LabVIEW Real-Time Application Development Course

Note: Starting July 2004, the LabVIEW Real-Time Application Development course replaces the LabVIEW Real-Time Systems using PXI/FieldPoint courses (P/N 910642-xx and 910653-xx).

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 that runs indefinitely with less than 4 nanoseconds of jitter. 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 7.1
- 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/italy/customerservice or contact NI Italy

Milan Office: (02) 41309217 • Fax: (02) 41309215
Rome Office: (06) 520871 • Fax: (06) 52087309
E-Mail: ni.italy@ni.com

NI can also hold this class onsite at your facility.

Ordering Information 910733-xx
-01 NI Offices, -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, install and configure real-time hardware. 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 the target
- Configuring your input and output
- Connecting to the 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:
- Understanding the need for control
- Using PID control
- 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 shared memory, network communication, and bus communication. Topics include:

- Communicating with applications on an RT target
- Creating communication VIs with the RT Communication Wizard
- Network communication methods including: TCP/IP, UDP, DataSocket, VI Server and Logos

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
- Implementing Watchdogs
- 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. These topics include:

- Implementing multiple time-critical loops
- Reusing code
- Using DLL’s in your real-time application