploying your application

This lesson describes how to deploy an application for use. Topics include:

- Introduction to deployment
- Application Builder
- Launching executables
- Communicating with deployed application

### Advanced Topics

This lesson introduces some advanced topics for implementing your real-time application like implementing time-critical loops.