Enhancing Control System GUI Experience

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Agenda

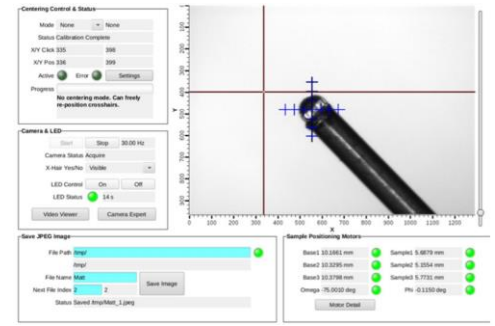
- Motivation
- EPAC Control System application
- Future work

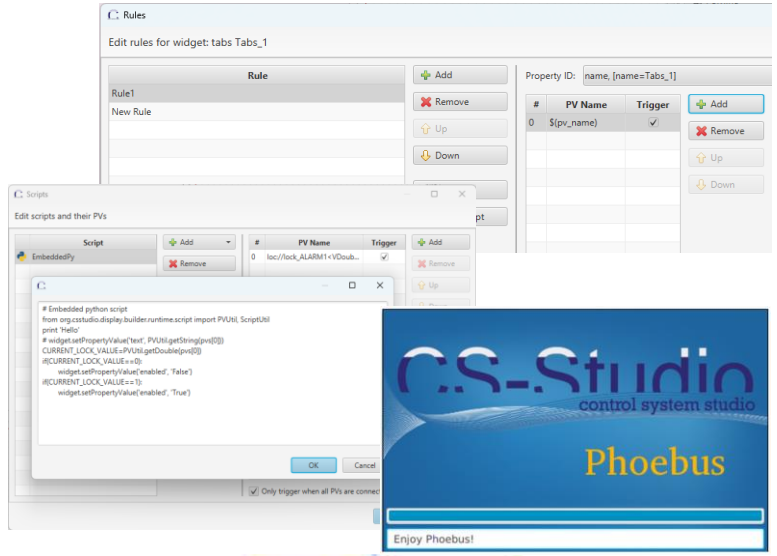
Why need a new one?

CS-Studio Phoebus

One of the industry's favorite tool, no doubt its powerful but it lacks

- **Authenticate** – Relies on Operating System user
- **Look and feel** – Lacks visually appealing user interfaces
- **Feature Accessibility** – Steep learning curve to master Rules, Scripts, etc.
- **Desktop-Only support** – Limited to desktop use only
- **Maintainability** – Hard to maintain and keep track of all the rules and scripts
- **Automated Tests** – Hard to test the application interfaces



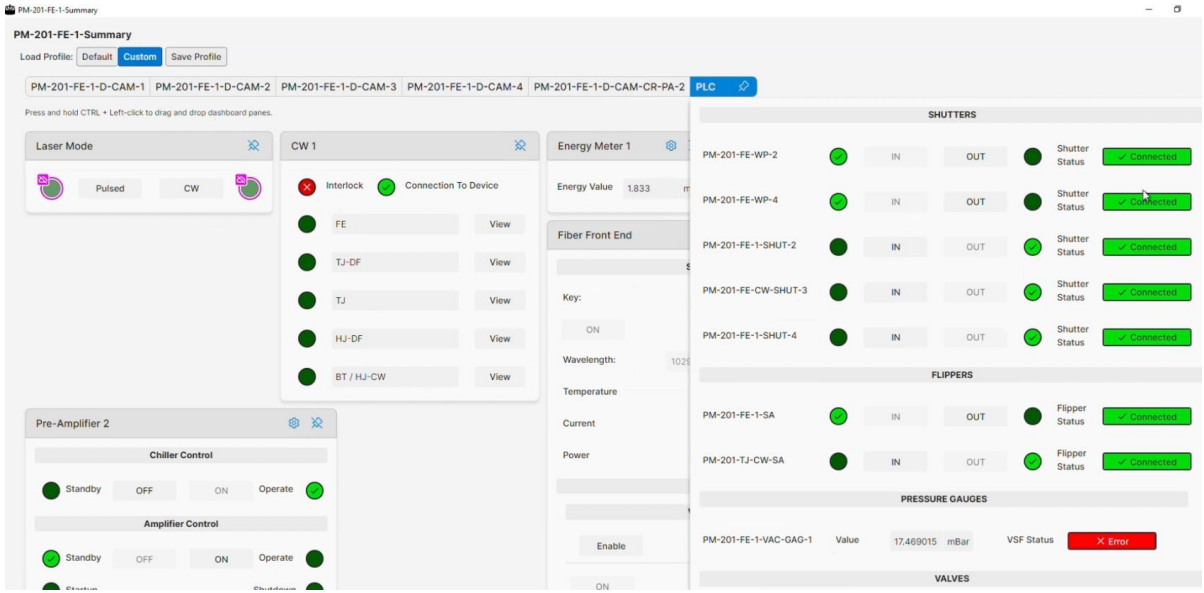


EPAC Control System application

Introducing a new control system software – **EPAC Control System application**

- Built with .NET framework (Blazor and C#)
- Developed by **CLF controls team** and **EPIC team**
- Operational at the Extreme Photonics Applications Centre (EPAC), Central Laser Facility (CLF), UK

Quick Peek



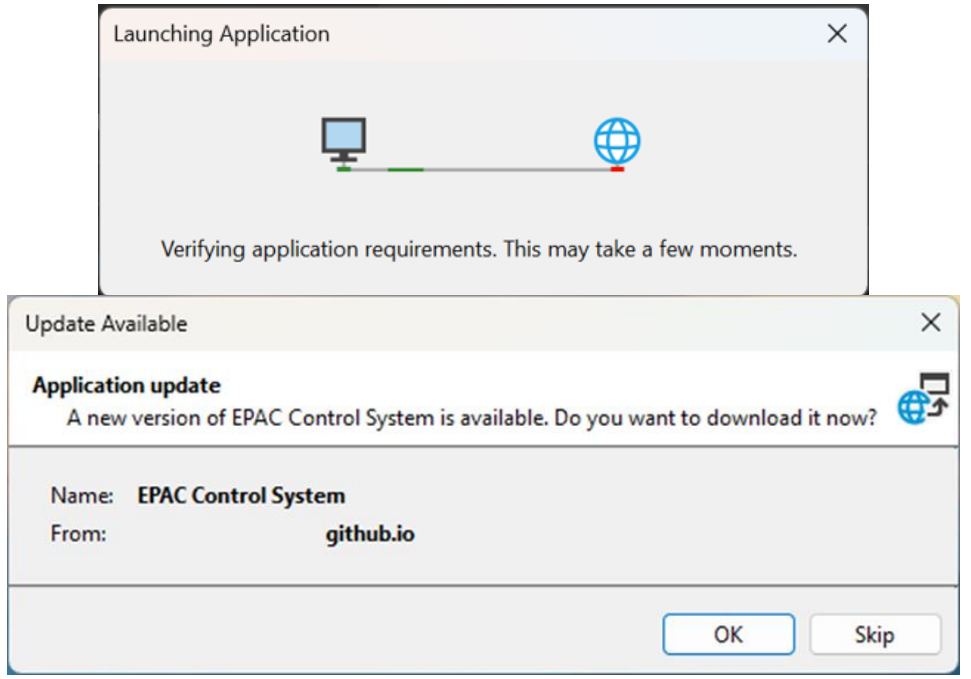
Key Features

★ **One Click Installation**

Easy Installation with a simple setup link and minimal user effort.

★ **Check Updates and Install**

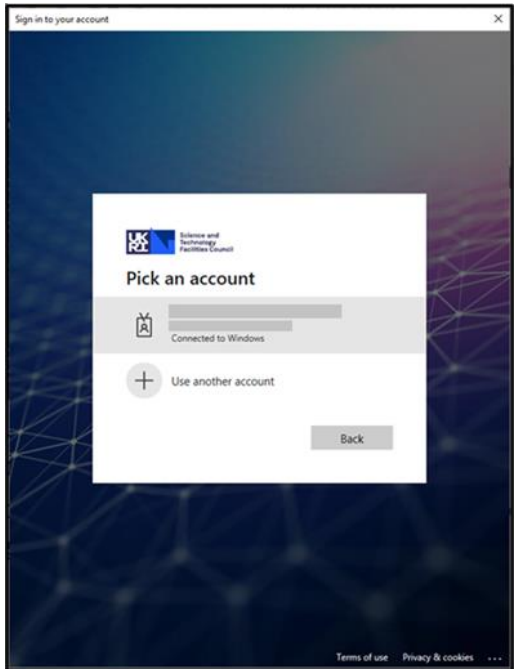
Always checks for latest update at application start



Key Features

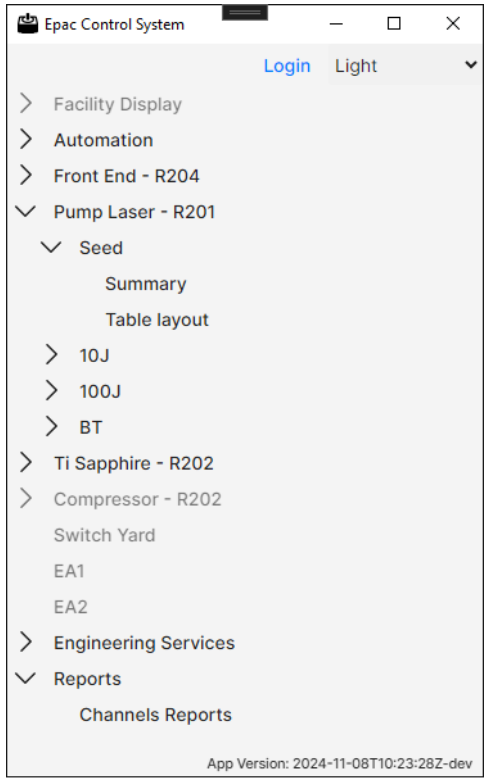
★ **Authentication**

Login into the application using Azure AD Identity and save your profile for personalized experience



★ **Customize the Navigation Pane**

Based on your facility requirement, customize the navigation menu



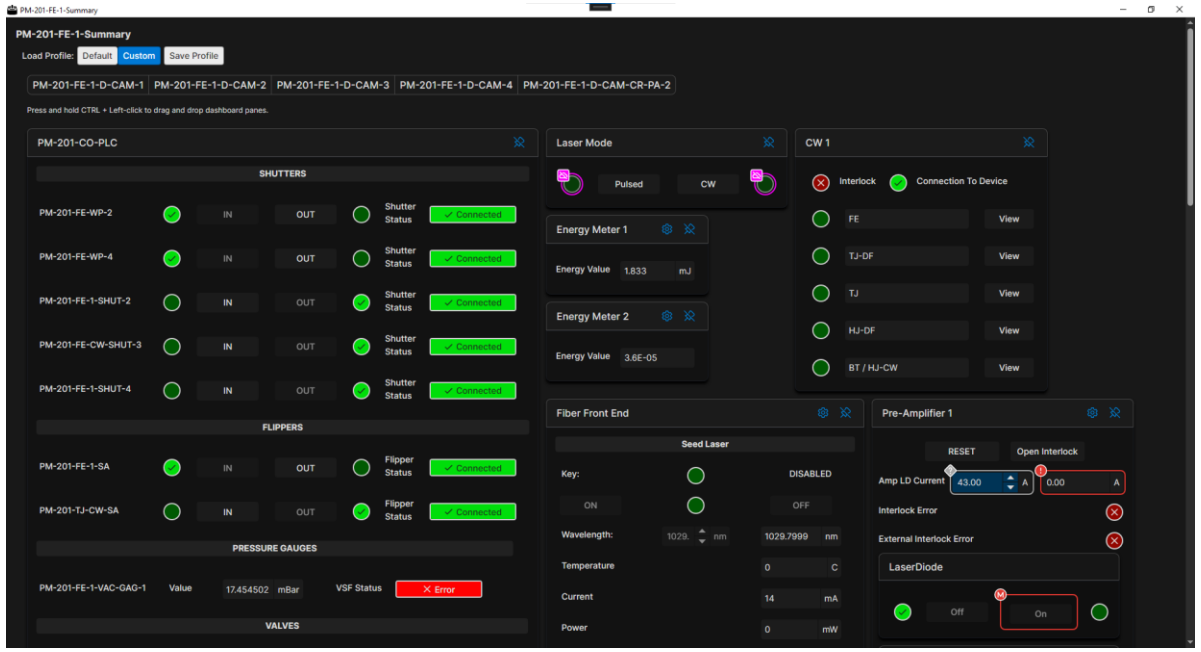
Key Features

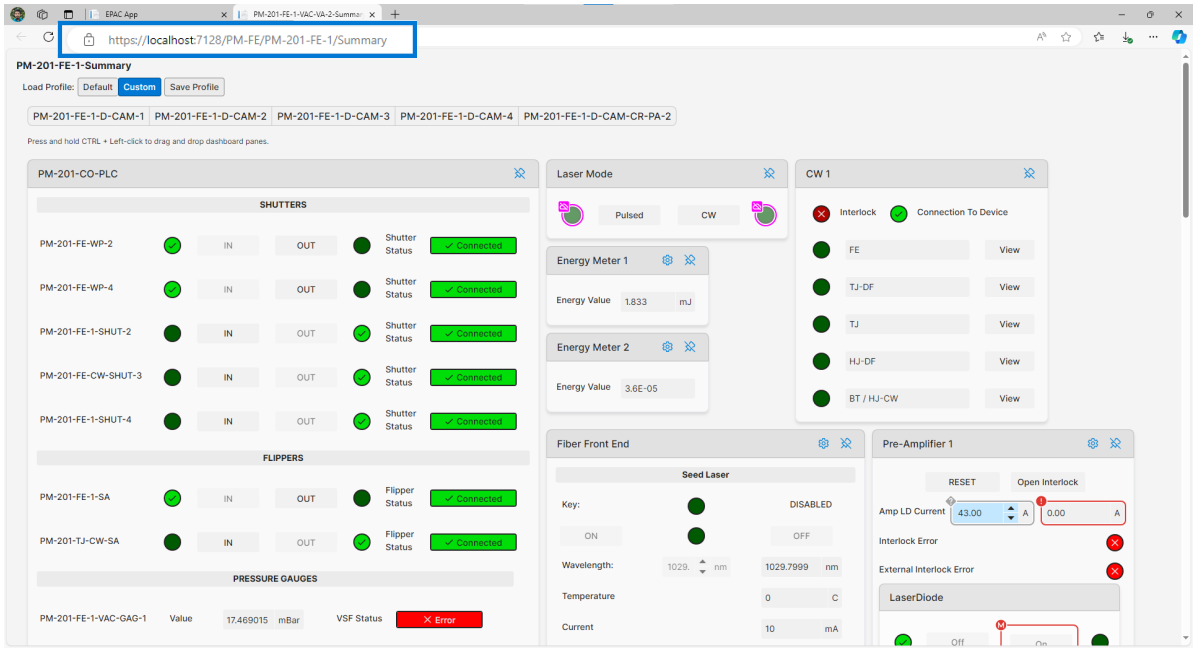
★ **Themes**

Supports both Light and Dark modes for a personalized experience

★ **Browser Access**

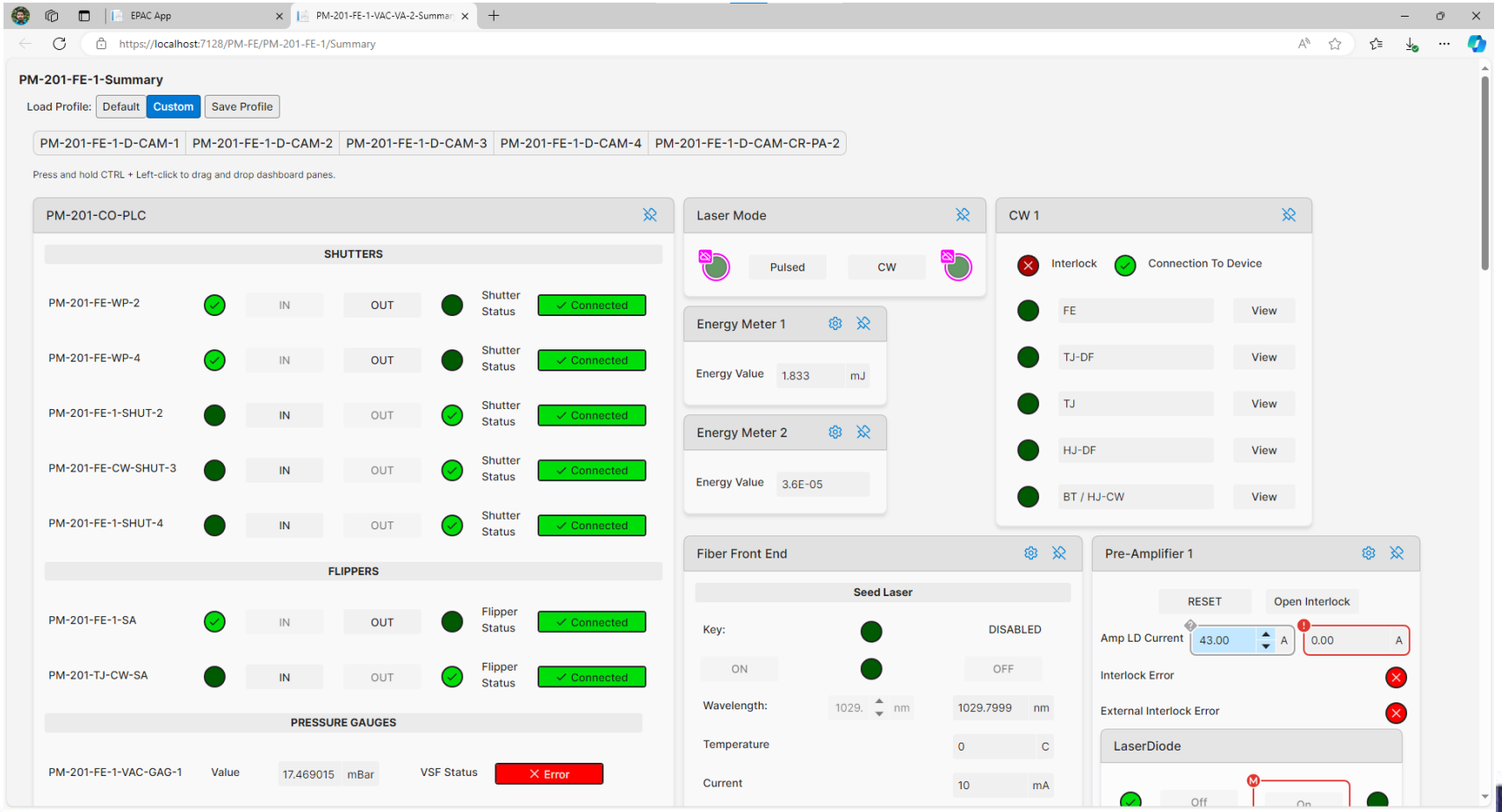
Use the application directly from your web browser for added convenience





Key Features

★ **Sample Summary Page:** Multiple relevant devices arranged as a dashboard



Key Features

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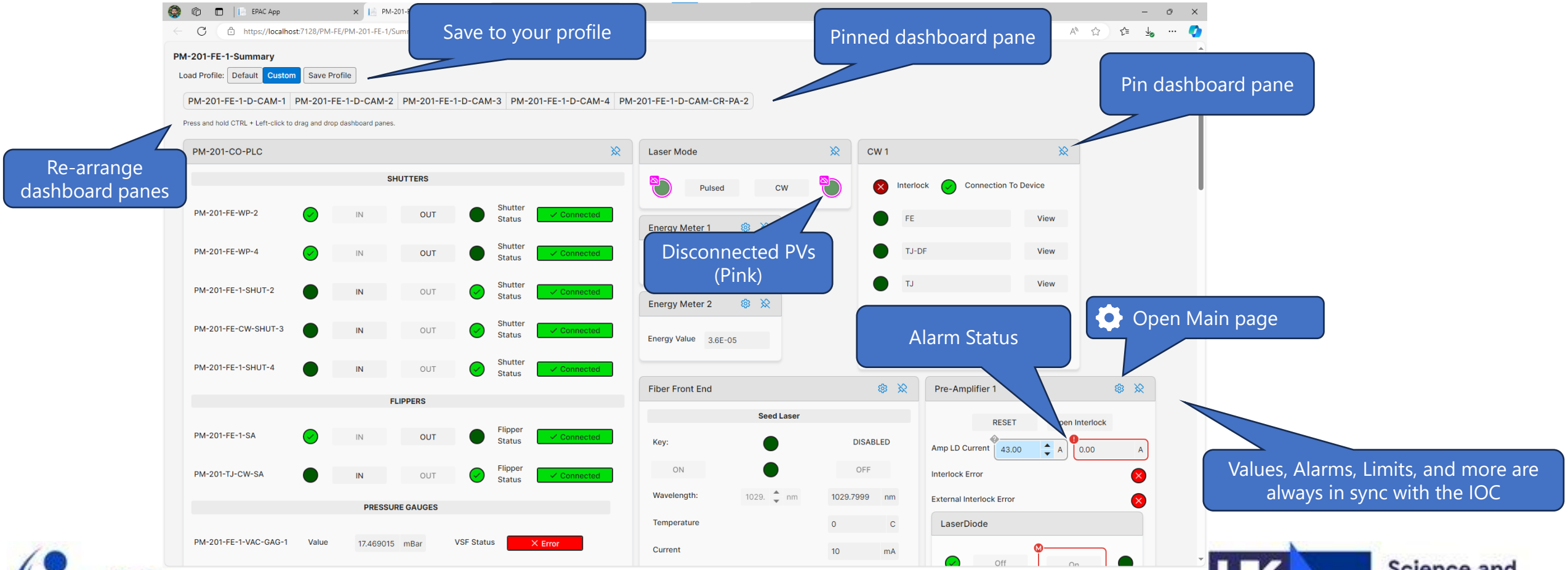
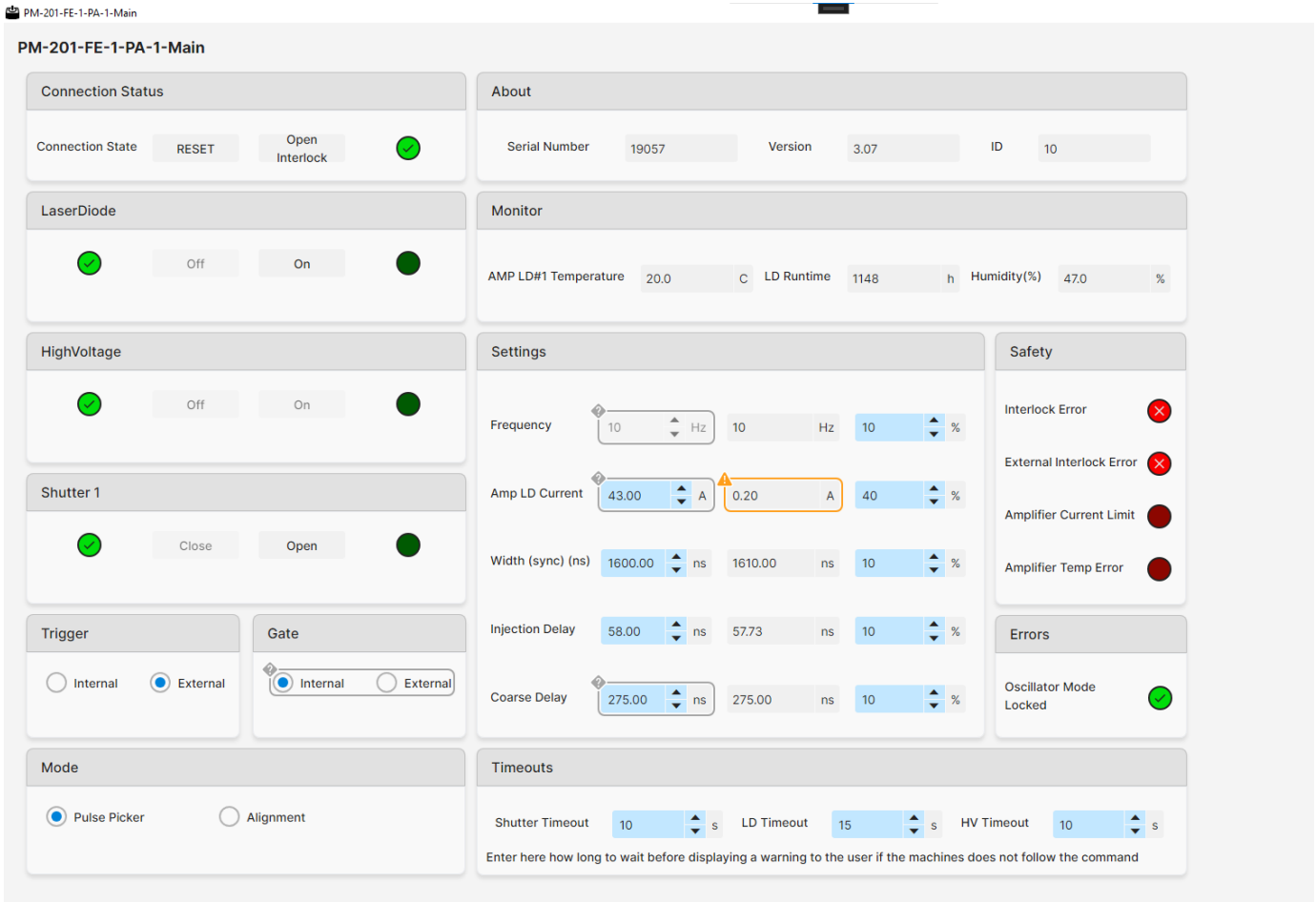


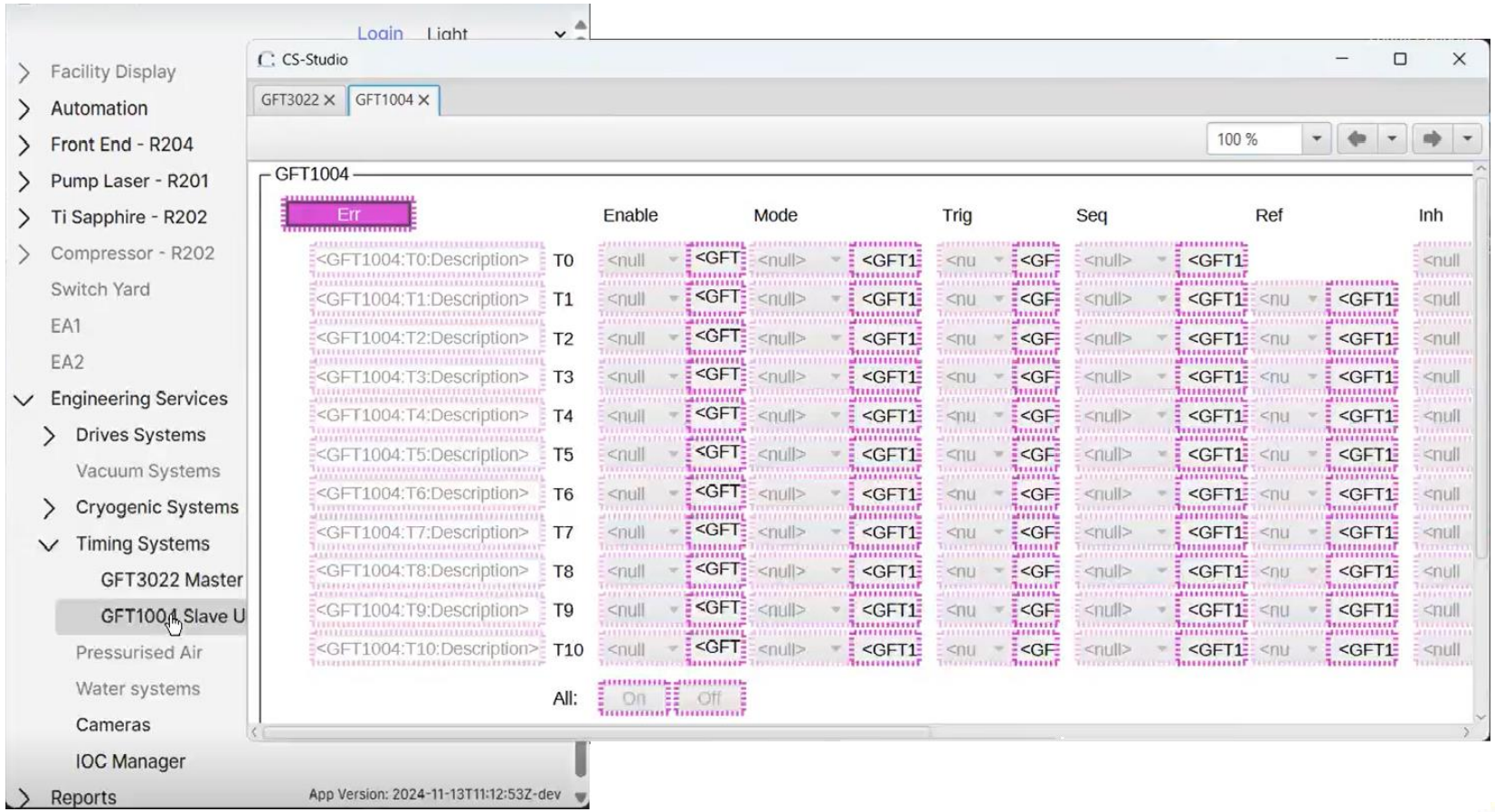
Key Features

★ **Sample Main Page:** Detailed information and settings for each individual device



Key Features

★ **Access Phoebus files:** Add Link to open from application



Key Features

★ **Active Channels Reporting:** Detailed information on all active channels

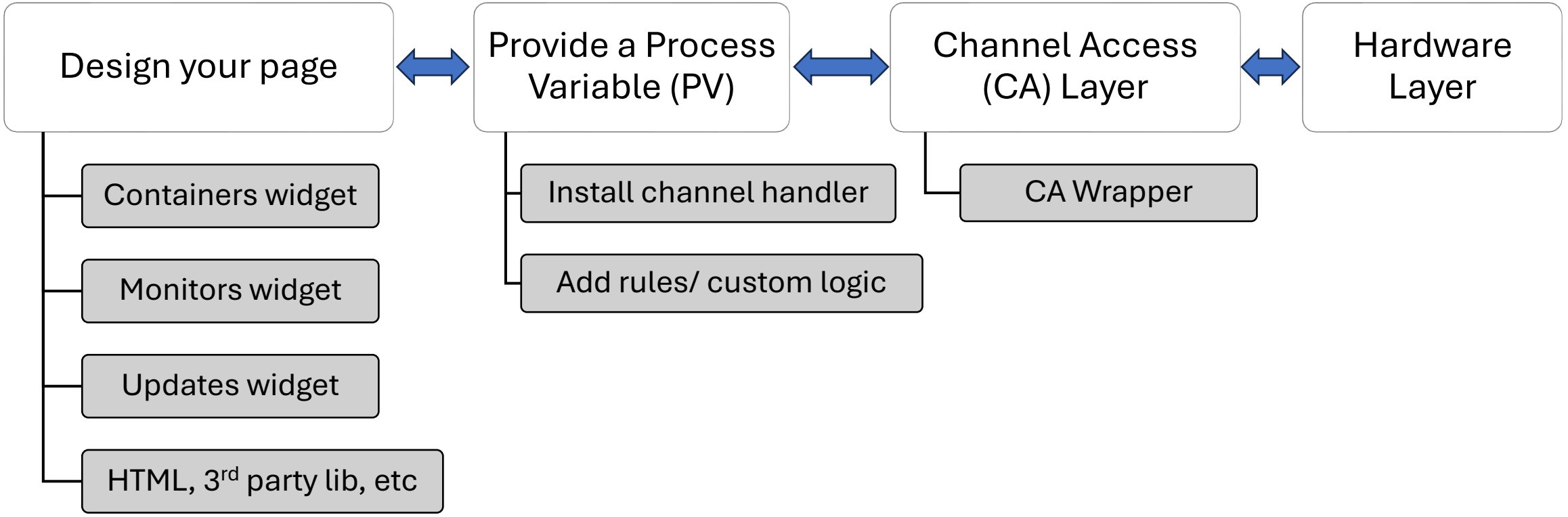
Channel Reports

Channel Reports

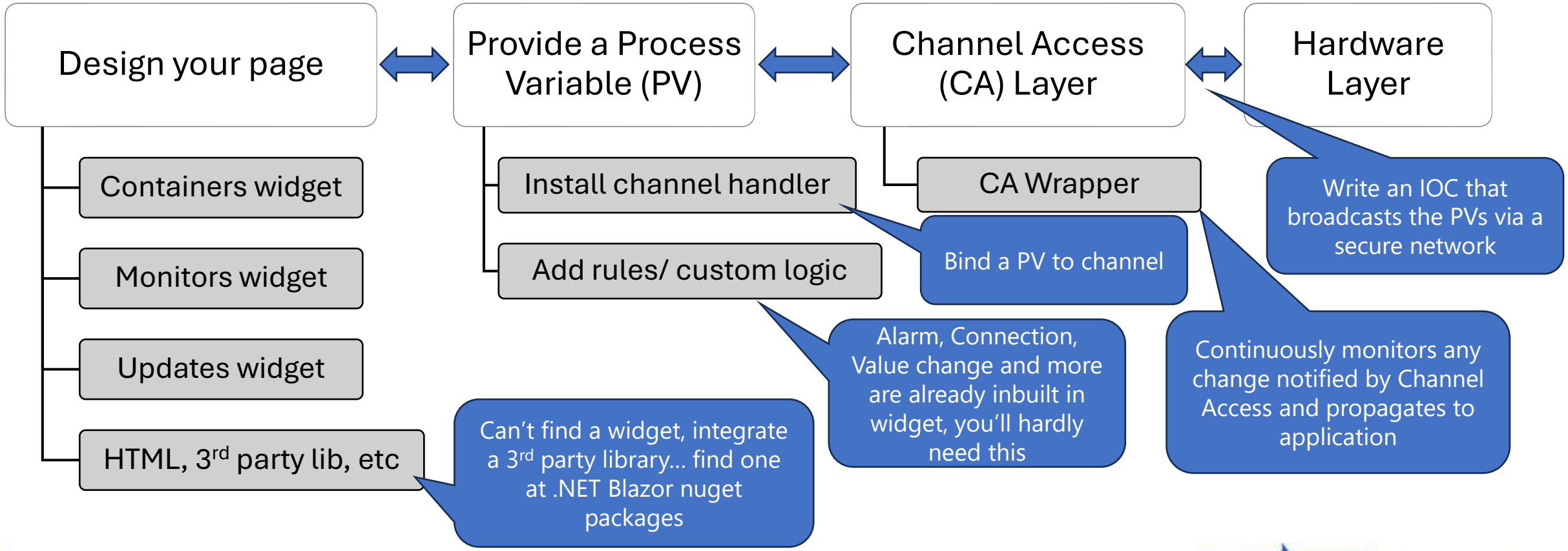
Active Channels (310)

Channel Name	Type	Host IP And Port	Clones	Connected?	Created At	Monitored?	Invalid?	Comments
PM-201-FE-1-PA-1:ReadSerial	Remote	192.1 ...	0	YES	25/11/2024 08:24:48	YES	NO	
PM-201-FE-1-PA-1:ReadVersion	Remote	192.1 ...	0	YES	25/11/2024 08:24:48	YES	NO	
PM-201-FE-1-PA-1:ReadId	Remote	192.1 ...	0	YES	25/11/2024 08:24:48	YES	NO	
PM-201-FE-1-PA-1:ReadLD1Temp	Remote	192.1 ...	0	YES	25/11/2024 08:24:48	YES	NO	
PM-201-FE-1-PA-1:ReadLDRuntime	Remote	192.1 ...	0	YES	25/11/2024 08:24:48	YES	NO	
PM-201-FE-1-PA-1:ReadHumidity	Remote	192.1 ...	0	YES	25/11/2024 08:24:48	YES	NO	
PM-201-FE-1-PA-1:ReadPklFreq	Remote	192.1 ...	1	YES	25/11/2024 08:24:48	YES	NO	
PM-201-FE-1-PA-1:ReadPklDelay	Remote	192.1 ...	1	YES	25/11/2024 08:24:48	YES	NO	
PM-201-FE-1-PA-1:ReadCoarseDelay	Remote	192.1 ...	1	YES	25/11/2024 08:24:48	YES	NO	
PM-201-FE-1-PA-1:StatOsc	Remote	192.1 ...	0	YES	25/11/2024 08:24:48	YES	NO	
PM-201-FE-1-PA-1:StatAmpCurr	Remote	192.1 ...	0	YES	25/11/2024 08:24:48	YES	NO	
PM-201-FE-1-PA-1:StatAmpTemp	Remote	192.1 ...	0	YES	25/11/2024 08:24:48	YES	NO	
PM-201-FE-1-PA-1:SelTrig	Remote	192.1 ...	1	YES	25/11/2024 08:24:48	YES	NO	
PM-201-FE-1-PA-1:SelGate	Remote	192.1 ...	1	YES	25/11/2024 08:24:48	YES	NO	
PM-201-FE-1-PA-1:SelMode	Remote	192.1 ...	1	YES	25/11/2024 08:24:48	YES	NO	
PM-201-FE-1-PA-1-TFL:SyncFreqTimeoutCount	Remote	192.1 ...	0	YES	25/11/2024 08:24:48	NO	NO	
PM-201-FE-1-PA-1:SyncFreqTimeoutStatus	Remote	192.1 ...	0	YES	25/11/2024 08:24:48	YES	NO	
PM-201-FE-1-PA-1-TFL:SyncDelayTimeoutCount	Remote	192.1 ...	0	YES	25/11/2024 08:24:48	NO	NO	
PM-201-FE-1-PA-1:SyncDelayTimeoutStatus	Remote	192.1 ...	0	YES	25/11/2024 08:24:48	YES	NO	
PM-201-FE-1-PA-1-TFL:CoarseDelayTimeoutCount	Remote	192.1 ...	0	YES	25/11/2024 08:24:48	NO	NO	
PM-201-FE-1-PA-1:CoarseDelayTimeoutStatus	Remote	192.1 ...	0	YES	25/11/2024 08:24:48	YES	NO	
PM-201-ITL-TFL:OverallStatus	Remote		0	NO	25/11/2024 08:11:45	YES	NO	
LOC:IsR201InterlockTripped_LOGIC	Local	simulated	1	YES	25/11/2024 08:11:45	YES	NO	
TS-202-TIME-ITL-TFL:OverallStatus	Remote		0	NO	25/11/2024 08:11:45	YES	NO	
LOC:IsR202InterlockTripped_LOGIC	Local	simulated	0	YES	25/11/2024 08:11:45	YES	NO	
FE-204-ITL-TFL:OverallStatus	Remote		0	NO	25/11/2024 08:11:45	YES	NO	
LOC:IsR204InterlockTripped_LOGIC	Local	simulated	0	YES	25/11/2024 08:11:45	YES	NO	

Workflow


Design your page
Provide a Process Variable (PV)
Channel Access (CA) Layer
Hardware Layer
Containers widget
Monitors widget
Updates widget
HTML, 3rd party lib, etc
Install channel handler
Add rules/ custom logic
CA Wrapper

Workflow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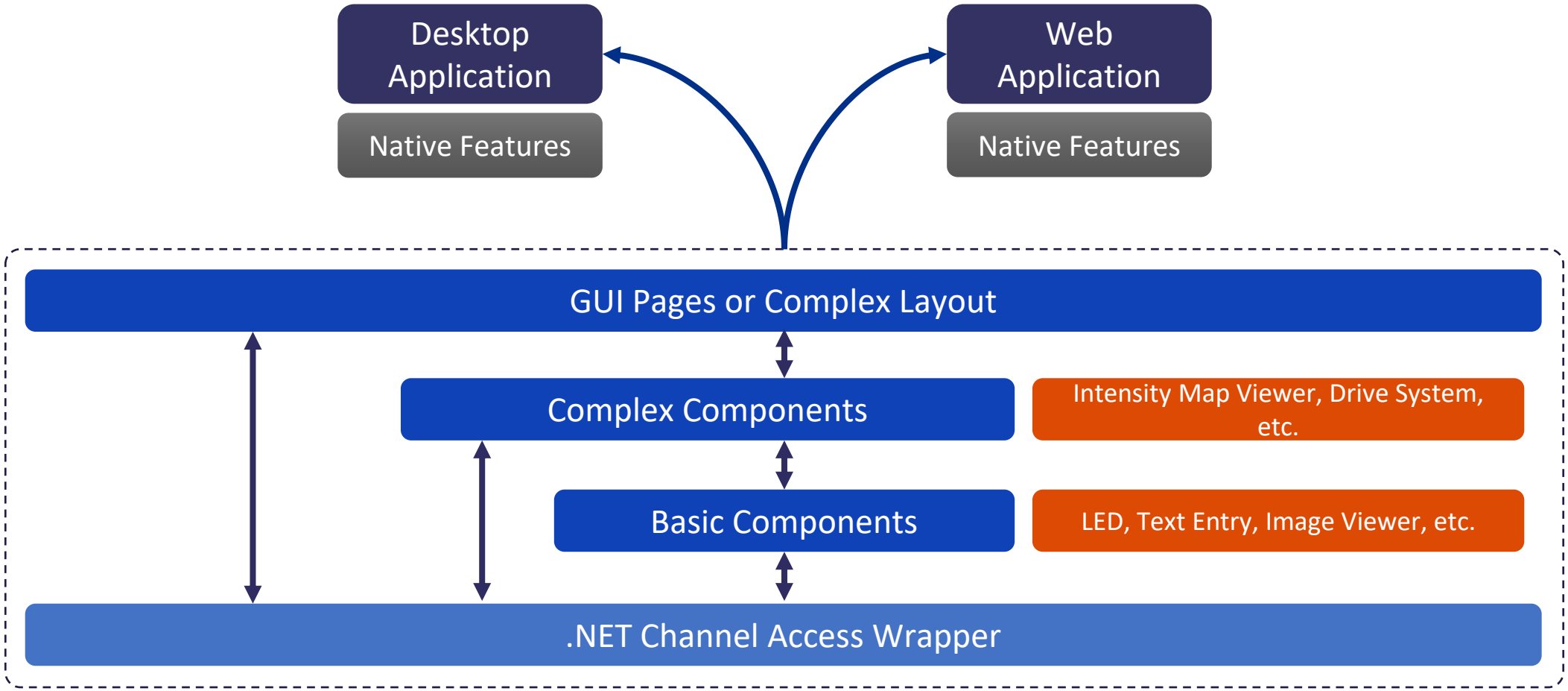
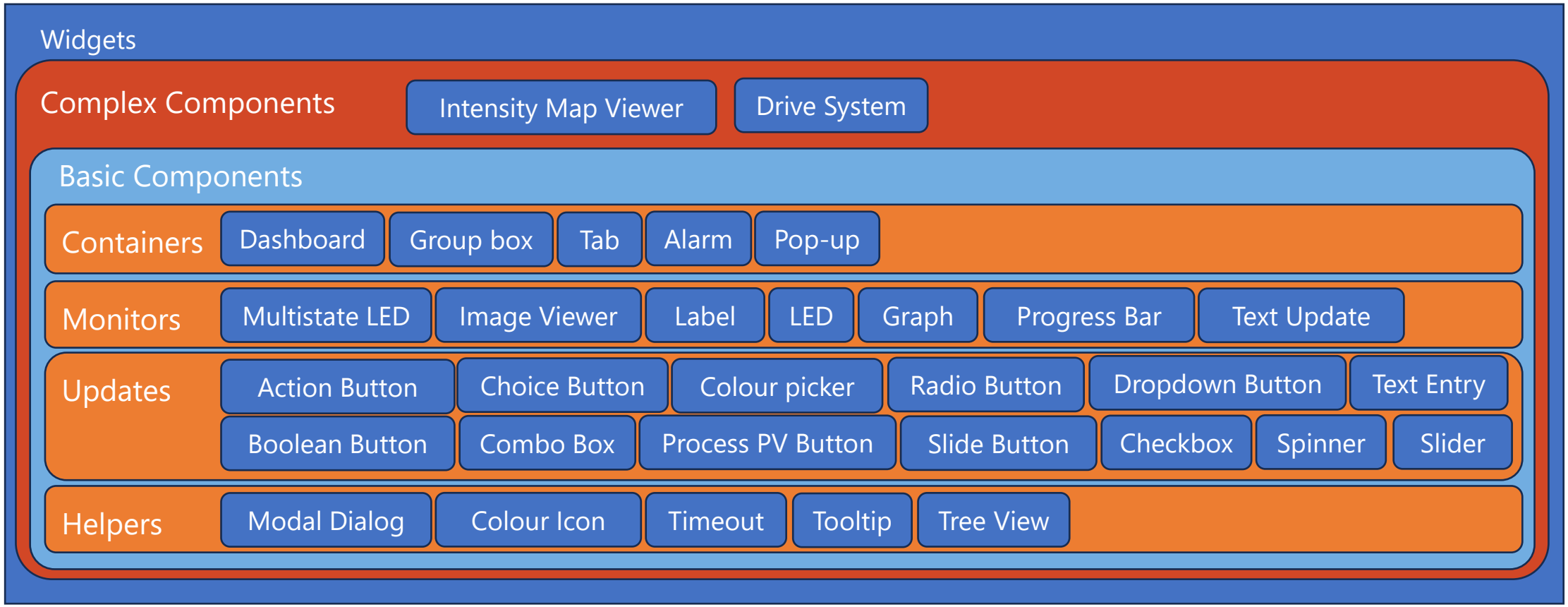
Add rules/ custom logic
CA Wrapper
Bind a PV to channel
Write an IOC that broadcasts the PVs via a secure network
Alarm, Connection, Value change and more are already inbuilt in widget, you'll hardly need this
Continuously monitors any change notified by Channel Access and propagates to application
Can't find a widget, integrate a 3rd party library... find one at .NET Blazor nuget packages

Application Architecture



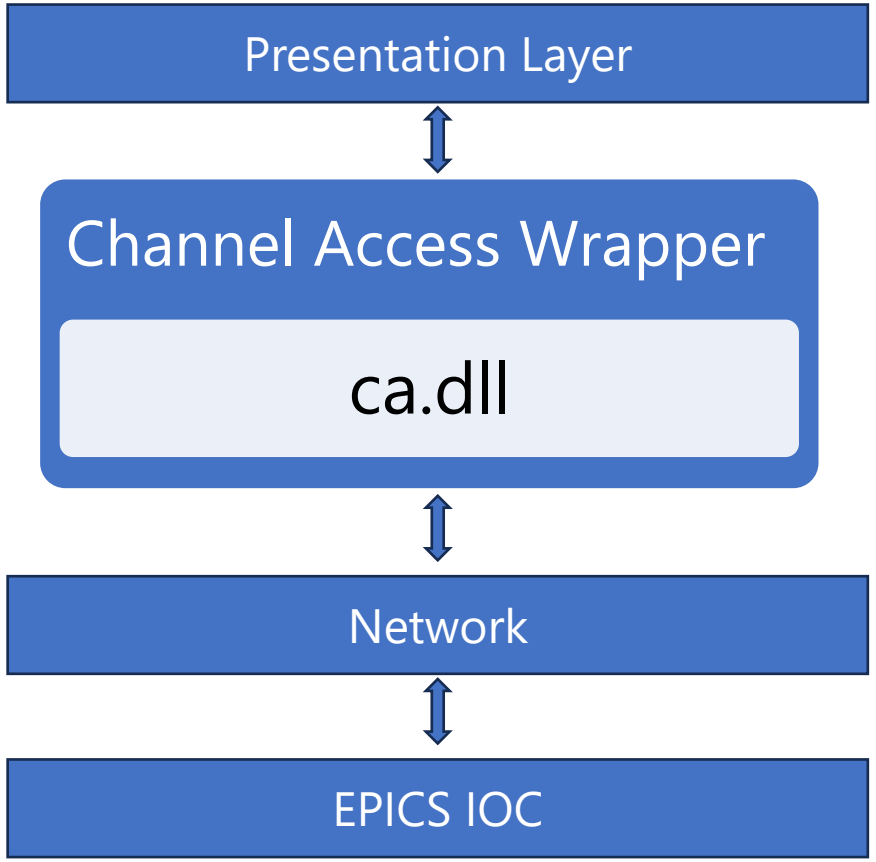
GUI Components

All the Phoebus widgets and more …



.NET Channel Access Wrapper

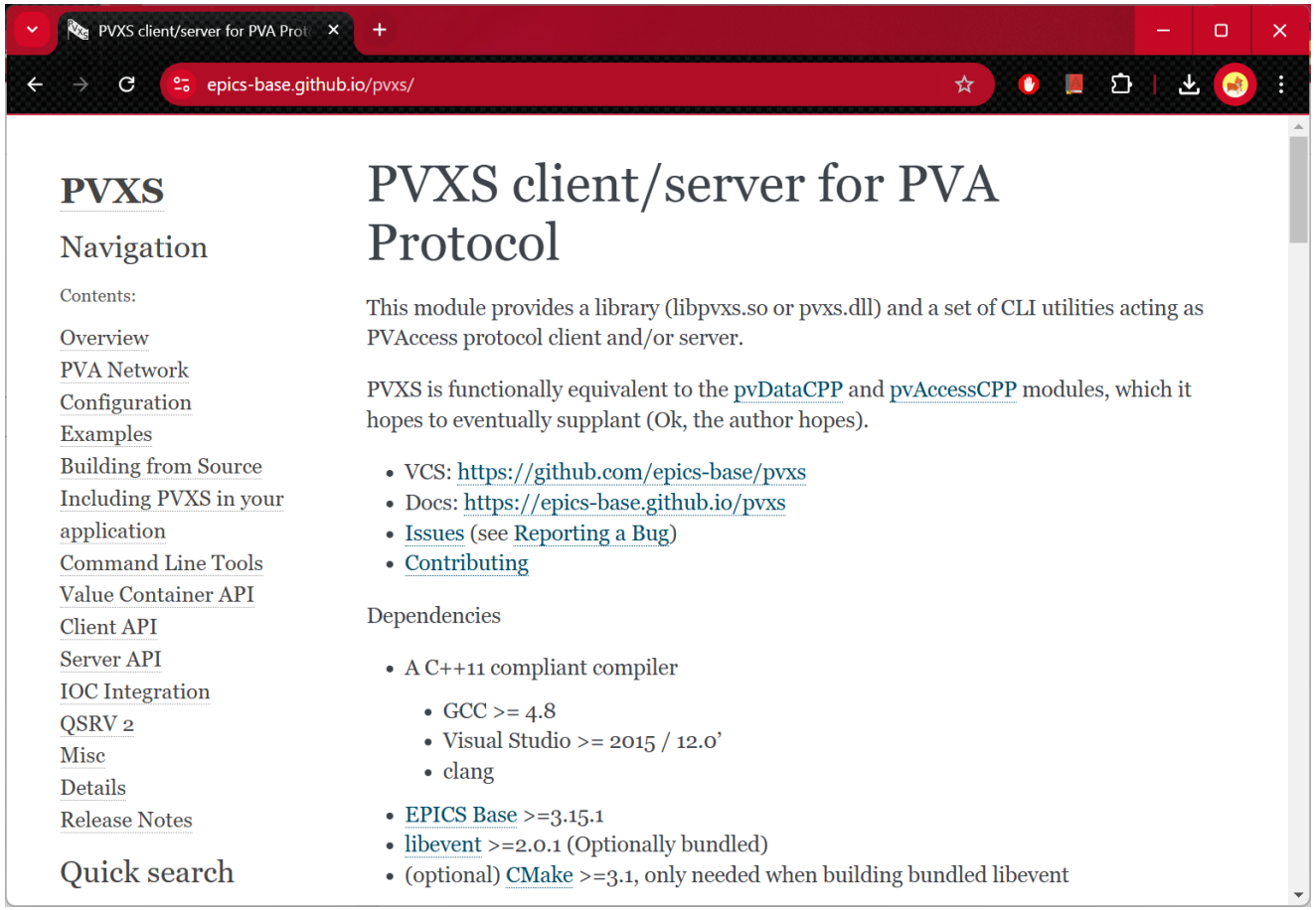
- EPICS provides a C API methods for accessing channel access features
  https://epics.anl.gov/base/R3-14/12-docs/CAref.html
- CA Wrapper - C# library that wraps the methods provided by ca.dll to communicate with the process variables (PV) available over the network



Future Work

- .NET PV Access Wrapper

  using the pvxs library



Thank You !

Any questions?

Feel free to contact me at

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