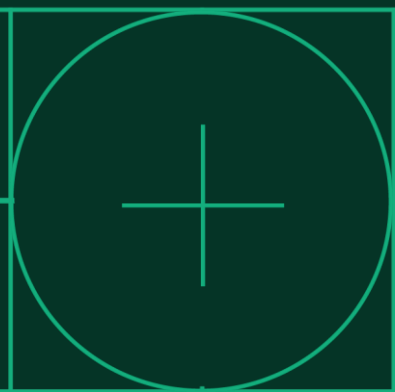
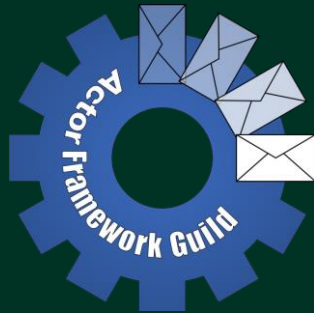


 connect

2024 AUSTIN



The Actor Framework: State of Play

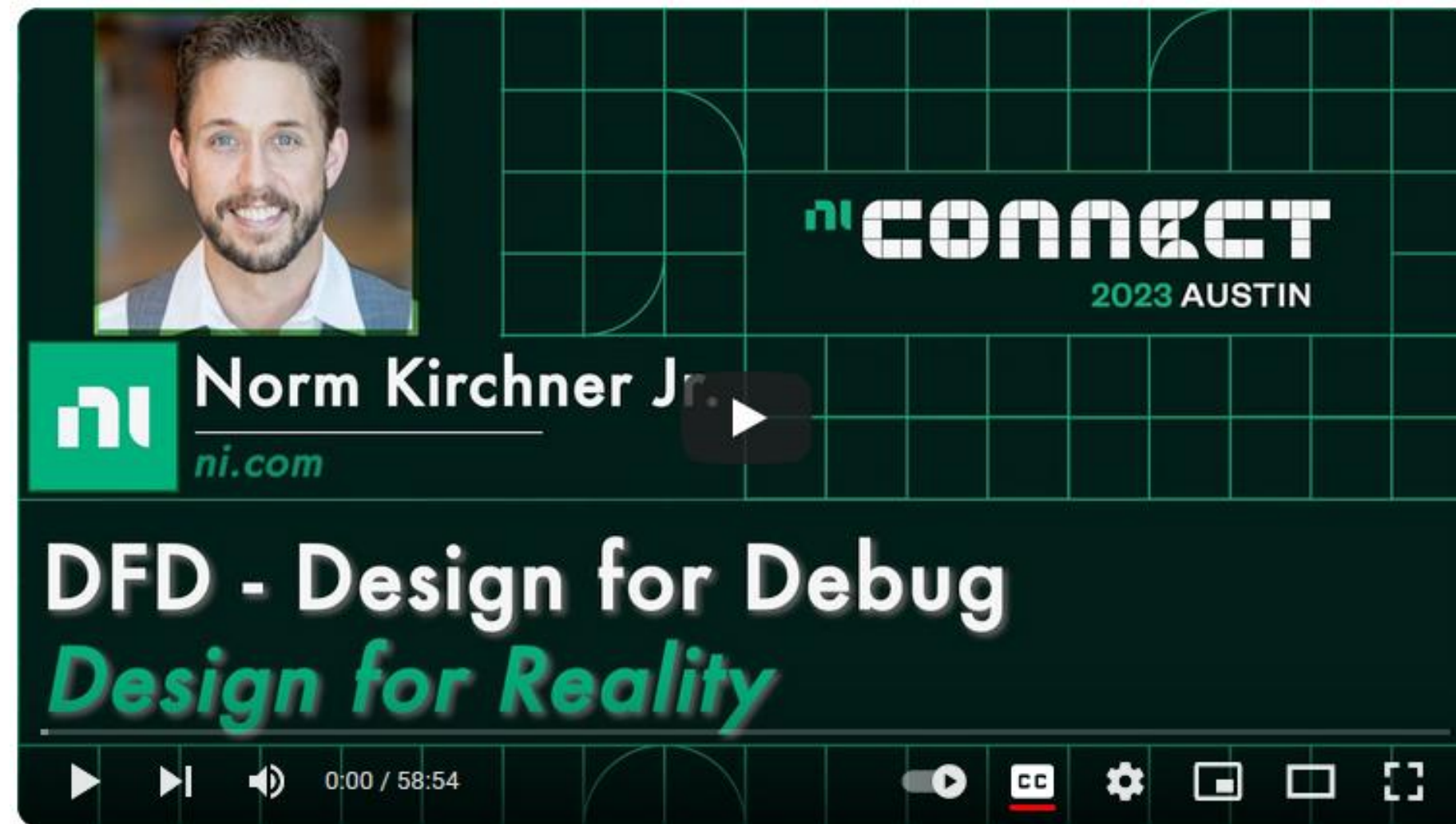


Allen C Smith

CLA, CLED, CPI, LabVIEW Champion

justACS

Why This Talk?



DFD - Design for Debug (Design for Reality)



ShireyStudios
135 subscribers

Subscribe

19



Share

Save



Design for Debug

“Proactively augment your design with a mindful compassion towards the person who needs to debug your code.”

- Norm Kirchner

Design for Debug

*“Explicit **design** choices which intentionally enable or **accelerate** the inevitable process of **debugging**.”*

- Norm Kirchner

Insights and Accelerators

Insight

Information that leads to identification

Accelerator

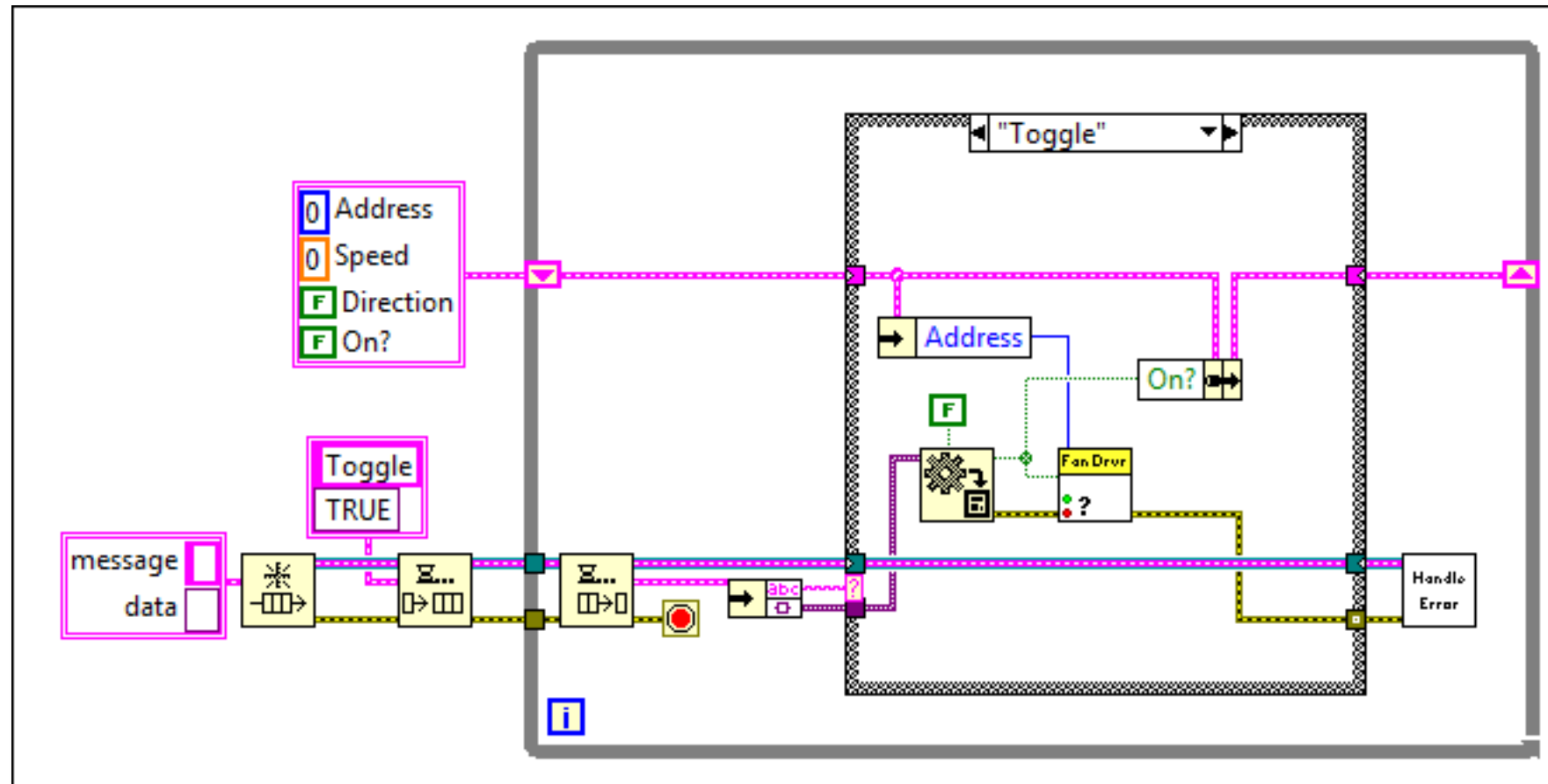
A tool that leads to access

What does Actor Framework Offer?

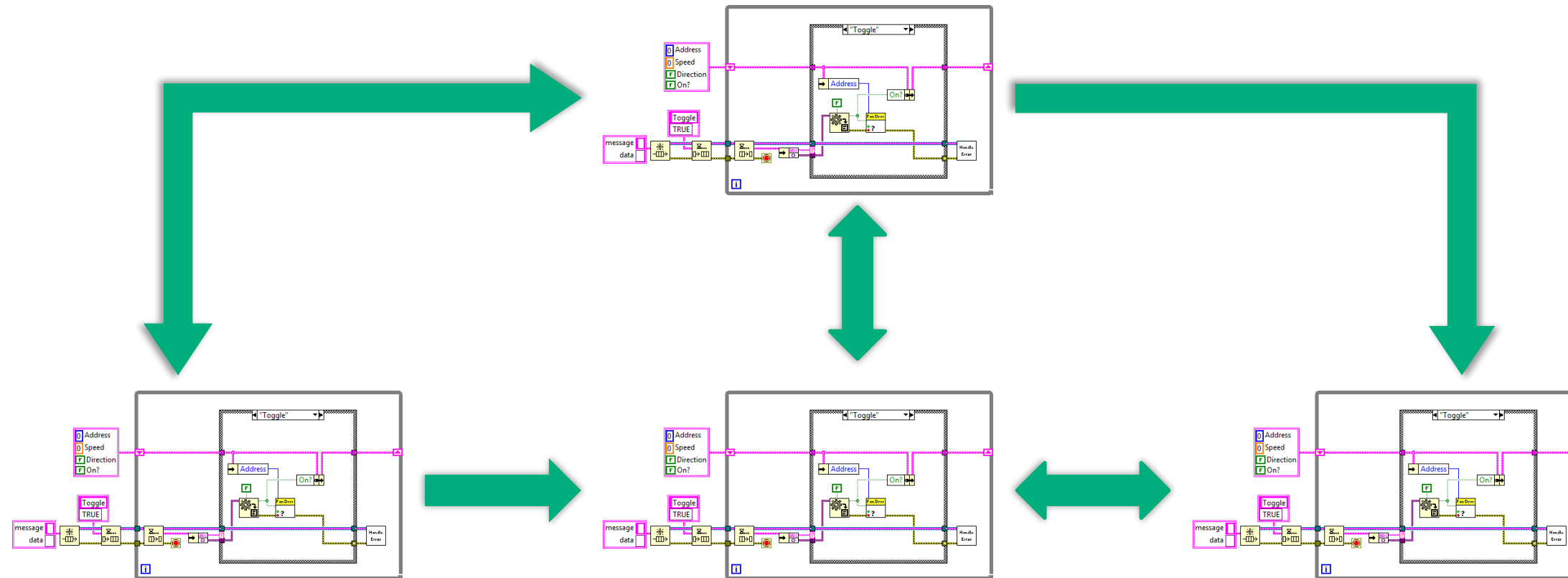
- A structured and organized approach to software development
- Reuse potential to grow the pool of tested, reliable code modules
- Workflows that improve initial code quality and accelerate bug finding
- Transparency tools that give insight and rapid access into the code base

The Actor Framework: Overview

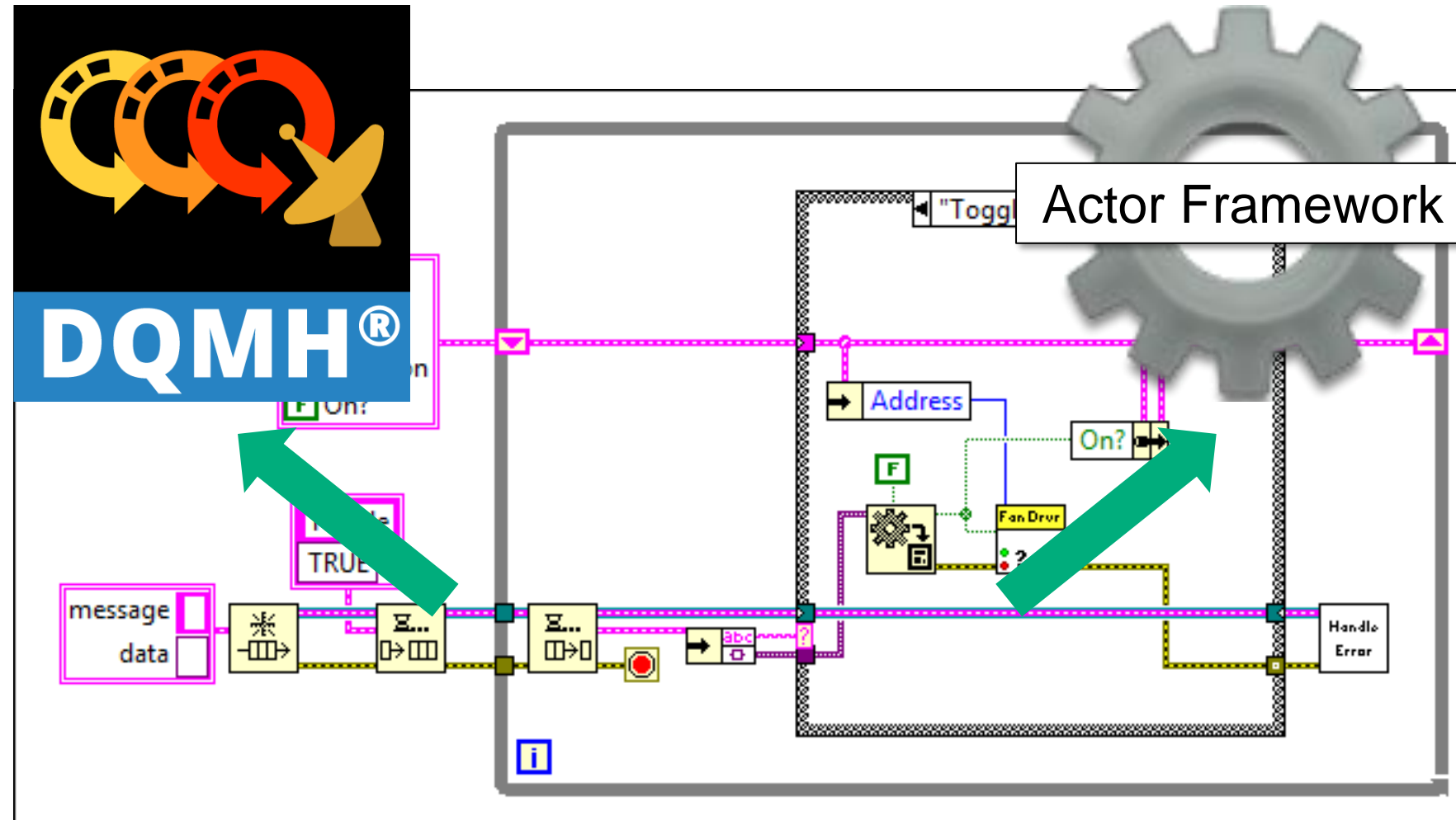
It's Message Handlers...



... All the Way Down



Modern Frameworks



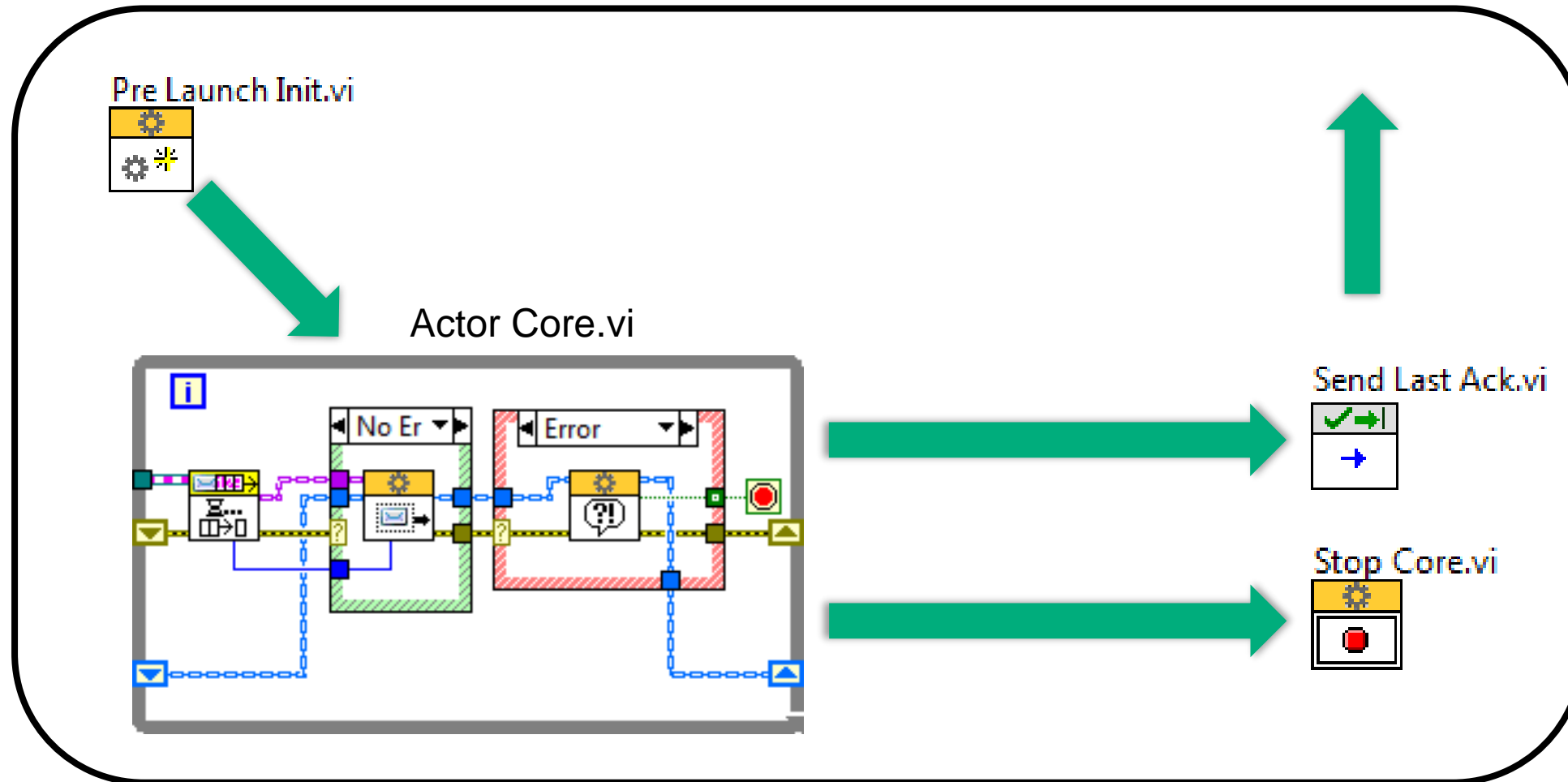
What's in the Framework?

- A standard template for actors
- A standard methodology for exchanging data between actors
 - Dynamic launching
- Multiple instances of an actor in a system
- Tools for rapidly building actors and messages

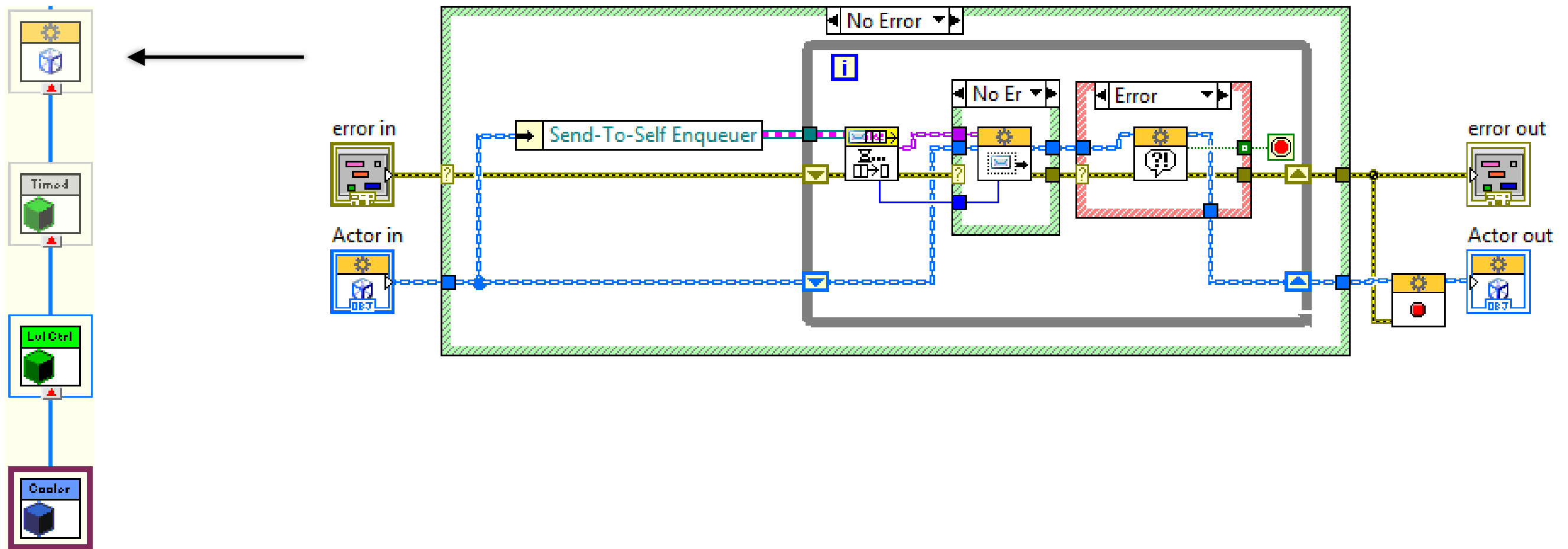
Actor Framework: Code Organization

Actors Have a Lifecycle

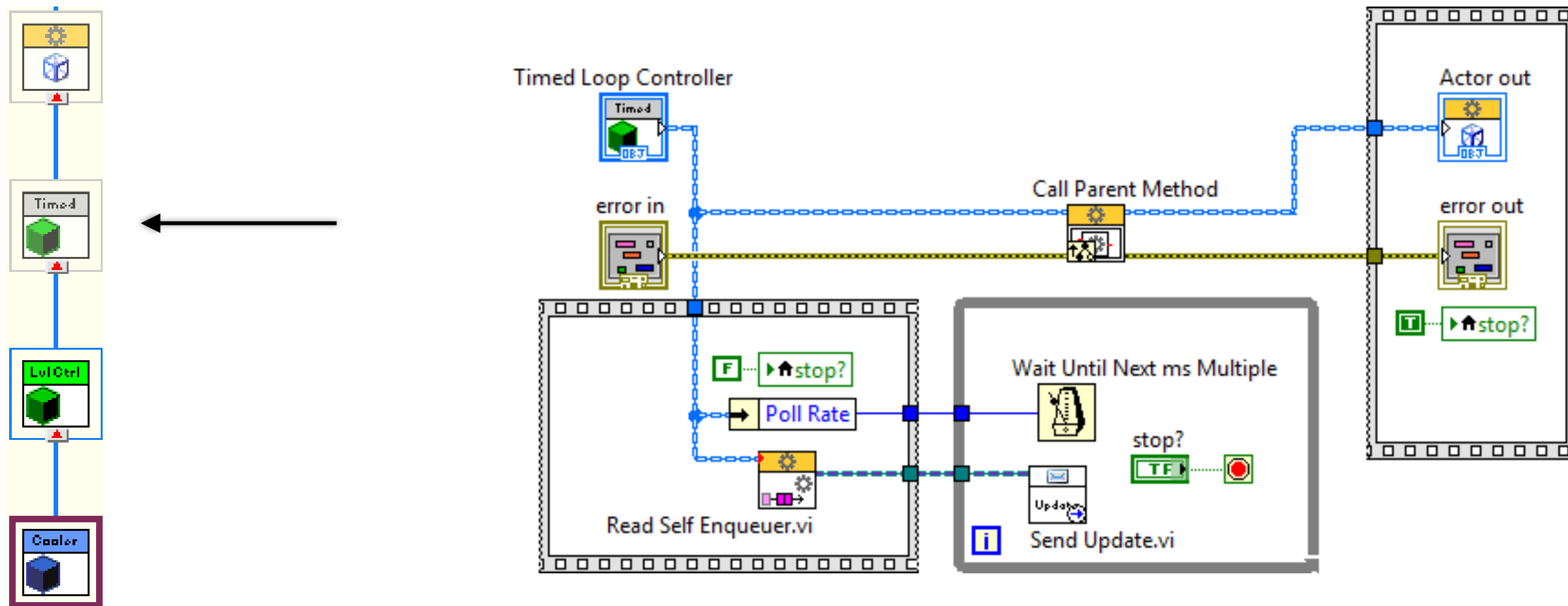
Actor.vi



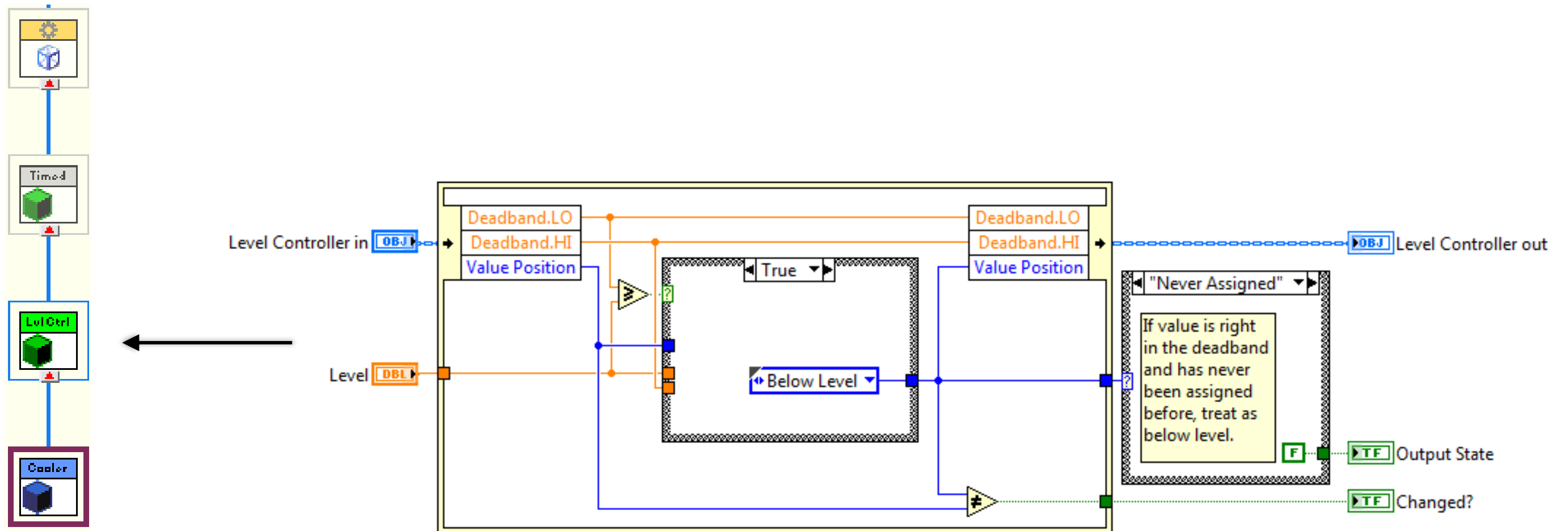
Actors Inherit Complex Behavior



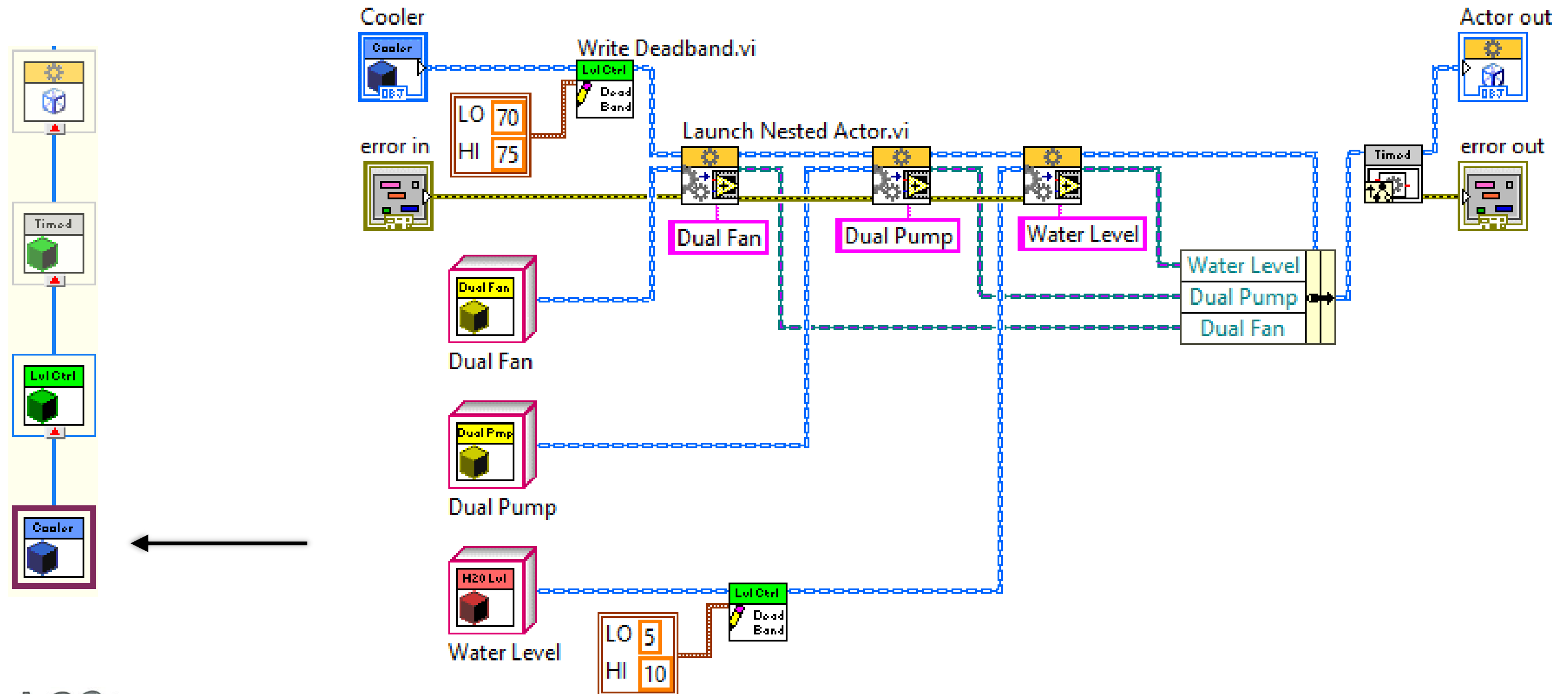
Actors Inherit Complex Behavior



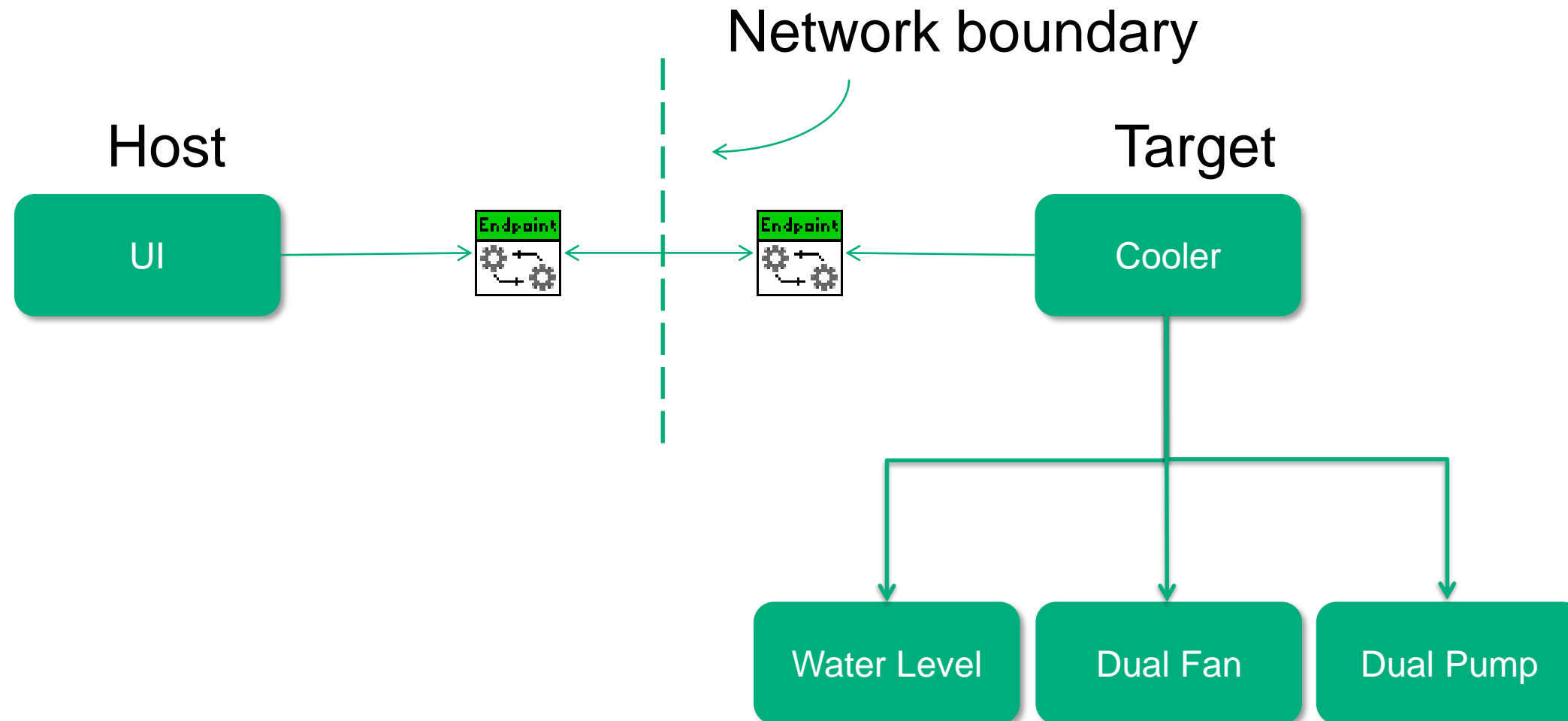
Actors Inherit Complex Behavior



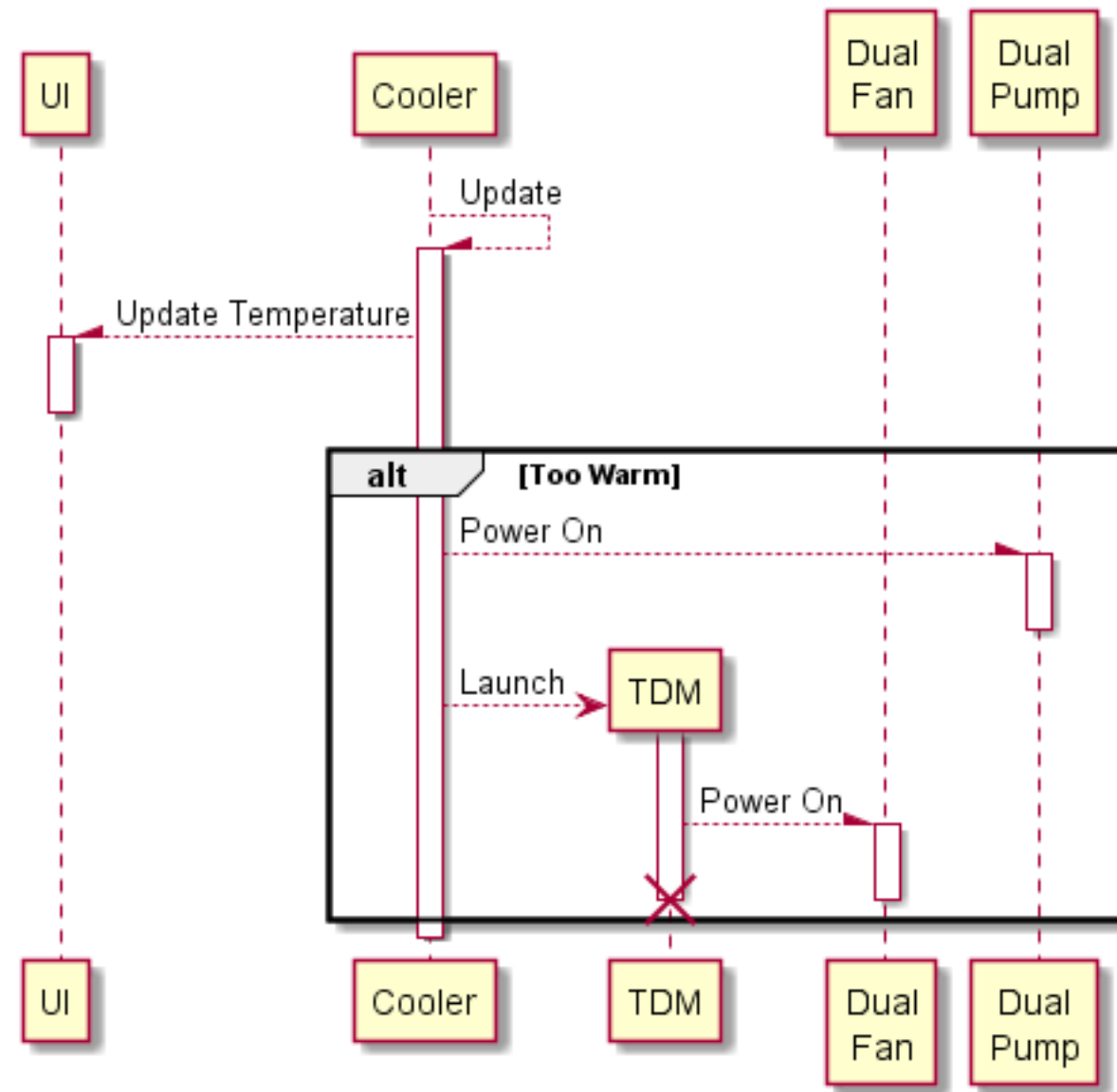
Actors Inherit Complex Behavior



Complex Systems Composed of Actors

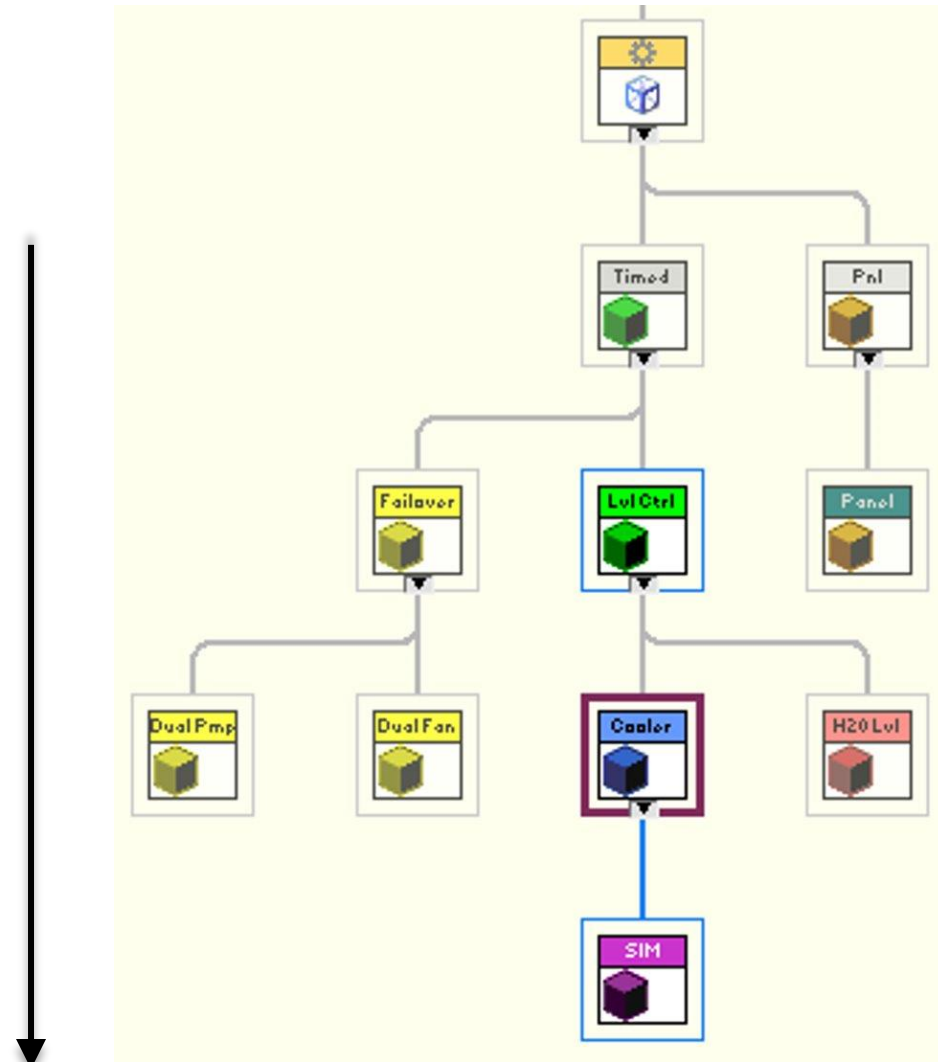


Features Composed of Actor Interactions



Inheritance vs. Composition

Inheritance



Composition

Development Libraries: A Starting Point

Reuse

JKI VI Package Manager

File Edit View Package Tools Window Help

VI [Icons]

2022 All

actor

Install Uninstall

	Name ^	Version	Repository	Company
+	Actor Hierarchy Inspector	0.5.0.12	VIPM Community	justACS
✓	Actor Tester	2.1.2.13	Unpublished	SAS
	Async Methods Actor	0.2.1.1	VIPM Community	LS Instruments AG
	Event Source Actor	1.1.0.5	NI LabVIEW Tools Network	NI
	Events for UI Actor Indicators	1.0.0.14	VIPM Community	justACS and SAS Workshops
✓	Interface for Actor INI	1.0.1.2	VIPM Community	Zyah Solutions
	MGI Actor Framework Message M	1.0.1.6	NI LabVIEW Tools Network	MGI
	MGI Monitored Actor	2.0.0.23	NI LabVIEW Tools Network	MGI
	NI Launch Remote Actor	1.0.0.15	NI LabVIEW Tools Network	National Instruments
	NI Launch Remote Actor Example	1.0.0.5	NI LabVIEW Tools Network	National Instruments
	NI Nested Endpoint Actors Examp	4.0.0.4	Unpublished	National Instruments
✓	NI Network Endpoint Actors	4.0.0.24	Unpublished	NI
✓	NI State Pattern Actor	1.1.0.10	NI LabVIEW Tools Network	National Instruments
	WebSocket-Actor	1.0.0.5	VIPM Community	LS Instruments AG

VIPM>Package Lists>Actor Framework



Actor Framework

A set of tools for working with NI Actor Framework and some useful AF classes/comp

Created by [VIPM Community](#) • 18 packages

Packages



Actor Hierarchy Inspector

Displays an actor hierarchy in real time. Users can open the front panel and block diagram of an actor, or stop the actor.



Bowzer the Browser

A utility that allows developers to browse the payload methods (and their block diagrams) for any given actor in a project.



Events for UI Actor Indicators

Easily create events for front panel indicators of UI actors

Types of Reusable Actors

Plug-and-Play

Complete actors that solve a niche problem, ready for immediate use

Inheritable

Starting points that add specific behavior to your actors

Types of Reusable Actors

Plug-and-Play

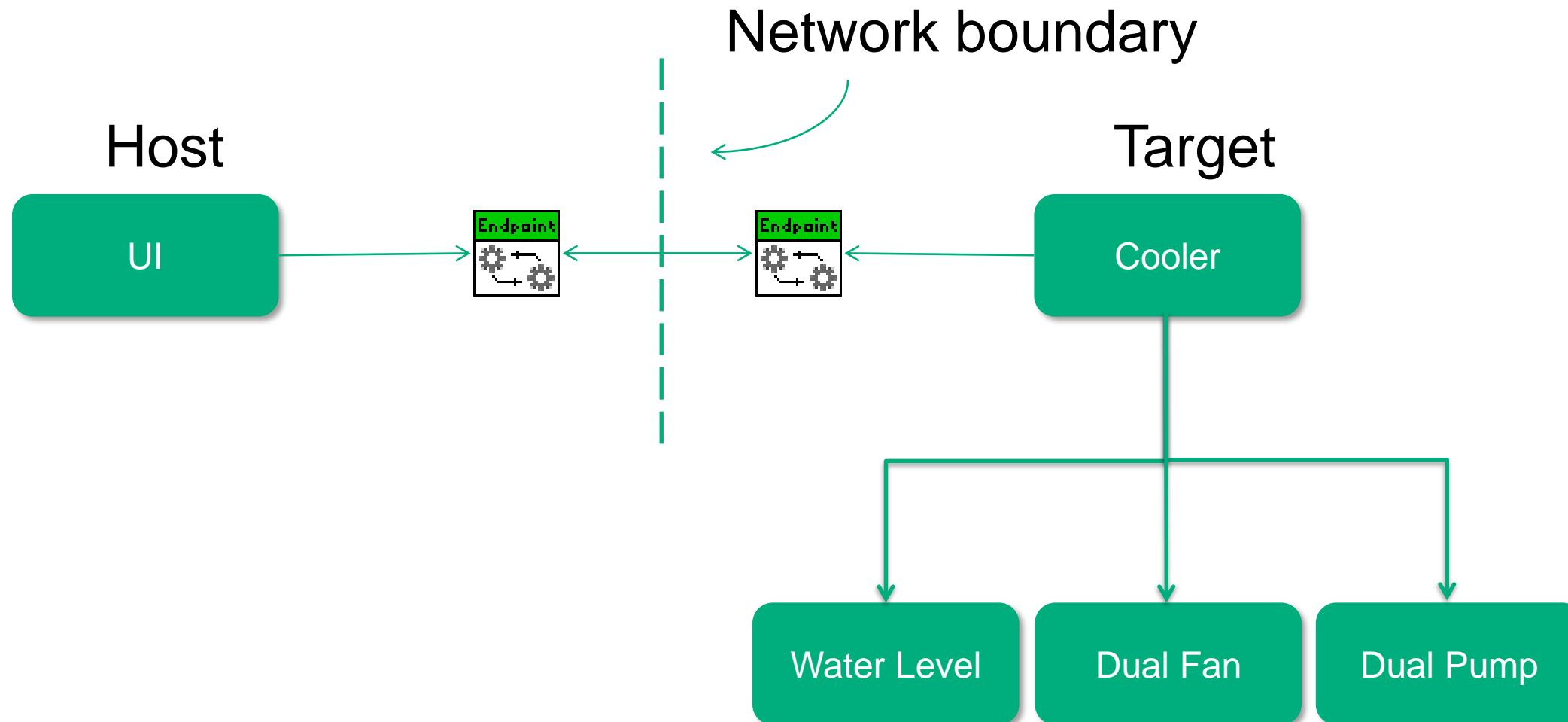
Complete actors that solve a niche problem, ready for immediate use

Inheritable

Starting points that add specific behavior to your actors



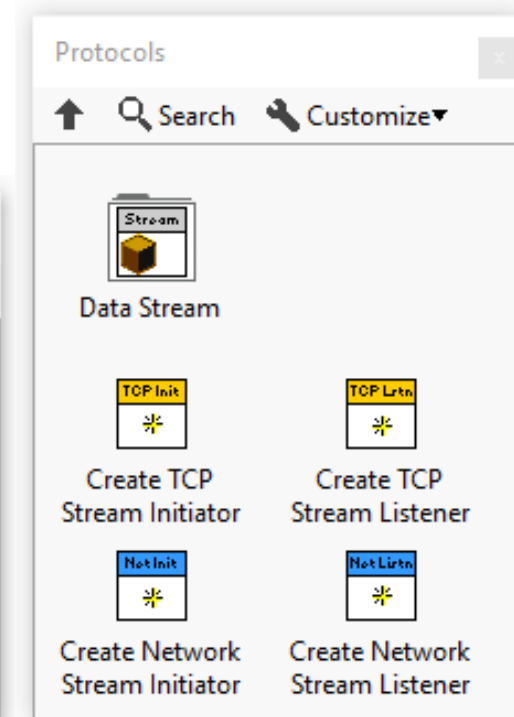
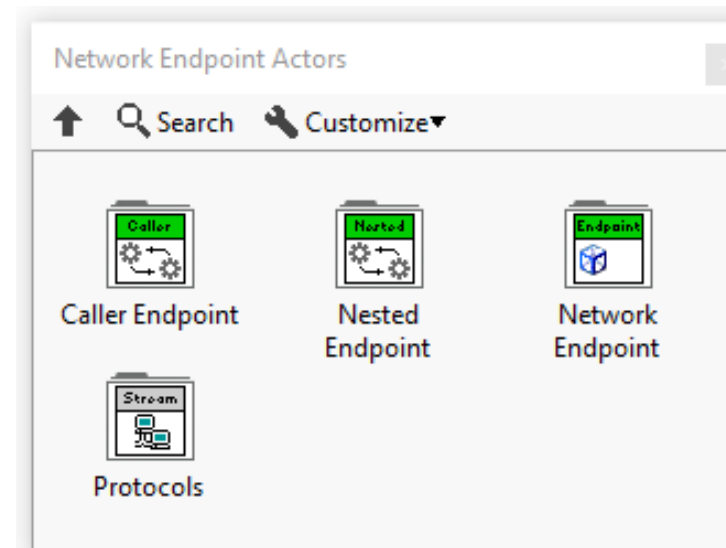
Network Endpoint Actors





Network Endpoint Actors

- Distributed applications connect through pairs of **network endpoints**
- The local caller actor sends messages to the local **endpoint actor**, which forwards messages to the remote endpoint actor, which passes messages to the remote caller actor
- Supports TCP/IP and Network Streams
- User Extensible



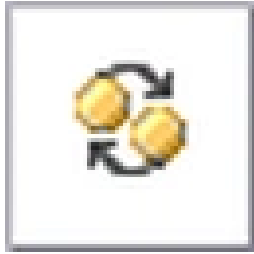
Types of Reusable Actors

Plug-and-Play

Complete actors that solve a niche problem, ready for immediate use

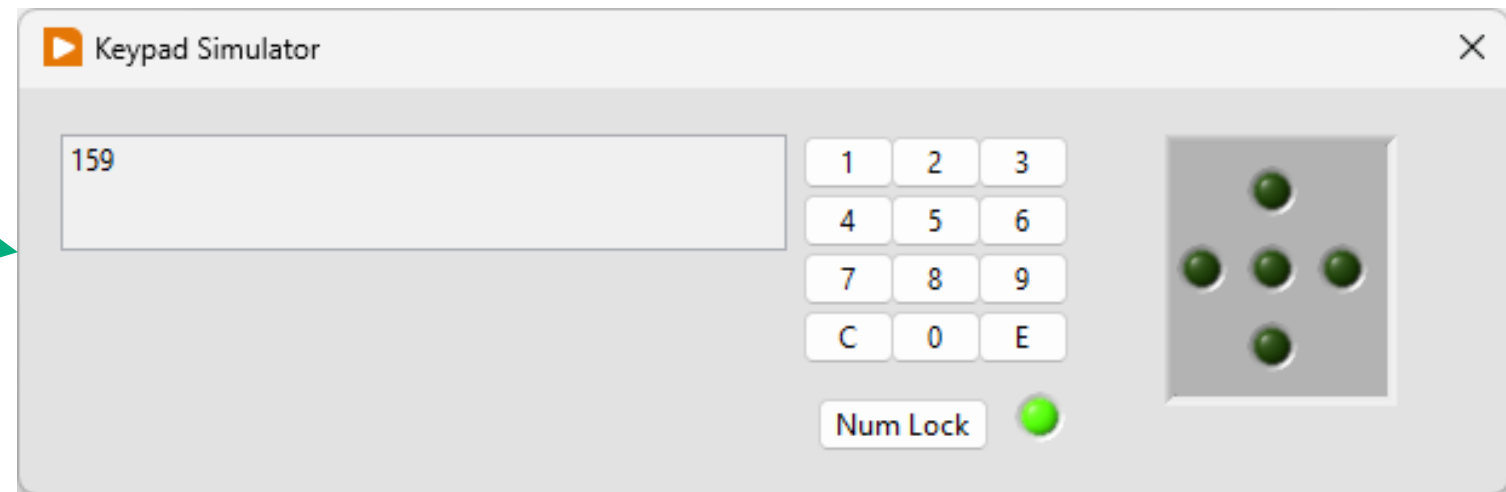
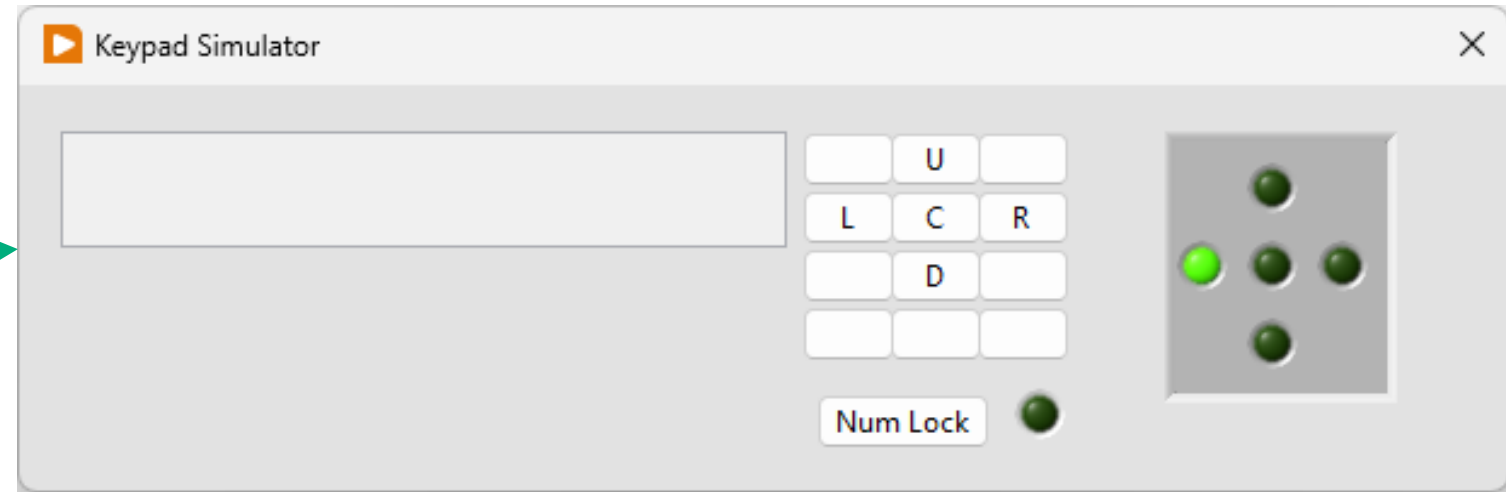
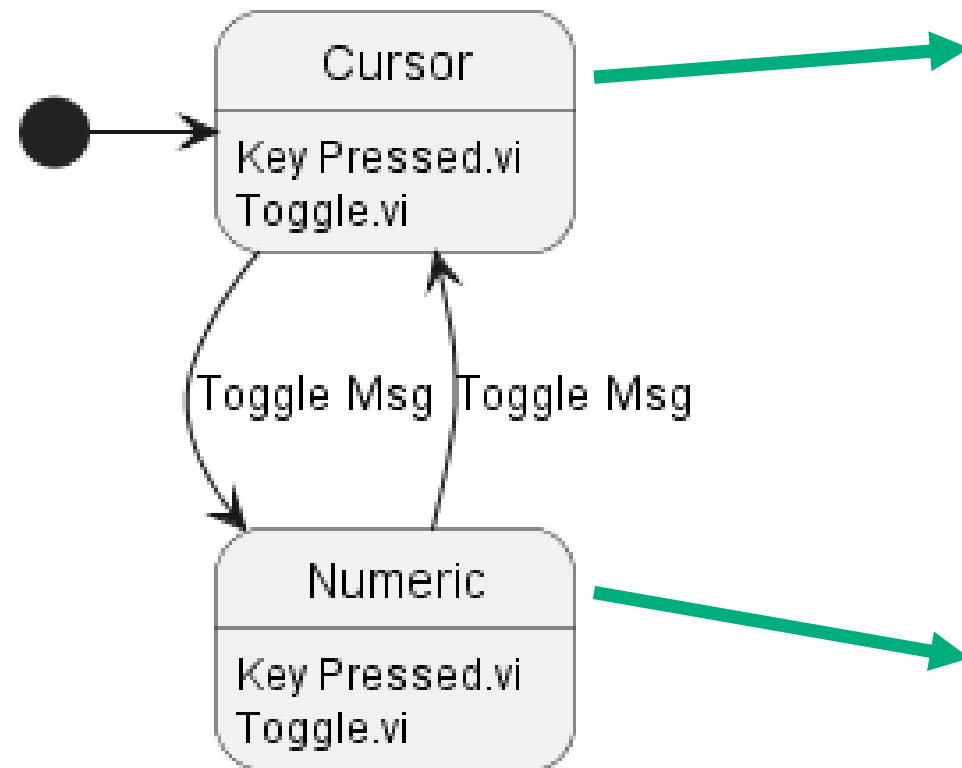
Inheritable

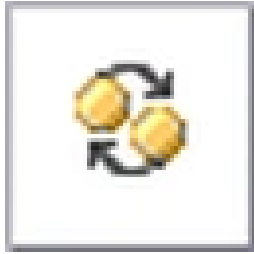
Starting points that add specific behavior to your actors



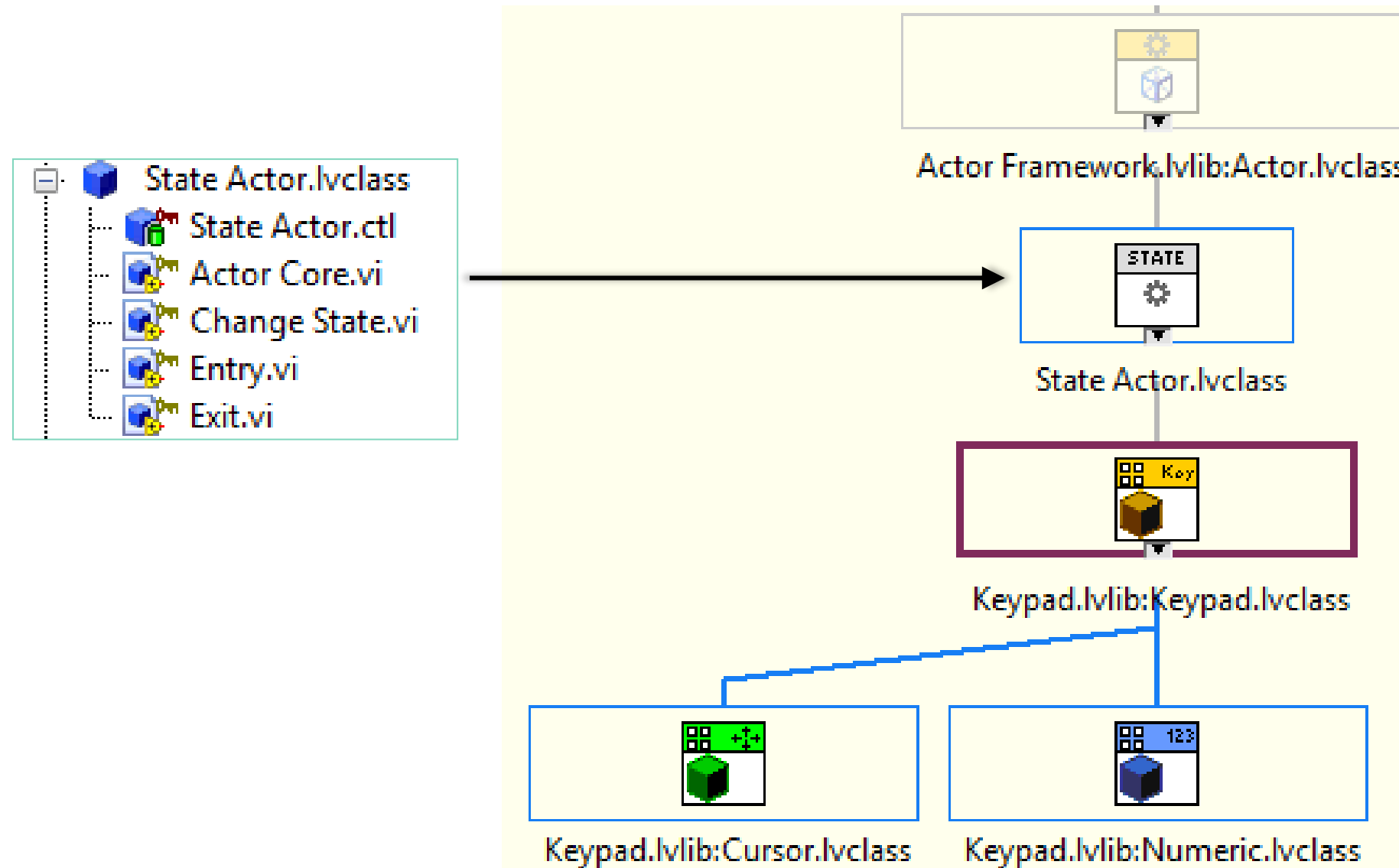
State Pattern Actors

Keypad State Diagram



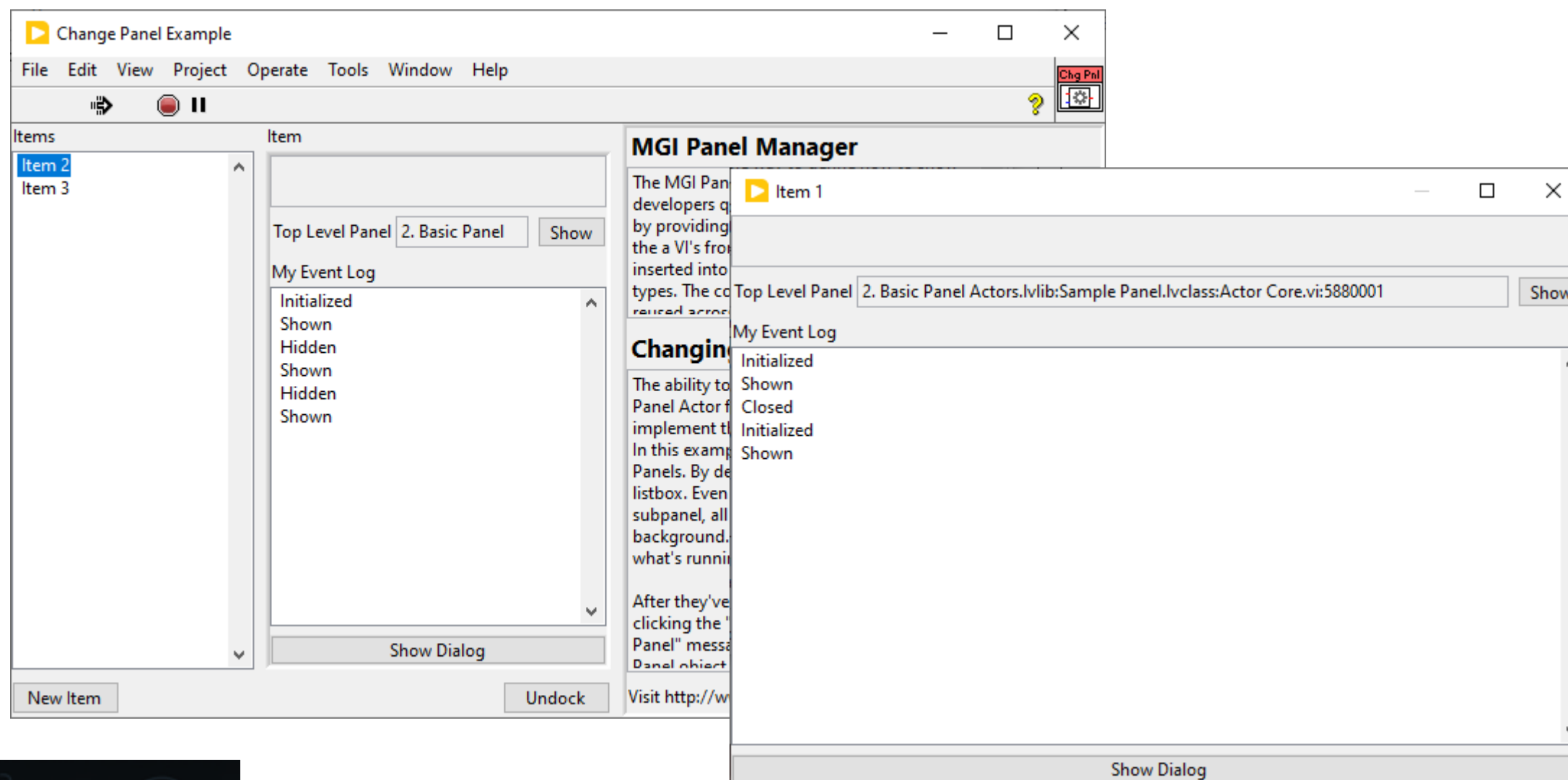


State Pattern Actors



Panel Manager

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NETWORK



Demo

The Panel Manager in the Wild

Instrument Display Name

Instrument Info

Model No Serial No

Short Name

Description

Cal Due Date

Device IO Config

Max Read Rate Timeout (sec)

Averages Resolution

Type

capabilities

Voltage Range (Auto)

Autozero ☐ Disabled

Device Core Config

Resource Name

Min Resolution

Max Resolution

Instrument Test Config

DUT Specific Parameters

Label	Unit	Precision	Multipl	Offset
Vdc	V	3	1	0

Global Parameters

Label	Unit	Precision	Multipl	Offset

DUT In Frequency (Hz) DUT Out Frequency (Hz)



A Call to Action



JKI VI Package Manager

File Edit View Package Tools Window Help

VI [Icons]

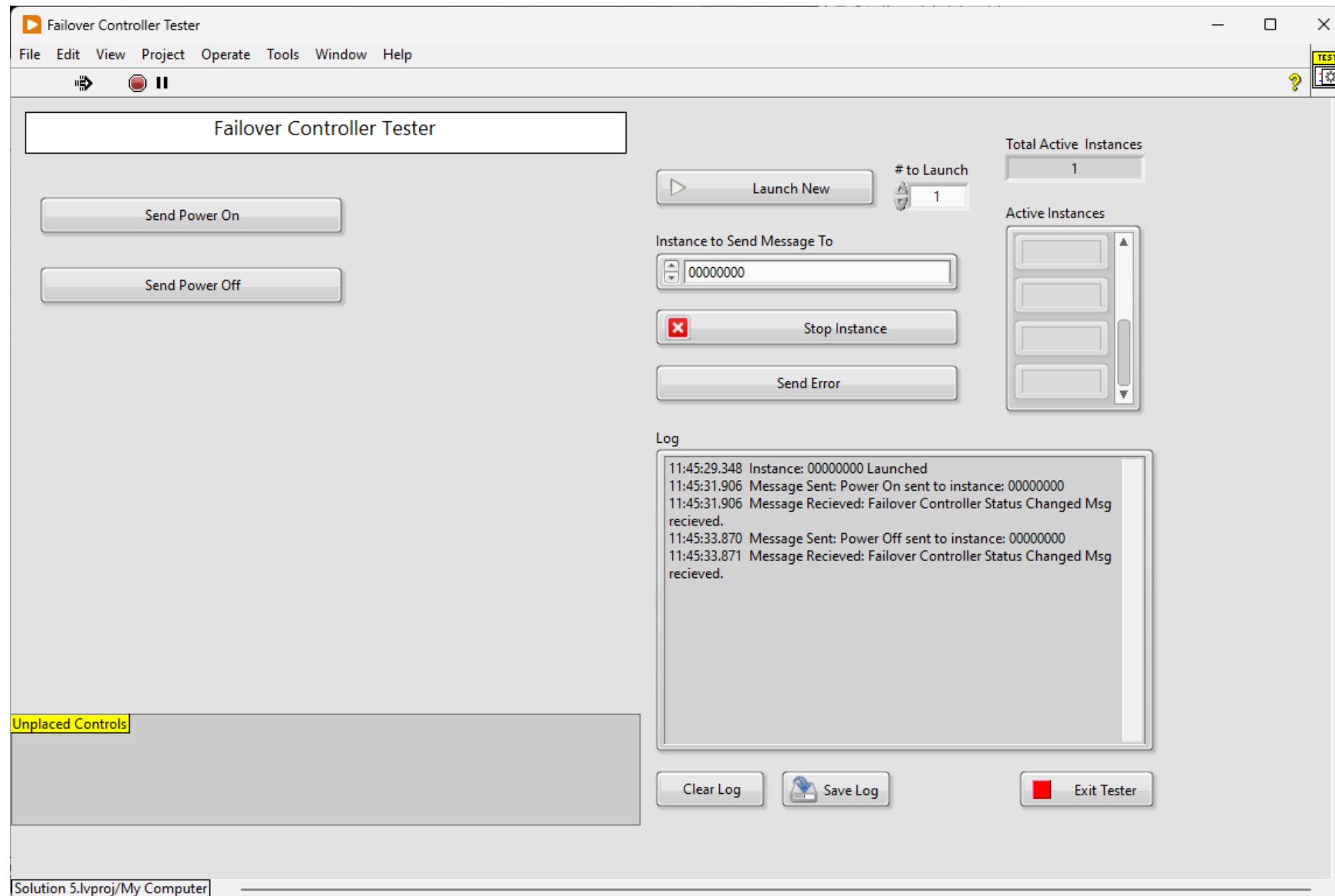
2022 All

Install Uninstall

	Name ^	Version
ⓘ	Actor Hierarchy Inspector	0.5.0.12
✓	Actor Tester	2.1.2.13
	Async Methods Actor	0.2.1.1
	Event Source Actor	1.1.0.5
	Events for UI Actor Indicators	1.0.0.14
✓	Interface for Actor INI	1.0.1.2
	MGI Actor Framework Message M	1.0.1.6
	MGI Monitored Actor	2.0.0.23
	NI Launch Remote Actor	1.0.0.15
	NI Launch Remote Actor Example	1.0.0.5
	NI Nested Endpoint Actors Examp	4.0.0.4
✓	NI Network Endpoint Actors	4.0.0.24
✓	NI State Pattern Actor	1.1.0.10
	WebSocket-Actor	1.0.0.5

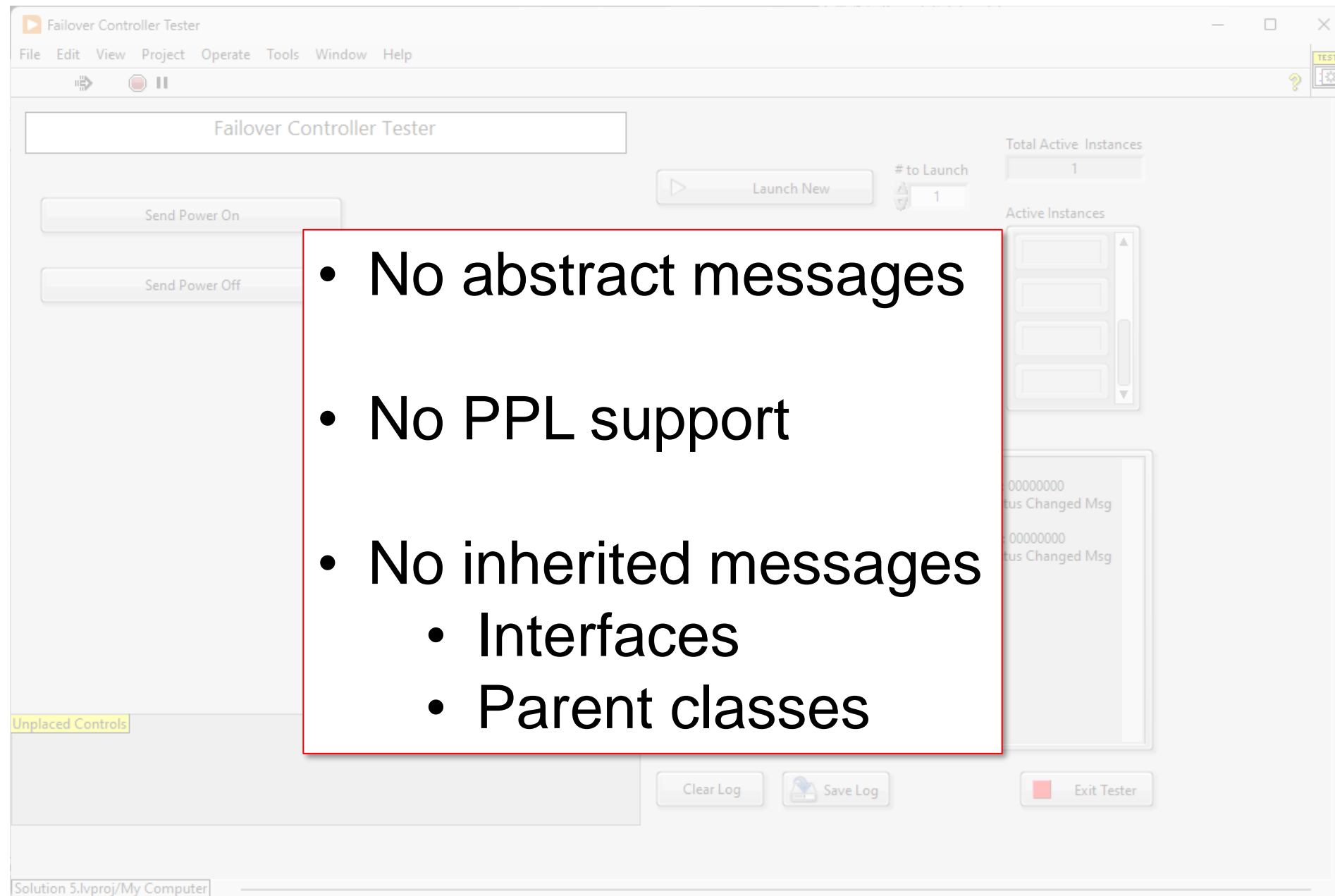
Workflows: Tool Support

Hand Testing with the Actor Tester



Demo

Hand Testing with the Actor Tester



Unit Testing



VI Tester



CARAYA

JKI

Unit Testing



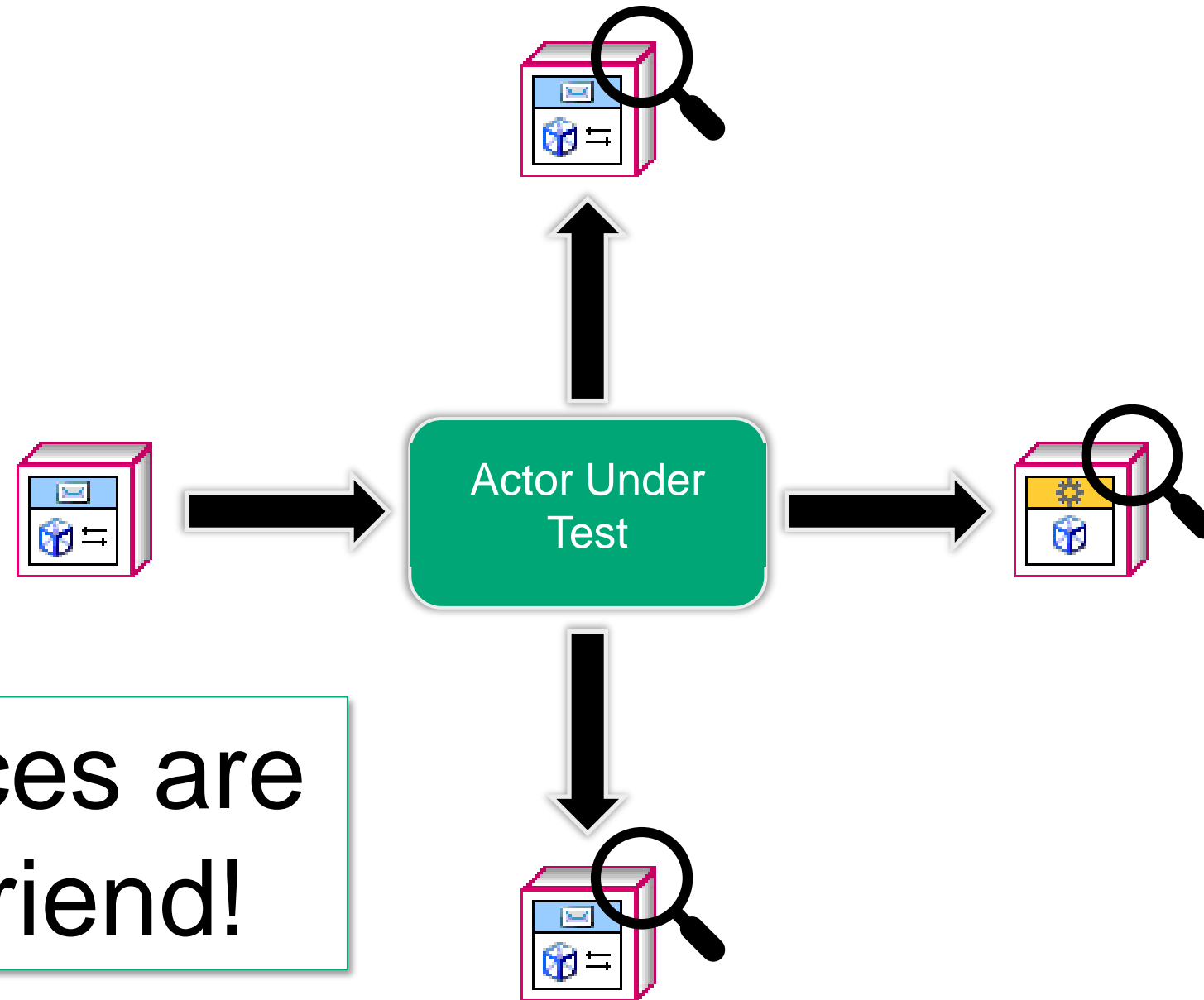
VI Tester



CARAYA

JKI

Unit Testing – Isolate Your Actors!



Interfaces are
your friend!



Americas CLA Summit - 2019

NATIONAL INSTRUMENTS

ARCHITECT

EXIT

Test Driven Development: Work Flow

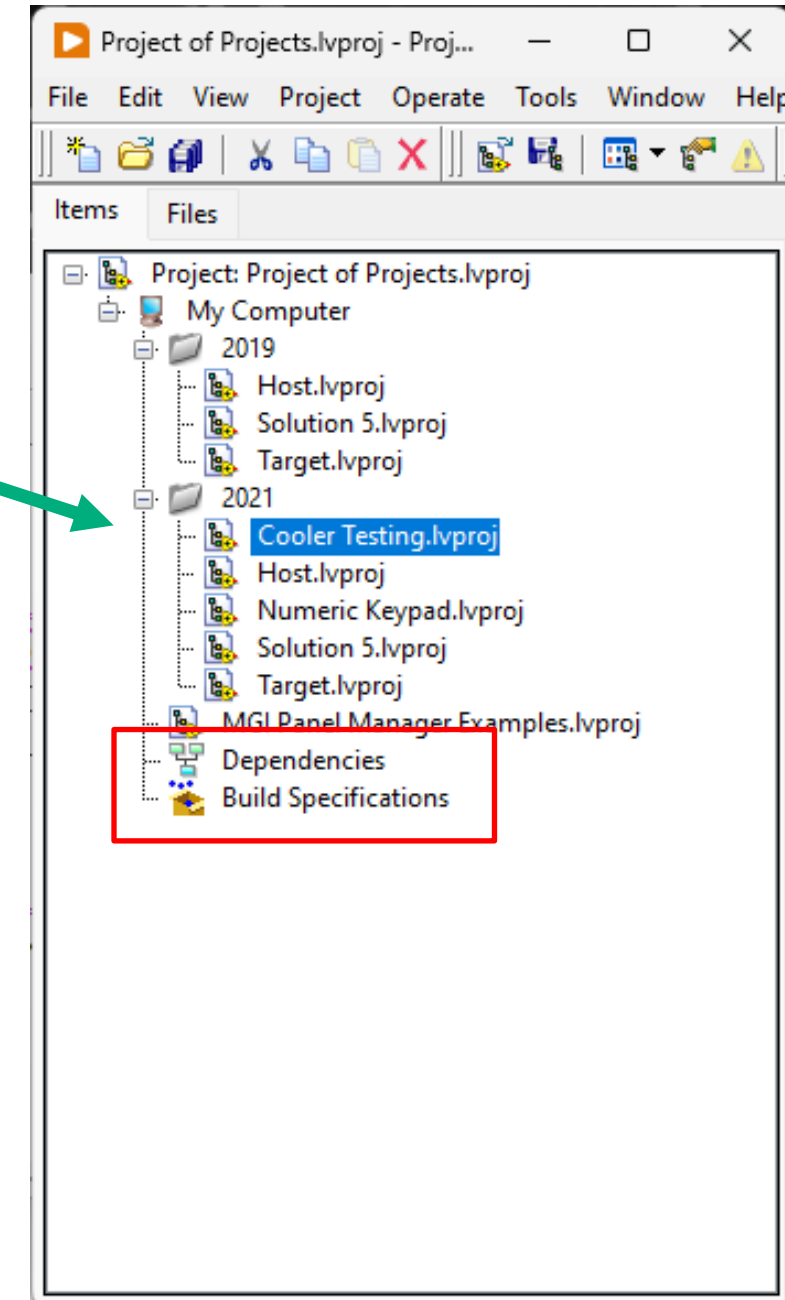
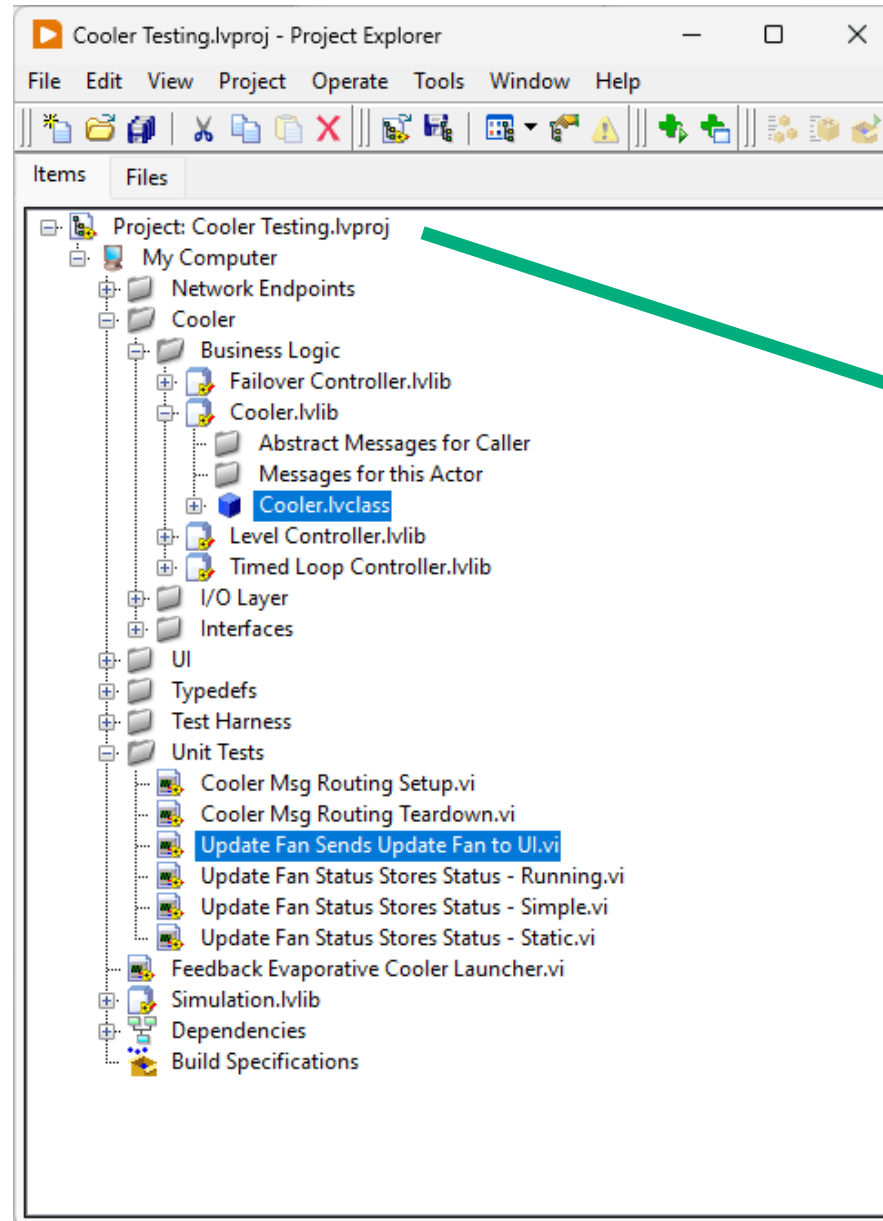
```
graph LR; A[Write Tests] --> B[Design API]; B --> C[Test to Fail]; C --> D[Implement]; D --> E[Test to Pass]; E --> C; C --> A; E --> D;
```

0:00 / 52:02

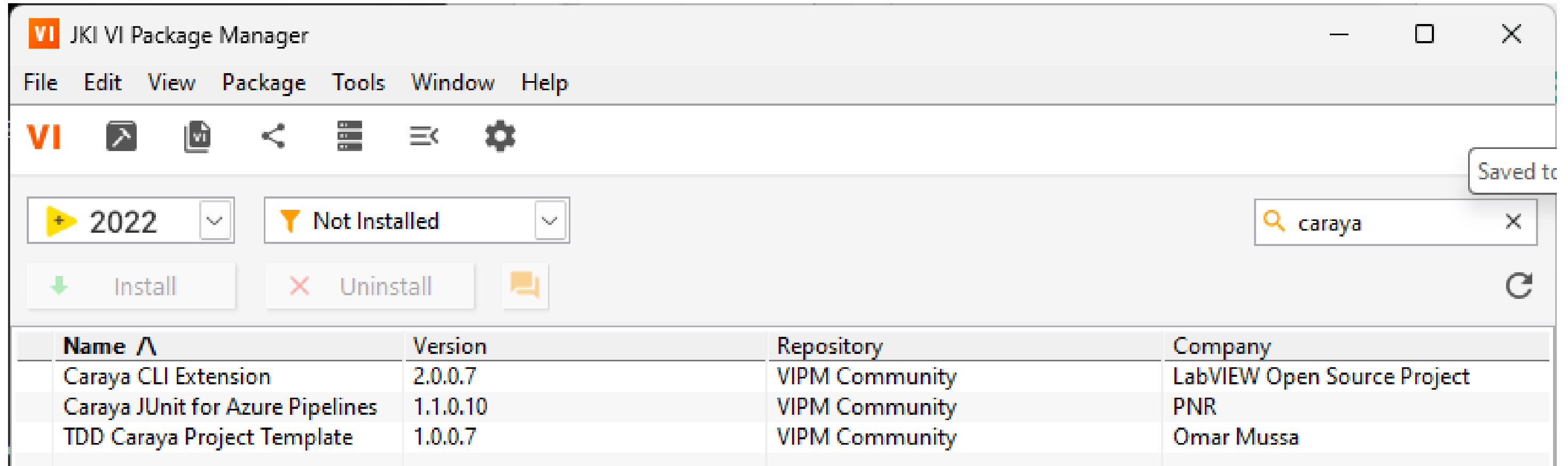
#161 TEST DRIVEN DEVELOPMENT IN ACTOR FRAMEWORK : ALLEN C SMITH

2019 ACLA SUMMIT

Unit Testing – Project Organization



Unit Testing and CI/CD



The screenshot shows the JKI VI Package Manager window. The title bar reads "JKI VI Package Manager". The menu bar includes "File", "Edit", "View", "Package", "Tools", "Window", and "Help". The toolbar contains icons for a package, a document, a share, a list, a refresh, and a settings gear. Below the toolbar, there are two dropdown menus: the first is set to "2022" and the second is set to "Not Installed". To the right of these is a search bar containing the text "caraya". Below the search bar are three buttons: "Install" (with a green arrow icon), "Uninstall" (with a red X icon), and a button with a speech bubble icon. A table below these buttons lists the installed packages.

Name ^	Version	Repository	Company
Caraya CLI Extension	2.0.0.7	VIPM Community	LabVIEW Open Source Project
Caraya JUnit for Azure Pipelines	1.1.0.10	VIPM Community	PNR
TDD Caraya Project Template	1.0.0.7	VIPM Community	Omar Mussa



Events for UI Actor Indicators

Create Actor from Template

Name of Actor
Bob

Template:
UI Template

Create Actor Cancel

String

1. Add a String Output indicator to this front panel.
2. Right click and select "Add Event Support"
3. Go modify String to Display.vi

UI Actors.lvproj/My Computer

- Visible Items
- Find Terminal
- Change to Control
- Change to Array
- Make Type Def.
- Description and Tip...
- Create
- Replace
- Data Operations
- Advanced
- Fit Control to Panel
- Scale Object with Panel
- ✓ Normal Display
- '\ ' Codes Display
- Password Display
- Hex Display
- Limit to Single Line
- Update Value while Typing
- ✓ Enable Wrapping
- Add Event Support
- Properties

Limit to Single Line
Update Value while Typing
✓ Enable Wrapping
Add Event Support
Properties



Events for UI Actor Indicators

Create Actor from Template

Name of Actor
Bob

Template:
UI Template

Create Actor Cancel

Known Issues

- Fixed Save Location
- Undesirable Folder Structure
- No Diagram Cleanup
- No Event Generation VIs

Code Transparency

Insights and Accelerators

Insight

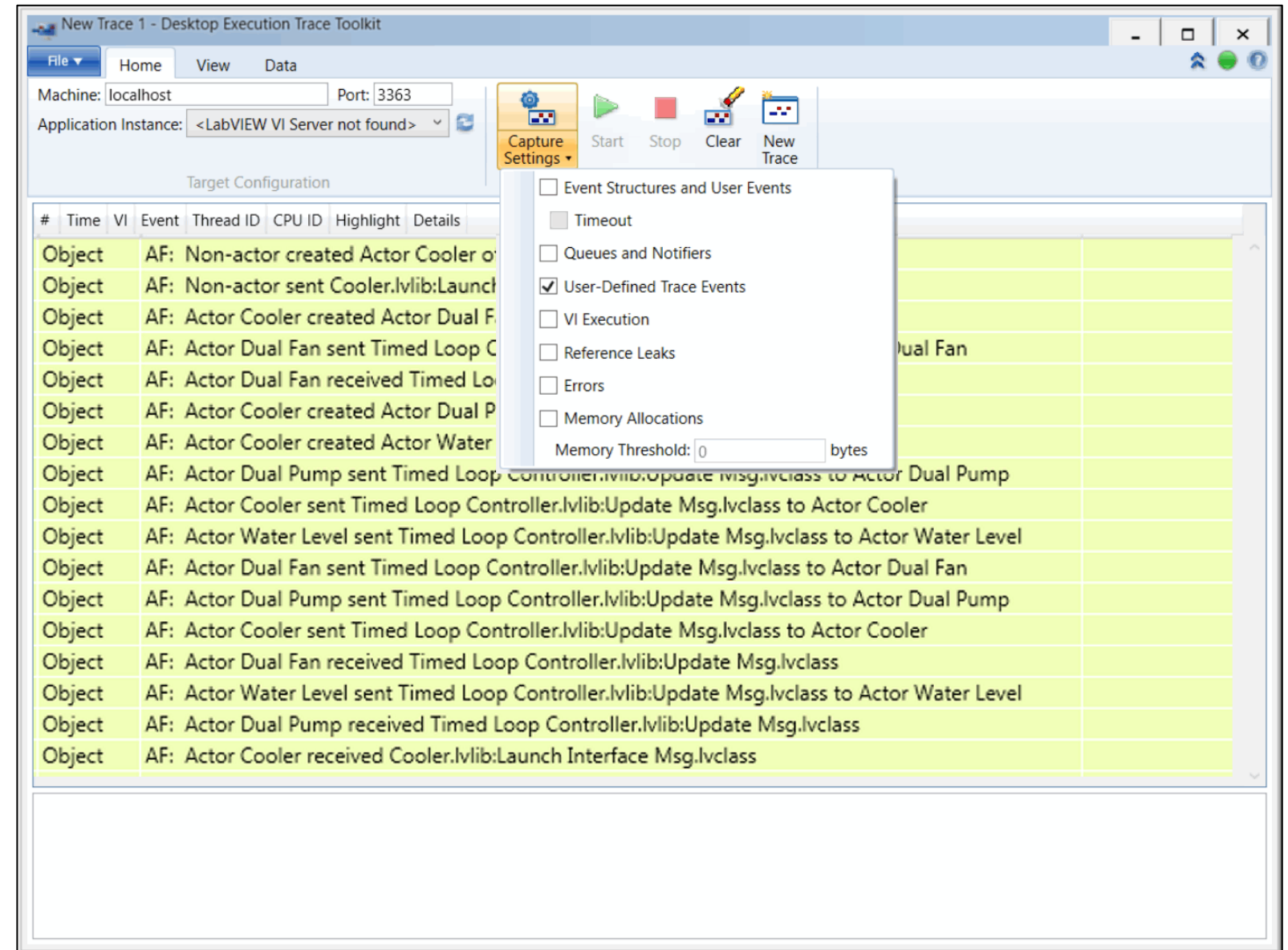
Information that leads to identification

Accelerator

A tool that leads to access

Desktop Execution Trace Toolkit

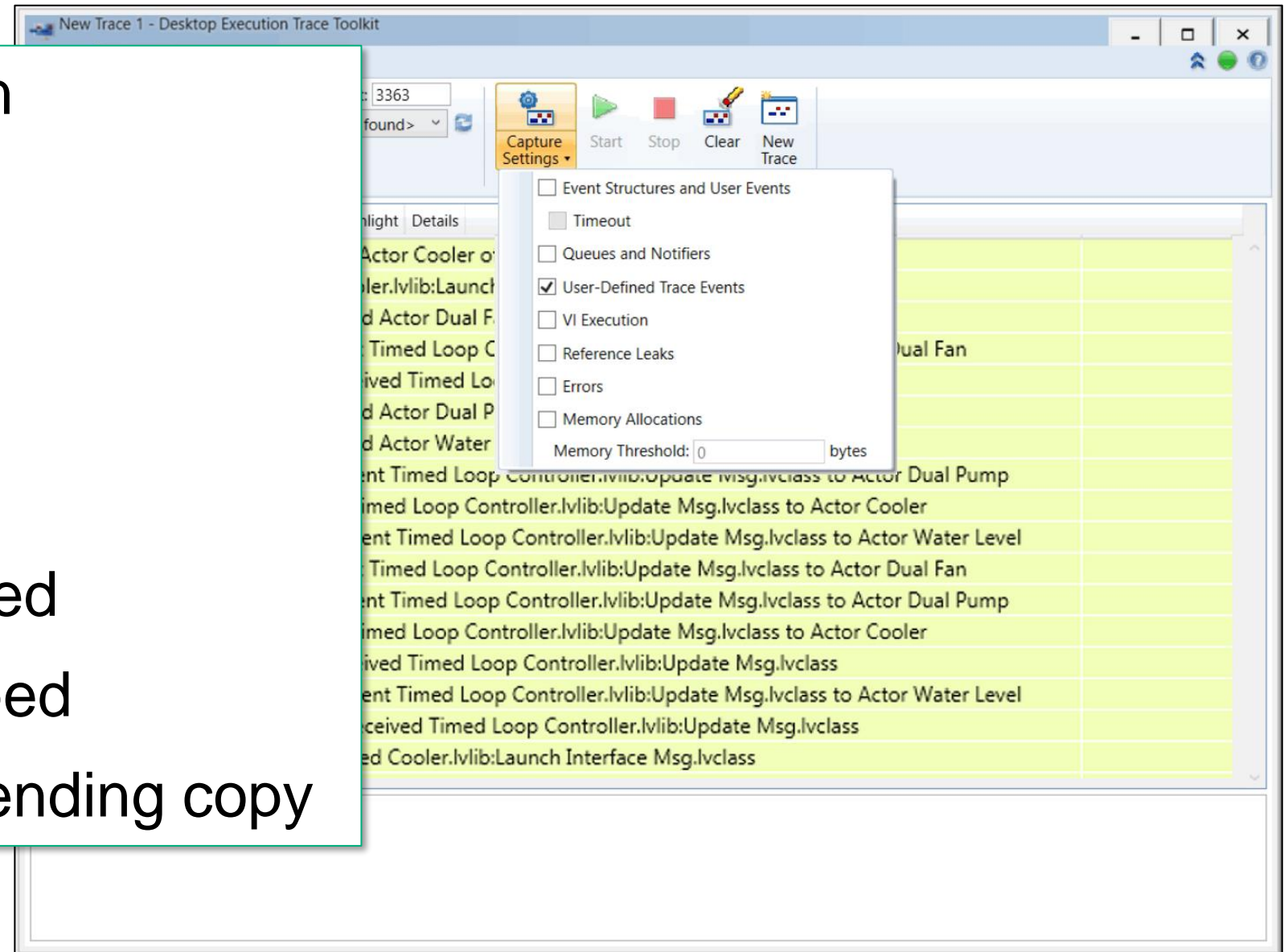
AF_Debug_Trace = TRUE



Desktop Execution Trace Toolkit

Trace events are generated when

- An actor is launched
- An actor stops
- A message is sent to an actor
- An actor receives a message
- A Time Delay Message is created
- A Time Delay Message is stopped
- A Time Delay Message skips sending copy



Monitoring Actors

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NI TOOLS
NETWORK

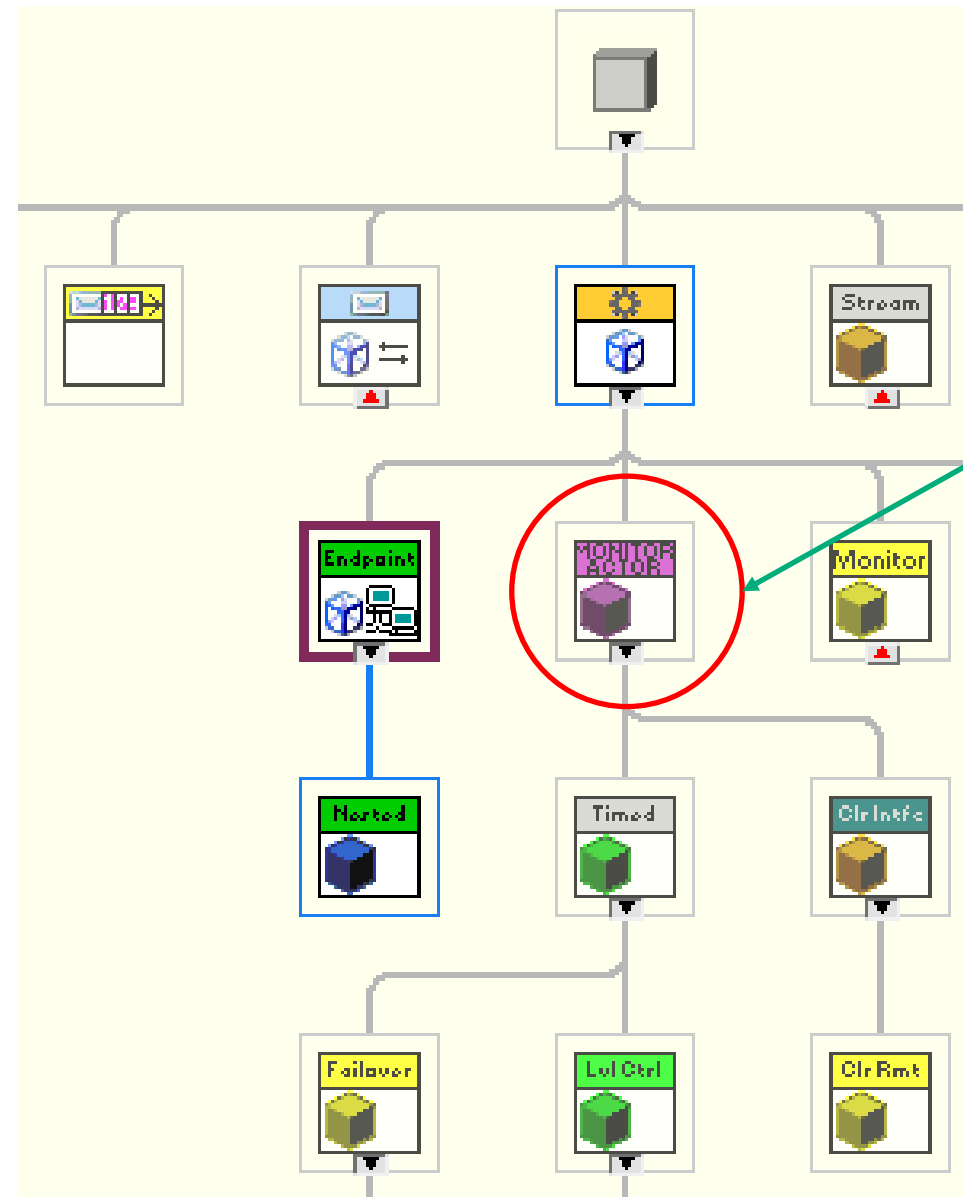
Monitored Actors

Actor Type	Actor Core Name	Ping Status
Test Actor.lvclass	Test Actor.lvclass:Actor Core.vi:8	Show Actor Core Ping Actor
Test Actor.lvclass	Test Actor.lvclass:Actor Core.vi:11	
Test Actor.lvclass	Test Actor.lvclass:Actor Core.vi:13	
Test Actor.lvclass	Test Actor.lvclass:Actor Core.vi:14	Stop Actor
Test Actor.lvclass	Test Actor.lvclass:Actor Core.vi:15	Emergency Stop Actor
Test Actor.lvclass	Test Actor.lvclass:Actor Core.vi:4	N/A
Test Actor.lvclass	Test Actor.lvclass:Actor Core.vi:6	N/A
Test Actor.lvclass	Test Actor.lvclass:Actor Core.vi:9	N/A
Test Actor.lvclass	Test Actor.lvclass:Actor Core.vi:2	N/A
Test Actor.lvclass	Test Actor.lvclass:Actor Core.vi:3	N/A
Test Actor.lvclass	Test Actor.lvclass:Actor Core.vi:1	N/A

Stop Actor Show Actor Core Poll Frequency (ms) -1

14,849 downloads on VIPM.IO!

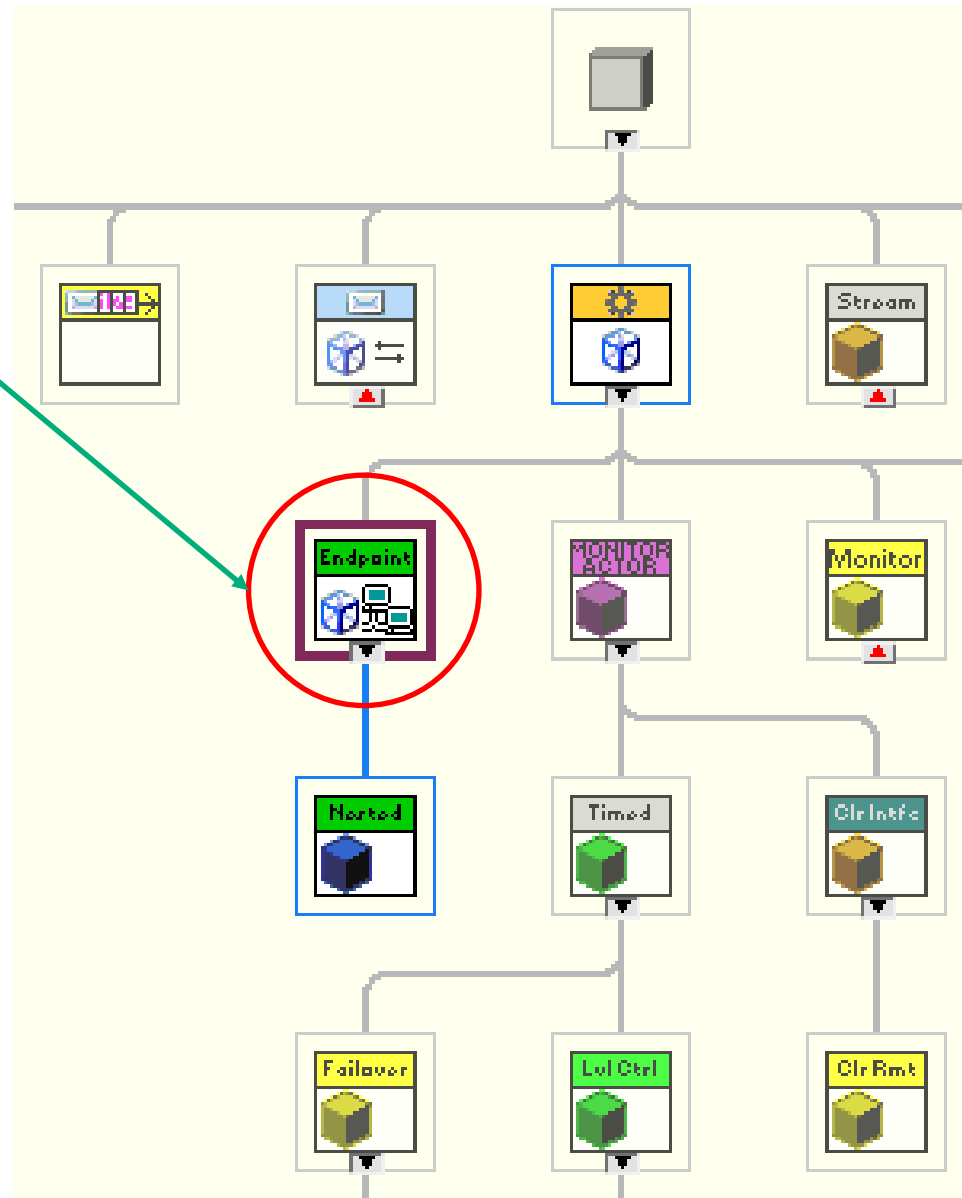
Required Parent

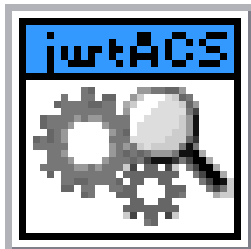


Required parent

Reuse Code Not Included

Reuse code excluded





Actor Hierarchy Inspector

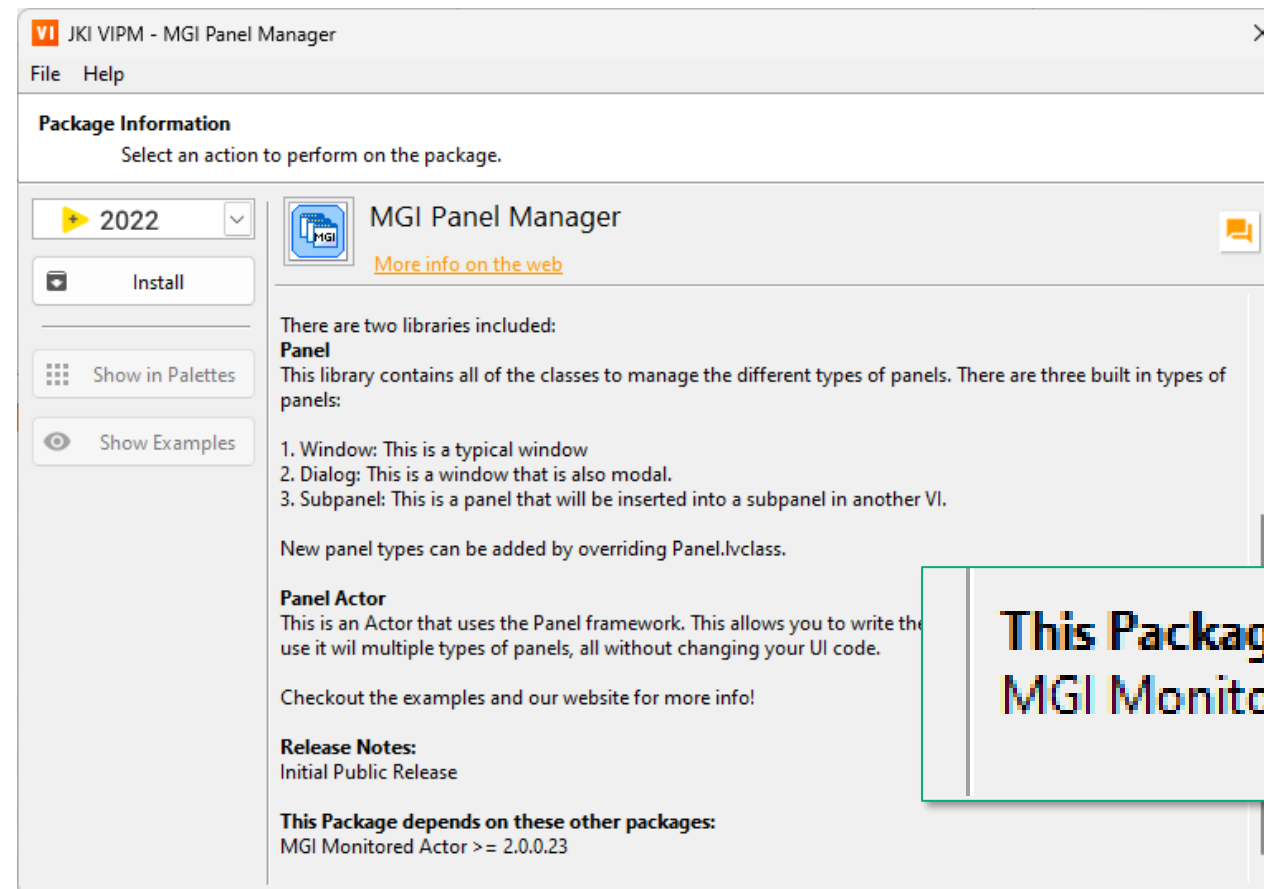
Actor Hierarchy Inspector

STOP ALL ACTORS

ID	Alias	Fully Qualified Name	Ping Time
6640002	Cooler	Simulated Cooler.lvclass	
6640008	Cooler Interface	Remote Front Panel.lvlib:Remote Front Panel.lvclass	
6640009	Target Endpoint	Nested Endpoint.lvlib:Nested Endpoint.lvclass	
6640010		Water Level.lvclass	
6640011		Dual Pump.lvclass	
6640012		Dual Fan.lvclass	

- Ping
- Show Block Diagram
- Show Front Panel
- Stop Actor
- Emergency Stop Actor

Demo



This Package depends on these other packages:
MGI Monitored Actor >= 2.0.0.23

MGI Panel Manager - Unmonitored

- Modified Panel Actor that does not inherit from Monitored Actor
- Forked examples that don't rely on Monitored Actor methods
- A template for use with Events for UI Indicators
- VI Package available in repository
- Prepublished version – not yet available on VIPM.IO.

The screenshot shows the GitLab web interface for a repository named 'MGI Panel Manager - Unmonitored' by user 'Allen C Smith'. The left sidebar contains a 'Project' menu with options: Manage, Plan, Code, Build, Deploy, Operate, Monitor, and Analyze. The main content area shows the repository details, including the 'main' branch, a commit hash '4cae186f', and a table of files.

Name	Last commit	Last update
Source	Initial Commit	16 minutes ago
.gitignore	Initial Commit	16 minutes ago
Paths.txt	Initial Commit	16 minutes ago
README.md	Initial commit	23 minutes ago
Revised MGI Pane...	Initial Commit	16 minutes ago

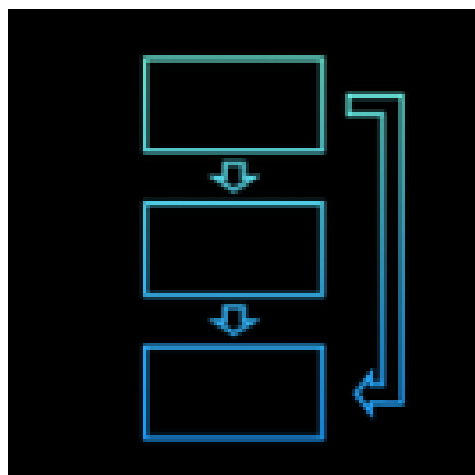
Insights and Accelerators

Insight

Information that leads to identification

Accelerator

A tool that leads to access



Open AF Payload Method Utility

The Zyah Open AF Payload Method utility adds a right-click menu option to AF Msg “Send” VIs allowing developers to more quickly jump to the block diagram of AF payload methods.

VIPM

Discover LabVIEW tools...

VIPM>Package Lists>Actor Framework



Actor Framework

A set of tools for working with NI Actor Framework and some useful AF classes/components

Created by VIPM Community • 18 packages

Packages



Actor Hierarchy Inspector

Displays an actor hierarchy in real time. Users can open the front panel and block diagram of an actor, or stop the actor.



Bowzer the Browser

A utility that allows developers to browse the payload methods (and their block diagrams) for any given actor in a project.



Events for UI Actor Indicators

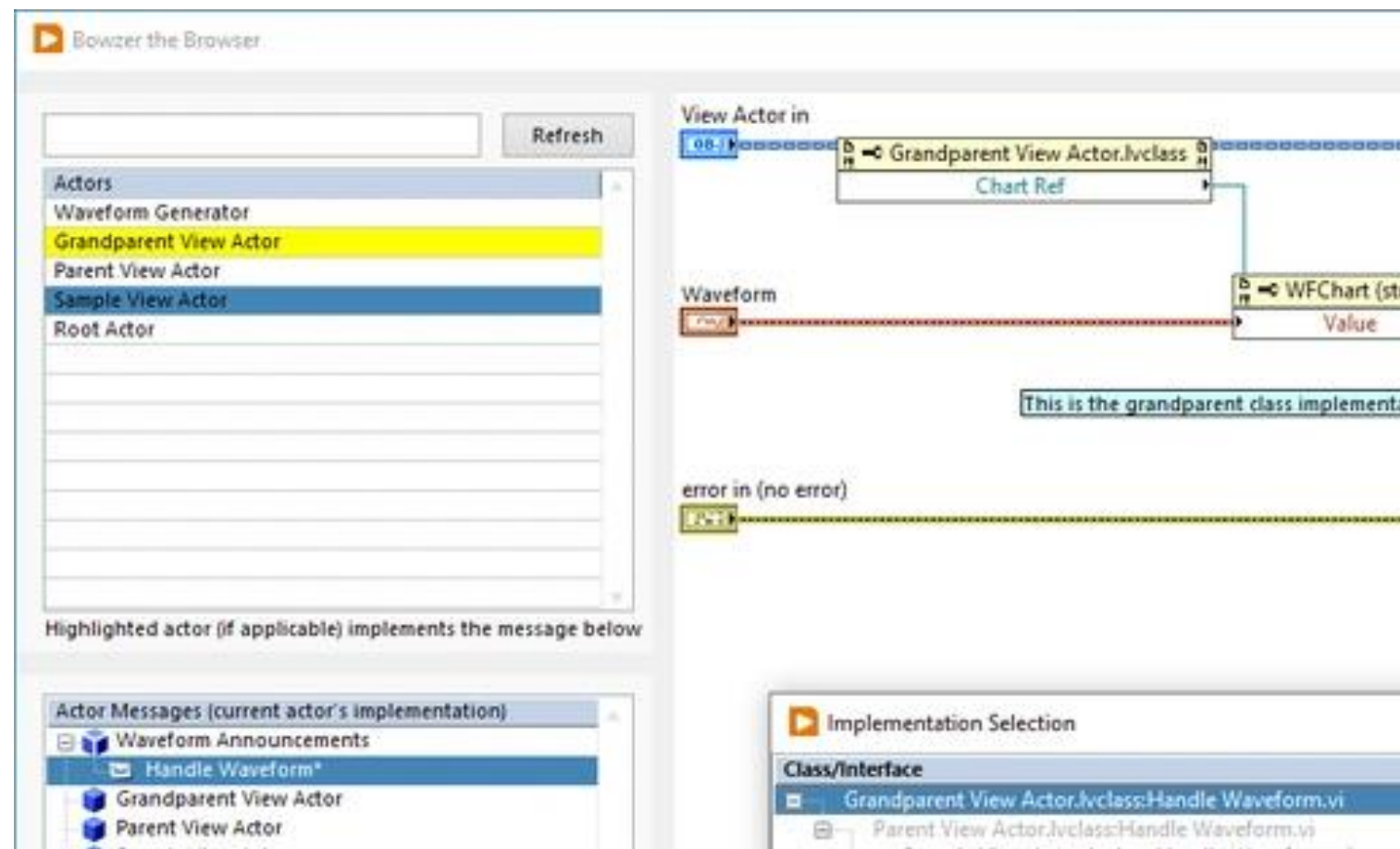
Easily create events for front panel indicators of UI actors





Bowzer the Browser

Bowzer the Browser is a utility that helps developers discover and navigate public Msg APIs for all actors in a project.



Demo

Where to Find It

VIPM>Package Lists>Actor Framework



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Created by [VIPM Community](#) • 18 packages

Packages



Actor Hierarchy Inspector

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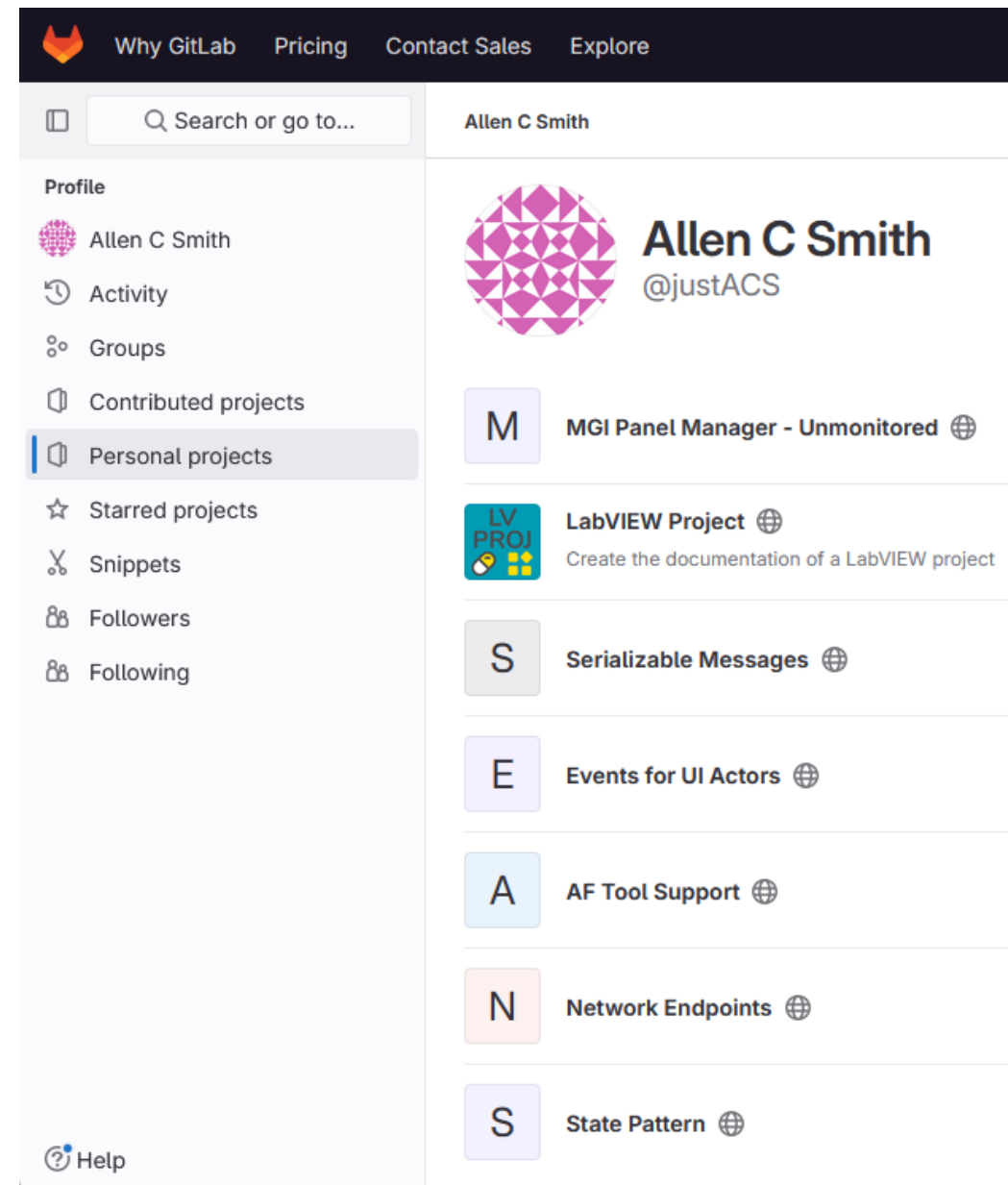


Events for UI Actor Indicators

Easily create events for front panel indicators of UI actors

Personal Repository - justACS

<https://gitlab.com/users/justACS/projects>



The screenshot shows the GitLab user profile for Allen C Smith (@justACS). The left sidebar contains a navigation menu with options: Profile, Activity, Groups, Contributed projects, Personal projects (selected), Starred projects, Snippets, Followers, and Following. The main content area displays the user's profile picture, name, and a list of projects:

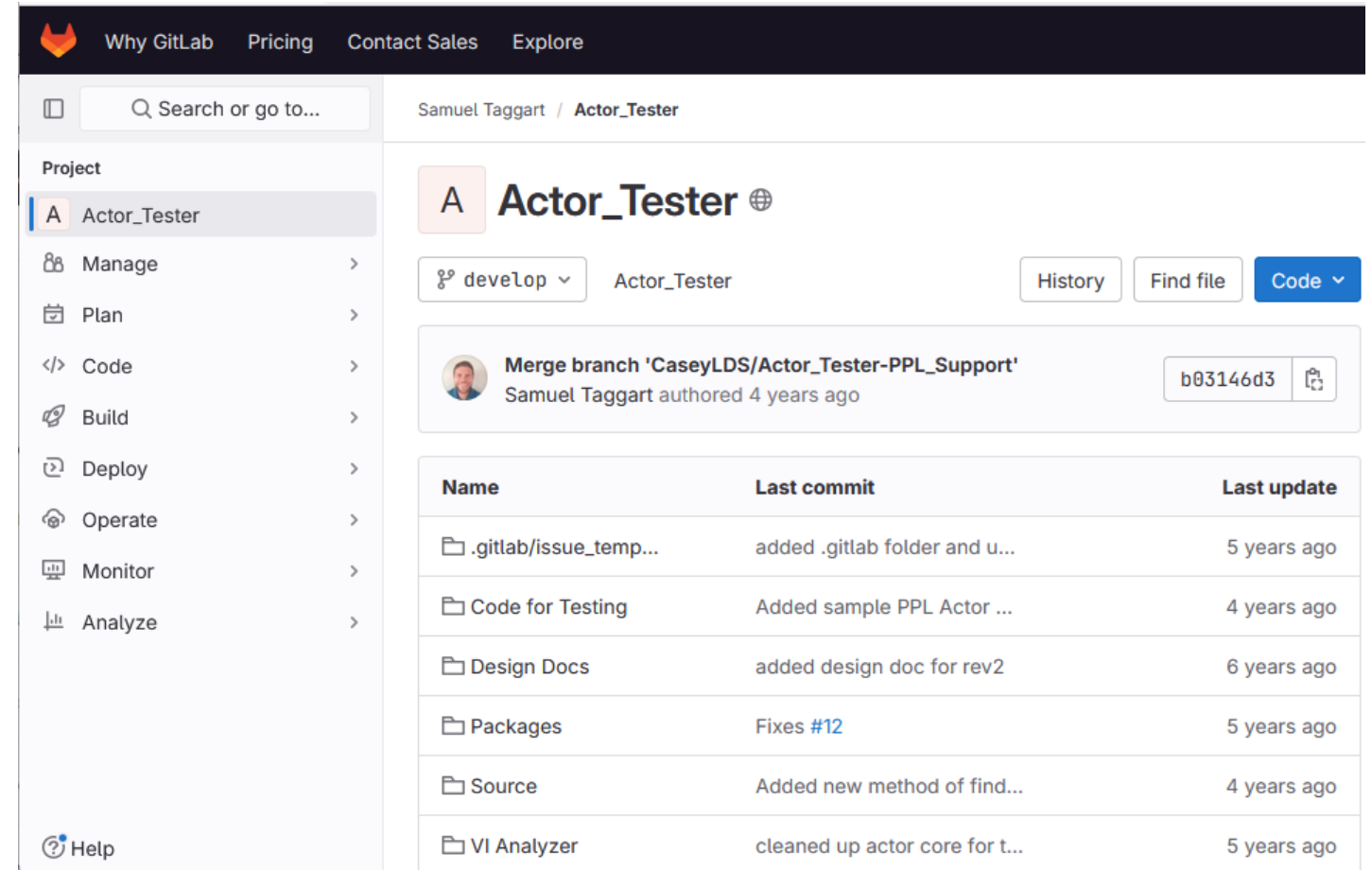
- MGI Panel Manager - Unmonitored
- LabVIEW Project (Create the documentation of a LabVIEW project)
- Serializable Messages
- Events for UI Actors
- AF Tool Support
- Network Endpoints
- State Pattern

The bottom of the sidebar includes a "Help" link.

Personal Repository – SAS Workshops

Find the Actor Tester here:

https://gitlab.com/stagg54/Actor_Tester



The screenshot shows the GitLab web interface for the repository 'Actor_Tester' by user 'Samuel Taggart'. The left sidebar contains a 'Project' menu with options: Actor_Tester, Manage, Plan, Code, Build, Deploy, Operate, Monitor, and Analyze. The main content area displays the repository name 'Actor_Tester' with a globe icon, a dropdown menu set to 'develoP', and buttons for 'History', 'Find file', and 'Code'. Below this, a merge commit is shown: 'Merge branch 'CaseyLDS/Actor_Tester-PPL_Support'' by Samuel Taggart, authored 4 years ago, with commit hash 'b03146d3'. A table lists the repository's contents:

Name	Last commit	Last update
.gitlab/issue_temp...	added .gitlab folder and u...	5 years ago
Code for Testing	Added sample PPL Actor ...	4 years ago
Design Docs	added design doc for rev2	6 years ago
Packages	Fixes #12	5 years ago
Source	Added new method of find...	4 years ago
VI Analyzer	cleaned up actor core for t...	5 years ago

Contact Me!



- Allen C Smith
 - [Linkedin/in/allencsmith](https://www.linkedin.com/in/allencsmith)
 - www.justacs.com

