What’s New in LabVIEW 2012

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Graphical System Design
A Platform-Based Approach for Measurement and Control

Test
Monitor
Embedded
Control
Cyber Physical

NATIONAL INSTRUMENTS
LabVIEW™

Desктops and PC-Based DAQ
PXI and Modular Instruments
RIO and Custom Designs
Open Connectivity With Third-Party I/O

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Unrivaled Integration with the Latest Technology

NI cDAQ-913x
Stand-alone measurements

NI PXIe-1085
Express Gen 2, All hybrid chassis

NI PXIe-5644R
Software-designed instrumentation

NI LabVIEW RIO Eval Board
Evaluate LabVIEW for FPGA-based systems

NI-946x
GPS and Chassis Synchronization

NI 9146 Ethernet RIO
NI 915x 9154 MXI-Express RIO
Expansion Chassis

NI miniSystems
for Engineering Education

NI USRP
Software Defined Radio

ni.com
Accelerates Your Success

By abstracting low-level complexity and integrating all of the tools you need to build any measurement or control system
Build This. Not That.
LabVIEW 2012 helps you eliminate spaghetti code

Start your application from recommended building blocks using Templates and Sample Projects

Access extensive training on LabVIEW programming concepts anytime on ni.com with Self-Paced Online Training

Innovate with confidence thanks to continued investment in stability and reliability

ni.com
Build This. Not That.

LabVIEW 2012 delivers all the tools you need to move from measurement to decision, faster.
Build This. Not That.

Build a custom and flexible test system in less time with LabVIEW 2012
Build This. Not That.
End-to-end integration means you can deploy an embedded system faster
LabVIEW 2012 Getting Started Window
Online LabVIEW Skills Guide

NI LabVIEW Skills Guide

Identify the skills you need and find learning resources to help you successfully develop a LabVIEW application with your hardware.

Step 1: LabVIEW Software Skills

Choose the hardware platform you are using with LabVIEW. Then identify the category that best describes how your application will use that hardware. Expand your chosen category to view the skills you need and resources to help you get there.

**Data Acquisition**
- NI Serial, X Series, CompactDAQ, and Stand-Alone DAQ

**Instrument Control**
- CPI, Serial USB, and Ethernet

**Embedded Control and Monitoring**
- CompactRIO and NI Single-Board RIO

**Automated Test**
- PXI and Modular Instruments, NI TestStand and NI TestStand Software

**Basic Performance (Scan Engine) Prototype**
- Build a functional prototype or short-term use system
- Sample or update all I/O channels at <500 Hz and use software-based control or safety logic

**Sound like you?**

<table>
<thead>
<tr>
<th>Required Skills</th>
<th>Online Product Documentation</th>
<th>Instructor-Led Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setup</td>
<td>Online documentation available 24/7 on ni.com</td>
<td>Live classes taught online or in a classroom by certified instructors; provides exercises and hands-on hardware experience, available for purchase</td>
</tr>
</tbody>
</table>

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Introducing Self-Paced Online Training
Core LabVIEW skills included with your software subscription

What You’ll Learn
• Environment basics
• Structures and data types
• How to read existing code
• Timing techniques
• Basics design patterns
• Building executables
• Software engineering basics

Video: Preview Self-Paced Training Experience
LabVIEW 2012 Getting Started Window Summary

- Start from a Template
- Pin Common Projects
- Find Learning Resources
- Find LabVIEW Add-Ons
- RSS News and Announcements

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Introducing Templates and Sample Projects

• Recommended starting points for common LabVIEW applications
• Clearly indicates where to add or change functionality
• Shows best practices for code design, documentation, and organization
• Add custom templates and sample projects
Finite Measurement Sample Project State Diagram

Acquire

Configure

Analyze

Copy Graph

Load Data

Clear Data

Export Data

Copy Graph

Save Data

Save Data

Export Data

Copy Graph

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LabVIEW Continuous Measurement Architecture

Provides a **ready-to-run** starting point using a **scalable** architecture

ni.com
LabVIEW Continuous Measurement Architecture

Provides a ready-to-run starting point using a scalable architecture.
LabVIEW FPGA Control Sample Project

Provides a recommended starting point using a scalable architecture
LabVIEW FPGA Control Sample Project

Provides a recommended starting point using a scalable architecture
Simple VSA + VSG Sample Project for VST

Host Application

User Interface

VSA Configuration

FPGA

Acquisition Engine

Generation Engine

Vector Signal Analyzer

Vector Signal Generator

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Template and Sample Project FAQ

- The list of available templates and sample projects depends on the modules and drivers that are installed.

- Creating a project from a template or sample project does not modify the original project, as a new copy of code is created and saved on disk.

- Sample projects that are designed for deployment on Real-Time and FPGA targets require additional configuration to map the hardware and I/O.

- Blue comments are used throughout the code to clearly indicate where code is either recommended or needed.

- Users can create and add their own templates and sample projects.
Pre-Release LabVIEW Defect Flow

- Fewer defects despite additional testing
- Concerted focus on most commonly reported crashes
- Fixed 50% of top 30% crashes
Continuous Investment In Stability

Top 20 LV 2011 NIER Reported Crashes (30% of all reported crashes)

Over half of the top reported crashes were fixed in 2012
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Productivity Enhancements
12 Productivity Enhancements From the LabVIEW Idea Exchange

- Subdiagram Labels
- Enumerated dialog enhancements
- Removing selected broken wires
- Icon Editor API
- Contextual Help for Data Coercion
- Event structure in Base version
- Conditionally writing values to loop output tunnels
- Concatenate indexing
- Right-click menu for multiple items
- Long file path truncation
- Separate label locations for controls and indicators
- String editing dialog box
Idea Exchange Features

Integrated Subdiagram Labels

Create labels that move and resize with any structure
Idea Exchange Features

Pop-up Menus for Multiple Selected Objects

Save the time required to manually apply settings to multiple items
Idea Exchange Features

Conditional Loop Tunnel

Simplified approach

Extract odd and prime numbers from a given array

Simplifies common coding practices for conditionally building arrays
Help keep code looking clean by enabling users to edit large blocks of text without expanding the string constant.
Idea Exchange Features

Separate Default Label Locations for Control & Indicator Terminals

Enables block diagram clean up to be used without rearranging labels
Idea Exchange Features

Context Help for Coercion Dots

Quickly identify the reason for the data coercion
Idea Exchange Features

Truncate Long Paths

Makes it simple to display long paths using standard conventions
High-Performance Analysis
3D Stereo Vision in LabVIEW 2012

• New 3D Stereo Vision Features in Vision Development Module
• Calibrate cameras to analyze left and right images
• Generate depth and disparity maps
• Perform advanced inspection and guided motion with depth information

Left Image

Right Image

Defective Chocolate

Combined Image for Depth Information
LabVIEW Multicore Analysis and Sparse Matrix Toolkit

Continued investment in advanced multicore capabilities

Support for sparse matrices across a variety of linear algebra, matrix manipulation, and other functions

Support for both double and single-precision data
LabVIEW GPU Analysis Toolkit
Support for NVIDIA® CUDA™ GPUs

- Communicate with NVIDIA® CUDA™ GPUs from LabVIEW applications

- Quickly prototype GPU algorithms using cuBLAS and cuFFT functions wrapped in LabVIEW

- Access documentation on calling custom GPU code from LabVIEW

- Select GPU devices and manage resources using CUDA Runtime and Driver APIs
Real-Time and FPGA
Real-Time Image Deployment Improvements

- Parallel image deployment to targets
- 30% faster image retrieval and deployment
- File and directory blacklist option
- Improved and expanded web configuration

Parallel Image Deployment

File & Directory Blacklisting

encryption passphrase
restart automatically (T)
session in source file
network settings (preserve ...
error in (no error)
original system only (F)
file and directory blacklist
LabVIEW 2012 FPGA Linux Compile Worker

- Approximately 30% faster compilations with Linux OS
- Support across all FPGA compilation options
  - Remote Machine Compilation
  - LabVIEW FPGA Compile Farm Toolkit
  - LabVIEW FPGA Compile Cloud Service
LabVIEW FPGA Floating Point Data Type Support

Monte Carlo Algorithm for Approximating Pi

Fixed-Point

Floating Point
New in 2012

Monte Carlo Algorithm for Approximating Pi
LabVIEW FPGA Floating Point Data Type Support

Sending Fixed-Point Data to Host as Single Precision Floating-Point

The same conversion in LabVIEW FPGA 2012

No host conversion required

Host requires type conversion

subVI code required for type conversion
LabVIEW FPGA IP Builder
Generate optimized FPGA IP from high-level LabVIEW algorithms

- Rapidly develop high performance algorithms for FPGAs
- Quickly explore design tradeoffs using directives
- Reuse IP to meet new design requirements

LabVIEW FPGA VI
LabVIEW FPGA IP Builder VI

Manual optimization required
Optimization using high-level synthesis

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Compatibility with industry-standard modeling environments for system simulation

Import models from industry-standard tools like SolidWorks

Simplifies simulation and deployment of mechatronics systems
Cloud and Mobile
Mobile Applications to Control and Visualize Your Data

Control and visualize data from LabVIEW systems on an iPad

Data Dashboard for LabVIEW

Available on the App Store
Summary of New Features in the Enhanced Data Dashboard for LabVIEW App (Coming in September)

- Create custom layouts (place dashboard elements freely)

- Add controls as well as indicators

- Share dashboards via email or the NI Cloud

- Connect to data using secure or non-secure web services or network-published shared variables

- Customize the look and feel of individual dashboard elements

- Define background colors or use an image

- Create many dashboards and make single dashboards multi-page

- Access data from the NI Technical Data Cloud
Advanced Features
New Framework for Multi-Process Systems

The Actor Framework designed for large multi-process applications

Includes utility for generating messages and invoking actor methods

For more information: ni.com/actorframework

Makes heavy use of object-oriented programming in order to eliminate duplication of code and improve system scalability
New Framework for Multi-Process Systems

Children of the Message Class define the information that can be passed between actors

Children of the Actor Class are queued message handlers

For more information: ni.com/actorframework
Enhanced data management tools and technologies

- TDMS API available on Mac and Linux
- Improved reporting capabilities of DIAdem 2012

New API makes creating detailed and highly-customized reports simple and fast
LabVIEW Ecosystem Growth

LabVIEW Tools Network
1,000,000 add-ons downloaded
26 Certified Add-Ons
Over 100 add-ons

User Community
Over 9,000 certified users
Over 700 alliance partners
58 registered user groups

Connectivity
Over 9,500 instrument drivers
Any bus, any protocol, any platform
Integration with third-party languages
Overview of New Features in 2012

Start your application from recommended building blocks using **Templates and Sample Projects**

Access extensive training on LabVIEW programming concepts anytime on ni.com with **Self-Paced Online Training**

Innovate with confidence thanks to continued investment in **stability** and reliability

Control and visualize data from LabVIEW systems on an **iPad**

High-Performance **Analysis and Image Processing Capabilities**, including connectivity with NVIDIA (R) CUDA (TM) GPUs

New interactive **control design & analysis tools** with tight integration to simulation & real-time implementation

Simplify and speed development of **FPGA** applications with new optimization and productivity improvements

Import industry-standard models to design and **simulate complex control systems and robots**

Use **twelve productivity enhancements** powered by the developer community on the Idea Exchange

Simplify **report generation** with DIAdem 2012 and TDMS support for Mac and Linux

Improved **deployment** and imaging capabilities for Real-Time applications

Take advantage of a growing **ecosystem** of over 9,000 certified users and native integration with the LabVIEW Tools Network

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Accelerates Your Success
By abstracting low-level complexity and integrating all of the tools you need to build any measurement or control system

Measurement Systems
From sensors to decisions, build your measurement system faster

Test Systems
Confidently meet the demands of any test system in less time

RF Test Systems
Test the latest wireless devices faster

Embedded Systems
Go from design to deployment faster than ever before

ni.com/labview/whatsnew