LabVIEW Real-Time 2: Architecting Embedded Systems Course

Overview
The LabVIEW Real-Time 2: Architecting Embedded Systems course delivers hands-on training for designing scalable, maintainable, and reliable embedded applications. At the end of the course, you will be able to translate your embedded system requirements into a scalable software architecture, choose appropriate methods for inter-process and network-based communication, design your real-time application for reliability, and efficiently deploy and replicate your real-time systems.

Duration
Classroom: Three (3) Days

Audience
- LabVIEW Real-Time Module users preparing to develop and deploy professional applications using real-time targets
- Users who are developing medium to large embedded applications that require a scalable software architecture and reliable communication
- Users who need to develop and deploy real-time applications with maximum reliability and extended run times

Prerequisites
- LabVIEW Real-Time 1 and LabVIEW Core 2, or equivalent experience

Suggested Next Courses
- LabVIEW FPGA
- LabVIEW Core 3
- Data Acquisition and Signal Conditioning

NI Products Used During the Course
- LabVIEW Professional Development System
- LabVIEW Real-Time Module
- Real-Time Execution Trace Toolkit
- CompactRIO Integrated Controller
- CompactRIO Thermocouple Input Module
- CompactRIO Sourcing Digital Output Module

After attending this course, you will be able to:
- Identify requirements and design a real-time application
- Document your system design using diagrams
- Implement the most appropriate method of sharing data locally on the RT target between multiple processes
- Implement the most appropriate method of communicating between RT targets and host computers over the network
- Properly manage memory and monitor the health of your system
- Implement a variety of techniques to increase the reliability of a real-time application
- Debug, benchmark, and test your real-time application
- Deploy your application to multiple systems

Registration
Register online at ni.com/training or call (800) 433-3488 Fax: (512) 683-9300 email info@ni.com

Outside North America, contact your local NI Office.
Worldwide Contact Info: ni.com/global

Part Number
910809-xx
-01 NI Corporate or Branch
-11 Regional
-21 Onsite (at your facility)
LabVIEW Real-Time 2: Architecting Embedded Systems Course Outline

Real-Time Application Design Flow
This lesson walks through a variety of considerations when designing and developing a real-time application. Topics include:

- Analyzing your real-time application
- RT target considerations
- Host considerations

Documenting Your Design
This lesson describes how to use and create different types of diagrams to document your system design. Topics include:

- Overview of diagrams
- Creating a communication diagram
- Typical real-time system diagrams
- Additional documentation

Real-Time Processes and Inter-Process Communication
This lesson describes different methods to share data between processes on the RT target. Topics include:

- Comparing shared variables, RT FIFO functions, and queues
- Using functional global variables for encapsulation and current value tables

Network Communication
This lesson describes a variety of methods to communicate between RT targets and host computers in different scenarios. Topics include:

- Selecting an appropriate network communication method
- Implementing a variety of network communication methods to monitor latest values, stream data, and send messages in different scenarios

Managing Memory and Monitoring System Health
This lesson discusses techniques to manage memory properly and monitor the health of an RT target and application. Topics include:

- Impacts of memory usage
- Memory management
- System monitoring

Reliability
This lesson discusses techniques to improve the reliability of a real-time application. Topics include:

- Safe states and shutdown
- Specific and central error handling
- Implementing a watchdog
- Redundancy

Debugging, Benchmarking, and Testing
This lesson discusses methods of debugging, benchmarking, and testing your real-time application. Topics include:

- Debugging tools
- Benchmarking performance and code duration
- Examining detailed traces of application behavior using the Real-Time Execution Trace Toolkit
- Testing a real-time application

Deployment and Replication
This lesson discusses how to deploy and replicate an RT application to multiple targets. Topics include:

- Target imaging
- System replication