GPower

Refactoring for Modularity

Applying GPower’s Modular Development Approach in a Real Customer Project

Revision: 1.0

02.11.2026

About me



Name Jens Christian Østergaard Andersen

Location Denmark

Work for GPower since 2015

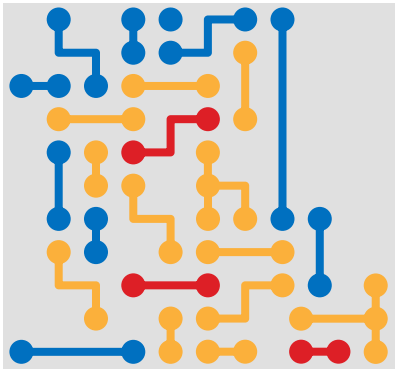
LabVIEW since 1998

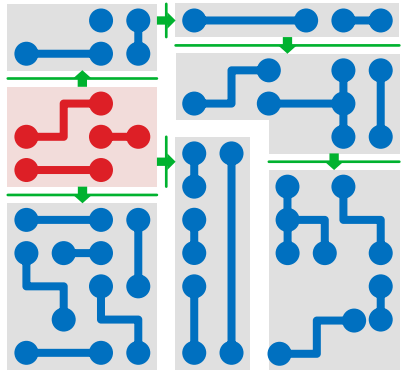
NI LabVIEW CHAMPION

ARCHITECT

ARCHITECT

INSTRUCTOR

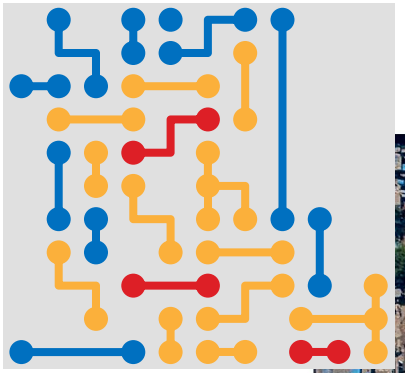




Monolithic vs Modular

Why modularity beats a monolith

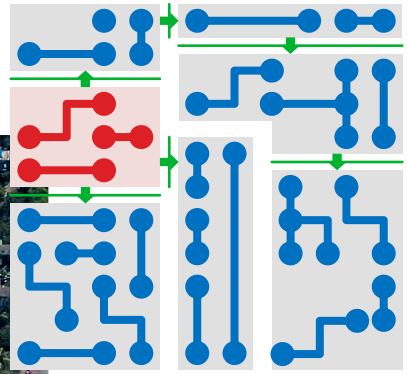
Monolithic vs Modular











Monolithic vs Modular - Audience check

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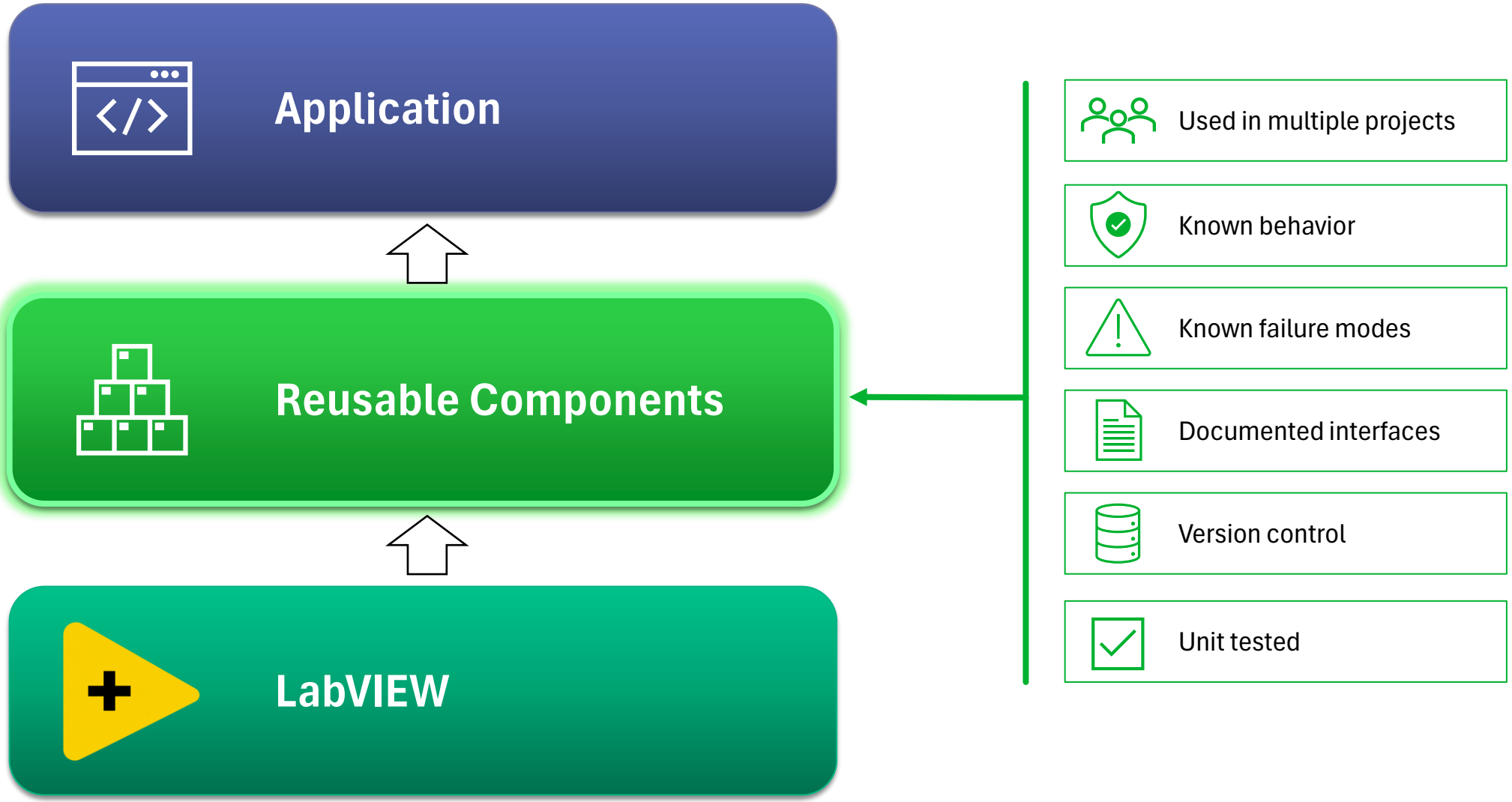
Where are you on the modularity journey?



How GPower exercises modularity

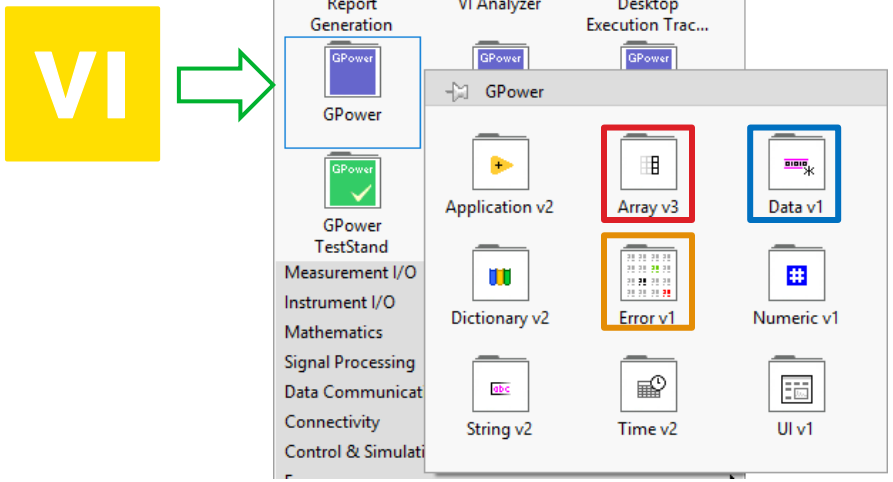
The same idea appears at several levels of our LabVIEW architecture.

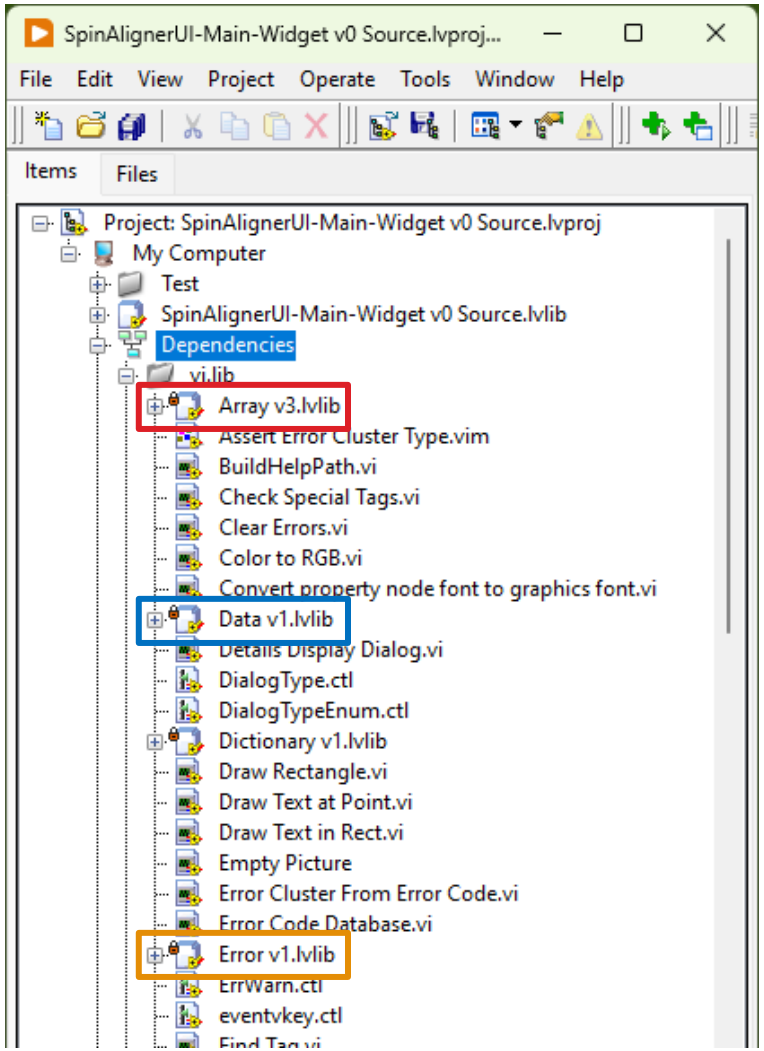
Quality in reusable components



Level 1: **Shared tools as packages**

Reusable Components

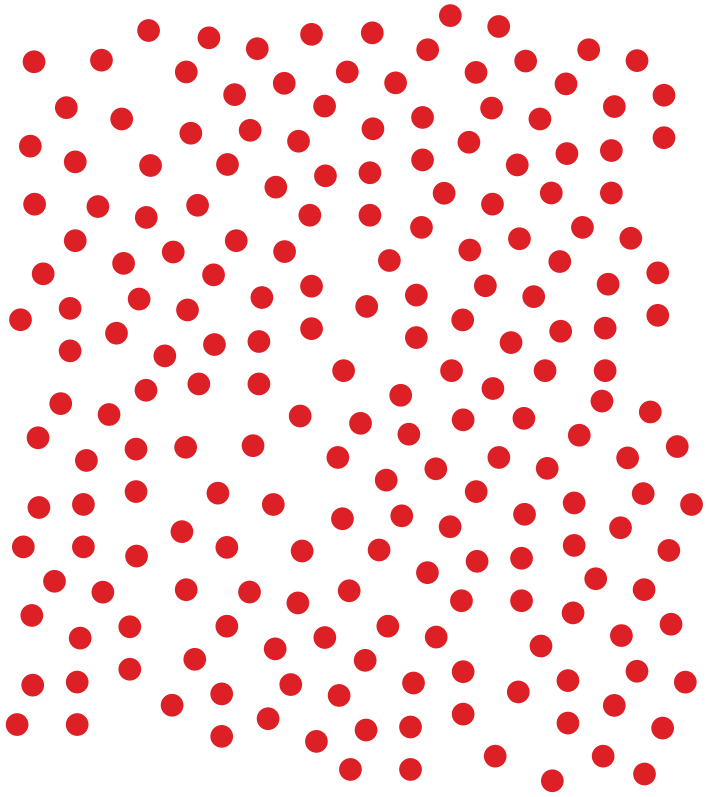




Level 1: **Shared tools as packages -** Less New Code, Less New Risk

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Application (lvproj)



1500 source files

Application (lvproj)



30 source files

Custom (vi.lib / lvproj)

.vip v1.0.0
.vip v1.0.0
.vip v1.0.0

3 packages
(170 source files)

Reusable (vi.lib / lvproj)

.vip v2.0.1
.vip v1.1.0
.vip v1.0.0
.vip v1.4.0
.vip v1.1.7
.vip v3.1.0
.vip v1.7.0
.vip v1.0.0

8 packages
(1300 source files)

Level 1: **Shared tools as VI packages** - Audience check

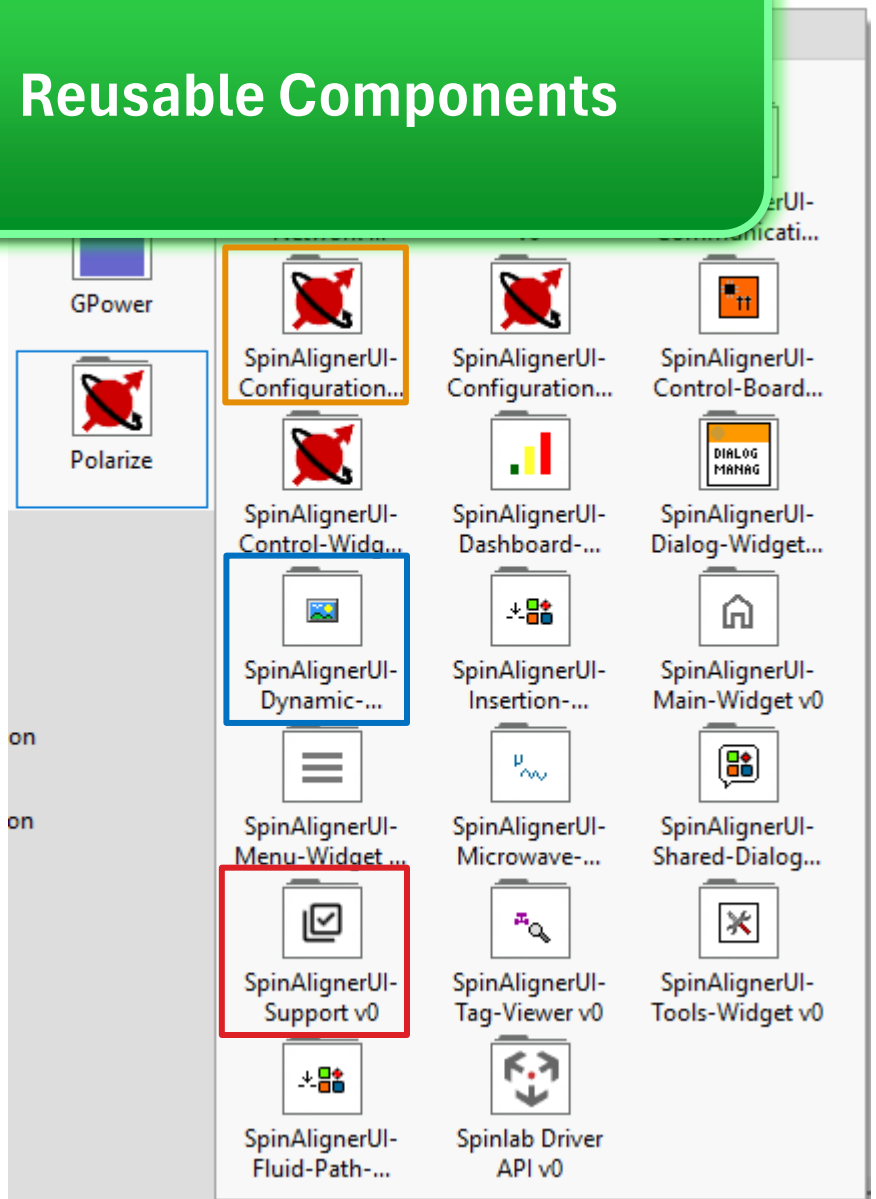
Do you build your own tools or reusable components and distribute them as VI packages?

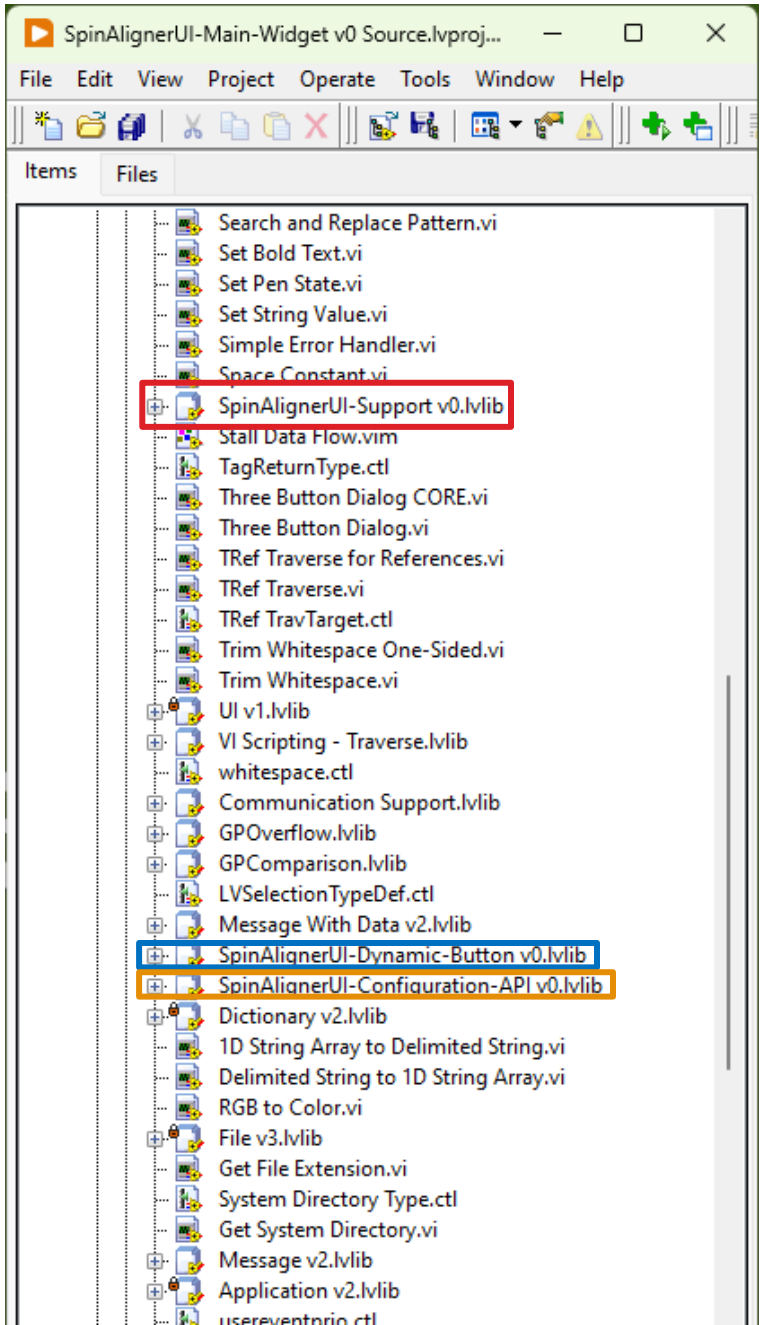


Level 2: **Project and customer specific packages**

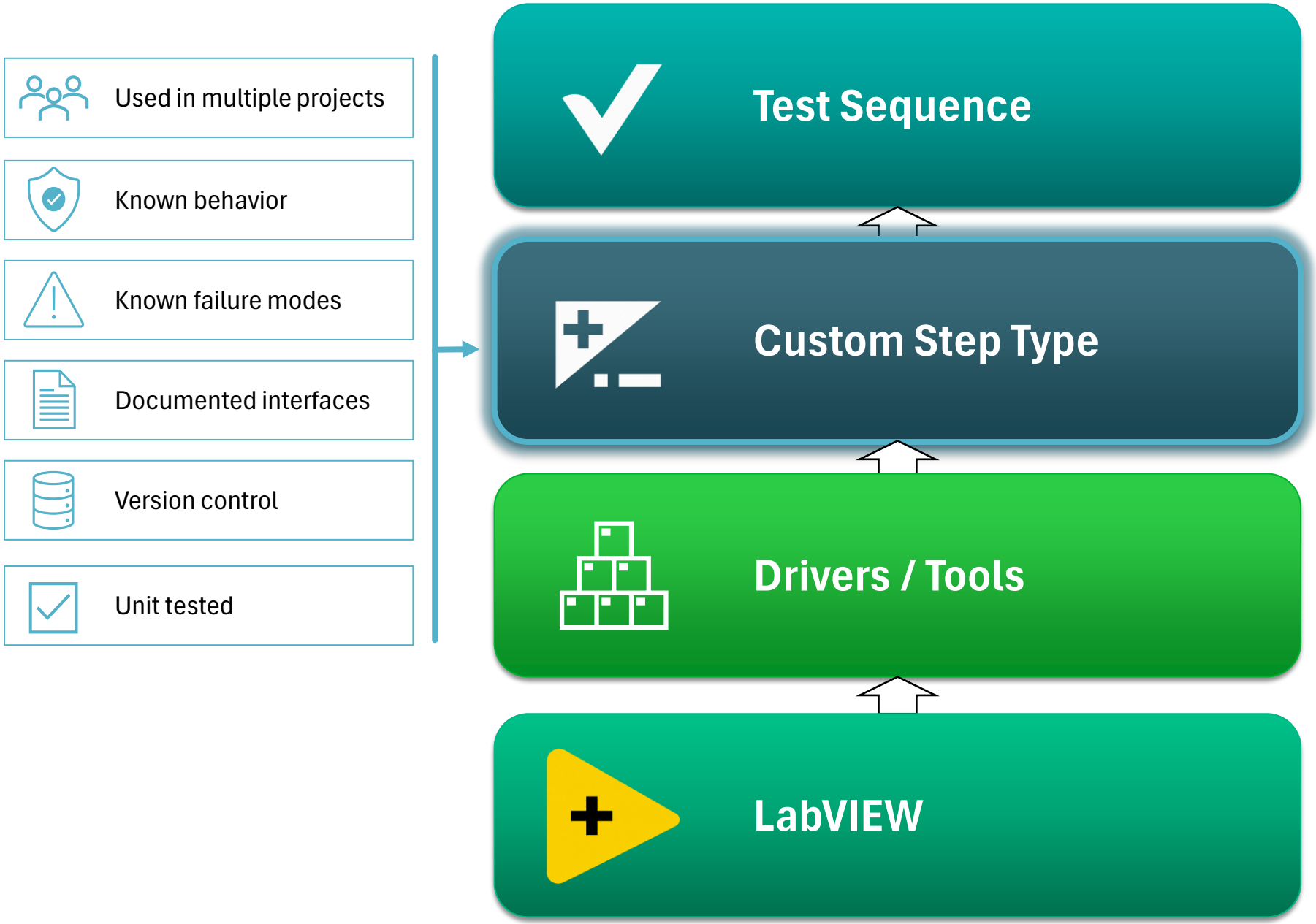
Reusable Components

VI





Level 3: **TestStand step types build with LabVIEW drivers / tools**





Customer case: Polarize – SpinAligner

A real LabVIEW control system migrated step by step from a monolithic to a modular architecture.

Company and product background for the refactoring case



Polarize ApS

- Established **2018**
- Founded to commercialize **SpinAligner**
- **Mission:** make hyperpolarized MR a routine method
- **Glostrup, Denmark**

SpinAligner

Flexible, cryogen-free polarizer for dissolution DNP research

- **6.7 T** dry magnet
- **<1.3 K** sample temp.
- **188 GHz** microwave

NMR detection

Fully automated software control

+



What does the machine do?



SpinAligner

MRI shows anatomy
Hyperpolarized MRI can also show metabolism

Earlier / more precise insight
Metabolic changes can provide information beyond structural imaging

Real-time functional information
Observe metabolism, perfusion and molecular uptake while they happen

Towards personalized treatment
Additional biological information can potentially help guide diagnosis and treatment

The SpinAligner community

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Customer case

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Initial situation

- Monolithic Software base PC + cRIO
- No systematic versioning or source code control
- No UX strategy
- Limited software documentation
- Complex system deployment

Business direction

- From lab system to clinic solution
- Scaling: Multi-developer team
- Modern UI / UX
- Full software documentation
- Easy system deployment

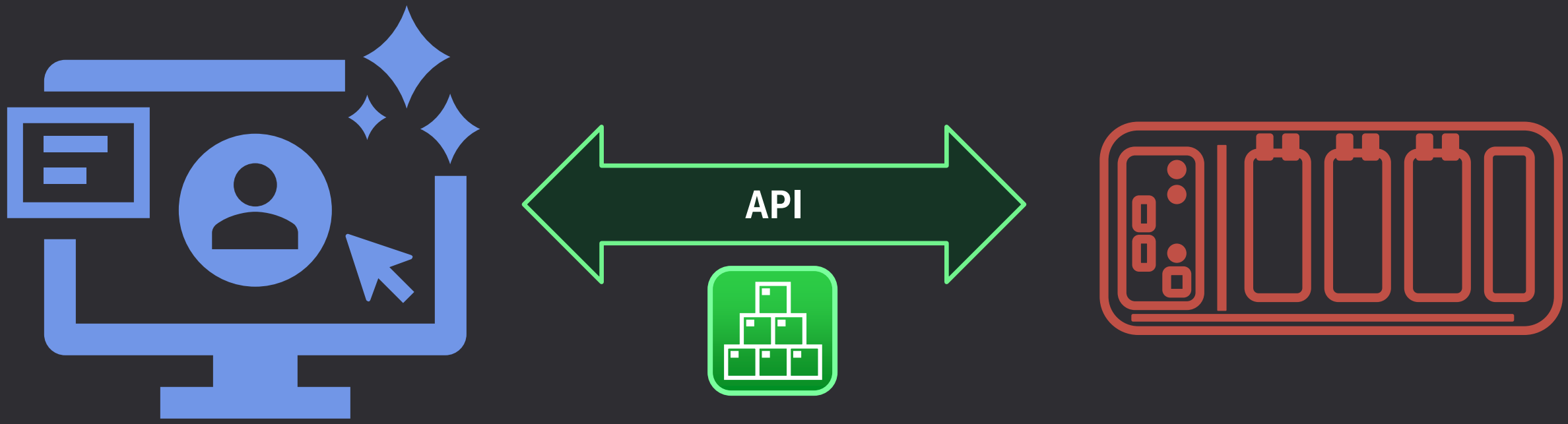
Conclusion: Complete code refactoring needed

Migration approach

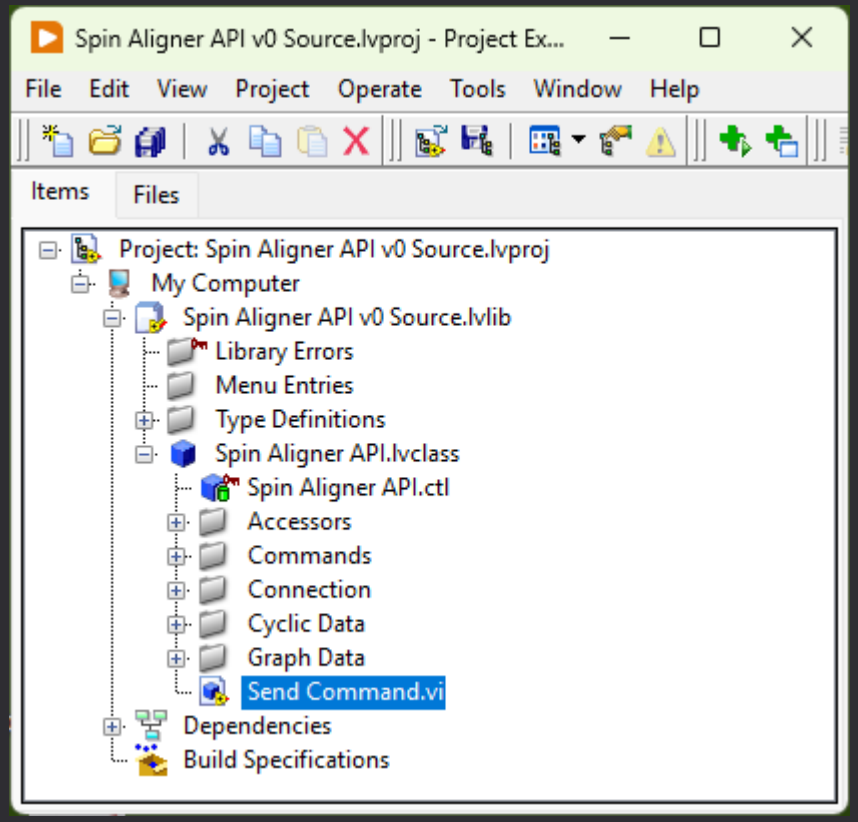
- Identify interfaces
- Create a roadmap
- Establish control: SCC + versions + tasks
- Select framework
- Define APIs
- Execution: Deliver values in controlled steps

GPower code review and analysis

Start where the user sees the system

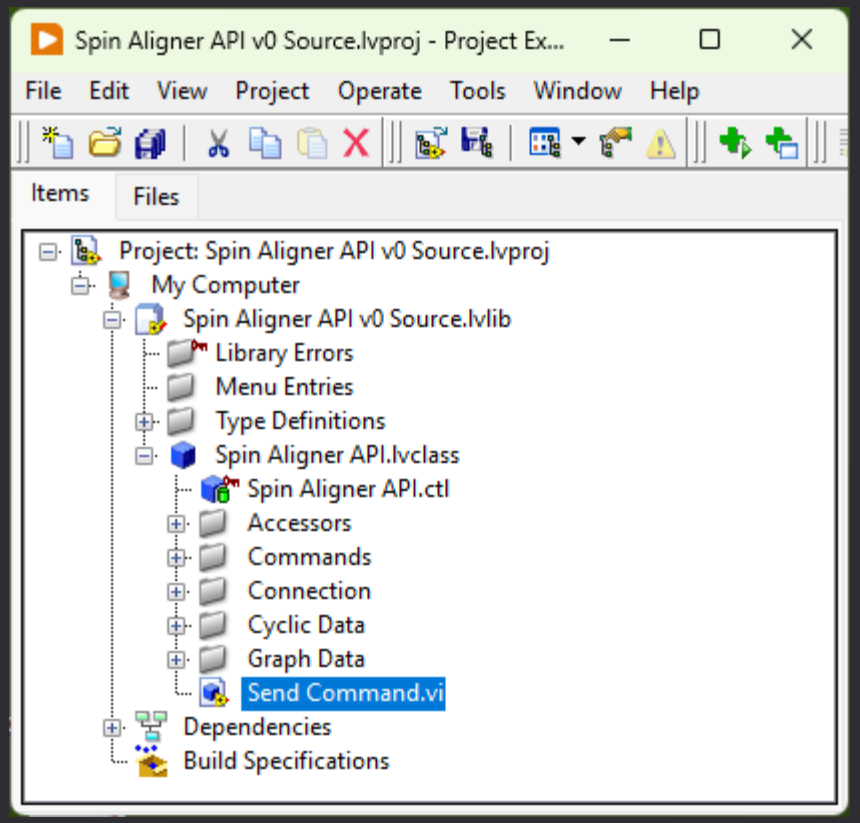


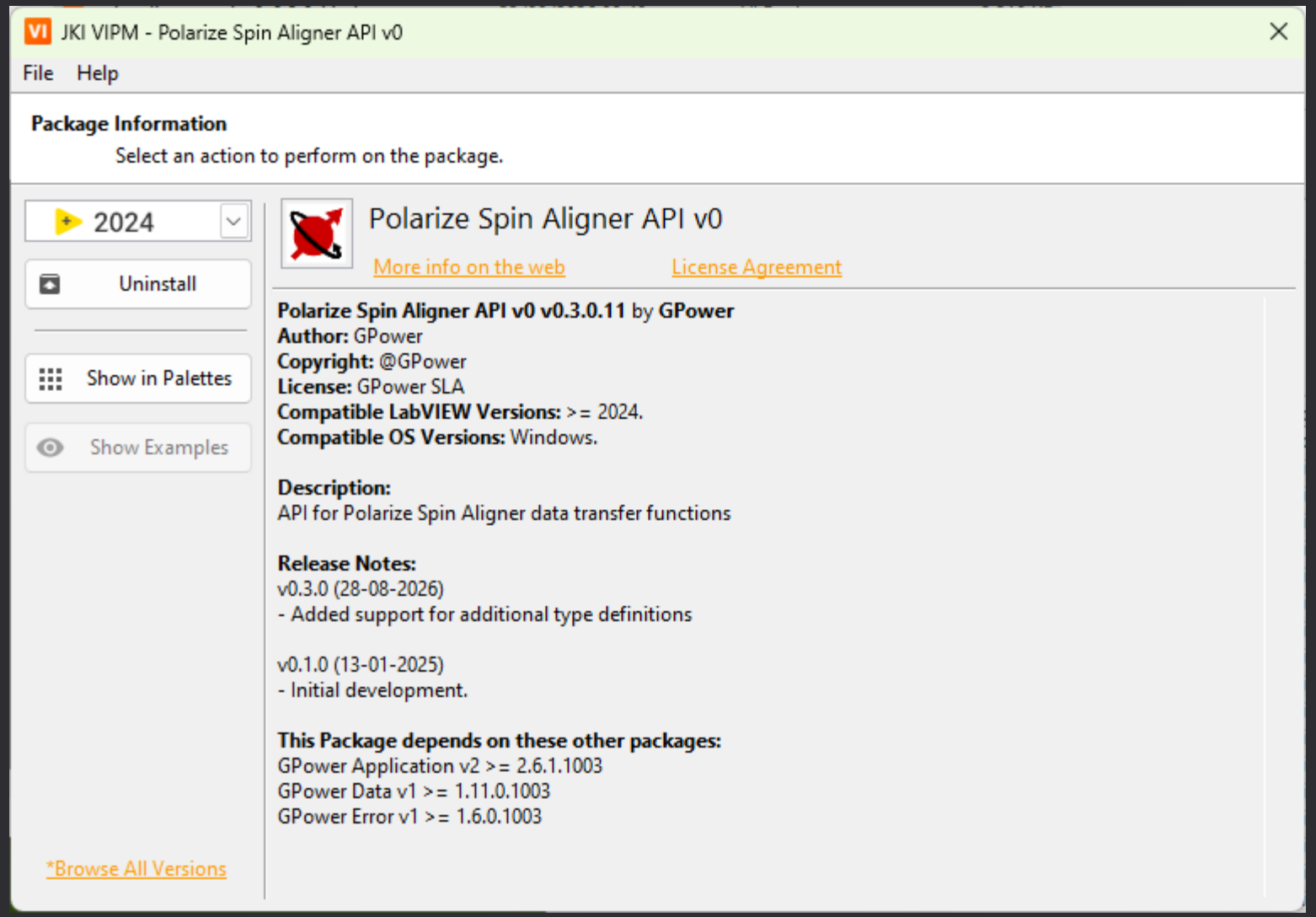
Spin Aligner API



Spin Aligner API

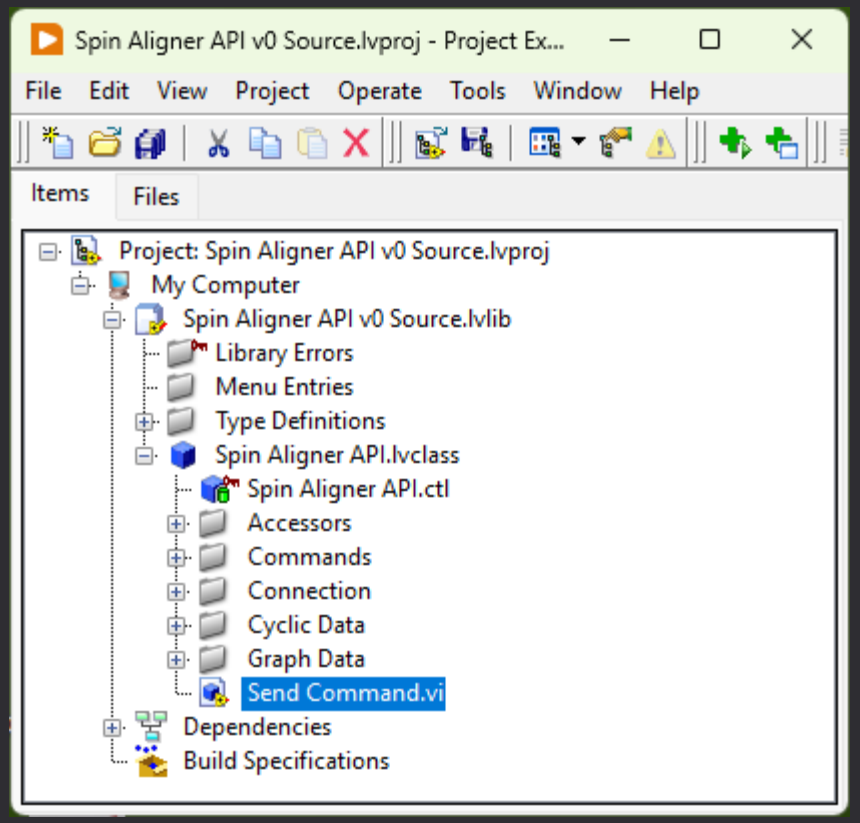
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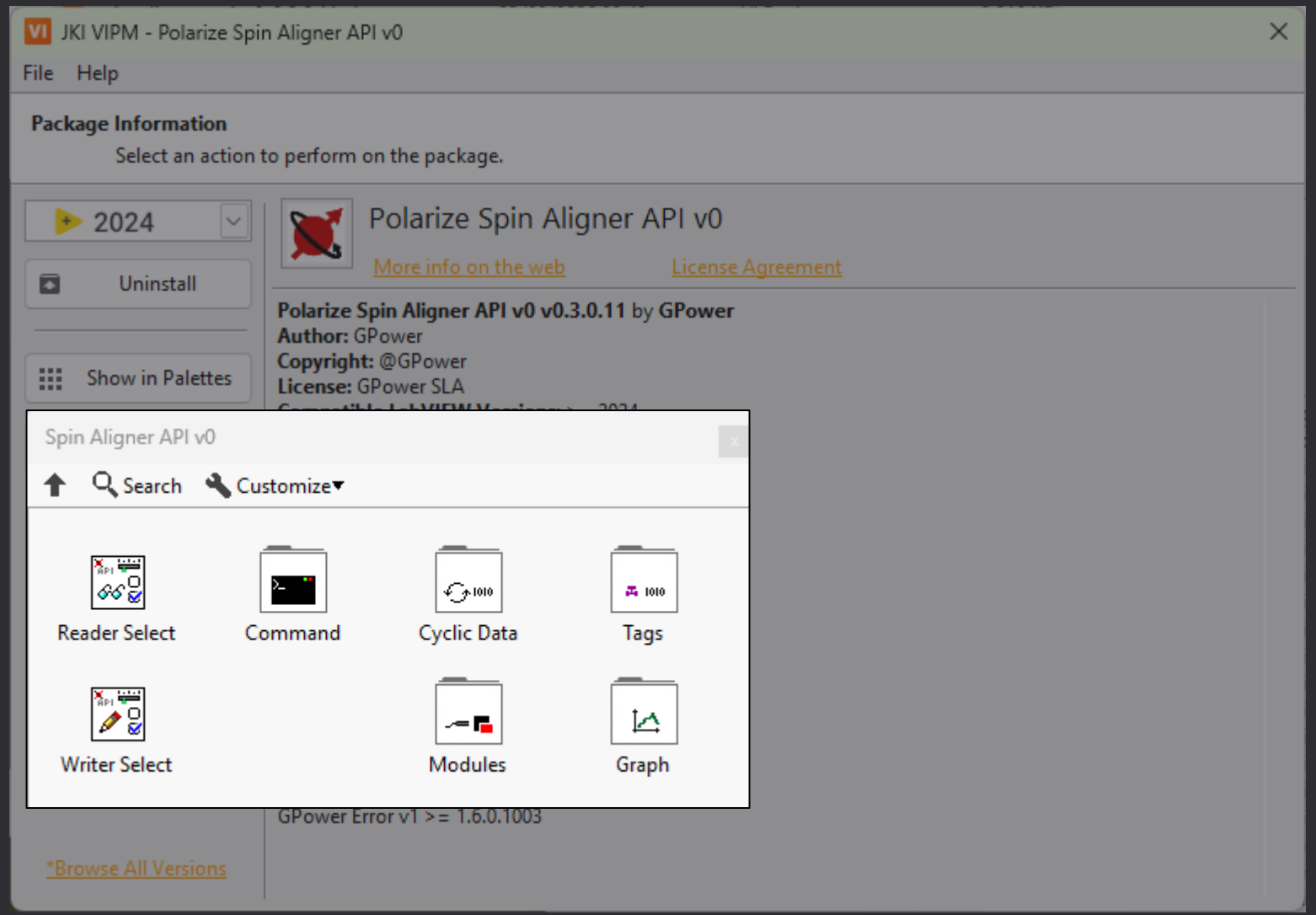




Spin Aligner API

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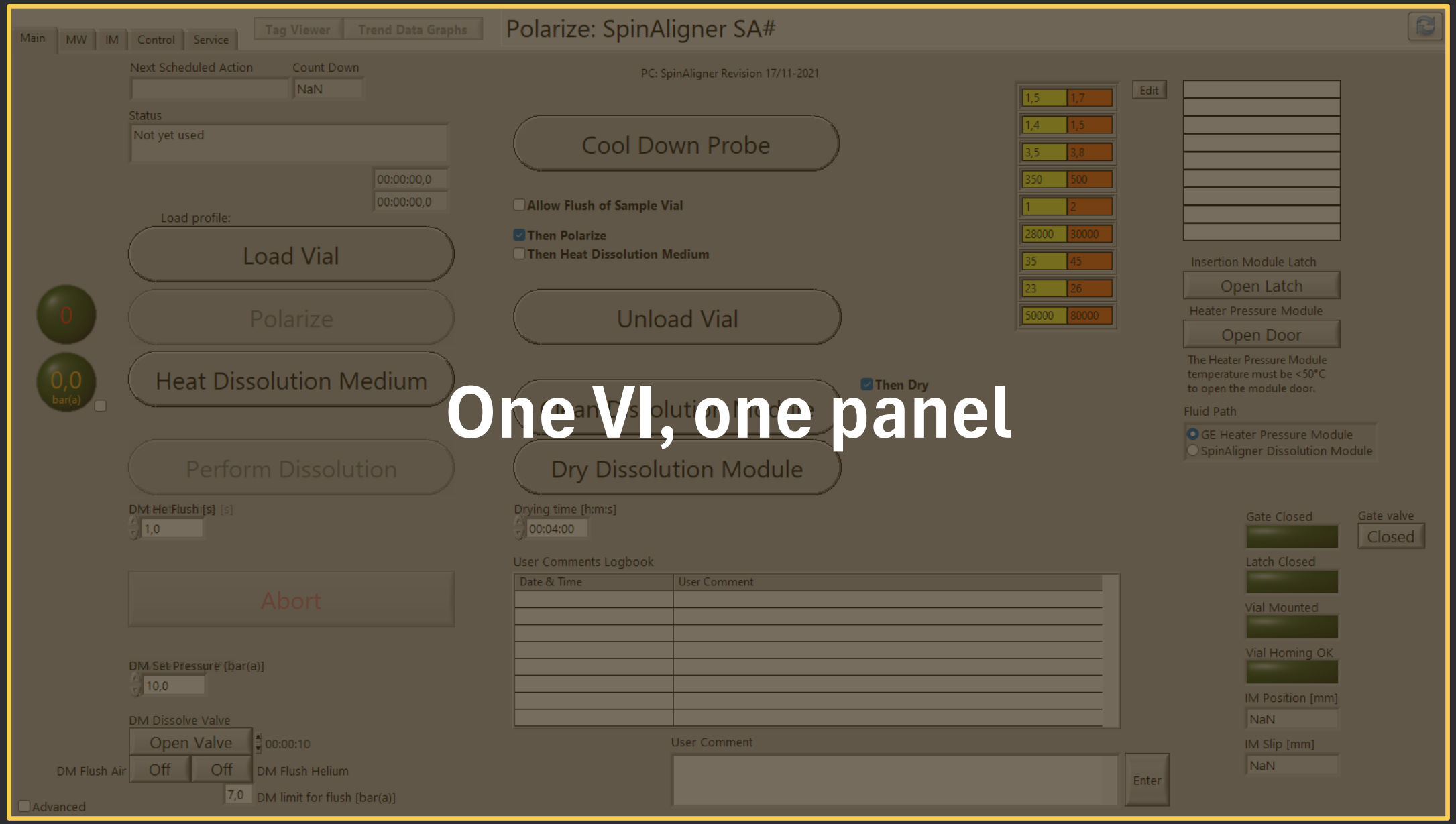


Challenge



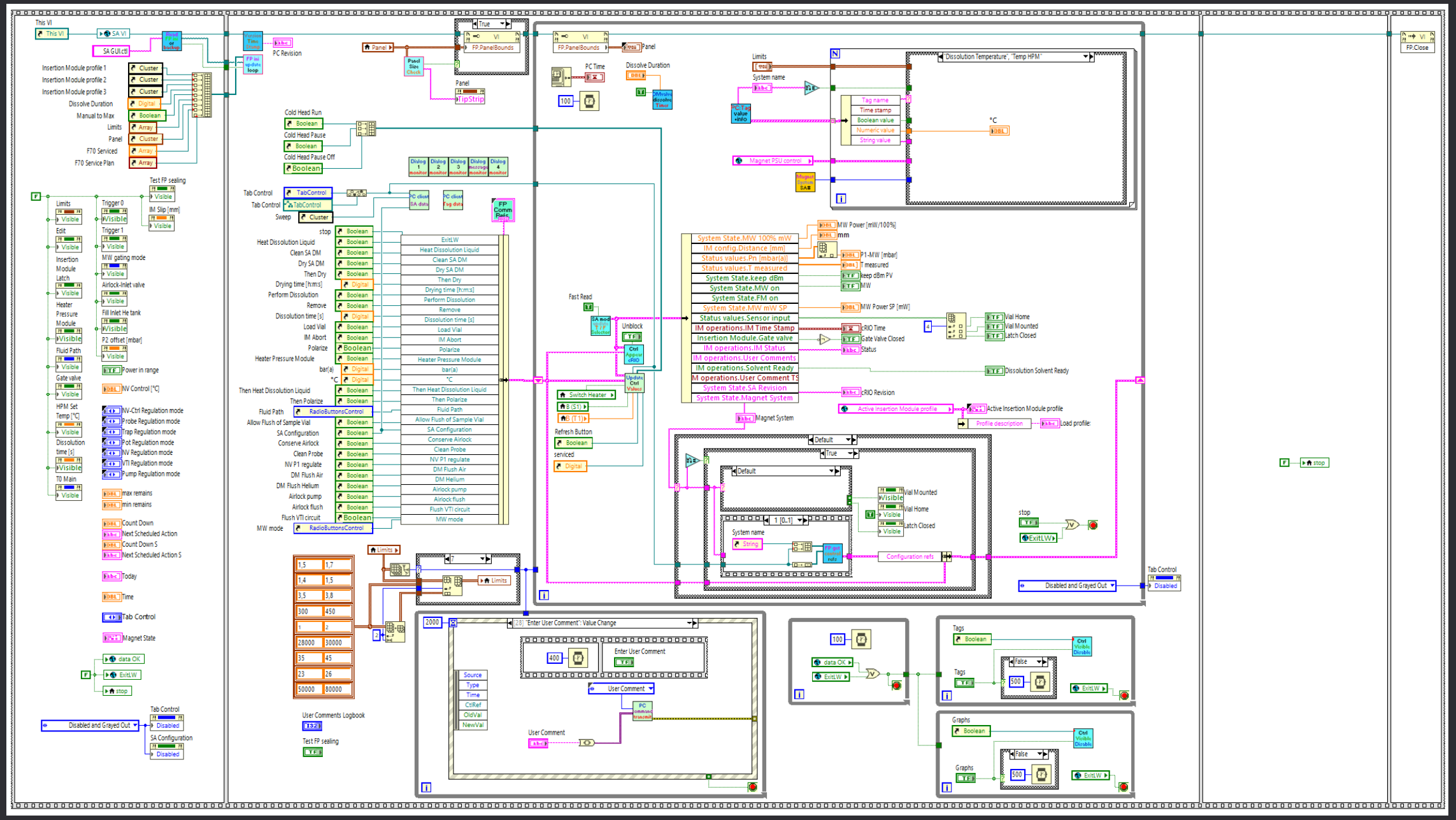
Make a modern UI and meet the functional requirement

PC Application - UI old version



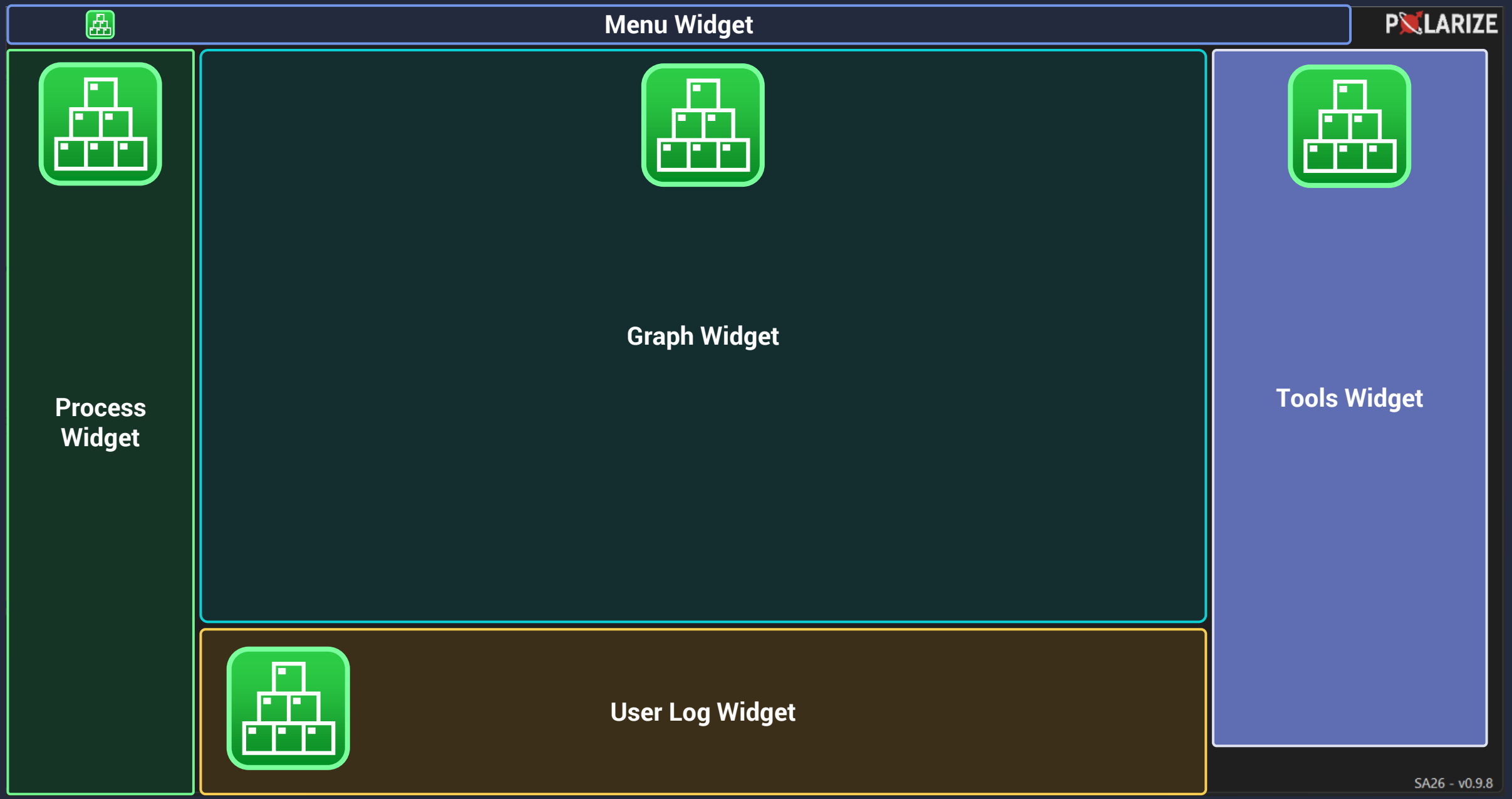
One VI, one panel

PC Application - Code old version



PC Application - UI new version

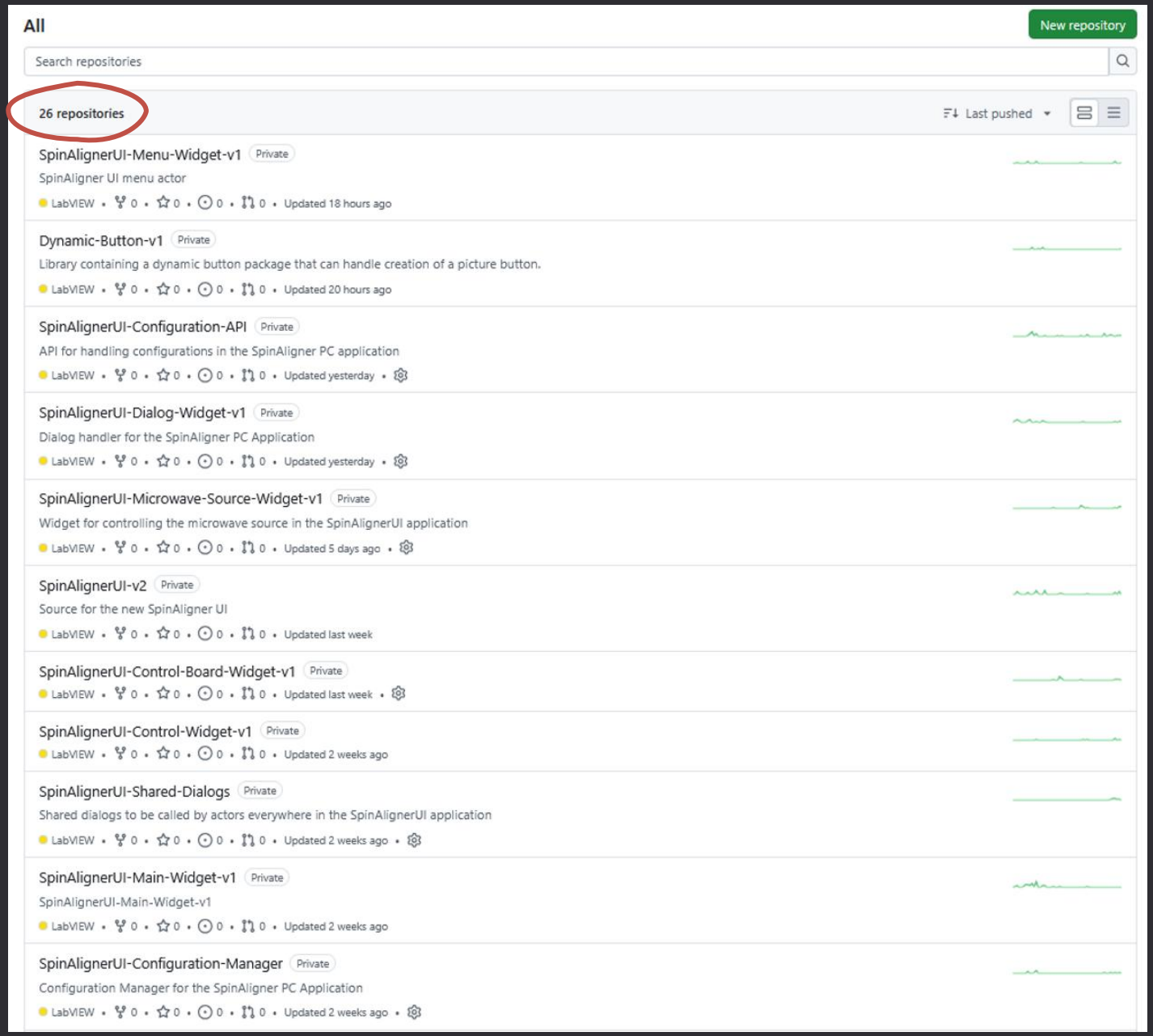
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PC Application – SCC with GitHub

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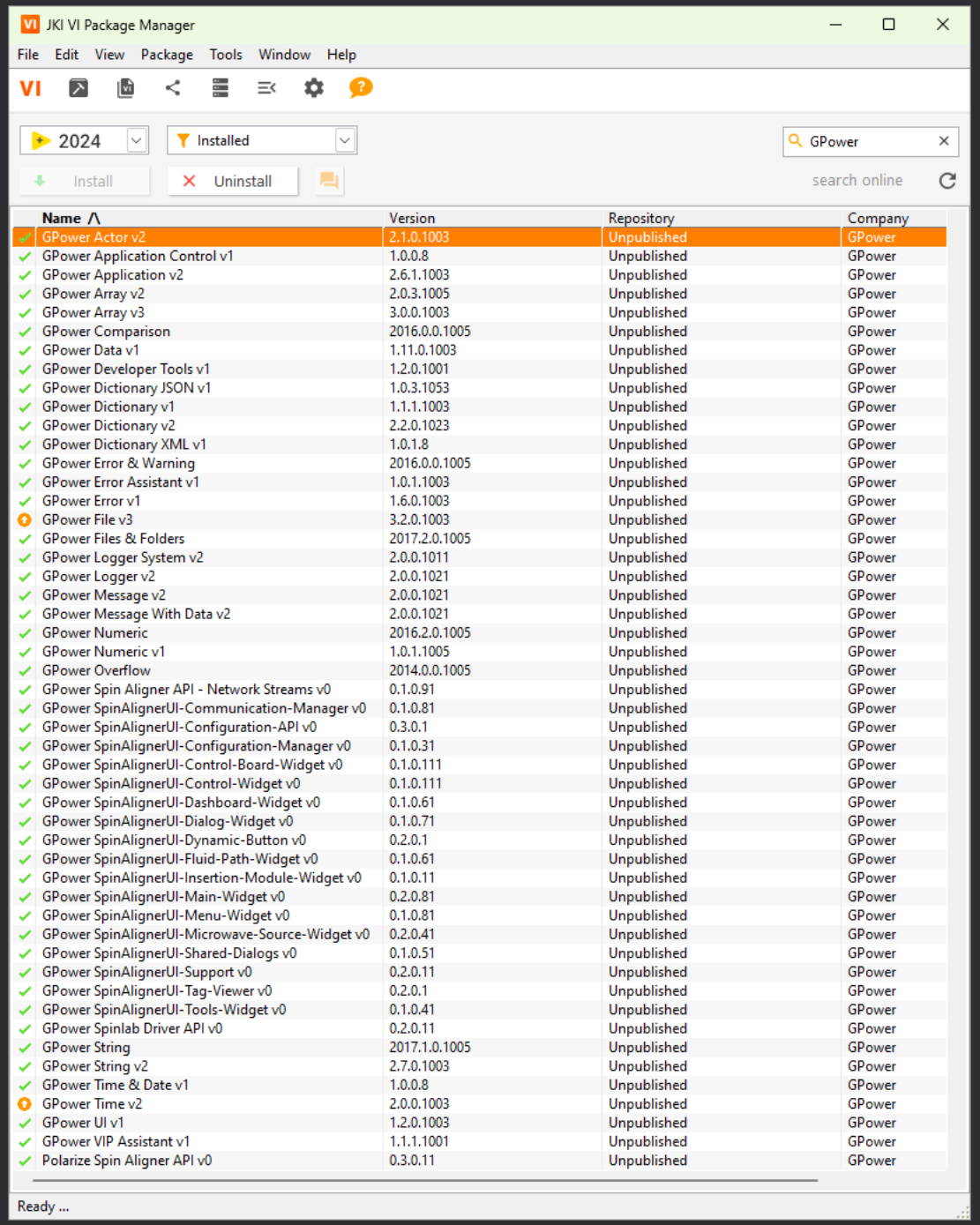
Source Code Control:
One repository for each software component.



PC Application – All the components

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general tool

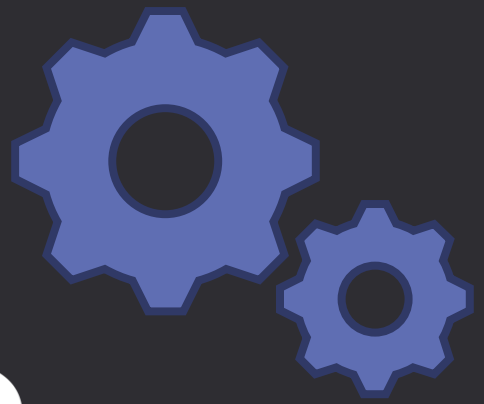
Polarize
specific tools



Name	Version	Repository	Company
GPower Actor v2	2.1.0.1003	Unpublished	GPower
GPower Application Control v1	1.0.0.8	Unpublished	GPower
GPower Application v2	2.6.1.1003	Unpublished	GPower
GPower Array v2	2.0.3.1005	Unpublished	GPower
GPower Array v3	3.0.0.1003	Unpublished	GPower
GPower Comparison	2016.0.0.1005	Unpublished	GPower
GPower Data v1	1.11.0.1003	Unpublished	GPower
GPower Developer Tools v1	1.2.0.1001	Unpublished	GPower
GPower Dictionary JSON v1	1.0.3.1053	Unpublished	GPower
GPower Dictionary v1	1.1.1.1003	Unpublished	GPower
GPower Dictionary v2	2.2.0.1023	Unpublished	GPower
GPower Dictionary XML v1	1.0.1.8	Unpublished	GPower
GPower Error & Warning	2016.0.0.1005	Unpublished	GPower
GPower Error Assistant v1	1.0.1.1003	Unpublished	GPower
GPower Error v1	1.6.0.1003	Unpublished	GPower
GPower File v3	3.2.0.1003	Unpublished	GPower
GPower Files & Folders	2017.2.0.1005	Unpublished	GPower
GPower Logger System v2	2.0.0.1011	Unpublished	GPower
GPower Logger v2	2.0.0.1021	Unpublished	GPower
GPower Message v2	2.0.0.1021	Unpublished	GPower
GPower Message With Data v2	2.0.0.1021	Unpublished	GPower
GPower Numeric	2016.2.0.1005	Unpublished	GPower
GPower Numeric v1	1.0.1.1005	Unpublished	GPower
GPower Overflow	2014.0.0.1005	Unpublished	GPower
GPower Spin Aligner API - Network Streams v0	0.1.0.91	Unpublished	GPower
GPower SpinAlignerUI-Communication-Manager v0	0.1.0.81	Unpublished	GPower
GPower SpinAlignerUI-Configuration-API v0	0.3.0.1	Unpublished	GPower
GPower SpinAlignerUI-Configuration-Manager v0	0.1.0.31	Unpublished	GPower
GPower SpinAlignerUI-Control-Board-Widget v0	0.1.0.111	Unpublished	GPower
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GPower SpinAlignerUI-Tools-Widget v0	0.1.0.41	Unpublished	GPower
GPower Spinlab Driver API v0	0.2.0.11	Unpublished	GPower
GPower String	2017.1.0.1005	Unpublished	GPower
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GPower Time & Date v1	1.0.0.8	Unpublished	GPower
GPower Time v2	2.0.0.1003	Unpublished	GPower
GPower UI v1	1.2.0.1003	Unpublished	GPower
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Polarize Spin Aligner API v0	0.3.0.11	Unpublished	GPower



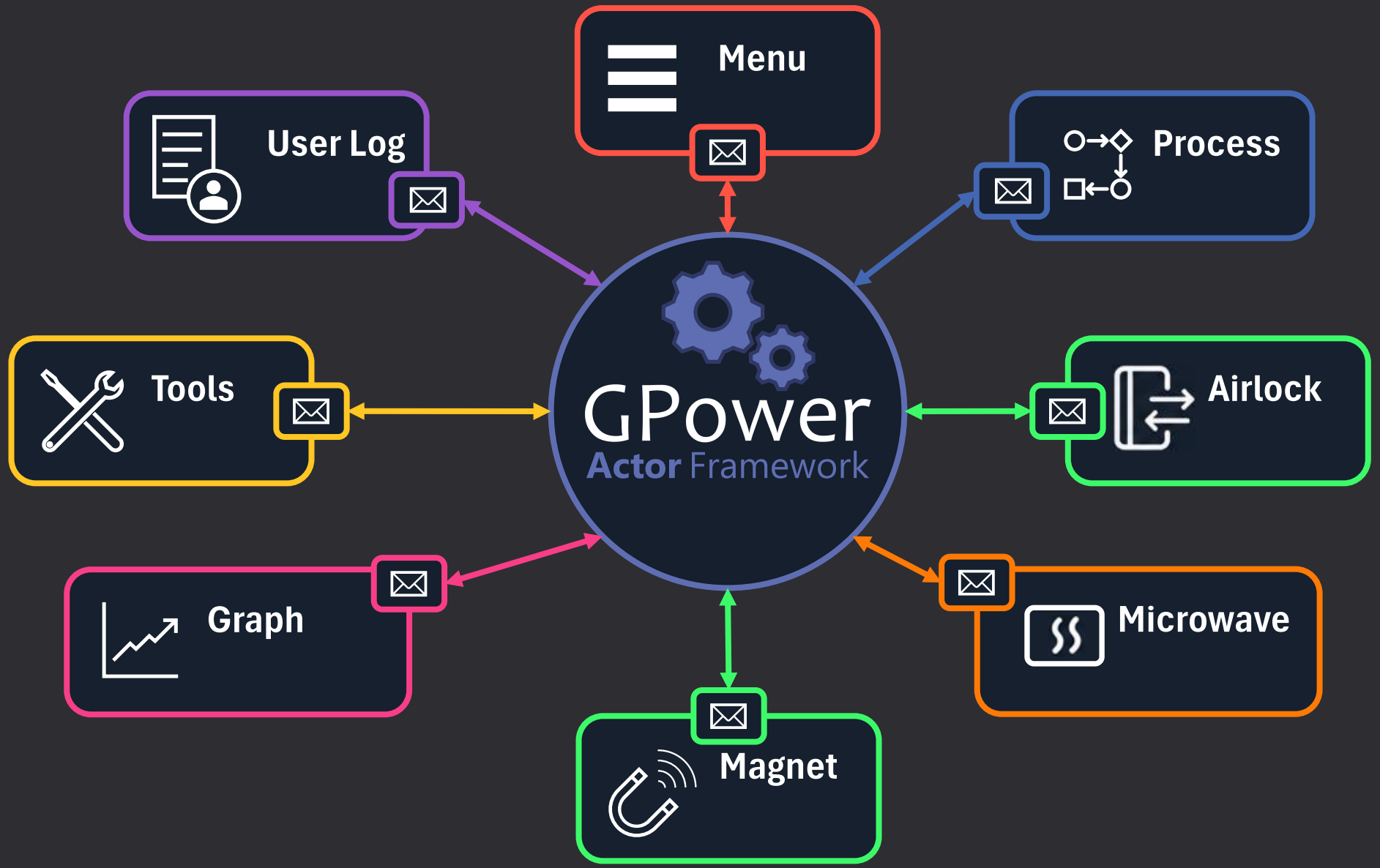
Actor Framework



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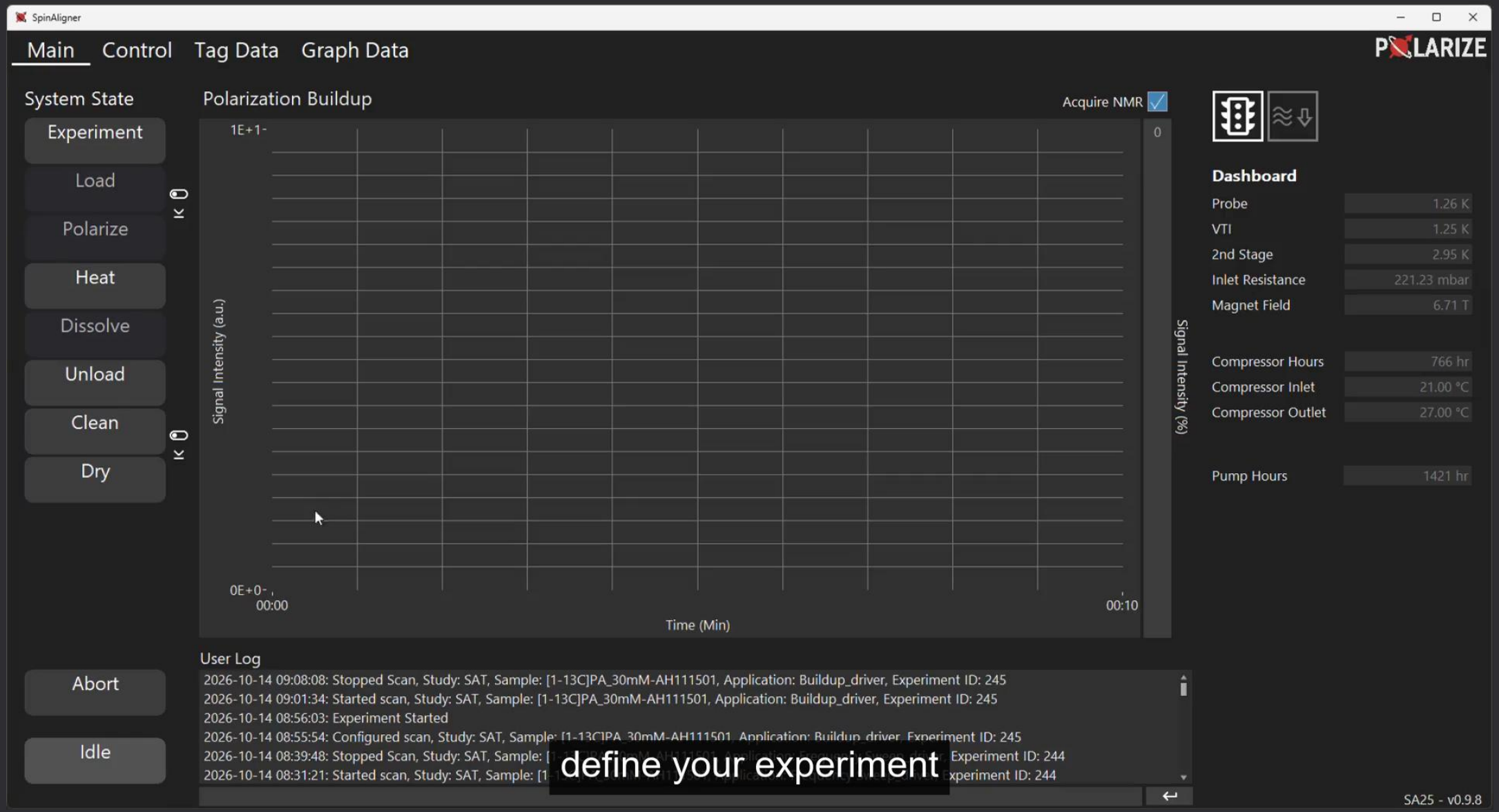
Actor Framework

PC Application – Why actors are a great fit



PC Application – Demo

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Summary

- **Make a conscious choice**
  Do modularization in everything you build.
- **Stick to the path**
  Do not let someone or something push you off it.
- **Gain qualification and experience**
  It requires training and expertise to know if you are departing from the path.
- **It works in real life**
  The Polarize case demonstrates that it works, and we have many more examples.



Thank you