What's New in LabVIEW 2012

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Presented to the IEEE Long Island Section Instrumentation & Measurement Society and the Long Island LabVIEW Users Group (LILUG) on Thursday December 6, 2012

Graphical System Design

A Platform-Based Approach for Measurement and Control

Test

Monitor

Embedded

Control

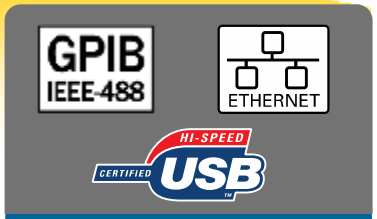
Cyber Physical

NATIONAL INSTRUMENTS LabVIEW™

Desktops and PC-Based DAQ

PXI and Modular Instruments

RIO and Custom Designs



Open Connectivity With Third-Party I/O

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

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New Hardware Products

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

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LabVIEW™

System Design Software

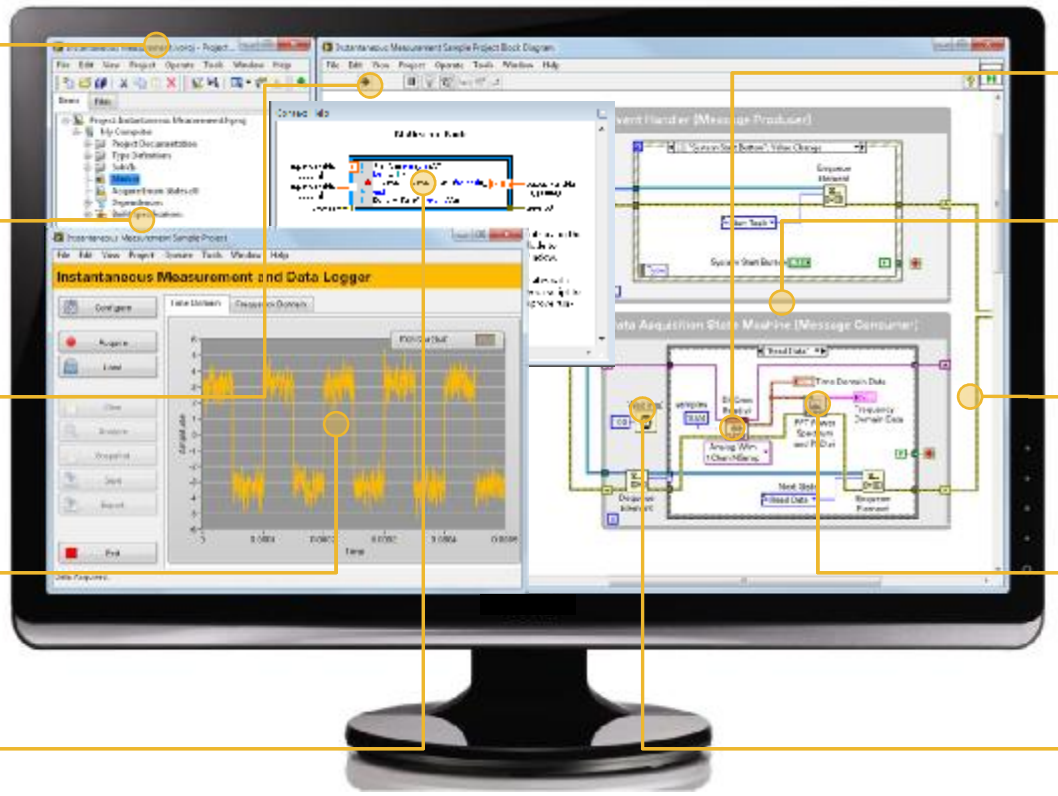
Project Explorer
Manage and organize all system resources, including I/O and deployment targets

Deployment Targets
Deploy LabVIEW code to the leading desktop, real-time, and FPGA hardware targets

Instant Compilation
See the state of your application at all times, instantly

Front Panel
Create event-driven user interfaces to control systems and display measurements

Models of Computation
Combine and reuse .m files, C code, and HDL with graphical code



Hardware Connectivity
Bring real-world signals into LabVIEW from any I/O on any instrument

Parallel Programming
Create independent loops that automatically execute in parallel

Block Diagram
Define and customize the behavior of your system using graphical programming

Analysis Libraries
Use high-performance analysis libraries designed for engineering and science

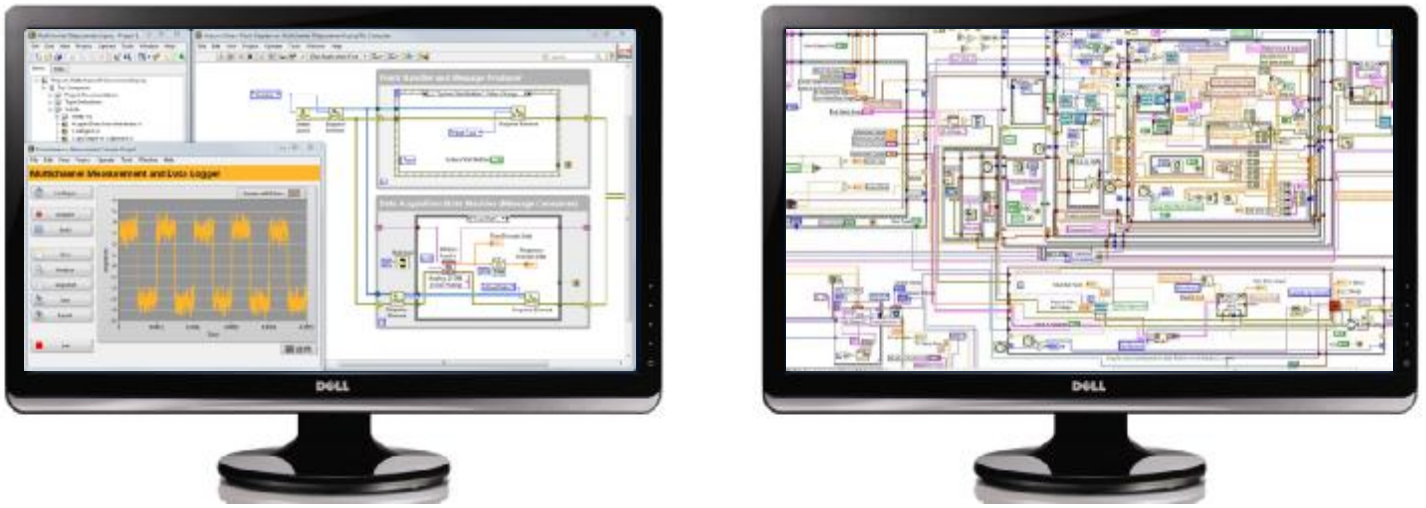
Timing
Define explicit execution order and timing with sequential data flow

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

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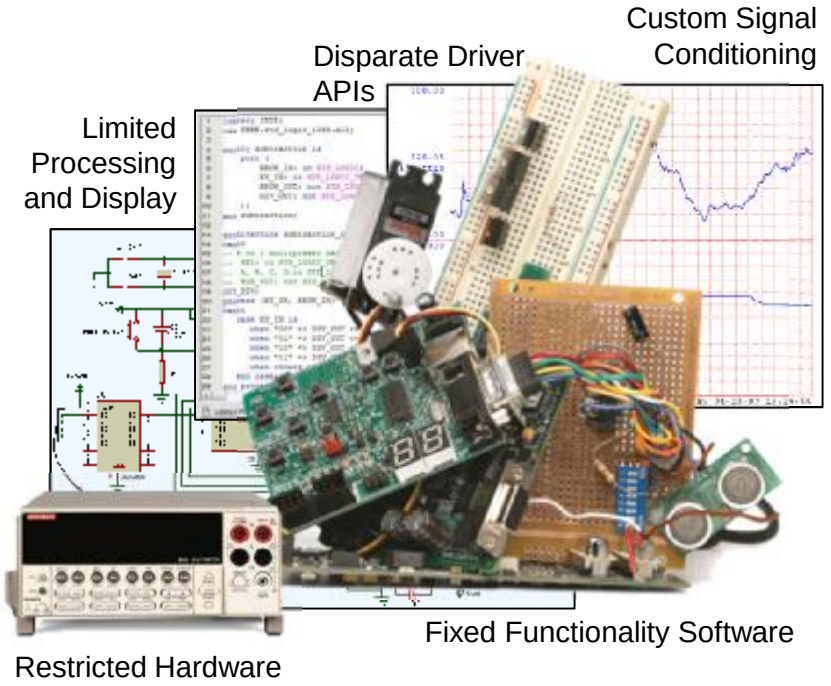
LabVIEW™ 2012



Build This. Not That.

LabVIEW 2012 delivers all the tools you need to move from measurement to decision, faster

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Build This. Not That.

Build a custom and flexible test system
in less time with LabVIEW 2012

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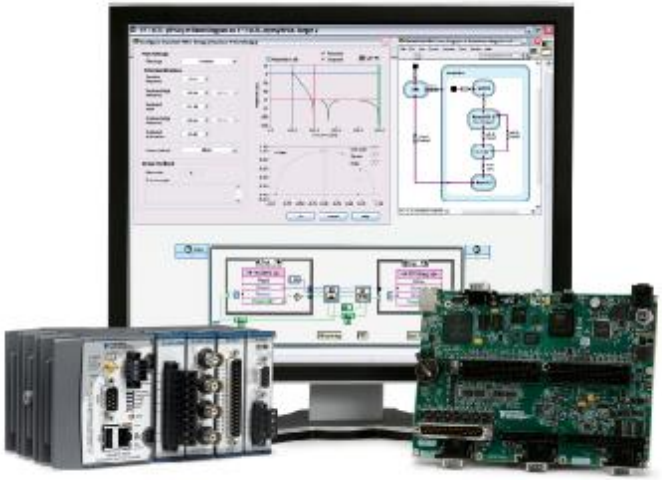
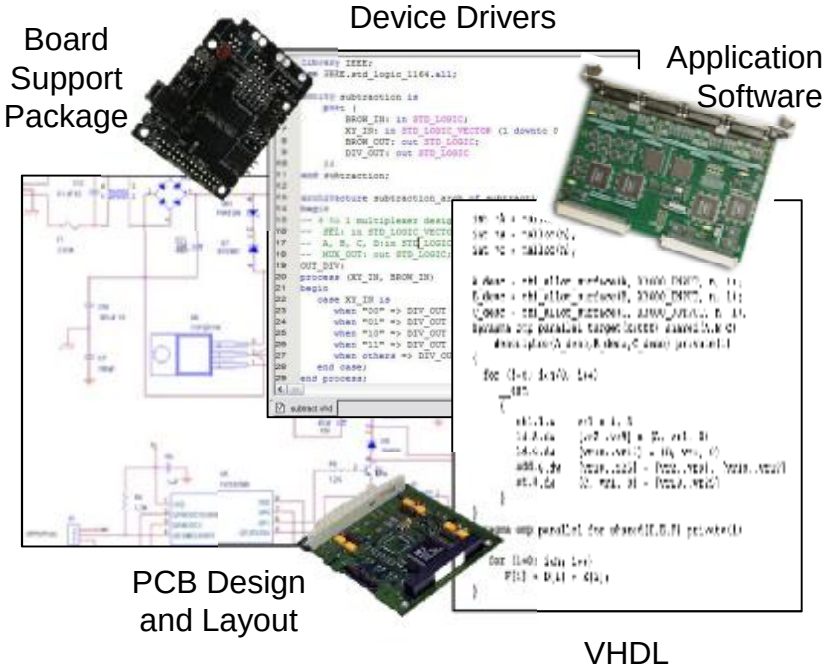
LabVIEW™ 2012





Build This. Not That.

End-to-end integration means you can deploy an embedded system faster

LabVIEW 2012 Getting Started Window

Demonstration

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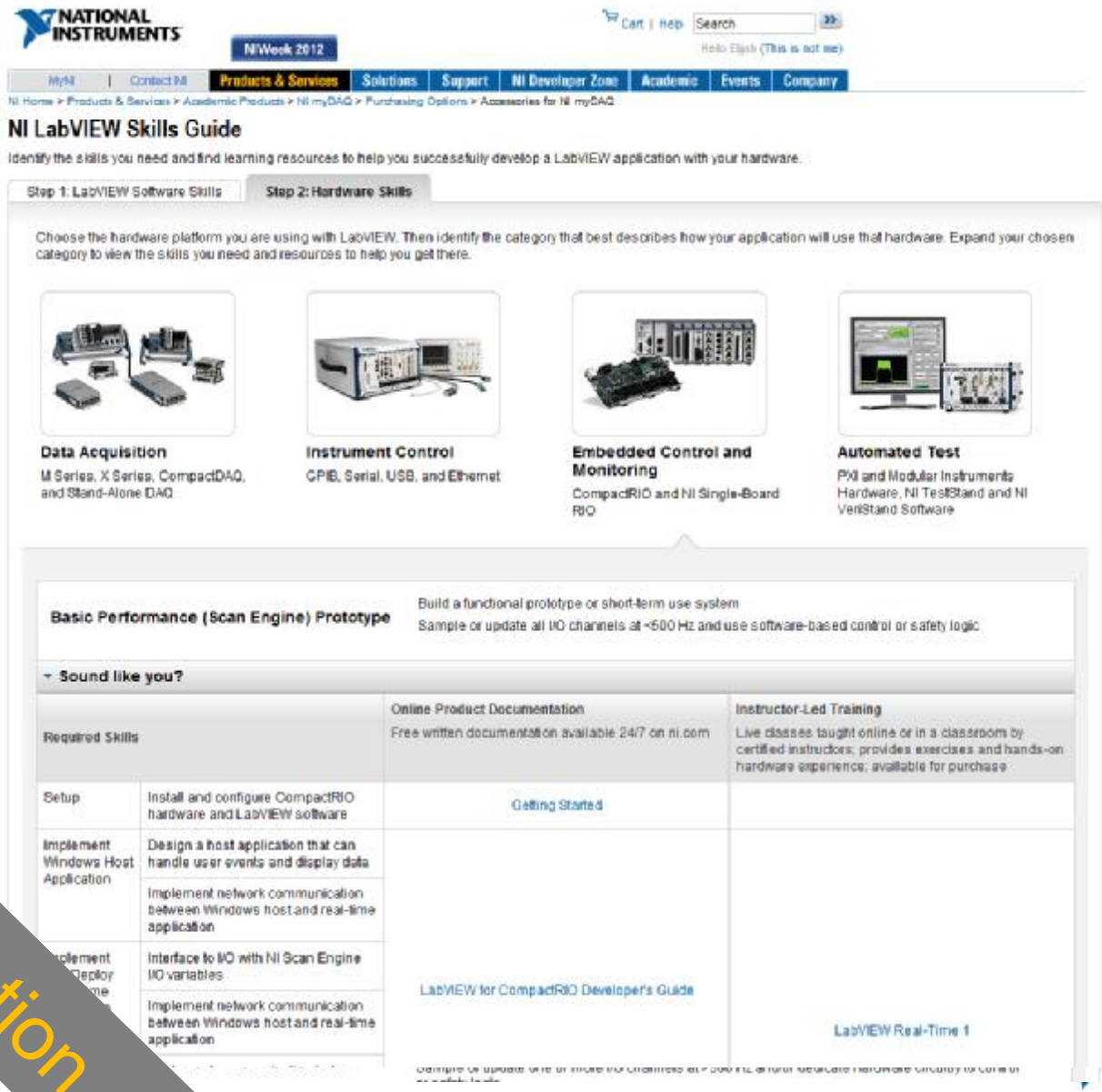
Online LabVIEW Skills Guide



Demonstration

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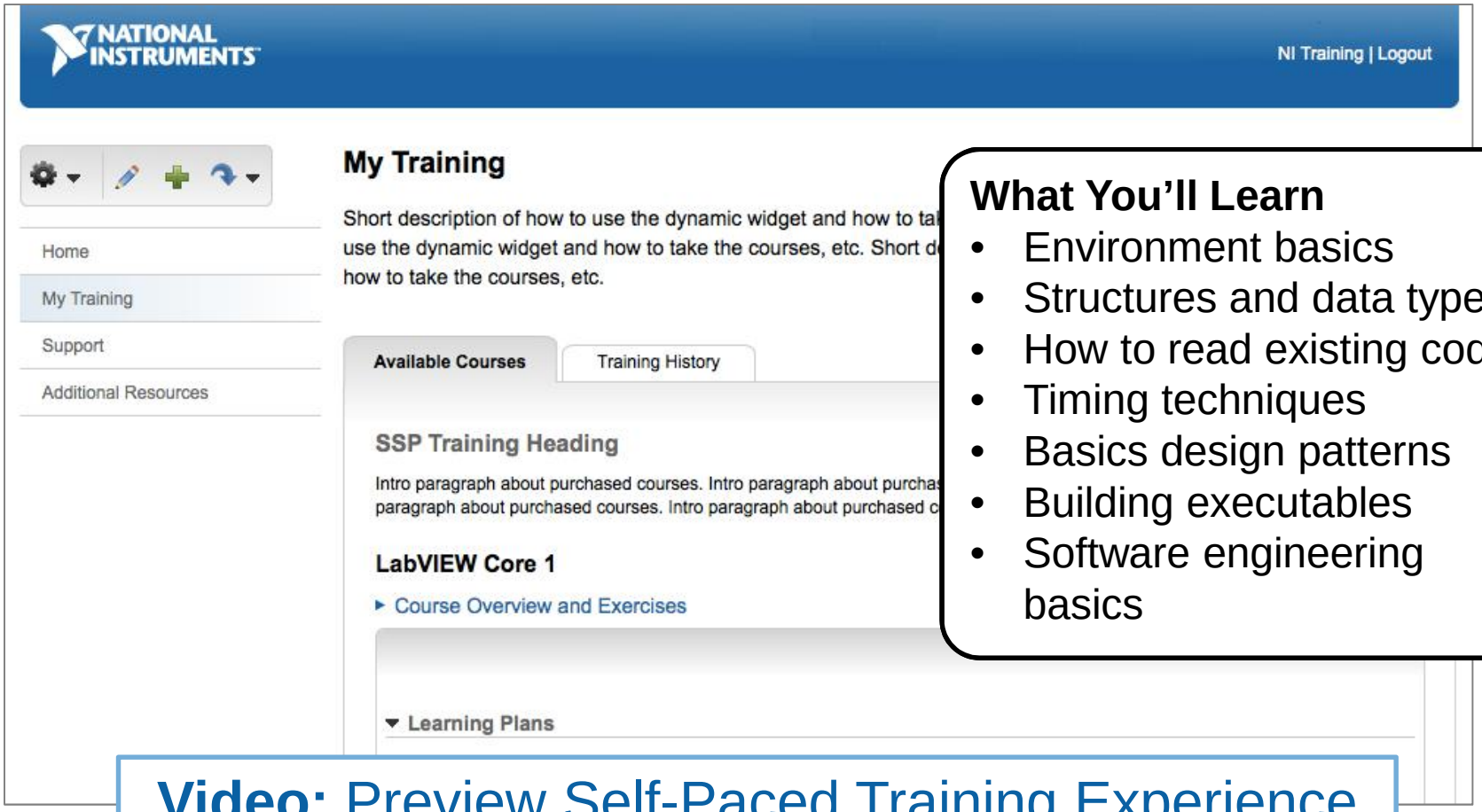
Introducing Self-Paced Online Training

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

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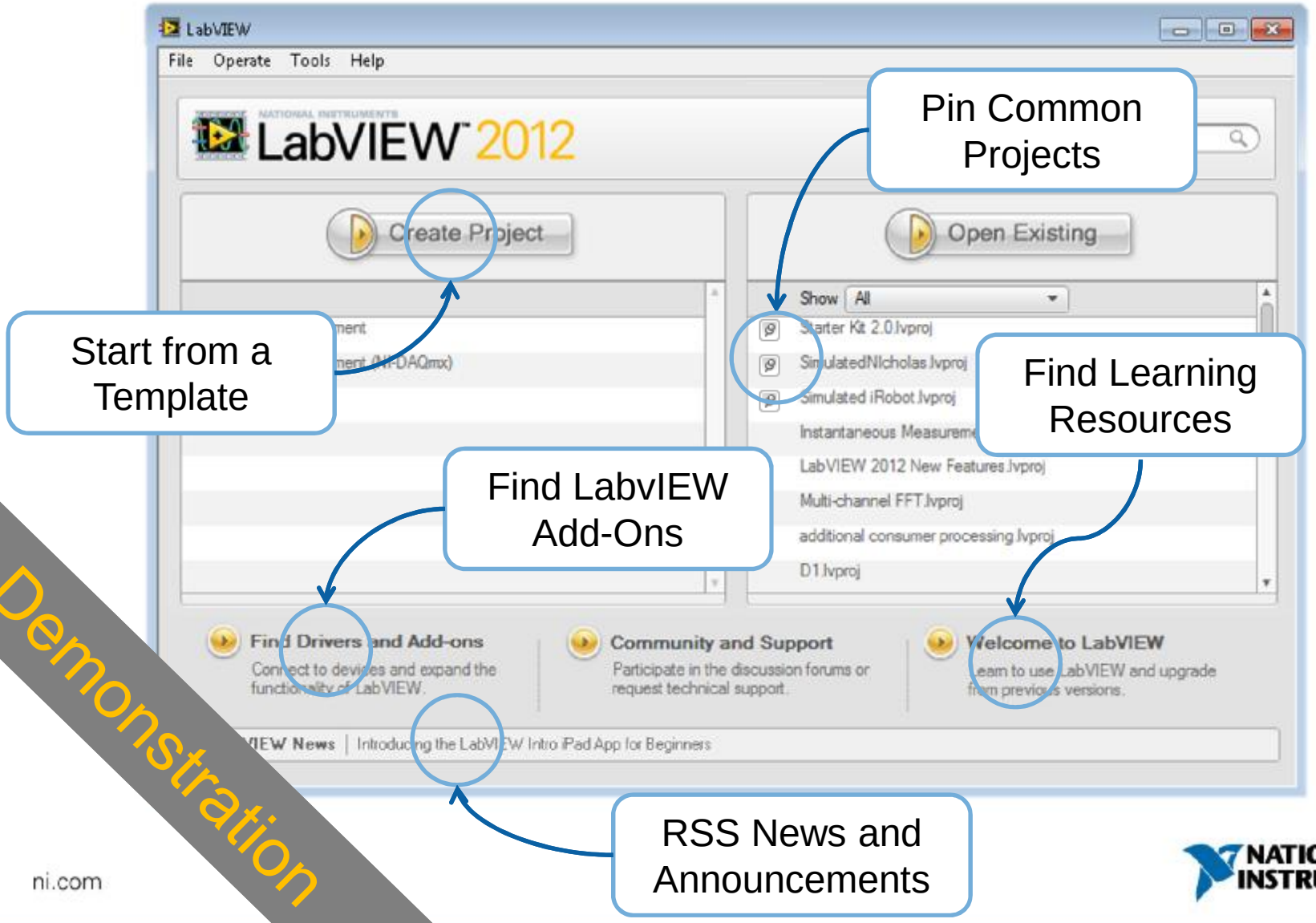
LabVIEW 2012 Getting Started Window Summary



Demonstration

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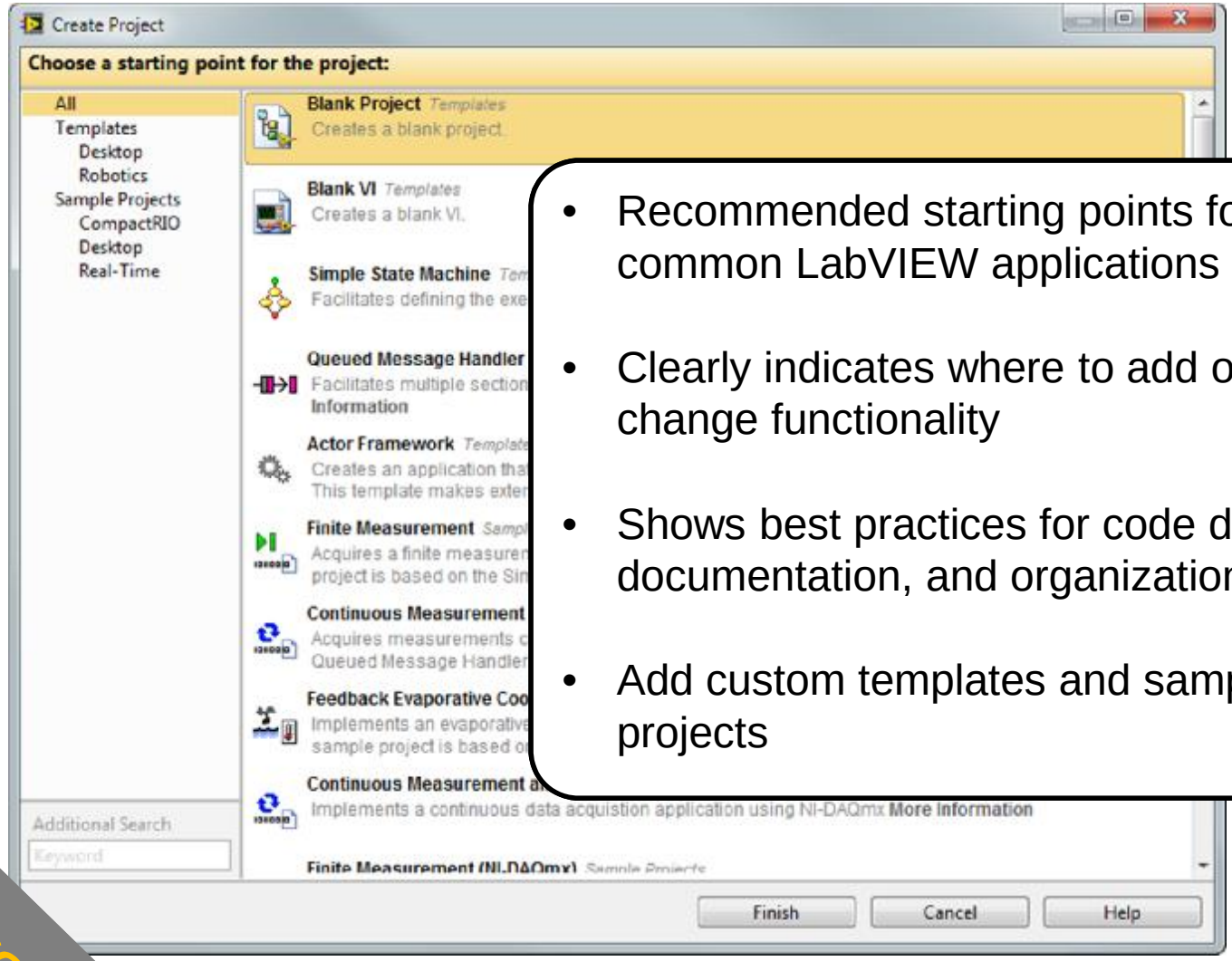
Introducing Templates and Sample Projects



- 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

Demonstration

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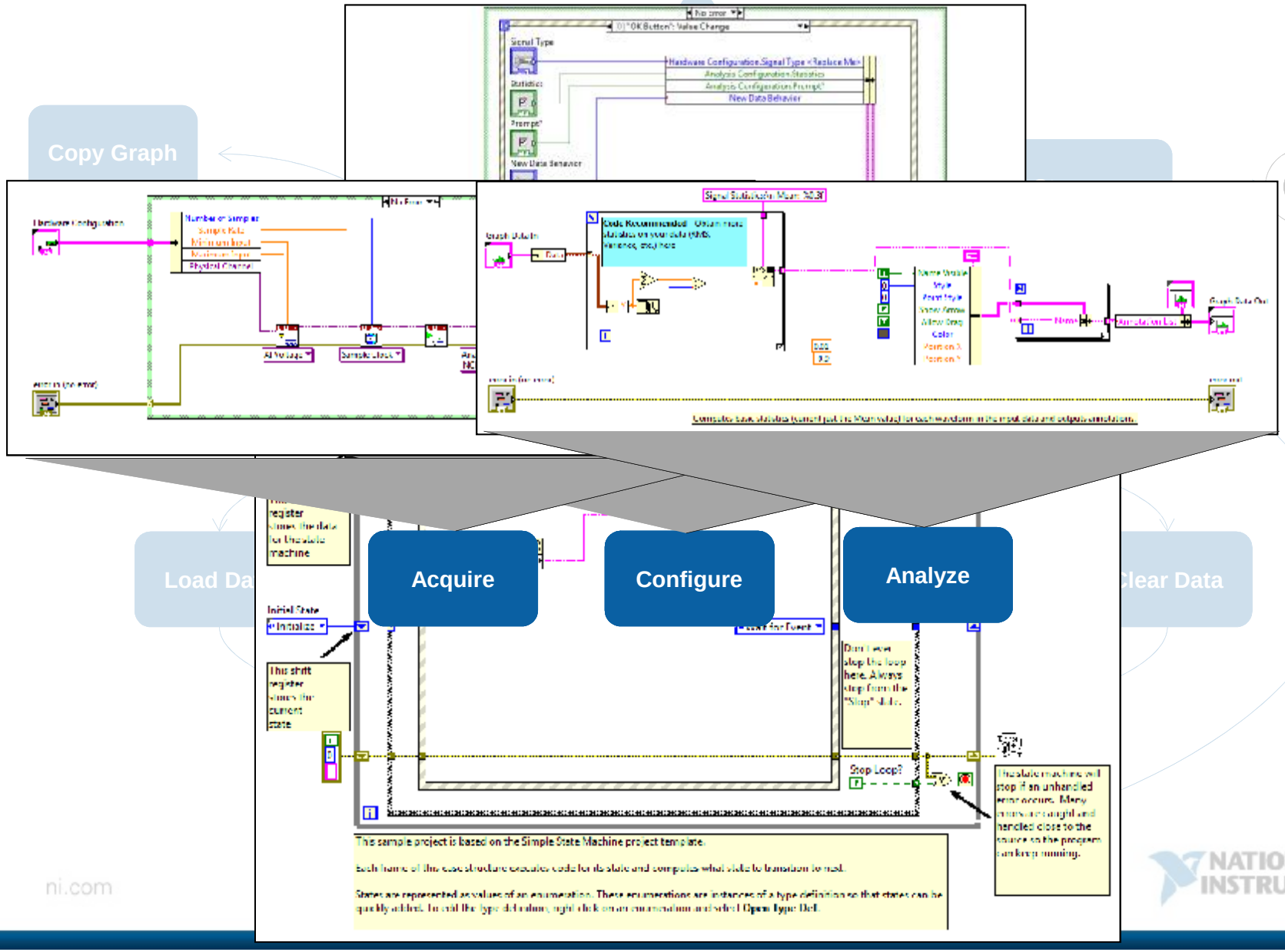
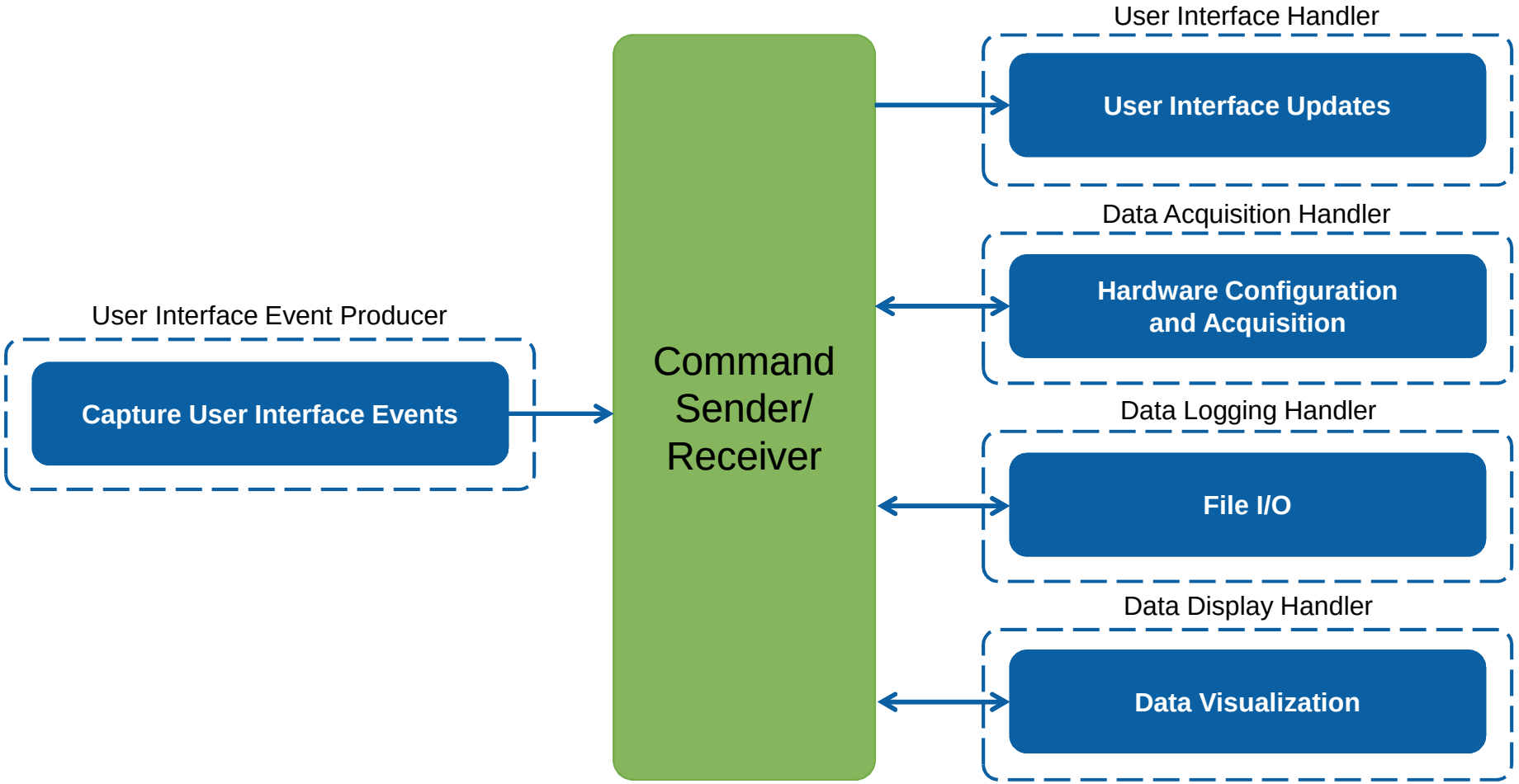
Finite Measurement Sample Project State Diagram

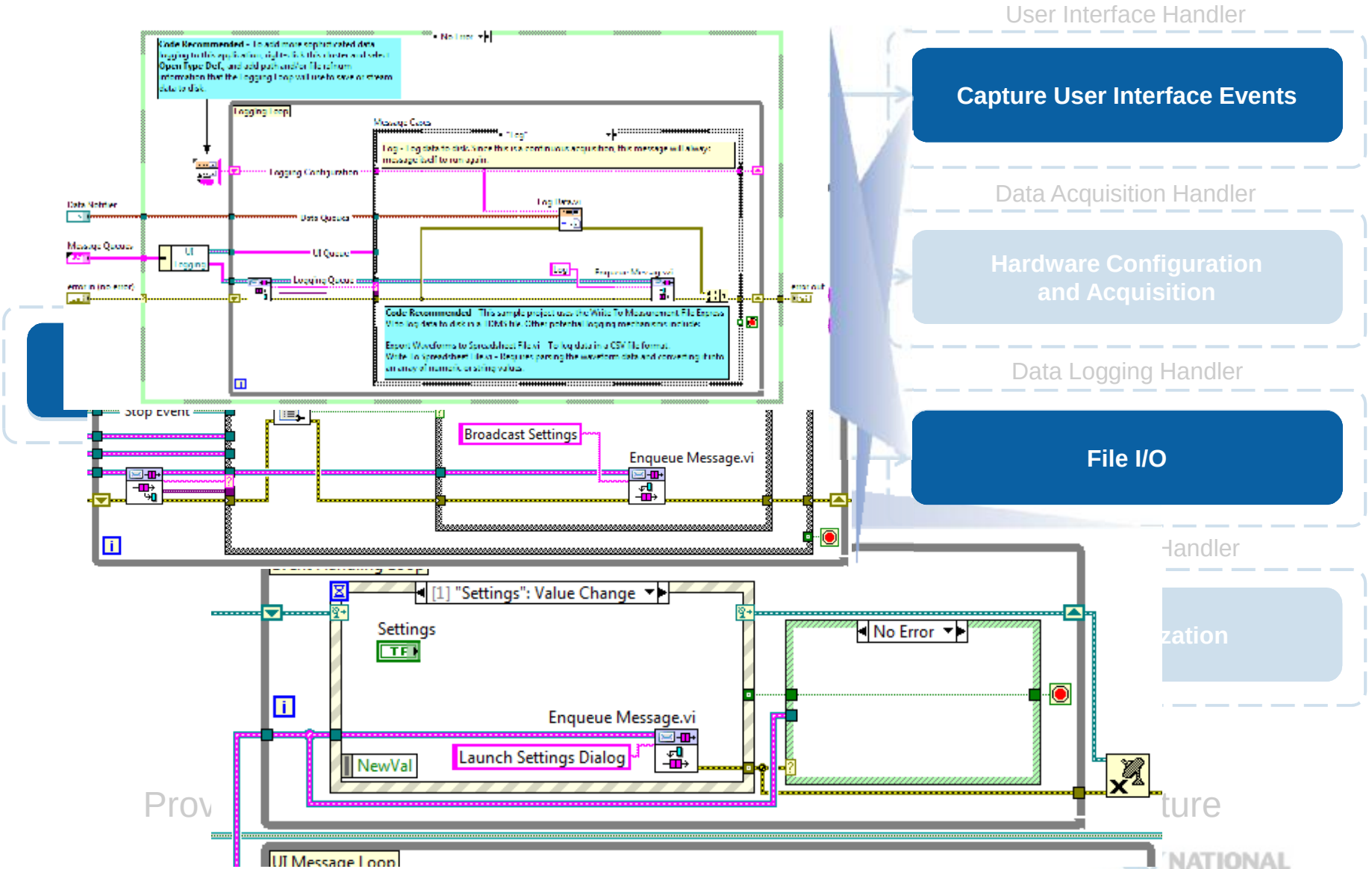


LabVIEW Continuous Measurement Architecture

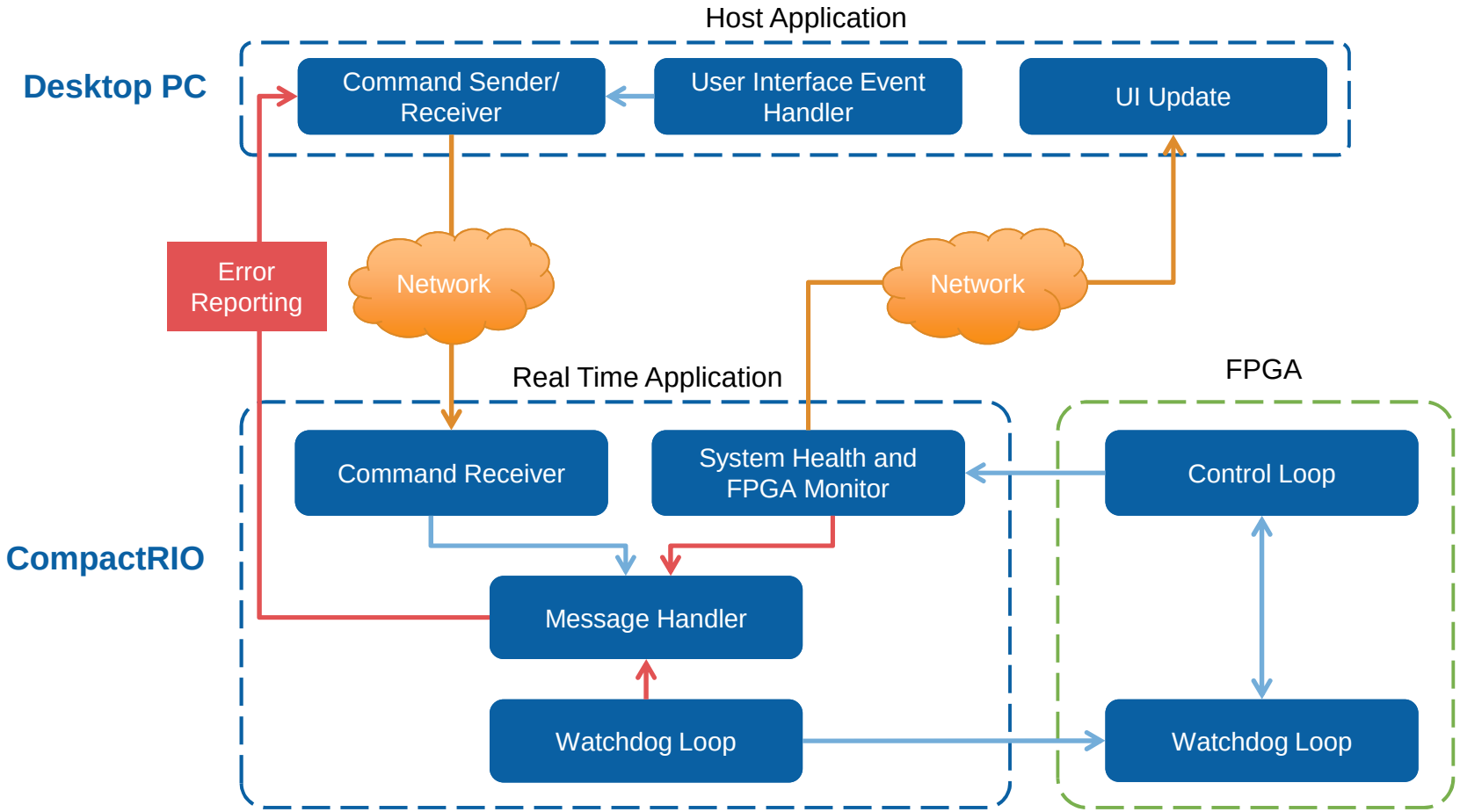


Provides a **ready-to-run** starting point using a **scalable** architecture

LabVIEW Continuous Measurement Architecture



LabVIEW FPGA Control Sample Project



Provides a recommended starting point using a scalable architecture

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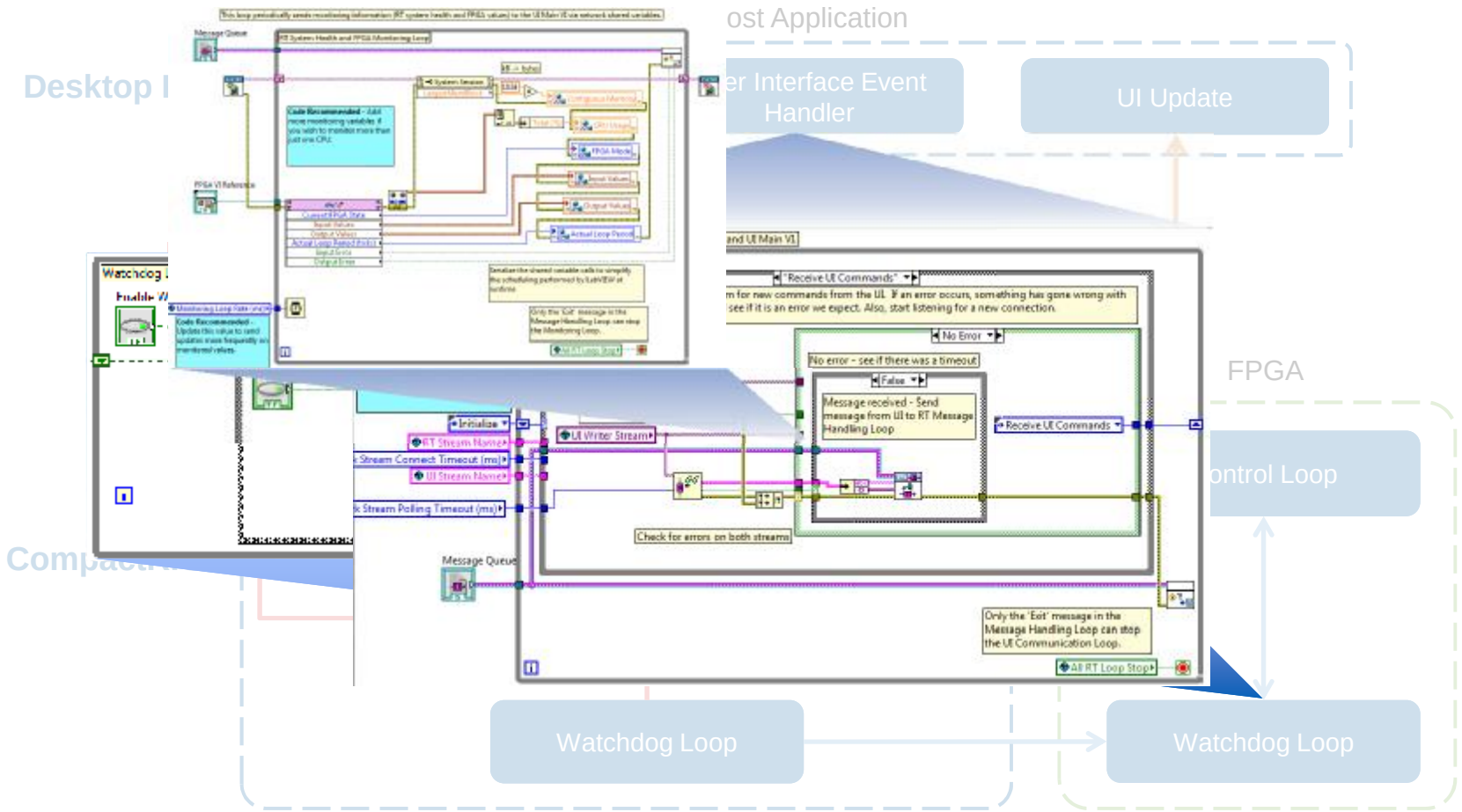
LabVIEW FPGA Control Sample Project



Provides a recommended starting point using a scalable architecture

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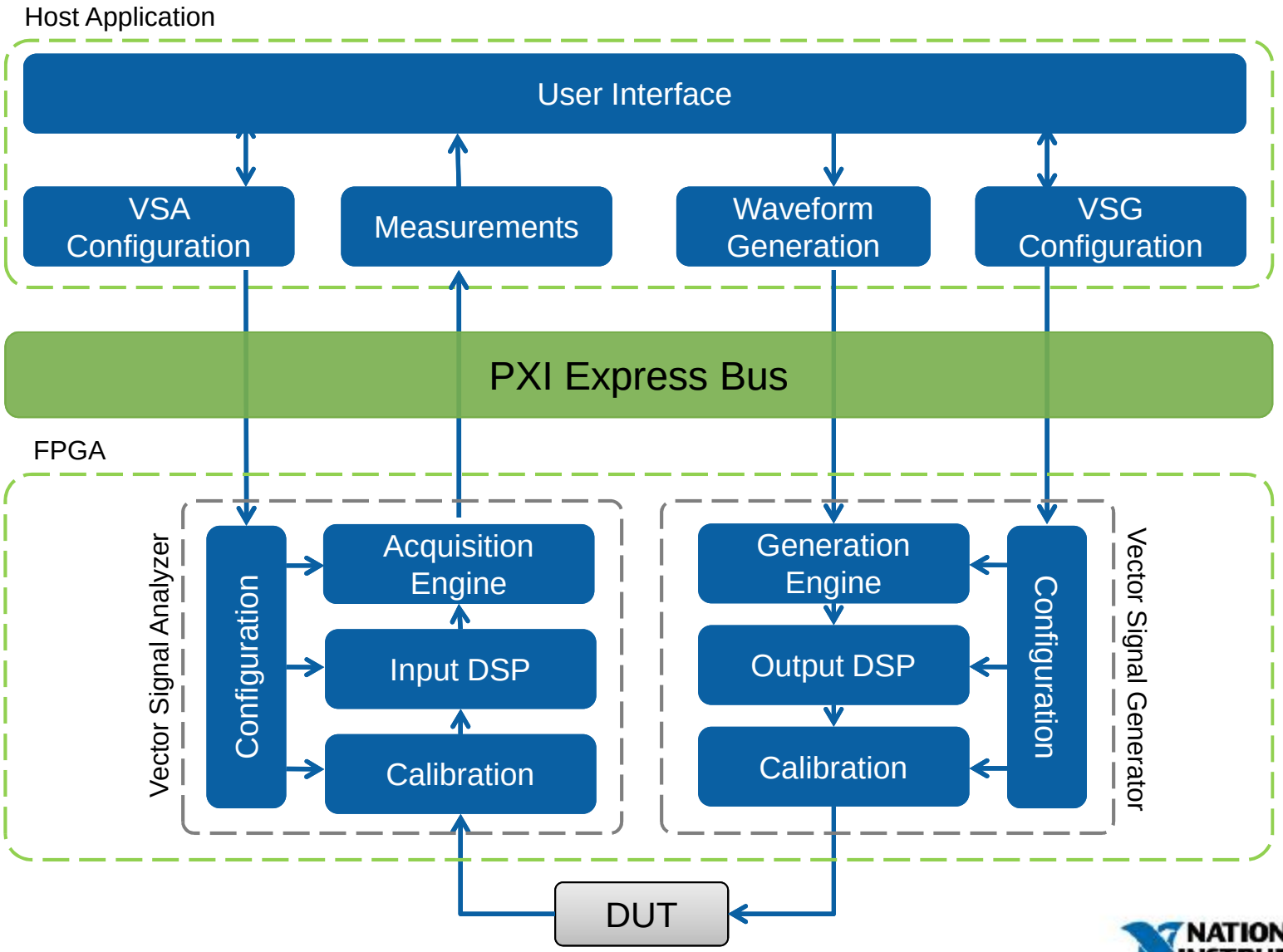
Simple VSA + VSG Sample Project for VST



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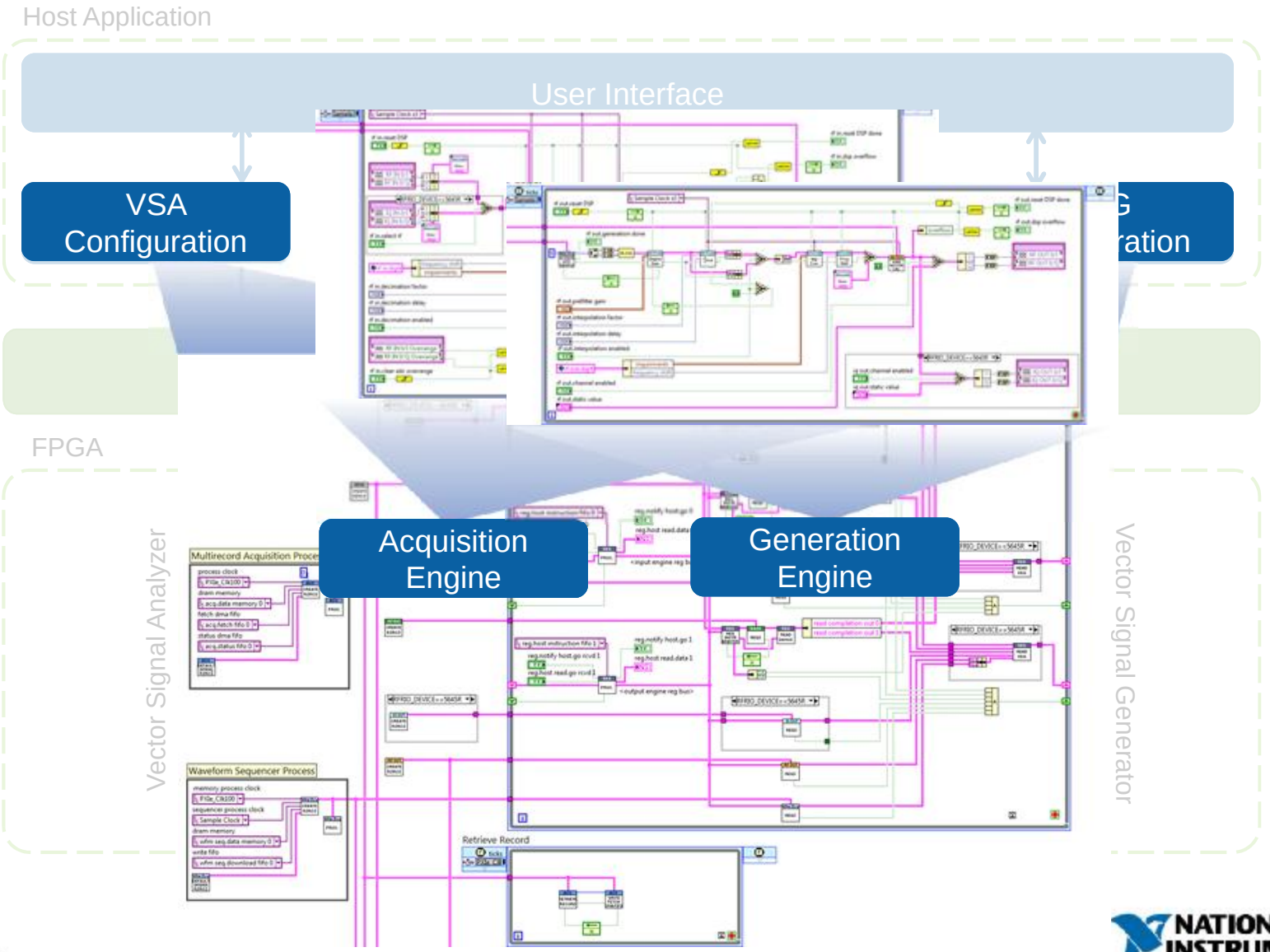

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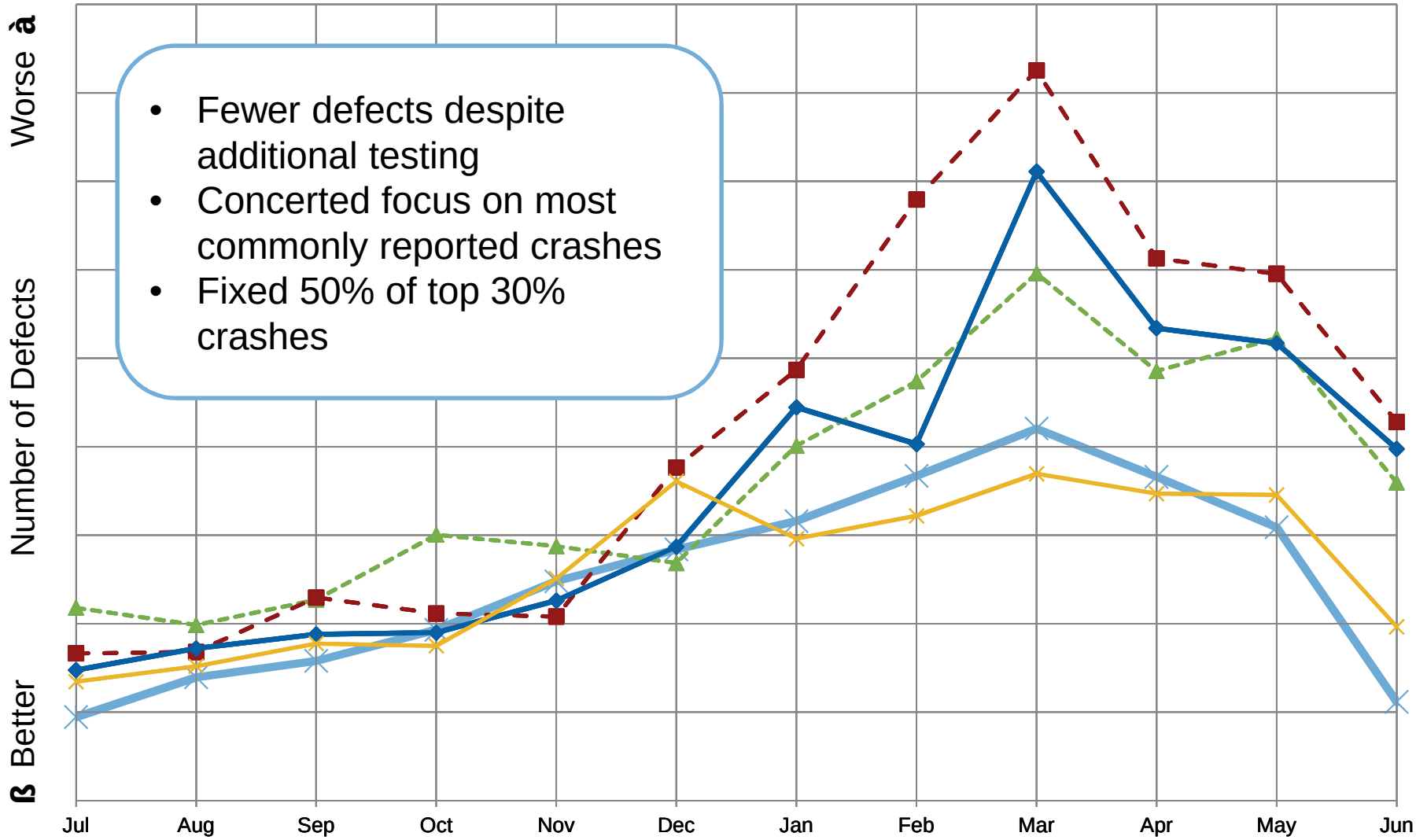
Template and Sample Project FAQ

- 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

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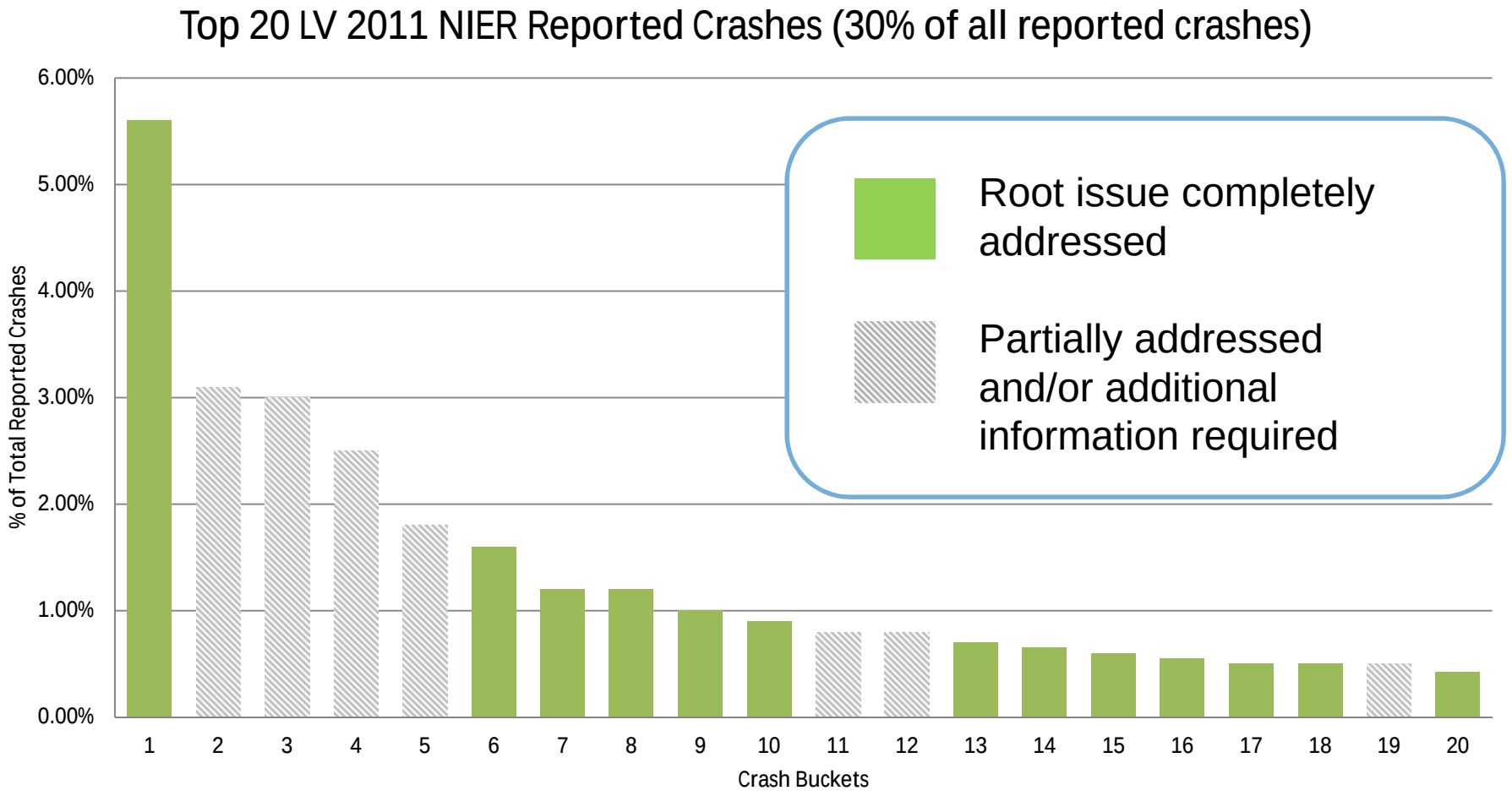
Continuous Investment In Stability



Over half of the top reported crashes were fixed in 2012

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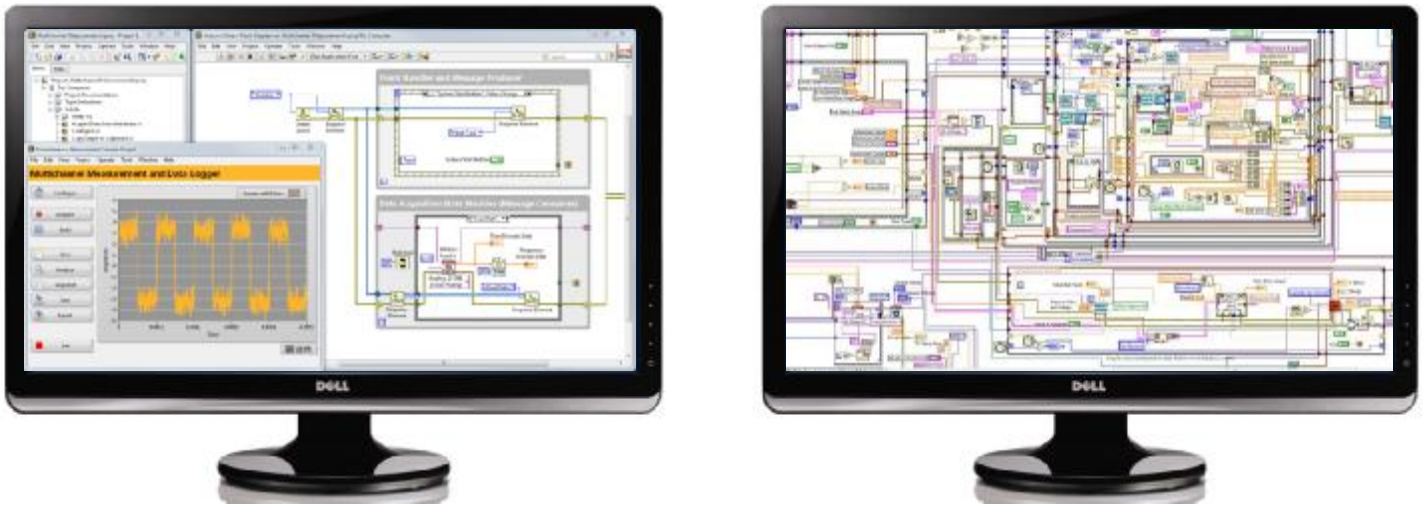

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Productivity Enhancements

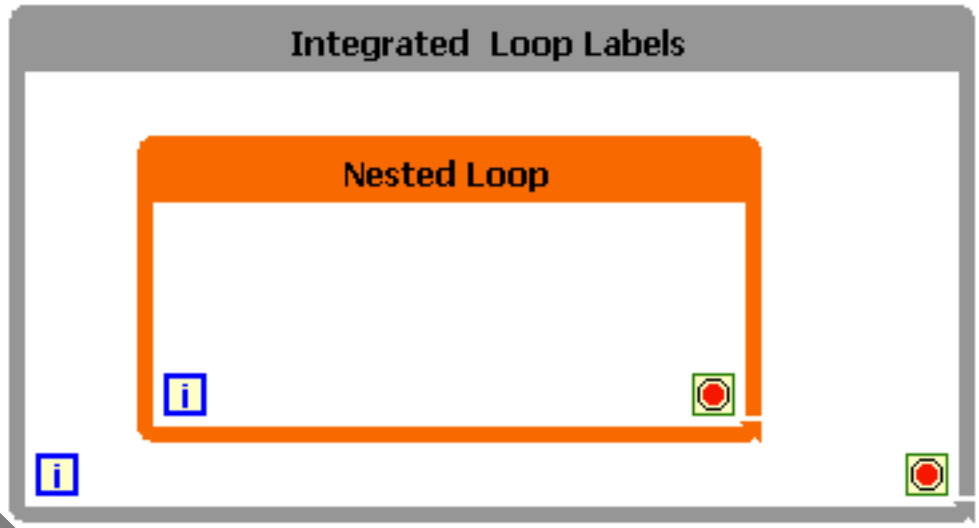
12 Productivity Enhancements From the LabVIEW Idea Exchange

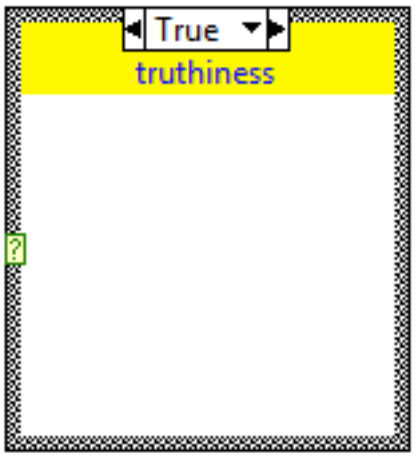
- Subdiagram Labels
- Enumerated dialog enhancements
- Removing selected broken wires
- Icon Editor API
- Contextual Help for Data [illegible]rcion
- Ev[illegible]cture in Base version
- Conditionally writing values to loop output tunnels
- Concatenate indexing
- Right-click menu for multiple items
- Long file path truncation
- Separate label locations for controls and indicators
- String editing dialog box

Demonstration

Idea Exchange Features

Integrated Subdiagram Labels





Demonstration

Create labels that move and resize
with any structure

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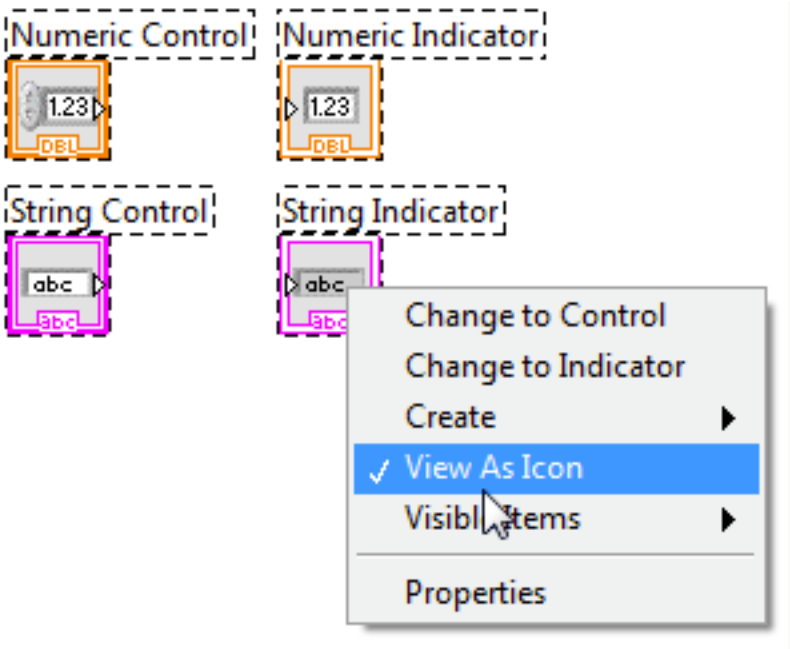
Idea Exchange Features

Pop-up Menus for Multiple Selected Objects



Save the time required to manually apply settings to multiple items

Demonstration

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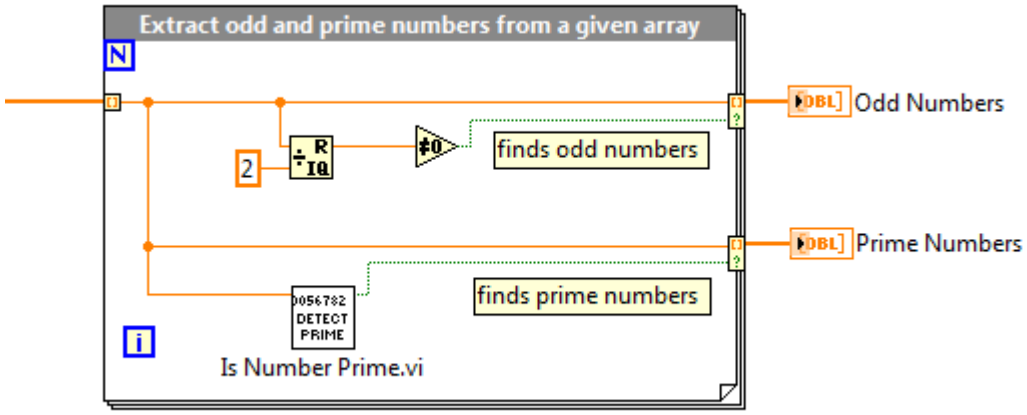
Idea Exchange Features

Conditional Loop Tunnel

Simplified approach



Demonstration

Simplifies common coding practices for conditionally building arrays

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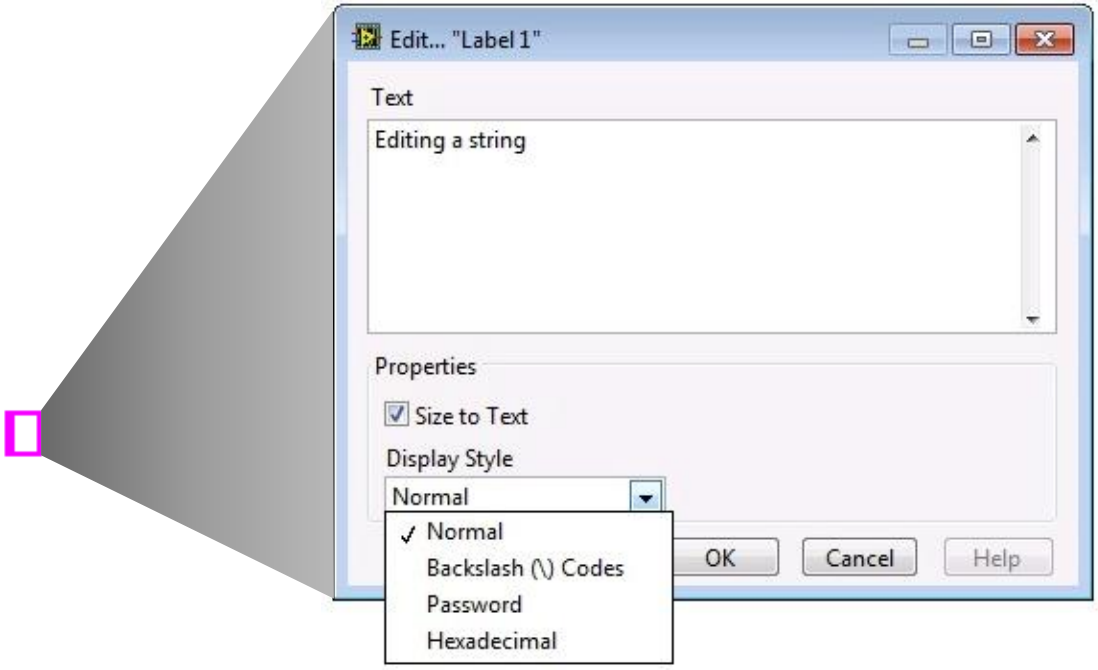
Idea Exchange Features

Edit String Constant Dialog



Help keep code looking clean by enabling users to edit large blocks of text without expanding the string constant

Demonstration

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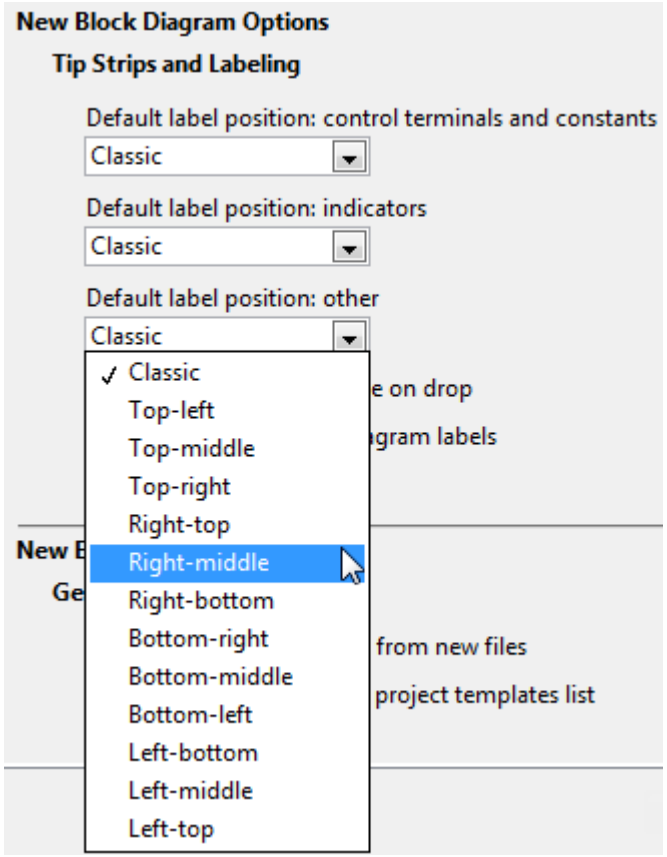
Idea Exchange Features

Separate Default Label Locations for Control & Indicator Terminals



Enables block diagram clean up to be used without rearranging labels

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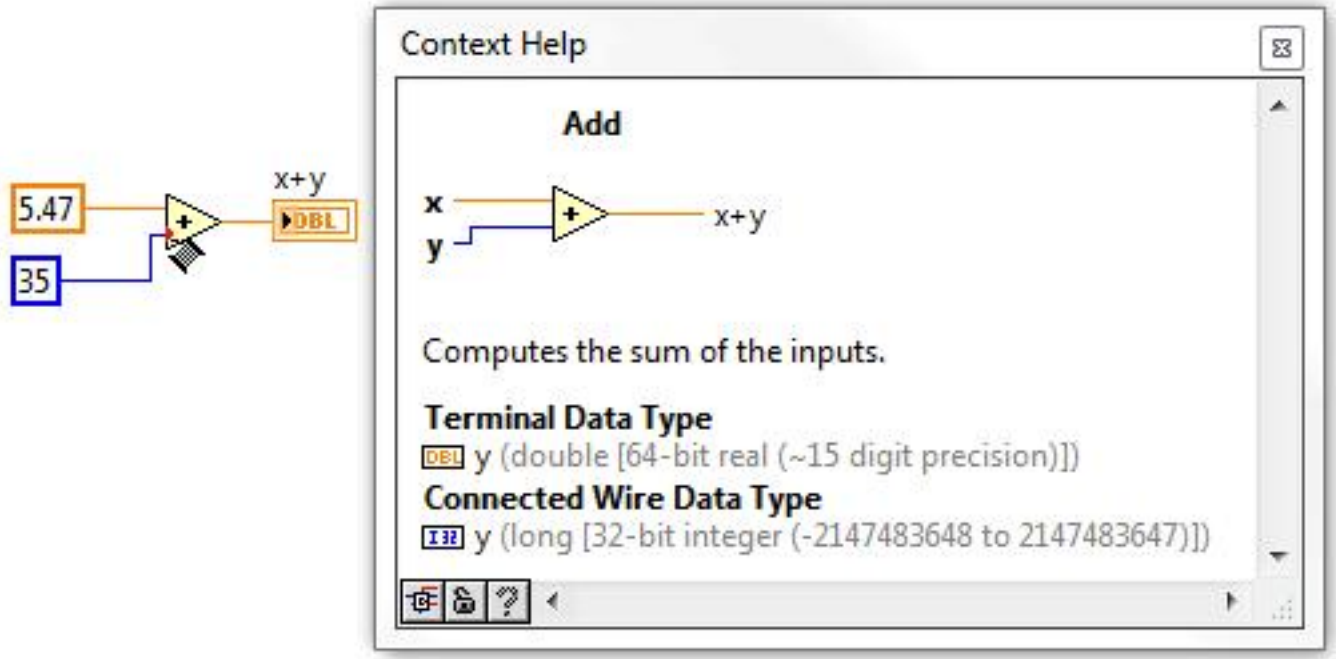
Idea Exchange Features

Context Help for Coercion Dots



Quickly identify the reason for the data coercion

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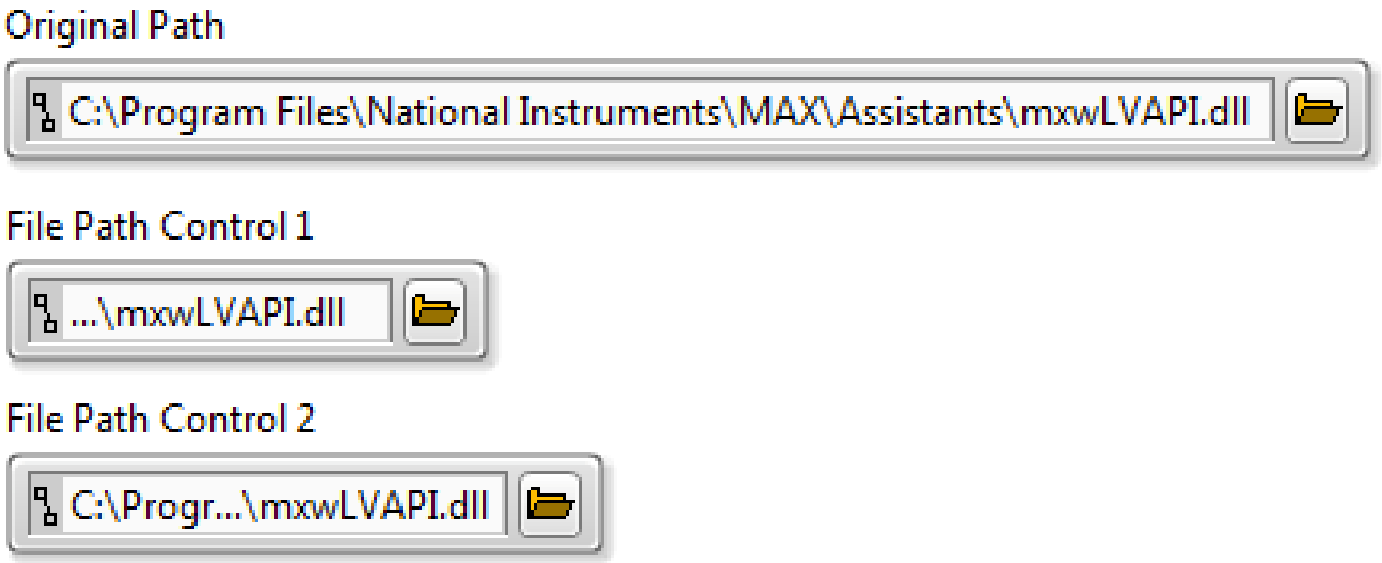
Idea Exchange Features

Truncate Long Paths



Makes it simple to display long paths using standard conventions

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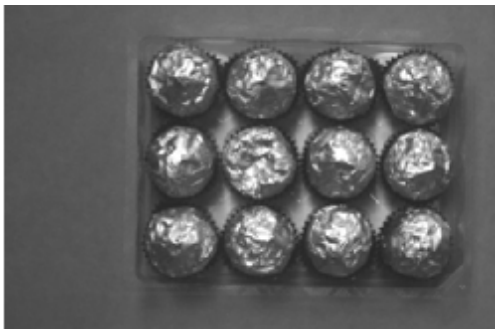
High-Performance Analysis

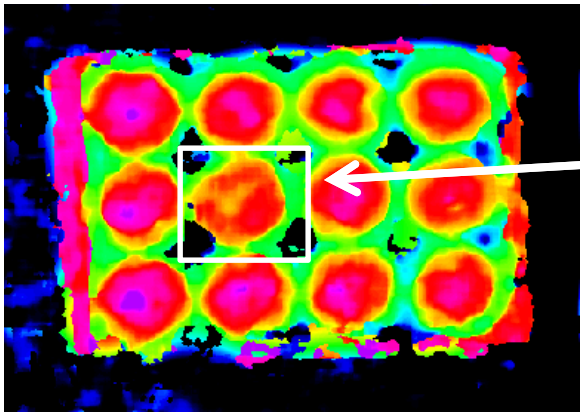
3D Stereo Vision in LabVIEW 2012



Left Image

Right Image

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



Defective Chocolate

Combined Image for Depth Information

Demonstration

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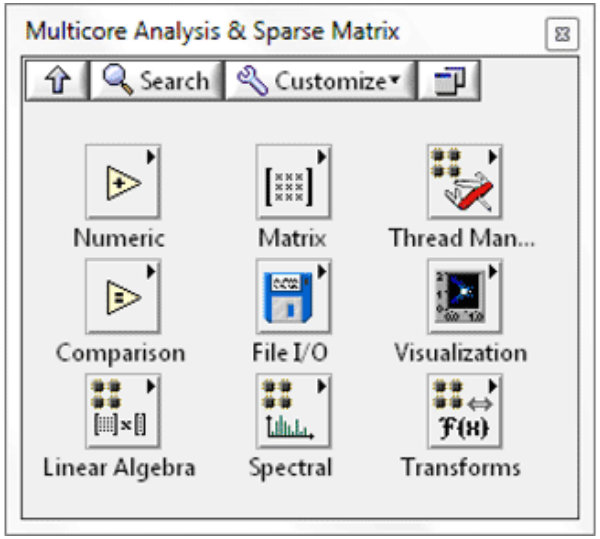
LabVIEW Multicore Analysis and Sparse Matrix Toolkit

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



Demonstration

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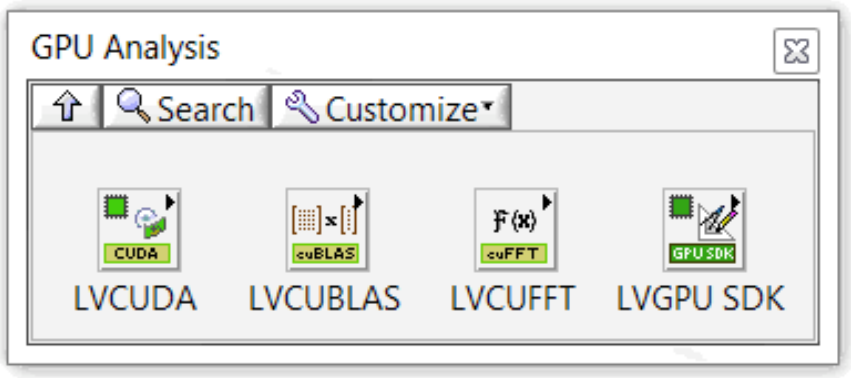
LabVIEW GPU Analysis Toolkit

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

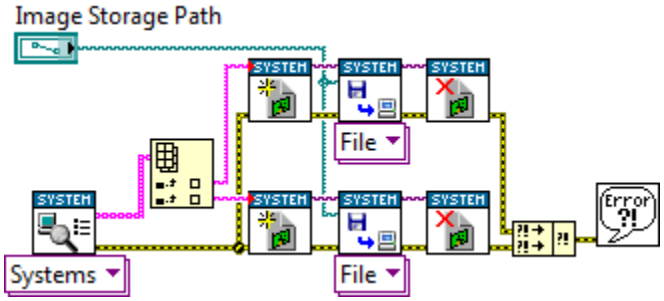
- Select GPU devices and manage resources using CUDA Runtime and Driver APIs

Real-Time and FPGA

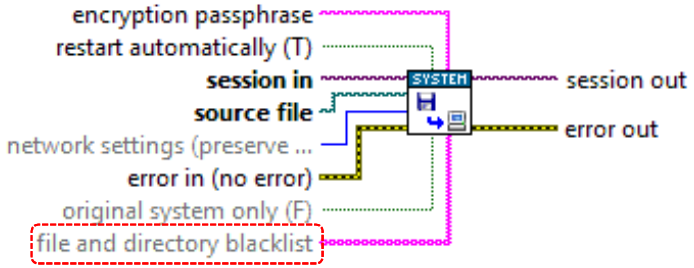
Real-Time Image Deployment Improvements

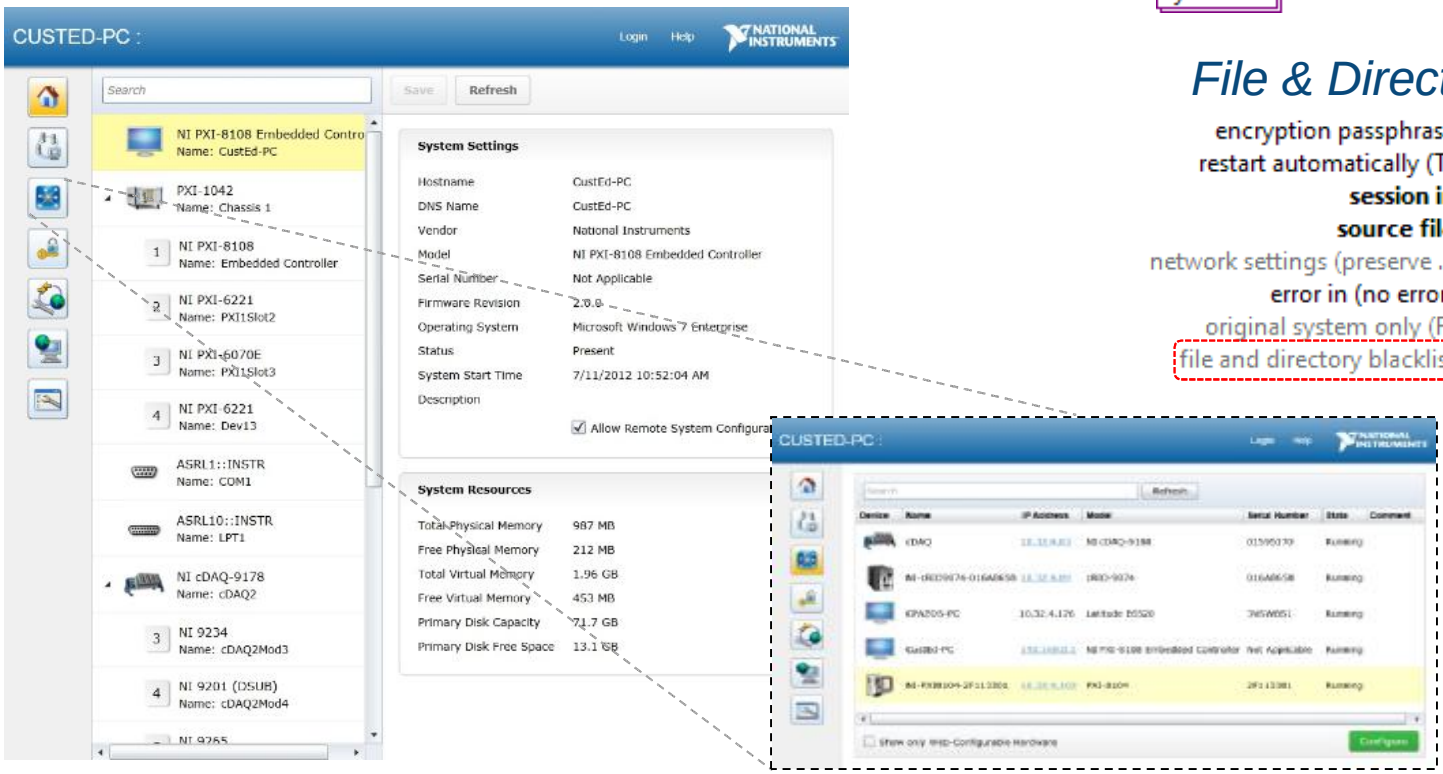
- Parallel image deployment to targets
- 30% faster image retrieval and deployment
- File and directory blacklist option
- Improved and expanded web configuration

Parallel Image Deployment



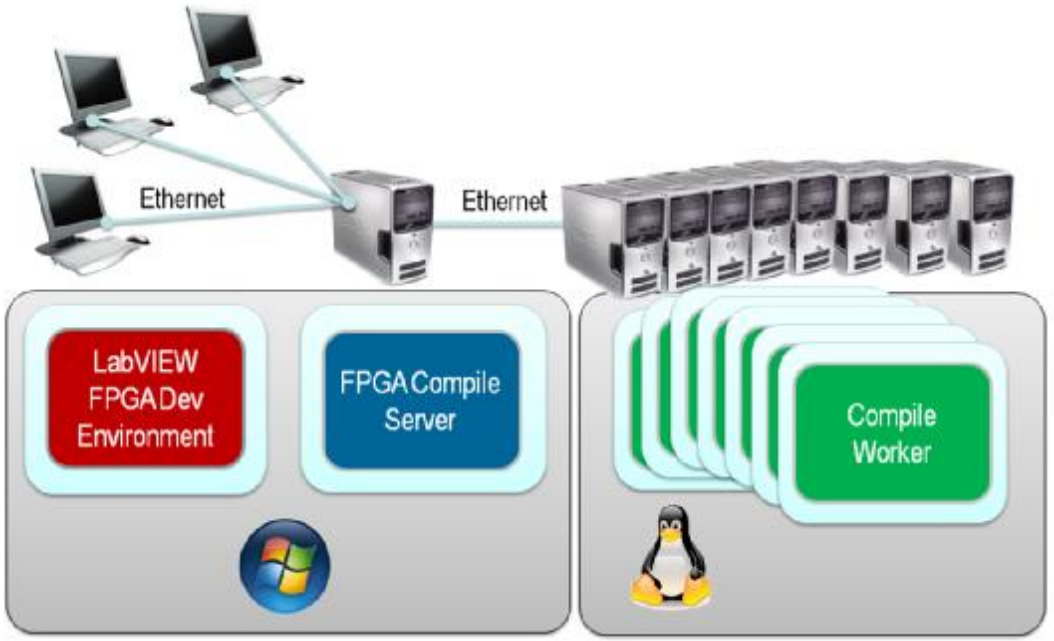
File & Directory Blacklisting





LabVIEW 2012 FPGA Linux Compile Worker

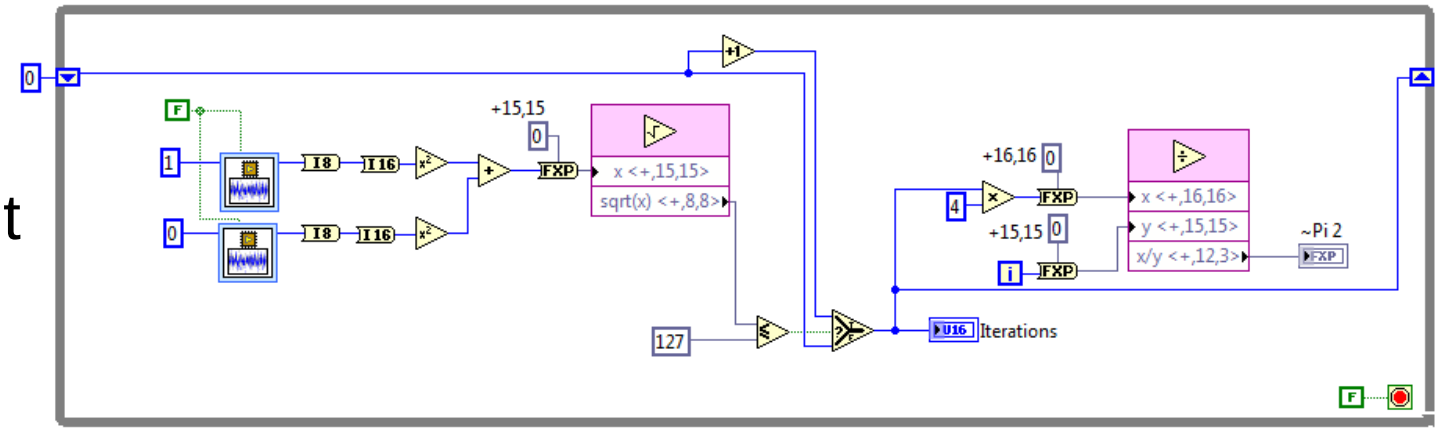
- Approximately 30% faster compilations with Linux OS
- Support across all FPGA compilation options
  - Remote Machine Compilation
  - LabVIEW FPGA Compile Farm Toolkit
  - LabVIEW FPGA Compile Cloud Service



LabVIEW FPGA Floating Point Data Type Support

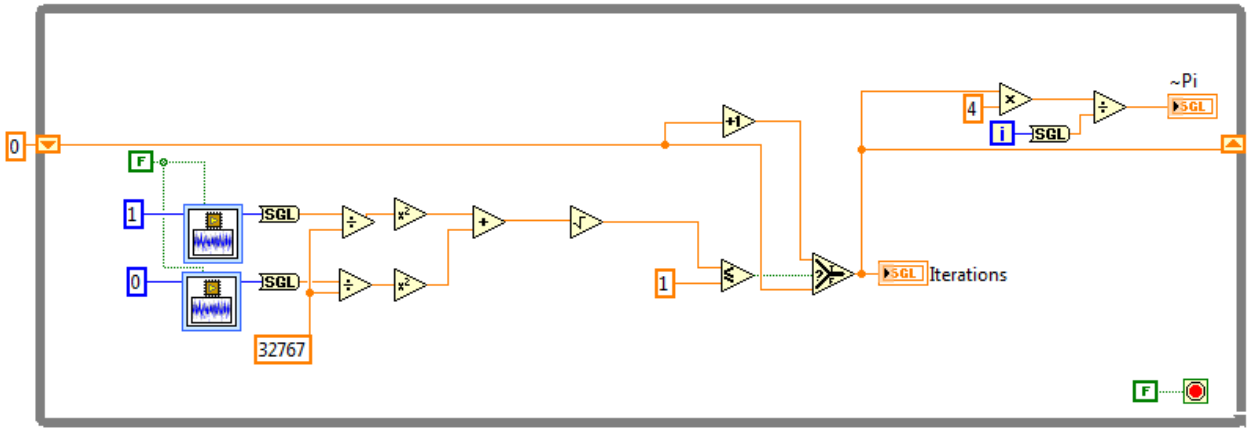
Fixed-Point

Monte Carlo Algorithm for Approximating Pi



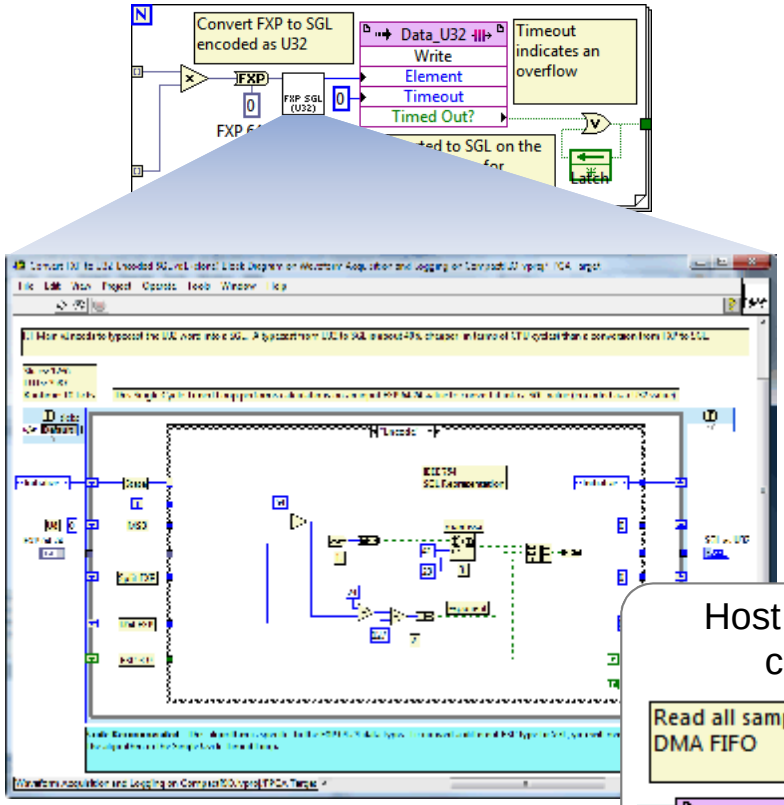
Floating Point New in 2012

Monte Carlo Algorithm for Approximating Pi



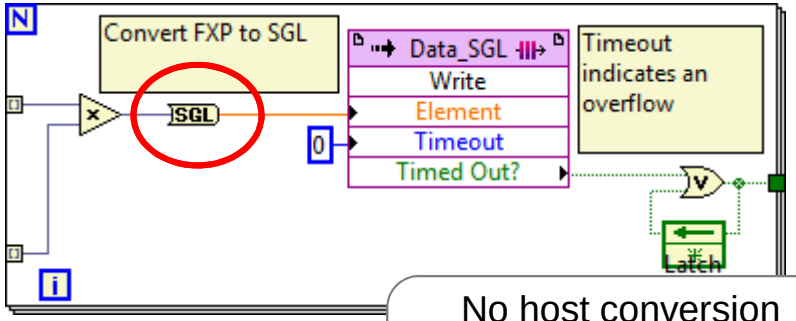
LabVIEW FPGA Floating Point Data Type Support

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

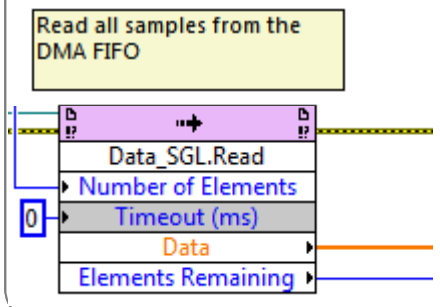


subVI code required for type conversion

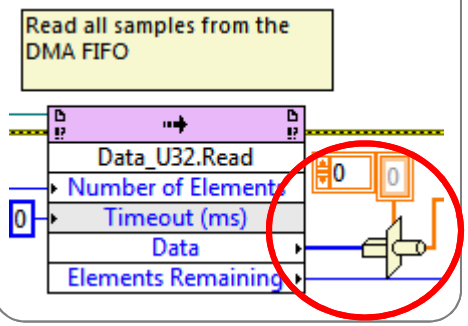
The same conversion in LabVIEW FPGA 2012



No host conversion required



Host requires type conversion



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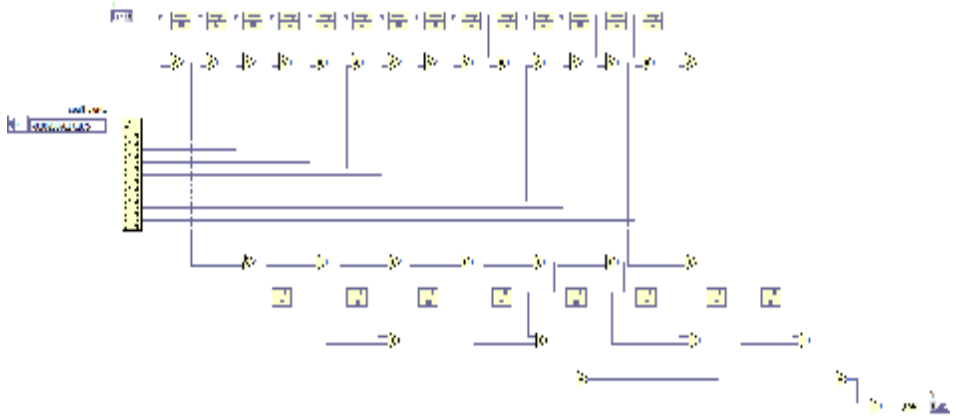
LabVIEW FPGA IP Builder

Generate optimized FPGA IP from high-level LabVIEW algorithms

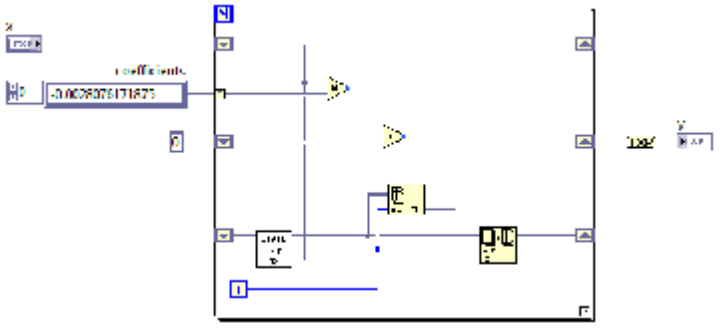
- Rapidly develop high performance algorithms for FPGAs
- Quickly explore design tradeoffs using directives
- Reuse IP to meet new design requirements

LabVIEW FPGA VI



Manual optimization required

LabVIEW FPGA IP Builder VI



Optimization using high-level synthesis

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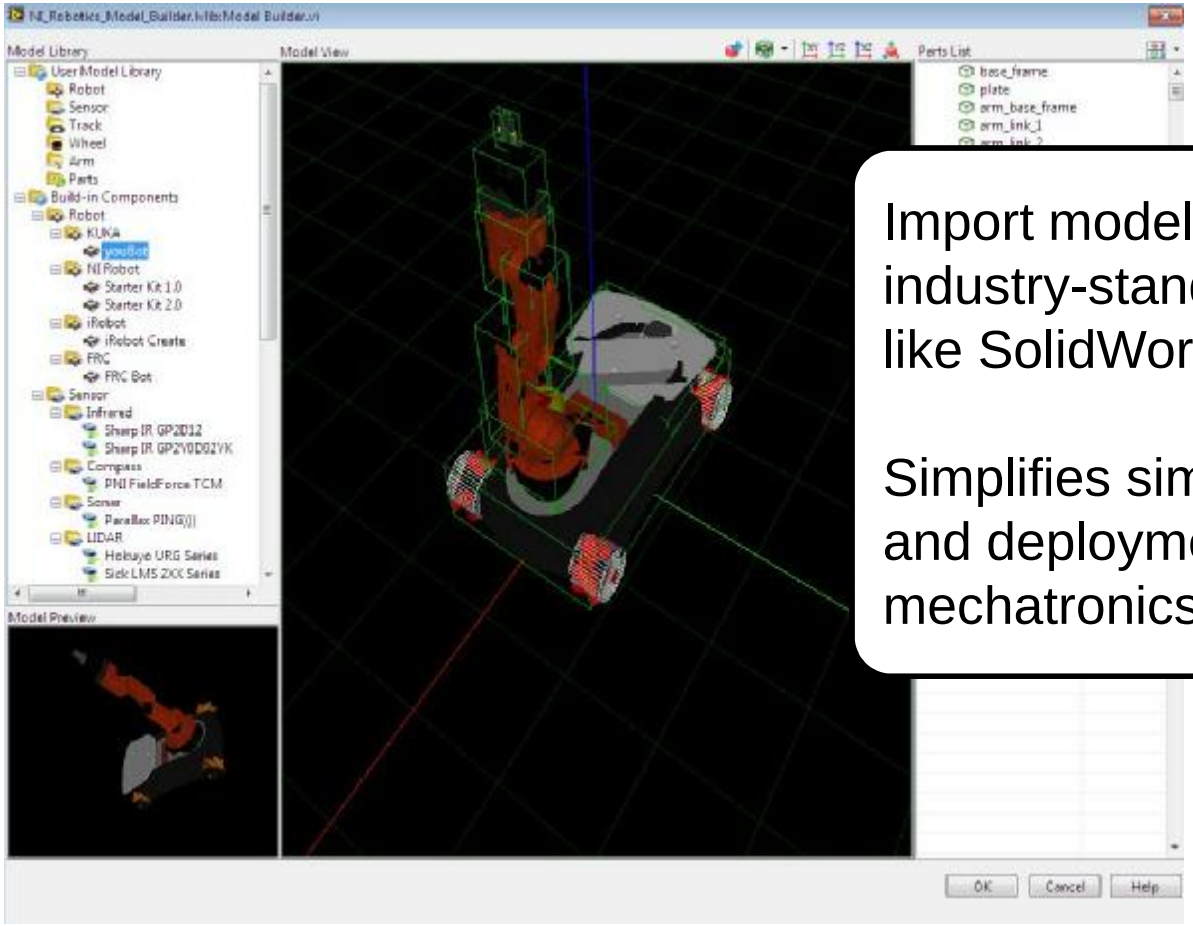
Compatibility with industry-standard modeling environments for system simulation



Import models from industry-standard tools like SolidWorks

Simplifies simulation and deployment of mechatronics systems

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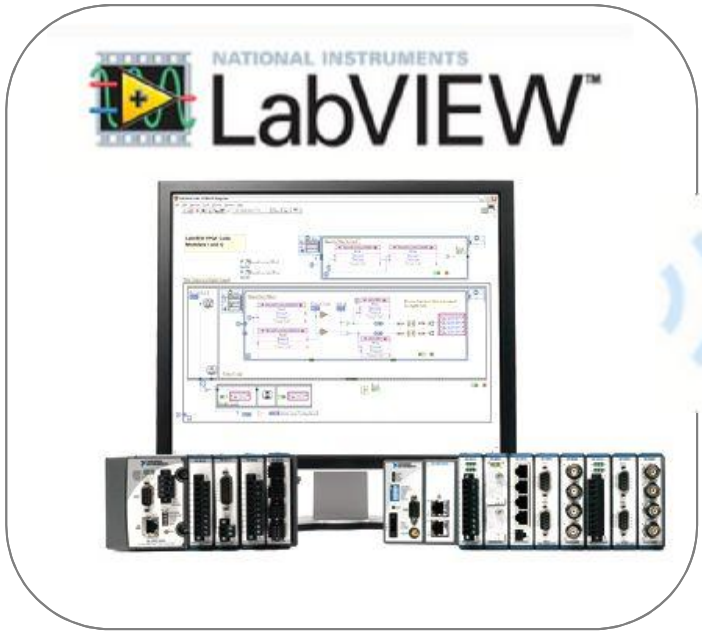
Cloud and Mobile

Mobile Applications to Control and Visualize Your Data



Demonstration

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

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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

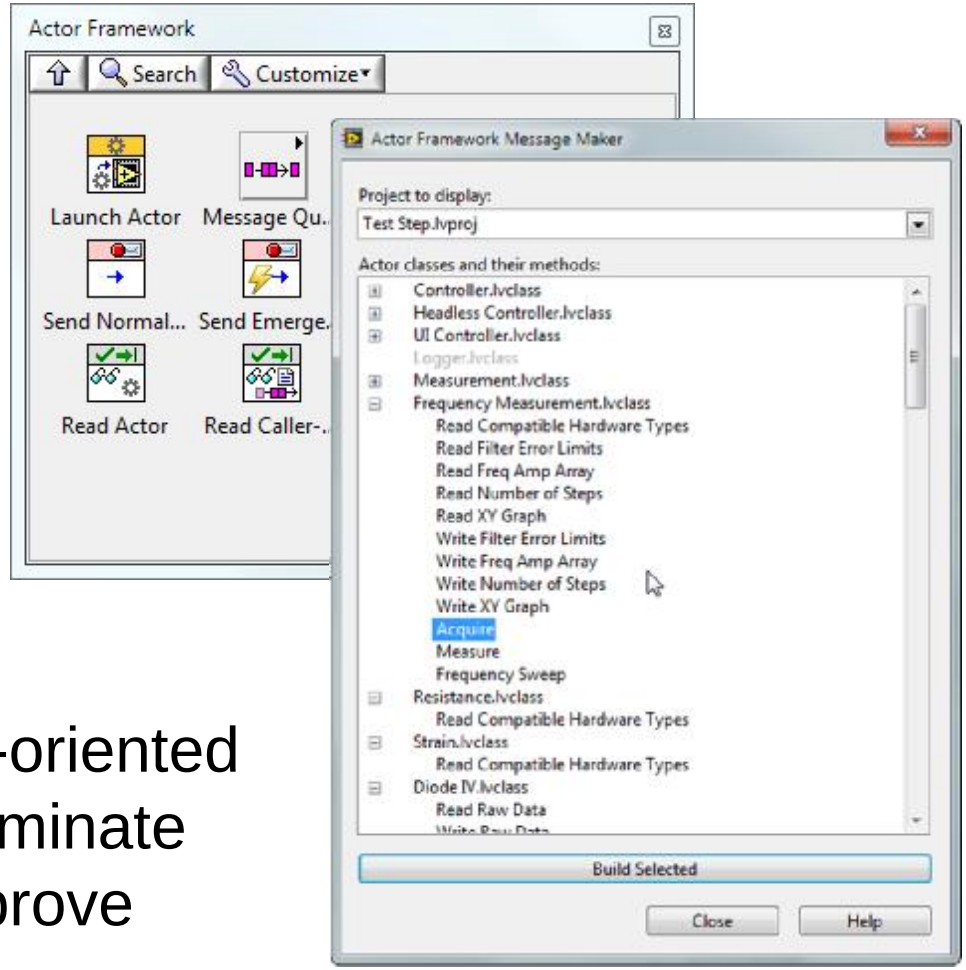
Advanced Features

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

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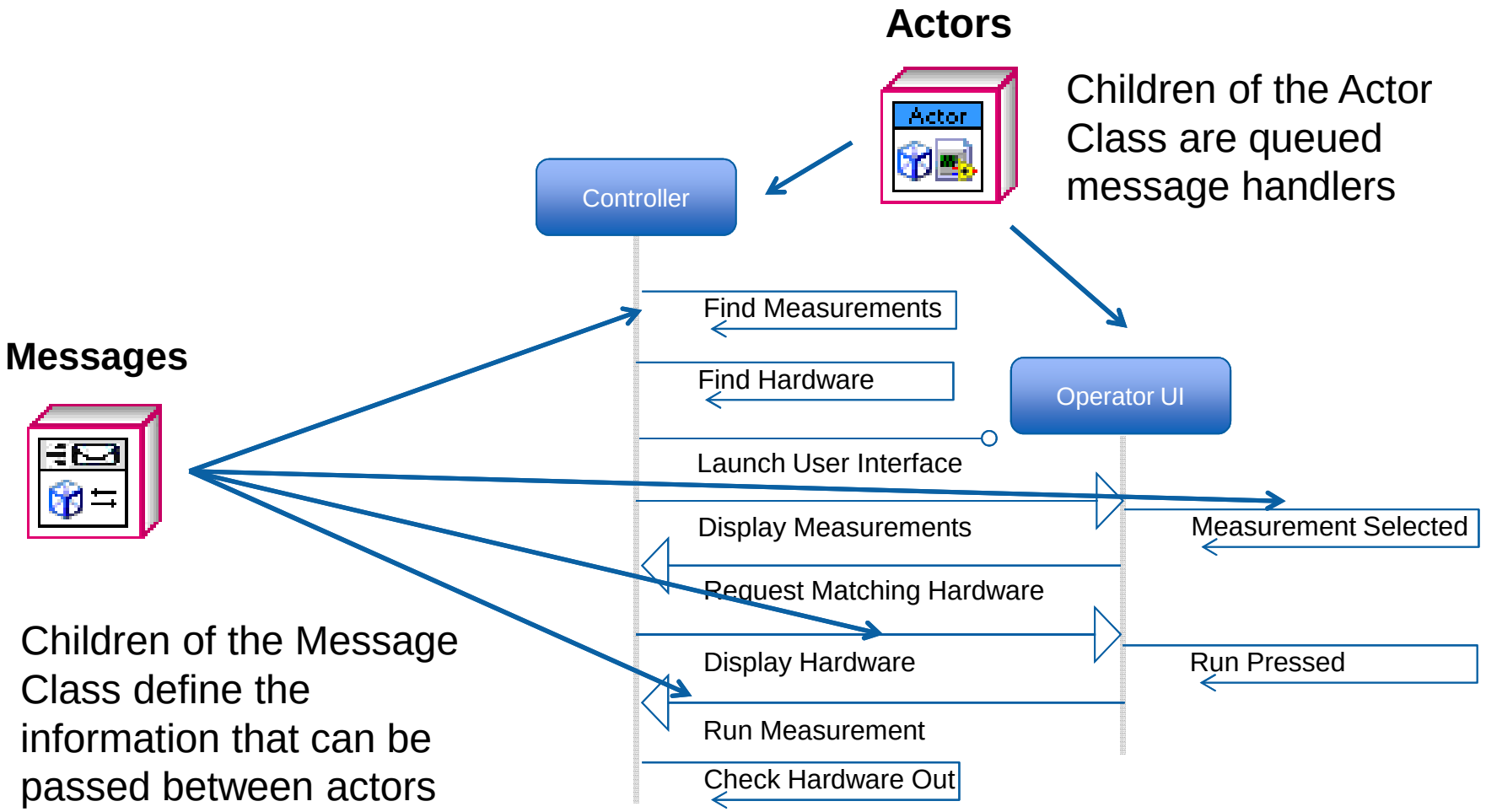
New Framework for Multi-Process Systems



For more information:
ni.com/actorframework

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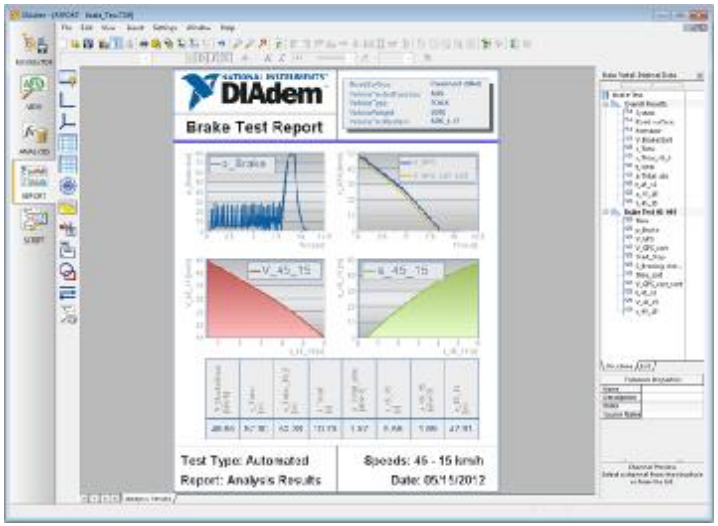
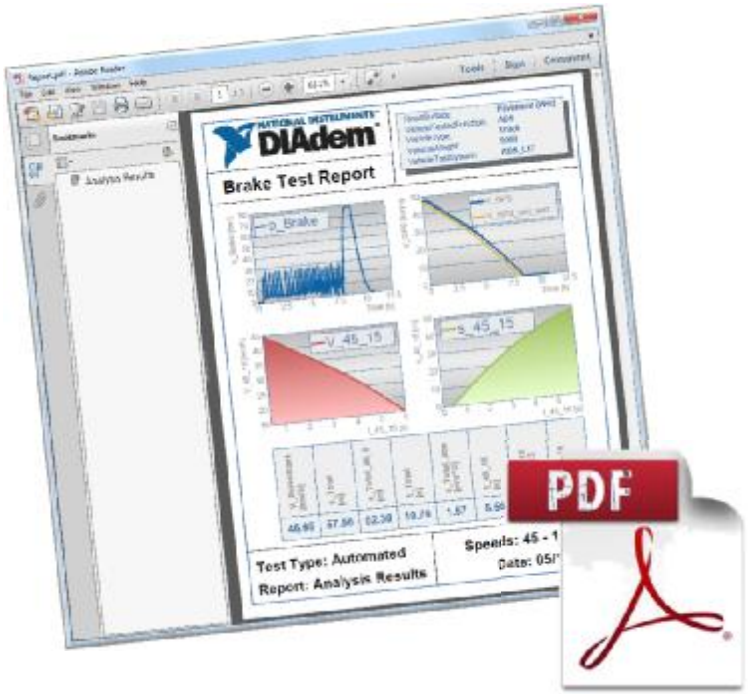
Enhanced data management tools and technologies

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



NI DIAdem 2012



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

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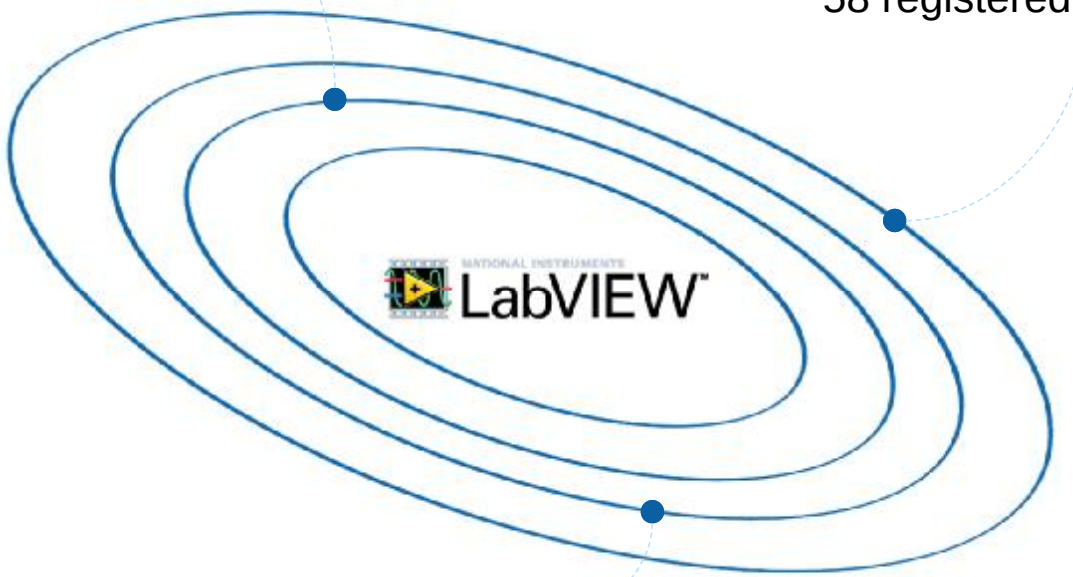
LabVIEW Ecosystem Growth

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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LabVIEW™ 2012

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