

# Getting Started With LabVIEW FPGA

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## Overview

The NI LabVIEW FPGA Module lets you graphically implement digital circuits within an FPGA chip. Watch these short videos to see what it's like to program in LabVIEW FPGA, and implement basic tasks using analog and digital I/O.

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### 1. Writing Your First LabVIEW FPGA Program

Learn how you can use LabVIEW system design software to program an FPGA hardware target.

- Use graphical structures and I/O nodes to build custom digital circuits
- Compile the block diagram to run LabVIEW code in hardware

Duration: 6:32

### 2. Implementing Counters in LabVIEW FPGA

FPGAs are excellent for implementing counters, and LabVIEW lets you build them graphically.

- Create a simple event counter in LabVIEW FPGA to count rising digital edges
- Display the counter register value on the LEDs of an NI CompactRIO module

Duration: 6:03

### 3. Using Analog Inputs and Outputs in LabVIEW FPGA

You can use I/O nodes in LabVIEW FPGA to generate analog signals and take analog measurements.

- Generate an analog voltage using a CompactRIO analog output module
- Measure back the voltage using a CompactRIO analog input module

Duration: 5:51

### 4. Using Graphical Loop Structures in LabVIEW FPGA

Unlike CPUs, FPGA hardware lets you execute code with true parallel operation, and LabVIEW FPGA has graphical loop structures to let different parts of your block diagram run simultaneously.

- Use multiple LabVIEW FPGA While Loop structures to create independent circuits
- Use Loop Timer functions to specify how fast different loops should run

Duration: 6:14

### 5. Measuring Loop Timing in LabVIEW FPGA

LabVIEW FPGA lets you run graphical block diagrams in hardware, which can execute on the order of microseconds and nanoseconds.

- Learn how low-level timing works when LabVIEW code is running on an FPGA chip
- Use Tick Count functions in LabVIEW FPGA to monitor loop execution speeds

Duration: 4:43

### 6. Single-Cycle Timed Loops in LabVIEW FPGA

Learn about the single-cycle Timed Loop, a special structure in LabVIEW FPGA that lets you optimize your FPGA design for both size and speed.

- Execute FPGA logic in a single-cycle Timed Loop within a single "tick"
- Achieve 25 nanosecond loop rates at the default compile clock of 40 MHz

Duration: 4:34

### 7. Debouncing Digital Signals in LabVIEW FPGA

Mechanical switches and relays can often bounce when changing state, and you can use LabVIEW FPGA to implement debounce circuitry and filter out unwanted digital edges.

- Graphically implement a digital debounce filter on a simple event counter
- Programmatically set a minimum amount of time to identify valid transitions

Duration: 9:10

## 8. Using Feedback Nodes in LabVIEW FPGA

In addition to using shift registers, you can also use Feedback Nodes in LabVIEW FPGA to pass data between different loop iterations.

- Learn how Feedback Nodes can be helpful for making LabVIEW block diagrams easier to read
- Use Feedback Nodes within subVIs to create modular functions that can hold data between loop iterations

**Duration:** 4:16

### Additional Resources

View additional resources to get you up and running with LabVIEW FPGA and reconfigurable I/O (RIO) hardware.

[Use the LabVIEW Skills Guide to build a learning plan and find resources to help meet your software and hardware needs](#)

[View recommended architectures and best practices to get started with CompactRIO](#)