Developing Proficiency

With Graphical System Design

Develop Faster | Reduce Costs | Exceed Requirements

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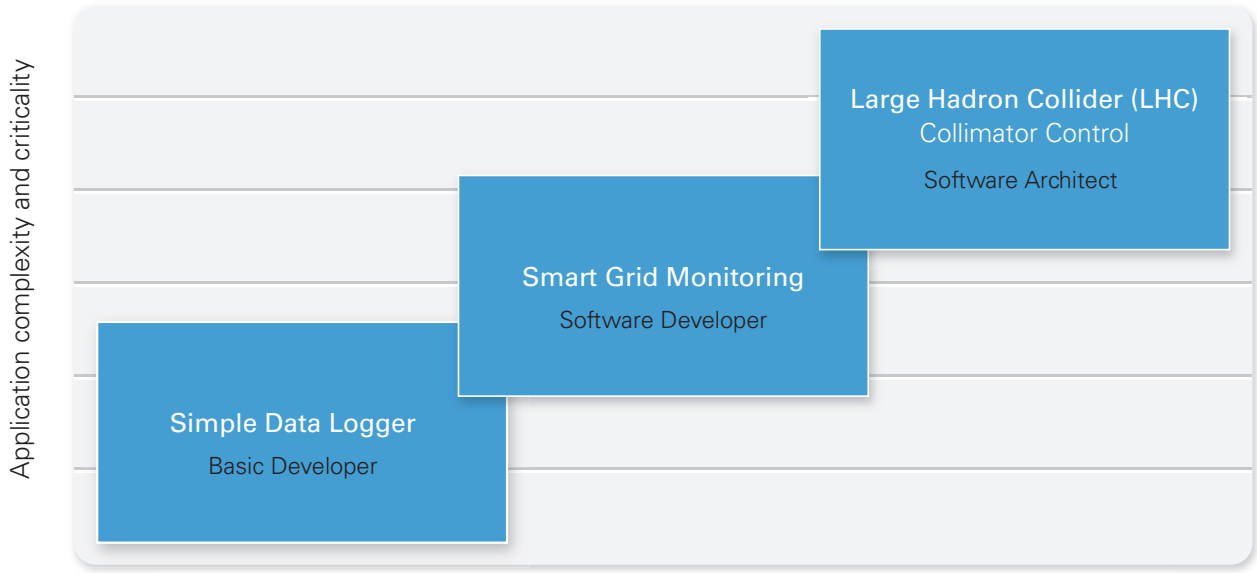
NATIONAL INSTRUMENTS

Your Success Depends on Proficiency

Successfully completing an application with the graphical system design approach means more than simply generating a functional program that meets requirements. A successful project also minimizes development time and maintenance costs while taking full advantage of National Instruments tools, including increased productivity with NI LabVIEW system design software and access to advanced technology through NI hardware. Proficiency with National Instruments products makes this kind of success possible.



LabVIEW and software engineering skill level required

Proficiency Varies by Application

As the size, complexity, and criticality of your application increase, the knowledge and skills you need to be successful change. Because of this, users who have been developing simpler LabVIEW applications for many years may have difficulty delivering a more complex system. As you move from project to project, you should assess which additional concepts you need to learn and scale your skill set to match the demands of your new application.

NI Hardware Proficiency

In addition to determining which level of LabVIEW proficiency you require to achieve success with your graphical system design application, you need to identify the level of hardware proficiency required. NI offers skills guides at **ni.com/skills-guide/hardware** for each of the following hardware platforms.

Data Acquisition (DAQ)

NI is a trusted computer-based measurement provider for engineers and scientists. Find out the level of DAQ proficiency you need to take advantage of NI DAQ's high-performance I/O, industry-leading technologies, and software-driven productivity gains for your application:

- Perform basic measurements
- Develop DAQ systems
- Architect complex DAQ systems

Instrument Control

NI offers high-quality instrument control hardware for buses such as GPIB, USB, and Ethernet to help you automate your measurements. And you can use NI resources to identify which category your application falls into and which level of instrument control proficiency you need:

- Tester/technician
- System developer
- System architect

Embedded Monitoring and Control

To help you develop embedded monitoring and control systems, NI CompactRIO hardware offers powerful benefits including precise high-speed timing and control plus rugged hardware. Find which level of proficiency is required for your embedded application:

- High-performance (FPGA) prototype
- High-performance (FPGA) deployment
- Basic performance (Scan Engine) prototype
- Basic performance (FPGA) deployment

How Do I Use This Brochure?

This brochure offers guidelines to determine the level of proficiency that best ensures success for current and future projects. To help you accelerate your development, create quality code that you can reconfigure and reuse, and effectively configure and control your hardware, NI skills guides assist you in identifying which proficiency level your current application requires. You can then learn more about the skill sets important for proficiency at that level and the options for obtaining those skills consistent with your time constraints, budget, and personal learning preferences.

Steps to Graphical System Design Proficiency

- Step 1: Read the descriptions below and find the category that best applies to you.
- Step 2: Find the corresponding category in the LabVIEW Skills Guide on the back of this page to identify your proficiency path.
- Step 3: Review the applicable hardware proficiency paths online at **ni.com/skills-guide/hardware**.

Graphical System Design Software and Hardware Skills Guide

	Technician or Basic Developer	Software Engineer	Software Architect
Size/complexity of application	Develop or support/troubleshoot a small to medium application (<20 VIs)	Design and develop a medium to large application (20+ to 100 VIs)	Determine and design the architecture or act as technical lead or project manager for a large application (100+ VIs)
Criticality of application	Build a functional prototype or short-term use system	Develop one or more systems for ongoing use or deployment over multiple months or years	Design a "mission critical" application: incorrect execution may result in significant loss
Support and maintenance expectations for the application	Support and maintain own applications or application will not be maintained	Develop any applications to be used, supported, or maintained by others	Develop any applications to be used, supported, or maintained by others
Expectation for future LabVIEW use	Plan to use LabVIEW for only one project	Plan to use LabVIEW for multiple projects	Plan to use LabVIEW for multiple projects
Frequency of LabVIEW use on current application	Spend less than 10 hours a week developing applications in LabVIEW	Use LabVIEW regularly	Either I am or the team I lead is using LabVIEW regularly

LabVIEW Skills Guide

ni.com/skills-guide

Required LabVIEW Software Skills	Online Product Documentation	Online Training Courses	Classroom Training Courses
Technician or Basic Developer			
Install LabVIEW	LabVIEW Installation Guide		
Navigate the LabVIEW environment	Getting Started with LabVIEW	LabVIEW Core 1	LabVIEW Core 1
Apply key LabVIEW structures and data types			
Apply key LabVIEW elements for relating data			
Read and interpret existing LabVIEW code			
Troubleshoot and debug LabVIEW code			
Understand and select appropriate application timing techniques	Controlling Timing in LabVIEW Applications		
Use event programming to handle user interface interaction or communicate data between processes	Event-Driven Programming	LabVIEW Core 2	LabVIEW Core 2
Programmatically control UI objects	Programmatically Controlling VIs		
Evaluate and use file I/O formats for data analysis and storage	File I/O		
Optimize reuse of existing code for your projects	LabVIEW Style Checklist		
Create executables and installers to distribute your application	Building and Distributing Applications		
Apply basic design patterns and LabVIEW templates such as Simple State Machine	Simple State Machine Template		
Software Engineer (builds on the skills obtained by Basic Developers)			
Identify an appropriate software development process for the project	Development Life Cycle Models	LabVIEW Core 3	LabVIEW Core 3
Understand and design to requirements	Software Engineering with LabVIEW		
Derive a task list and high-level flowchart to guide design and development			
Organize a software project using the LabVIEW Project Explorer Window			
Develop a user interface that meets user requirements and LabVIEW style guidelines			
Handle and log errors globally or locally during code execution			
Design, implement, document, and test code modules for each task			
Integrate code modules into the application architecture			
Design, implement, document, and test an intermediate-level LabVIEW architecture such as a Queued Message Handler	Queued Message Handler Template		
Software Architect (builds on the skills obtained by Software Engineers)			
Determine appropriateness of an object-oriented approach for your application	LabVIEW Object-Oriented Programming FAQ	Object-Oriented Design and Programming in LabVIEW	Object-Oriented Design and Programming in LabVIEW
Design an application using object-oriented design principles	LabVIEW Object-Oriented Programming		
Implement a basic class hierarchy using LabVIEW classes			
Use LabVIEW features that provide additional functionality to LabVIEW classes			
Implement an application using common object-oriented design patterns			
Modify an existing LabVIEW application to replace common patterns with LabVIEW objects			
Optimize code and resources to effectively reduce development time and costs	Software Engineering with LabVIEW	–	Managing Software Engineering in LabVIEW
Adapt the software engineering process to your projects			
Select and leverage appropriate tools and techniques for managing development			
Conduct an effective LabVIEW code review			
Understand tools and advanced techniques for testing and validating applications			
Refine a requirements document and develop an architecture for an application based on LabVIEW		Advanced Architectures for LabVIEW	Advanced Architectures for LabVIEW
Understand and apply the elements of a good architecture			
Understand architecture design trade-offs and select an appropriate design pattern for your application			
Design a clean API			
Analyze, critique, and improve the architecture of a LabVIEW application			
Understand and apply advanced design patterns and LabVIEW templates such as the Actor Framework template	Actor Framework Template		

To find training courses near you, view the NI training catalog at **ni.com/training**.

The Experience You Need

With NI training courses, you learn recommended techniques to reduce development time and improve application performance and scalability. In a recent survey, customers reported on average 66 percent faster learning times, 50 percent quicker development, and 43 percent less maintenance after taking NI training courses. Learn from NI and industry experts in a variety of formats, including online, virtual, and classroom settings. NI training is a smart and safe investment to unlock your application development potential.

> *"I estimate that the training courses have saved me more than 150 hours in self-paced learning time to get to an equivalent skill level."*
>
> –Thomas Sumrak, Test Engineer, **PAR Technologies, LLC**

Training Formats

NI offers courses in several languages and formats including classroom training at facilities worldwide or on-site at your facility, online courses, and virtual training to better serve your individual needs. Whichever course format you choose, NI training courses can help you achieve immediate productivity gain and long-term success.
Visit **ni.com/training/options** for more details.

			Classroom	
Format Features	**Online** Prerecorded modules viewable at ni.com	**Virtual** 1- to 4-day classes held live remotely	**Regional** 1- to 3-day classes held at training facilities	**On-Site** 1- to 3-day classes held at your location
Learn from a certified instructor who can answer questions	–	✓	✓	✓
Access relevant hardware[1]	–	✓	✓	✓
Eliminate distractions with a classroom setting	–	–	✓	✓
Interact with other students	–	–	✓	✓
Content modified to meet your group's specific needs	–	–	–	✓
Avoid travel expenses	✓	✓	–	✓
Printed manual that accompanies the course[2]	–	✓	✓	✓
Exercises to practice concepts you learn	✓	✓	✓	✓
Multimedia training	✓	✓[3]	–	–
Concept review quizzes	✓	✓	✓	✓
Full-day class (8 hours per day)	–	–	✓	✓
Half-day class (4 hours per day)	–	✓	–	–
Learn on your own schedule (24 hours/7 days)	✓	–	–	–
Price	$[4]	$$	$$$	$$$

[1]Some courses use simulated hardware; [2]Manuals differ in format and content detail by course; [3]Recorded video of the class can be reviewed; [4]Or included with software service contract

Courses

National Instruments provides many different training courses designed to help you become successful using your NI hardware and software. NI engineers and certified professional instructors design and teach courses that help you learn to develop robust, maintainable applications.

Development Courses

NI LabVIEW Development Courses

- LabVIEW Core 1
- LabVIEW Core 2
- LabVIEW Core 3
- LabVIEW Connectivity
- LabVIEW Performance
- Object-Oriented Design and Programming in LabVIEW
- Advanced Architectures in LabVIEW
- Managing Software Engineering in LabVIEW
- Using NI LabVIEW for Test and Automation in Regulated Markets

NI TestStand Courses

- TestStand 1: Test Development
- TestStand 2: Framework Development

LabVIEW Development With NI Hardware Courses

- LabVIEW Real-Time 1
- LabVIEW Real-Time 2
- LabVIEW FPGA
- High-Throughput LabVIEW FPGA
- NI FlexRIO
- Data Acquisition and Signal Conditioning
- LabVIEW Instrument Control
- Sound and Vibration Fundamentals
- Modular Instruments: Switches
- Modular Instruments: Digital Multimeters (DMMs)
- Modular Instruments: High-Speed Digital I/O
- RF Measurement Fundamentals
- RF Application Development
- LabVIEW Machine Vision and Image Processing

NI LabWindows™/CVI Courses

- LabWindows/CVI Core 1
- LabWindows/CVI Core 2

NI Multisim and Ultiboard Courses

- Multisim Basics
- Ultiboard Basics

NI VeriStand Course

- NI VeriStand Fundamentals

NI DIAdem Courses

- DIAdem Basics
- DIAdem Advanced

Purchasing Options

Purchase Now, Schedule Now

If you already know the course you need and when you would like to take it, you can get started now by browsing our training catalog at **ni.com/training.**

Purchase Now, Schedule Later

Buy training credits now and redeem them within the year for any training or certification offering. Credits can be applied to anyone and are valid anywhere in the country of purchase.

Membership Savings

Take regional and online courses and certification exams for one low price. Memberships are available in six-month, one-year, and two-year options.

Already a Member of the Standard Service Program (SSP)?

With an active LabVIEW SSP membership, you are entitled to online training. Visit **ni.com/ssp** to see the courses you are eligible for and begin viewing training videos immediately.

Validate Your Expertise

For developers and engineers using NI software, certification is a proven way to boost career potential. Certification helps inspire confidence in technical skills, leading to promotions, new opportunities, and higher pay for individuals. For organizations, certification is a strategic investment that pays off in increased productivity, reduced turnover, and an overall competitive advantage.

Certifications Offered

Skill Level	NI LabVIEW		NI TestStand	NI LabWindows™/CVI
	Core	Embedded Systems Developer		
Architect	Master architecting and managing applications	Proficiency in designing and deploying embedded control and monitoring applications	Architect and manage applications	No certification offered
Developer	Ability to create functional, well-documented code with minimal development		Complete understanding of core features and functionality	Complete understanding of core features and functionality
Associate Developer	Broad understanding of core features and the ability to interpret existing LabVIEW code		No certification offered	No certification offered

Benefits of Certification

NI certification demonstrates that you have the skills needed to create high-quality applications with NI software platforms and gives customers, peers, and employers confidence in your abilities. A recent survey of NI Certified LabVIEW Developers revealed tangible benefits that have a direct, measurable, and positive impact on employee and manager alike, such as the following:

- 54 percent said the quality of their work improved
- 45 percent said their peers' perceptions of them improved
- 29 percent received new project opportunities
- 36 percent said the certification increased their compensation by more than 5 percent
- 10 percent received a promotion at work

Reasons to Certify Your Employees

NI certification provides a standard, industry-accepted way of gauging employees' skills, whether they are developing a part of a program or the complete application architecture.

It also allows employers to clearly define and recognize technical skill development goals for individual employees while gaining the benefits of better work quality. At the same time, certification helps individuals within the organization recognize their peers and technical leaders, allowing the development of communication channels and communities that promote the use of good development practices and quick problem resolution.

> *"You can be confident in what you are getting if that certification level is there. Those individuals have the knowledge and experience to hit the ground running, and we had an aggressive timetable for completing the project."*
>
> –David Hakey, Certified LabVIEW Architect and GE Energy Employee

Prepare for Your NI Certification

National Instruments provides a variety of materials to help you prepare for your certification exam. Go online to view preparation guides, webcasts, sample exams, solutions, and a recommended preparation plan based on when you're taking the test and how much experience you have.

Visit **ni.com/training/certification_prep**.

Register for an Exam Near You

In the Americas and Europe, National Instruments offers many certification exams through Pearson VUE testing centers. For all other exams, please refer to the upcoming exam schedule for your area or contact your local National Instruments office to request a different date or location.

Visit **ni.com/certificationschedule**.

Already Certified?

Find a job that leverages your skills set. There are great companies out there looking for the best and brightest Certified LabVIEW Developers. Find employers at **ni.com/labviewcareers**.

Need More Help?

Additional Resources for Continuing Your Learning

LabVIEW User Groups

LabVIEW user groups provide the opportunity for you to learn from and interact with other LabVIEW developers face-to-face. Find a user group in your area to get connected. Visit **ni.com/usergroups** for more information.

Live Events and Webcasts

Free technical sessions presented live at local NI events and virtually via webcast help you learn additional tips and tricks and keep up with the latest NI product and technology developments. Visit **ni.com/events** for more information.

Discussion Forums

Visit **ni.com/forums** and ask questions and start discussions with peers and NI experts.

NI Developer Community

Visit **ni.com/community** to find the latest example code, tutorials, and more from LabVIEW and other NI product users across the globe.

Technical Support Resources

Access technical support resources such as online product manuals, the NI KnowledgeBase, and written tutorials. Visit **ni.com/support** for more information.

No Time to Learn?

If you are unable to gain the skill level you need in the time allotted for your project, NI can augment your expertise by connecting you with an NI Alliance Partner or certified user who can help.

NI Alliance Partner Network

The NI Alliance Partner Network is a program of more than 700 companies worldwide that provide complete solutions and high-quality products based on graphical system design. To find an NI Alliance Partner, visit **ni.com/alliance**.

NI Certified Users

Thousands of certified professionals all over the world have proven their knowledge and skills with NI products by successfully completing NI certification exams. To view a list of certified users in your area, visit **ni.com/training/certification**.

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