

Take Your LabVIEW Development Efficiency to the Next Level

Jeffrey Habets



NIDays Eindhoven, Nov 10 2015

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SPECIALISTS IN VIRTUAL INSTRUMENTATION

LabVIEW • TestStand

Realtime • FPGA • Embedded • Object Oriented UML • Consultancy • Framework • Architecture Machine Vision • Machine Automation

> Engineering support • Large Application development • Project startup • Training • Integration









Silver Alliance Partner

www.vi-tech.nl



- Why this presentation
- Project templates / frameworks
- Tools, tools, tools
- Building up proficiency
- Web resources
- Questions / discussion

Agenda



• There's a wealth of tools in LV



- A lot of people don't know all the gems
- There's a very lively online community a lot of beginners don't know of
 - ni.com forums and communities
 - LAVA
 - Blogs



Project templates

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	📴 Untitled 1 Block Diagram		
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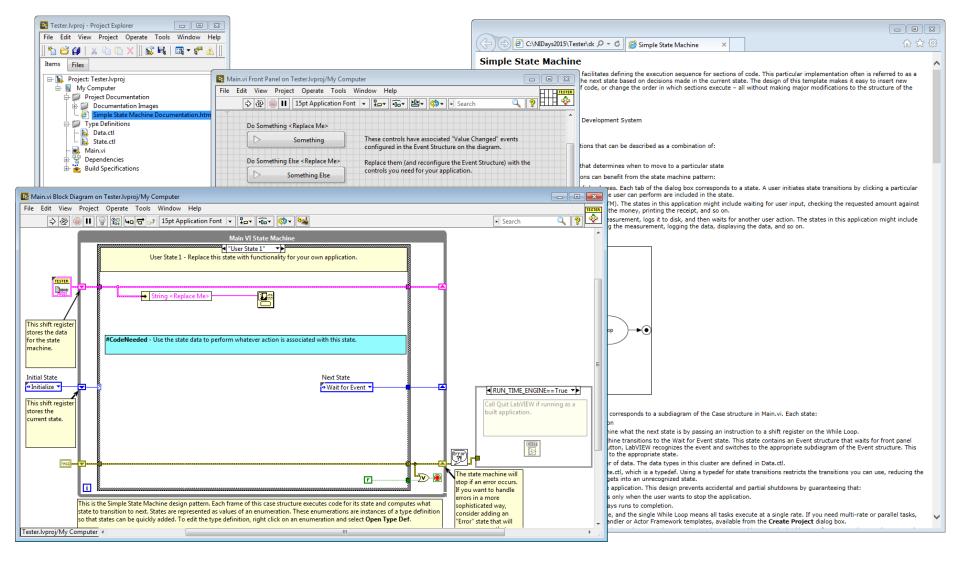
Project templates

💀 Create Project	
Choose a starting point for the proje	ct:
All Templates Sample Projects	VI Technologies Basic Project template Templates The VI Technologies Basic Project starting point.
	Blank Project Templates Creates a blank project.
	Blank VI Templates Creates a blank VI.
	Simple State Machine Templates Facilitates defining the execution sequence for sections of code. More Information
	Queued Message Handler Templates -II->I Facilitates multiple sections of code running in parallel and sending data between them. More Information
	Actor Framework Templates Creates an application that consists of multiple, independent tasks that communicate with each other. This template makes extensive use of LabVIEW classes. More Information
	Instrument Driver Project Templates Creates an instrument driver.
	Touch Panel Project Templates Creates an application for a touch panel running Windows Embedded Standard. More Information
	LabVIEW FPGA Project Templates The LabVIEW FPGA Project Wizard helps you discover or create RIO hardware devices for LabVIEW FPGA application development.
Additional Search	
Keyword	,
	Next Cancel Help



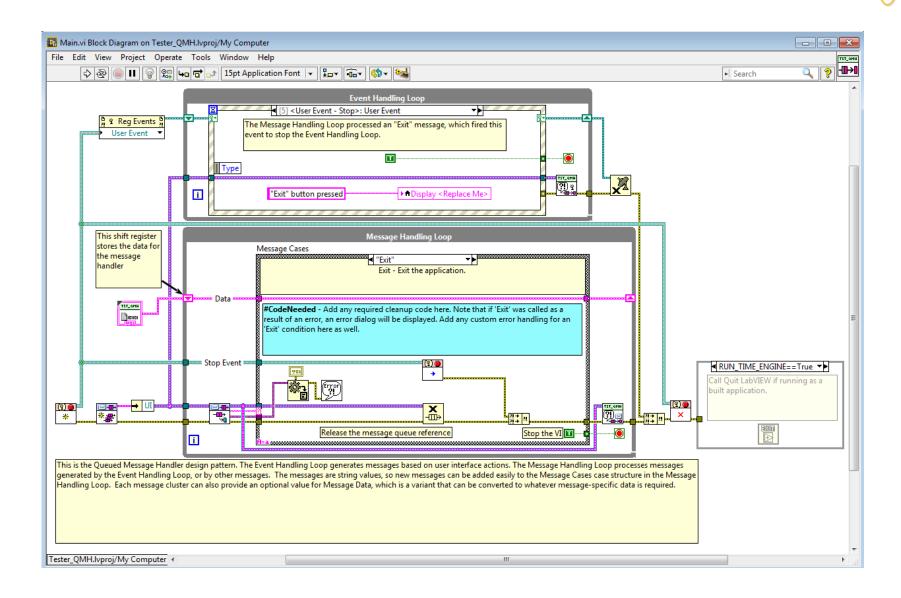
Project templates – Simple Statemachine





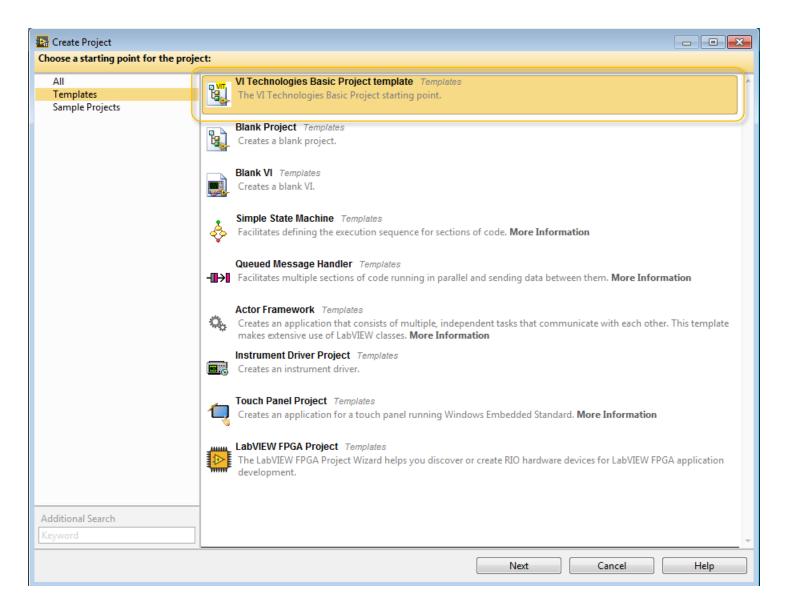


Project templates – QMH





Project templates



Project templates – Create your own

Create Project Create Project: VI Technologies Basic Project template	
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heck out a tutorial on ni.com and an excellent blog post by Elijah Kerry	y on this topic.

http://www.ni.com/tutorial/14045/en/

https://ekerry.wordpress.com/2012/11/09/creating-and-distributing-custom-templates-with-the-new-create-project-dialog/

echnologies



Frameworks

Wikipedia:

"The designers of software frameworks aim to facilitate software development by allowing designers and programmers to devote their time to meeting software requirements rather than dealing with the more standard low-level details of providing a working system, thereby reducing overall development time."

A Framework:

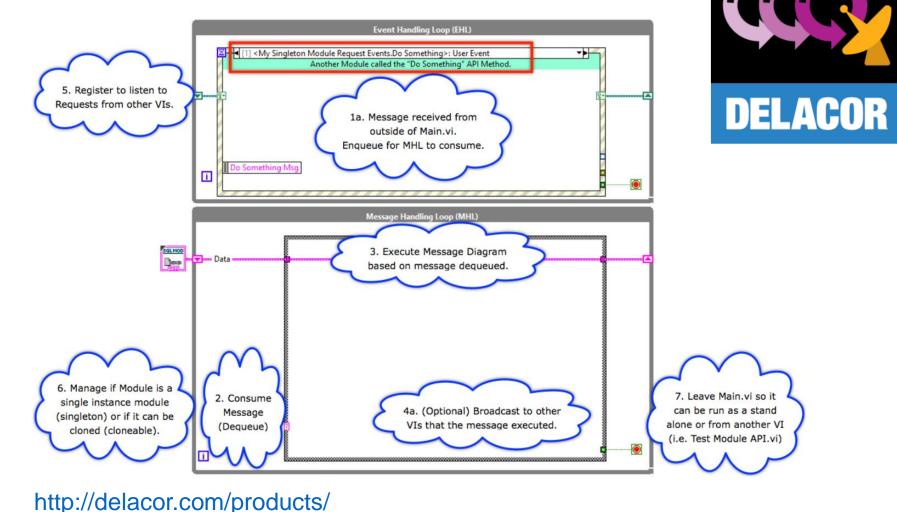
- Enables us to focus on implementing project requirements
- Needs to fit our use case and 'standard stuff' requirements
- Mostly offers multiple parallel processes and communication mechanism out if the box
- Luckily there's a lot to choose from
- Will often have a first-time learning curve!

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Frameworks - DQMH

Delacor Queued Message HandlerBased on NI QMH Project Template

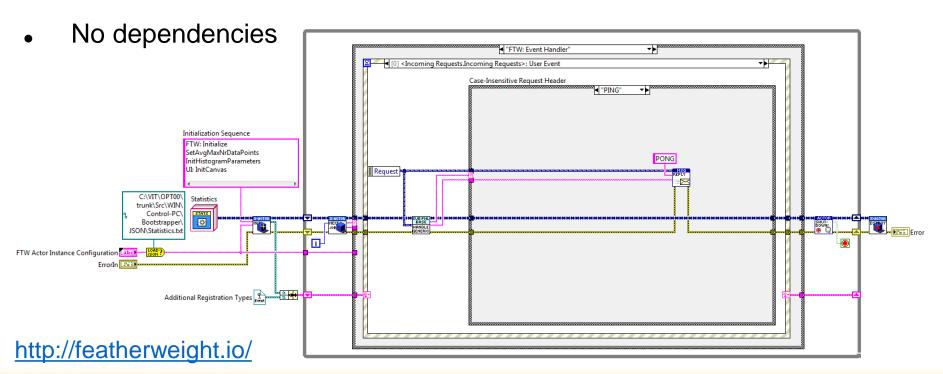


Frameworks - Featherweight

- Actor based applications (not related to NI Actor Framework)
- Also a collection of libraries

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- Messaging (cross-app boundary)
- . SQLite & JSON (with type adaption)

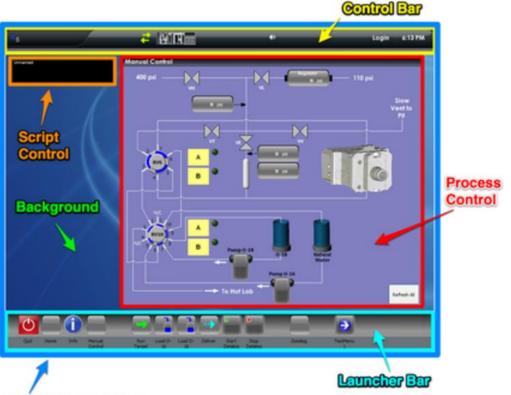




Take your LabVIEW Development Efficiency to the Next Level



- KISS approach, no CLA required
- Communication, cross-module and cross
 platform
- Save / restore persistent data
- Error handling and logging
- GUI management
 - . Save/restore windows
 - Combine GUI modules
 - Floating and docking windows



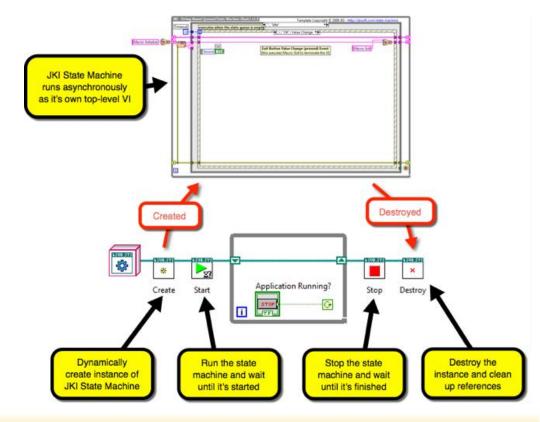
http://www.s5solutions.com/aloha.html ALOHA Container App





Some more frameworks:

- Actor Framework (comes with LabVIEW)
- . JKI Statemachine Objects



http://jki.net/state-machine-objects



Tools - VIPM

- Comes with LabVIEW
- Opens up access to over 450 libraries and tools for LabVIEW of which a lot are free
- LabVIEW Tool Network
- JKI Package Network
- Create your own packages
- With the Pro version you can create and manage your own package repository



http://jki.net/vipm

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Wire Multiple Objects Together 1.0.0.2 Unpublished National Instrum	truments	National Instruments	Unpublished	1.0.0.2	Wire Multiple Objects Together



Tools – A couple of highlights

GPower

	GPower VI Register	2014.0.0.30	NI LabVIEW Tools Network	GPower
103	GPower VI Launcher	2012.2.0.26	NI LabVIEW Tools Network	GPower
	GPower Timing	2014.0.0.19	NI LabVIEW Tools Network	GPower
12	GPower String	2012.1.0.8	NI LabVIEW Tools Network	GPower
	GPower Overflow	2014.0.0.4	NI LabVIEW Tools Network	GPower
12	GPower Numeric	2015.0.0.11	NI LabVIEW Tools Network	GPower
	GPower Math	2012.1.0.6	NI LabVIEW Tools Network	GPower
12	GPower Events	2012.0.0.7	NI LabVIEW Tools Network	GPower
	GPower Error & Warning	2014.0.0.38	NI LabVIEW Tools Network	GPower
12	GPower Comparison	2012.0.0.3	NI LabVIEW Tools Network	GPower
	GPower Array	2014.0.0.23	NI LabVIEW Tools Network	GPower
12	GPower All Toolsets	2015.0.0.9	NI LabVIEW Tools Network	GPower

JKI / LAVA / MGI

	JKI State Machine	3.0.0.8	JKI Package Network	JKI
12	jki_rsc_toolkits_palette	1.1-1	JKI Package Network	JKI Software
12	Variant_Probe	2.4.1	Unpublished	LAVA
12	OpenG LabVIEW Data Library	4.2.0.21	JKI Package Network	LAVA
	LAVA Palette	1.0.0.1	NI LabVIEW Tools Network	LAVA
12	Robust CSV	1.1.0.4	Unpublished	LAVA
12	LabVIEW Task Manager	1.7.0.28	Unpublished	LAVA
122	JSON API	1.3.2.27	Unpublished	LAVA
10-	MGI Actor Framework Message Maker	1.0.0.17	NI LabVIEW Tools Network	MGI

Tools – A couple of highlights

Unpublished

National Instruments

National Instruments

Timer Notification	1.0.0.13	Unpublished	National Instruments
OpenG Time Library	4.0.1.3	JKI Package Network	National Instruments
NI Syslog Library	1.3.0.20	NI LabVIEW Tools Network	National Instruments
NI String Tools Library	2.0.0.5	NI LabVIEW Tools Network	National Instruments
NI LogRotate	1.0.0.18	NI LabVIEW Tools Network	National Instruments
NI Linked Network Actor	1.2.0.19	Unpublished	National Instruments
NI Keyed Array Library	2.0.0.11	NI LabVIEW Tools Network	National Instruments
NI GXML	1.4.2.8	NI LabVIEW Tools Network	National Instruments
NI Asynchronous Message Communication (AMC) Library	3.3.0.21	NI LabVIEW Tools Network	National Instruments
Wire Multiple Objects Together	1.0.0.2	Unpublished	National Instruments
Hidden Gems in vi.lib	1.0.0.8	NI LabVIEW Tools Network	National Instruments
Structured Error Handler	2.0.6.9	Unpublished	NI
)penG OpenG Toolkit	4.0.1.9	JKI Package Network	OpenG.org
-			
OpenG Variant Configuration File Library	4.0.0.5	JKI Package Network	OpenG.org
OpenG String Library	4,1.0,12	JKI Package Network	OpenG.org
OpenG Port IO	4.0.0-2	JKI Package Network	OpenG.org
OpenG Picture Library	4.0.0.13	JKI Package Network	OpenG.org
OpenG Numeric Library	4.1.0.8	JKI Package Network	OpenG.org
OpenG Message Queue Library	4.0.0.15	JKI Package Network	OpenG.org
OpenG MD5 Digest Library	4.1.1.10	JKI Package Network	OpenG.org
OpenG LabVIEW ZIP Library	4.0.0-2	JKI Package Network	OpenG.org
OpenG Large File Library	4.0.0.3	JKI Package Network	OpenG.org
OpenG File Library	4.0.1.22	JKI Package Network	OpenG.org
OpenG Error Library	4.2.0.23	JKI Package Network	OpenG.org
OpenG Dictionary Library	4.0.0.4	JKI Package Network	OpenG.org
OpenG Comparison Library	4.0.0.3	JKI Package Network	OpenG.org
OpenG Buttons Library	4.0.0.7	JKI Package Network	OpenG.org
OpenG Boolean Library	4.0.0.7	JKI Package Network	OpenG.org
OpenG Array Library	4.1.1.14	JKI Package Network	OpenG.org
OpenG Application Control Library	4.1.0.7	JKI Package Network	OpenG.org
1			



Formerly known as Goop Development Suite

- A must-have if you do Object Oriented Programming
- Contains a UML modeler, able to do code-generation and synchronization
- Plugs into Project Explorer
- Easiest class and method (VI) icon editing ever! (also for non-OOP VI's)
- Easier method creation
- Plug-in template based
- Build-in design patterns

https://opengds.github.io/

Socket.lv-	lace		
- 👘 Socke	New	•	
 □· □· prote □· □· □· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·	Open Explore Show in Files View Ctrl+	E	
- Sta	Add	•	
<mark>∕®</mark> ™ Th ⊕ 📁 ETSC	Go to Parent Class Show Class Hierarchy		
	Save	•	
- 🔗 Socke	Find	•	
🕀 🚏 Depende	Show Error Window		
🖙 🍝 Build Sp	GOOP		Add Method
	UML	•	Add Design Pattern
	Unit Tests	•	Edit Class Icon
	SVN Update SVN Commit SVN Get Lock VSI TSVN Tools	•	Edit Class Apperance Set Class Item Icon Rename class Modify this class inheritance Clone class
	Analyze VIs	-	Debug class
	Find Project Items		Change Connector Pane To
	Arrange By	•	Get class information



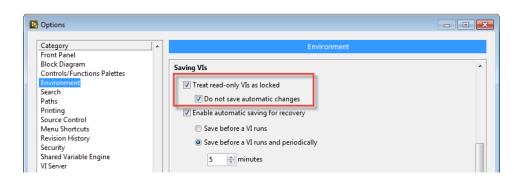
Source Code Control and issue tracker

- Subversion / TortoiseSVN for SCC
- ViewPoint Systems' TSVN toolkit for SubVersion SCC integration in LabVIEW's project explorer
- Redmine for issue tracking (work items, bugs, etc.) and project management
- All integrate nicely with each other

http://www.viewpointusa.com/product/ni-labview-toolkits/tsvn-toolkit/ http://tortoisesvn.net/ http://www.redmine.org/



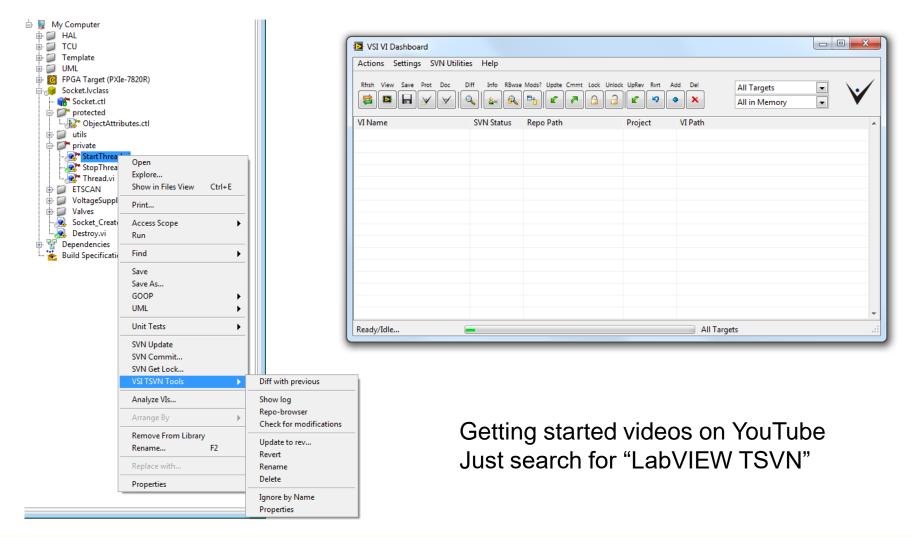
- In TortoiseSVN general settings: add *.aliases and
 *.lvlps to the SVN global ignore pattern list
- Set your project to "Separate compiled code from source" http://zone.ni.com/reference/en-XX/help/371361H-01/lvconcepts/saving_vis_compiled_code/
- Configure SVN to automatically add the needs-lock property to all LV-related files *.vi = svn:needs-lock
- In the LabVIEW Options enable 'Treat read-only VIs as locked'





TSVN toolkit for LabVIEW

• This toolkit makes using SVN with LabVIEW a breeze

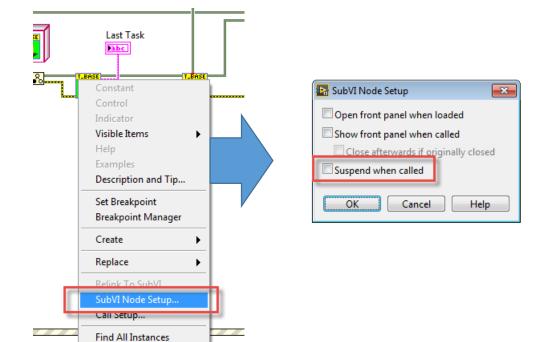




- Debugging
 - Create custom probes to view specific data in a more meaningful way

http://zone.ni.com/reference/en-XX/help/371361H-01/lvhowto/creating_custom_probes/

Suspend when called





- Debugging
 - Datalog VIs A feature that has been in LabVIEW since version 1.2

GetClass	Name.vi Front Panel on PXI_OPRS_TASK	5.lvproj/My Comp	uter*		
project	Operate Tools Window Help				
1 1	Run	Ctrl+R	arch Q ?		
	Stop	Ctrl+.			
	Step Into	Ctrl+Down	ClassName		
	Step Over	Ctrl+Right	TaskValveMeas		
	Step Out	Ctrl+Up			
	Suspend when Called				
	Print at Completion				
	Log at Completion				
	Data Logging	•	Log		
	Change to Run Mode	Ctrl+M	Retrieve		
	Connect to Remote Panel		Purge Data		
	Debug Application or Shared Library.		Change Log File Binding		
	Debug Application of Shared Elbrary.		Clear Log File Binding		
			status code		
			₫0		
			source		
•			A		
-					

https://decibel.ni.com/content/blogs/labviewramblings/2015/10/17/datalog-vis--labviews-forgotten-feature#comment-45878



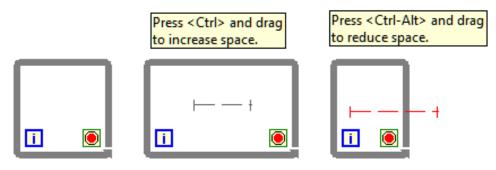
- You can add custom items in shortcut menus!
 - . Change to array or element
 - Empty listboxes
 - . Remove and rewire objects
 - Size array constants to contents
 - There's more in the community...

	Debugger Notepad.IIb		
-	3 weeks ago	by jtagg82	6.7
	Property Node to Invoke Node.IIb 1 month ago	by fabric	à
	Create SubVI from Selected Wires.llb 1 month ago	by Darren	S
	Darren's Favorite Shortcut Menu Plug-Ins.zip 1 month ago	by Darren	Q
	Wire Multiple Items to Bundler.IIb 1 month ago	by Darren	S
	Insert Build Array.IIb (for broken wires) 1 month ago	by Darren	S
	Create Event.IIb 1 month ago	by Darren	Q
	Clear Variant Data.llb 1 month ago	by Darren	Q
	Create Scalar Constant.IIb (from an array terminal) 1 month ago	by Darren	S
V 2	Re: Suggestion: Change All To Write (resp. Read) for local/global variables 1 month ago	by X.	8
	Multi-select Change Local Direction 1 month ago	by Darren	Q
	Popout Create Menus.IIb 1 month ago	by Darren	S
	Copy and Paste Font of text elements 1 month ago	by mr_builder	P
	Remove Coercion Dots.IIb 1 month ago	by Karsten van Zwol	Ŷ.

https://decibel.ni.com/content/groups/labview-shortcut-menu-plug-ins



• Adding and **reducing** block diagram or frontpanel space



- Hyperlinks in free labels
- Better tool integration for creating Actor Framework classes from the project explorer window



- With proficiency comes efficiency
- NI Courses (Instructor-led irl or online or self-paced)
- Leverage the LabVIEW online ecosystem
 - Forums (LAVA, ni.com)
 - Communities and whitepapers (ni.com)
 - Blogs (ni.com and more...)
- Learn from your peers (in and outside your own company)
 - Communicate, irl and online
 - (Public) Code reviews
 - Go to conferences: CLA/CLD Summit, NIWeek, NIDays, User group meetings



- Blogs
 - Walking The Wires (<u>http://www.walkingthewires.com/</u>)
 - Wiresmith Technology (<u>http://www.wiresmithtech.com/blog/</u>)
 - LabVIEW Craftsmen (<u>http://www.labviewcraftsmen.com/</u>)
 - Software Engineering for LabVIEW (<u>https://ekerry.wordpress.com/</u>)
 - Random Ramblings on LabVIEW Design
 (https://decibel.ni.com/content/blogs/labviewramblings)
 - Point of VIEW
 (http://ni.com/point-of-view)
 - JKI (<u>http://blog.jki.net/</u>)



Online resources - tips

Reference to the second						Search Community
Welcome, Jeffrey Habets (Log out)	✓ New =	🗎 Your Stuff 🔻	☑ History =	Browse ₹	? Help ₹	

Community

Find the National Instruments network that's right for you! From students to rocket scientists, NI unites users from around the world collaborating on similar applications.

Places		Ways to Get Involved
Spaces	NIDays	Discussion Forums
FIRST Community	Experience True Innovation Attend NIDays and join thousands of industry experts and NI employees worldwide to learn about the latest	Example Code
Regional Communities Academic Community	technologies and trends in design, test, and control. Learn more about NIDays	 ♀ Idea Exchange ⑦ Technical Blogs ⊗ User Groups
	New to the Community? Visit the Community HUB	Newsletters
Projects	Ask questions, watch videos, and learn more about the NI Developer Community.	Popular Bookmarks
Groups	😵 NI Community HUB	Beginner Tutorial (Very Simple 3-Actor System)
Search		Datalog VIs - LabVIEWs forgotten feature
	Popular Documents	Applying Common Object-Oriented (OO) Design Patterns to LabVIEW
Popular Blog Posts	Free 6-Month Evaluation of LabVIEW Student Edition for at-home learning	Measurement Utility (Plugin Hardware Abstraction Layer Using Actor Framework)
IN Named One of the World's Best Multinational Workplaces for Fourth Consecutive Year in NI News in Real Time	LabVIEW Interface for Arduino Setup Procedure	READ THIS FIRST to get started with Actor Framework
OUAC Virtualization and how it affects your Installers in Windows 7	NI LabVIEW for LEGO® MINDSTORMS® / LabVIEW Module for LEGO MINDSTORMS - Download	LabVIEW Queued State Machine Architectur Getting Started With Channel Wires
LabVIEW UI Tips and Tricks - Partl in UI Interest Group	FRC 2015] NI Software Set Up Guide	NI RTSA Host Example for the NI 7976R
IRremoteTools.cpp:5: error: 'TKD2' was not declared in this scope in LabVIEW Interface for Arduino	roboRIO Details and Specifications	CLAD Exam Preparation Hands-On: Actor Framework

NIDays Eindhoven, Nov 10 2015



- Forums
 - LAVA (<u>http://lavag.org/</u>)
 - NI Forums (<u>http://forums.ni.com</u>)
 - Presentation material (powerpoint / pdf)

(e.g. <u>https://decibel.ni.com/content/groups/niweek-2015?view=documents</u>) Some even have videos from the actual presentation

- Videos
 - CSLUG (Central South LabVIEW User Group (UK))

(https://www.youtube.com/channel/UCUeR9TSNhJzTLcp8E8aYkkA)

 Search YouTube for "LabVIEW <other keyword>" Try for example: "LabVIEW SVN" to find a nice instruction video on setting up TSVN.



Wrapping up

What do you think should be in this presentation, that isn't right now?



NIDays Eindhoven, Nov 10 2015