What’s New in LabVIEW 2018 and LabVIEW NXG

Swathi Madhavan
Field Marketing Engineer, National Instruments
## Who Uses LabVIEW?

<table>
<thead>
<tr>
<th>Industrial Machinery</th>
<th>Aerospace and Defense</th>
<th>Electronics and Semiconductor</th>
<th>Academic and Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wireless</td>
<td>Transportation and Heavy Equipment</td>
<td>Automotive</td>
<td>Energy</td>
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Architecture of an Automated Test System

- Test Management Software
- Software IDE
- Drivers
- Measurement Device
- Fixture/Mass Interconnect
Architecture of an Automated Test System

SOFTWARE

TestStand
LabVIEW NXG
LabVIEW 2018
Other Software
C, C++, C#, .NET, Python, Measurement Studio

Instrument and Measurement Driver
Multicore Controllers
Timing and Synchronization
Fixturing/Integration
PXI Instrumentation
Condition Monitoring
Third-Party Instrumentation

HARDWARE

Fixture/Mass Interconnect

SOFTWARE

HARDWARE
Architecture of an Automated Test System

TestStand

LabVIEW NXG  LabVIEW 2018  Other Software
C, C++, C#, .NET, Python, Measurement Studio

Instrument and Measurement Driver

Portable Measurements  PXI Chassis  Conditioned Measurements  PXI Instrumentation  Embedded Controller  Third-Party Instrumentation

Fixture/Mass Interconnect

SOFTWARE  HARDWARE
Development Time is Critical to Meeting Project Schedules

Top 2 Factors in Considering a New Test System:

- Faster Test Throughout/Cycle Time: 100%
- Software/Application Development Time: 50%

- Increasing Complexity
- Compressed Test Times
- Smaller Teams

Best-in-Class Test Companies
LabVIEW 2018
LabVIEW™ Investment Areas

- Measurement Automation
- Comprehensive Data Analysis
- Simplified System Integration
- Large System Development
- Technology and Industry Trends
Simplify System Integration
Automate software building and execution with the LabVIEW Command Line Interface

Save Time: Reuse More IP
Natively call Python scripts with the Python Node

Prototype FPGA Faster
Use improved floating-point operations, new compile tools, and 64-bit LabVIEW FPGA
Simplify System Integration
LabVIEW Command Line Interface

- Automate the building and running of LabVIEW
- Easily integrate source code control and unit test
- Use continuous delivery tools like Jenkins
- Run batch scripts that call LabVIEW
Reuse More IP

Python Node

Natively call Python functions and pass parameters within the LabVIEW environment
LabVIEW 2018 FPGA Module Improvements

FPGA Floating-Point Library
Faster Prototyping With Expanded Floating-Point Support

64-Bit LabVIEW FPGA Module
Support for PXI Kintex-7 FPGAs

Vivado 2017.2 Support
Local Compilation Support for Windows 10

Faster Prototyping, Better Algorithms
Hardware Integration
CompactRIO With NI-DAQmx

- Intel Atom processor
- NI Linux Real-Time OS
- TSN-supported Ethernet ports
Backward-Compatible LabVIEW Run-Time Engine

Starting with LabVIEW 2017 built binaries:
No recompilation required for binaries (DLLs, EXEs, PPLs) built in earlier versions to be loaded and executed in LabVIEW Run-Time Engine 2018+.
**Simplify System Integration**
Automate software building and execution with the LabVIEW Command Line Interface

**Save Time: Reuse More IP**
Natively call Python scripts with the Python Node

**Prototype FPGA Faster**
Use improved floating-point operations, new compile tools, and 64-bit LabVIEW FPGA
LabVIEW NXG
Discover and Configure Your Hardware
Reduce system setup and validation time

Distribute Code and Build Applications
Confidently replicate and share system software

Visualize Your Process Data
Anywhere, Anytime
Run web-based UIs in any modern web browser without plug-ins or installers
Reduce your test system setup and configuration time
Put the right test data in front of the right people
Increase test software collaboration
System Procurement and Assembly
Test Sequencing
System Deployment and Maintenance
DUT Requirements
National Instruments™ LabVIEW™
Deploying a Test and Measurement System Today

Deployment Considerations
- Dependency management
- Distribution methods
- Version management
Deploying a Test and Measurement System in the Future

PACKAGES
A Standard Container Framework for Distributing Software

LabVIEW VIs, EXEs, NI Drivers
C, Java, Python Scripts
Documentation, Images

1.0
2.0
2.2
1.5
4.0
4.5
2.6

Your Dependencies
Drivers and Runtimes
Deploying a Test and Measurement System in the Future

Deployment Solutions

- **Auto** dependency management
- **Standardized** distribution methods
- **Inherent** version management
Architecture of an Automated Test System

**SOFTWARE**
- **TestStand**
  Sequencing, Test Management, Test Deployment, Reporting, User Management
- **LabVIEW NXG**
- **LabVIEW 2018**
- **Other Software**
  C, C++, C#, .NET, Python, Measurement Studio

**HARDWARE**
- Instrument and Measurement Driver
  IVI, NI-VISA, NI-DAQmx, NI-DMM, NI-SCOPE, NI-FGEN, NI-HSDIO, NI-RFmx, Third-Party Hardware
- **Portable Measurements**
- **PXI Chassis**
- **Conditioned Measurements**
- **PXI Instrumentation**
- **Embedded Controller**
- **Third-Party Instrumentation**

**Fixture/Mass Interconnect**
Distribute Reuse Code and Build Applications
Confidently Replicate and Share System Software

Centralize all the version and build settings for creating a new application or library

Automatic application dependency detection and installer inclusion

Build smaller and more adaptable package installers that automatically point to downloadable dependencies

Distribute your software using industry-standard package building and package management technology
Demonstration
Discover and Configure Your Hardware
Reduce System Setup and Validation Time

Live view for automatic discovery of hardware connected to system controller

Design view for offline or simulated system documentation and configuration

Consolidated configuration pane to quickly:
- Launch soft front panel and measurement panel
- Perform guided hardware driver search
- Reference manuals, specs, and pinouts directly
Hardware Support in LabVIEW NXG

Electronic Test and Instrumentation
- Digital Multimeters
- Switches
- Oscilloscopes
- Power Supplies and Source Measure Units
- Waveform Generators
- Digital Waveform/Pattern Instruments

Data Acquisition and Control
- CompactDAQ Chassis (USB, Ethernet, Wireless)
- PXI/PCI Multifunction I/O Modules and Devices (Except E and B Series)
- PXI/PCI Analog Input Modules
- PXI/PCI Temperature Input Modules and Devices
- PXI/PCI Strain/Bridge Input Modules
- PXI/PCI Sound and Vibration Modules and Devices
- PXI/PCI Analog Output Modules and Devices
- PXI/PCI Digital I/O Modules and Devices
- PXI/PCI Counter/Timer Modules and Devices
- PXI/PCI Position Displacement Module
- SC Express
- Vehicle Communication Buses—CAN/LIN/FlexRay (PXI/PXIe)
- PXI Frame Grabber Modules (Camera Link and Gigabit Ethernet)

700+ Third-Party Hardware Drivers
Designing Distributed User Interfaces

Remote UIs Require Command of:

Standard Web Technologies
- HTML
- CSS
- JavaScript

Networking and Communications
- HTTP
- AMQP
- WebSocket

Application Hosting
- Web Servers
- Security

DATA FLOW

Enterprise

Factory
LabVIEW NXG Web Module

Visualize Your Process Data Anywhere, Anytime

Quickly create powerful engineering UIs

Intuitively move data across your application

Efficiently share UIs with stakeholders
User Interface Building
- Manipulate front panels programmatically
- Configure and manage VIs to execute outside the editor
- Use new controls

Custom Algorithm Design
- Design custom machine vision algorithms
- Design custom filters and control algorithms

Distributed Applications
- Build and distribute EXEs, libraries, installers, and packages

Interoperability
- Integrate LabVIEW NXG code with TestStand
- Call external DLLs

Data Management
- Publish tags using simplified data communication VIs
- Create reports in Microsoft Excel

Software Engineering
- Abstract code with object-oriented programming
- Compare VI source code with Diff Tool
- Use more event-driven programming options

Systems Management
- Connect, configure, and document hardware graphically with SystemDesigner
- Design hardware systems offline from a catalog of NI hardware

Web Technology
- Create simple browser-based UIs using WebVI for remote operation and monitoring
- Use data service APIs for device-to-HMI communication

Hardware Support
- Control additional benchtop instruments
- Use additional electronic test instrumentation
- Integrate machine vision hardware
- Prototype MAC and PHY systems on most software defined radio hardware

LabVIEW NXG

LabVIEW 2018

Two Versions. One Price.
Expert Assistance for Migrations and Upgrades

NI and Prequalified Alliance Partners

Locate a resource in your area. Visit ni.com/findapartner.
Toolkits
LabVIEW Tools Network
Enhance Your System With Popular Third-Party Add-Ons

Download popular add-ons, including OpenG Library and MGI Library, at ni.com/labviewtools.
LabVIEW Tools Network
Add-Ons Now Available for LabVIEW NXG

- JKI State Machine
- MGI Library
- OpenG Library
- Saphir GDatabase for MySQL
- Saphir GMdBus over Serial
- Saphir GMdBus over TCP
- Viewpoint Systems SVN Toolkit

Download at ni.com/labviewtools.
LabVIEW Cloud Toolkits

- Available in VIPM as a free toolkit
- Open source via GitHub
- LabVIEW developers can add support for new services
- Support for LabVIEW 2015+

Market-Leading Cloud Services

- Blob Storage
- Queue Storage
- S3: Simple Storage
- SNS: Notifications
- SQS: Queue Service
- IoT: Internet of Things

LabVIEW Application
NI PXI

LabVIEW RT Application
NI CompactRIO

LabVIEW Application
PCs and DAQ devices
Cloud Computing Options With the NI Platform

LabVIEW Cloud Toolkits
Amazon AWS | Microsoft Azure

Use LabVIEW APIs to connect to leading cloud computing platforms.

SystemLink™ Server
SystemLink Installed in Cloud

Install SystemLink in the cloud computing environment of your choice.

SystemLink Cloud
NI-Hosted Data Visualization

Leverage NI-hosted service for running WebVIs and operational dashboards.
Resources
## Compare LabVIEW Versions

### Software Compatibility

The LabVIEW 2018 column represents all the functionality in the LabVIEW Professional edition plus all other NI modules and toolkits. This table lists compatibility through LabVIEW NXTG 2.1. Each LabVIEW NXTG release, including future versions beyond 2.1, will include more software capabilities. View the product roadmap to learn more about future releases.

<table>
<thead>
<tr>
<th>LabVIEW Module and Toolkit Summary</th>
<th>LabVIEW 2018</th>
<th>LabVIEW NXTG 2.1</th>
<th>LabVIEW NXTG 3.0 (Beta)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LabVIEW Real-Time Module</td>
<td>✓</td>
<td>LabVIEW Communications</td>
<td>LabVIEW Communications</td>
</tr>
<tr>
<td>LabVIEW FPGA Module</td>
<td>✓</td>
<td>LabVIEW Communications</td>
<td>Partial</td>
</tr>
<tr>
<td>Vision Development Module</td>
<td>✓</td>
<td>Windows Only</td>
<td>Windows Only</td>
</tr>
<tr>
<td>LabVIEW DataLogging and Supervisory Control (DSC) Module</td>
<td>✓</td>
<td>Partial</td>
<td></td>
</tr>
<tr>
<td>LabVIEW Report Generation Toolkit</td>
<td>✓</td>
<td>Partial</td>
<td></td>
</tr>
<tr>
<td>LabVIEW Application Builder Module</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>LabVIEW MultiScript Module</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>LabVIEW Advanced Signal Processing Toolkit</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>LabVIEW SelfTestModule</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>LabVIEW Control Design and Simulation Module</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>LabVIEW Sound and Vibration Toolkit</td>
<td>✓</td>
<td>✓</td>
<td></td>
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### Hardware Compatibility

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<td>Hardware Support Summary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acquiring data from third-party hardware (NI USB, NI Serial, NI-488.2)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>NI and third-party hardware auto-discovery and driver install</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>In-product hardware configuration and documentation</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Visual system representation and configuration</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Deploying to NI real-time hardware (LabVIEW Real-Time Module)</td>
<td>✓</td>
<td>LabVIEW Communications</td>
<td>LabVIEW Communications</td>
</tr>
<tr>
<td>Deploying to NI FPGA-based hardware (LabVIEW FPGA Module)</td>
<td>✓</td>
<td>LabVIEW Communications</td>
<td>Partial</td>
</tr>
<tr>
<td>CompactDAQ platform</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Software defined radios</td>
<td>✓</td>
<td>Partial</td>
<td>Partial</td>
</tr>
<tr>
<td>Engineering education hardware</td>
<td>✓</td>
<td>Partial</td>
<td>Partial</td>
</tr>
<tr>
<td>PFI platform</td>
<td>✓</td>
<td>Partial</td>
<td>Partial</td>
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<tr>
<td>CompactDAQ platform</td>
<td>✓</td>
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<tr>
<td>NI data acquisition hardware</td>
<td>✓</td>
<td>✓</td>
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Consider 3 Things
When Evaluating LabVIEW NXG for a Future Project

TODAY—Take advantage of LabVIEW 2018 and LabVIEW NXG now

OVER TIME—Transition your skills and knowledge

WHEN YOU NEED IT—Get expert assistance for migrations and upgrades
Transition Your Skills and Code
Training for new and experienced LabVIEW users

Transitioning to LabVIEW NXG
Courses for experienced LabVIEW users cover:
- Differences between LabVIEW and LabVIEW NXG
- Techniques for new application development in LabVIEW NXG
- Application migration with the Code Conversion Utility

Courses for New Users
- LabVIEW NXG Core 1: Acquire, Analyze, Visualize
- LabVIEW NXG Core 2: Create User-Driven Applications
- Data Acquisition Using NI-DAQmx and LabVIEW NXG

Available online and in the classroom. Accommodate your time constraints, budget, and personal learning preferences.
Your LabVIEW Application

LabVIEW

NI LabVIEW NXG R&D Team

Benefits

- R&D team performs the initial migration of your application to LabVIEW NXG
- You communicate your application needs to LabVIEW NXG R&D
- LabVIEW NXG R&D discusses the results with you
- You give feedback directly to LabVIEW NXG R&D

After this session, contact nick.carlough@ni.com.
Effectively Maintaining Your Investment
Take advantage of LabVIEW NXG and LabVIEW 2018 now

**Code Migration**
Convert your LabVIEW 2014+ code to LabVIEW NXG .gvis with the built-in utility. Ease your migration cleanup with the generated report.

**Coexistence**
Develop on both LabVIEW 2018 and LabVIEW NXG. Complement existing applications by taking advantage of new features.

**Code Interoperability**
Call an existing LabVIEW 8.0+ VI from LabVIEW NXG when you require functionality not yet supported by LabVIEW NXG.
Concurrent Investment in LabVIEW

Compare Table?

LabVIEW NXG

LabVIEW
Questions?
Use the Chat Pod!