EPICS Laser Control System GUI using Blazor

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Introduction

The software team at Central Laser Facility (CLF) is currently engaged in the development of a new Graphical User Interface (GUI) for the Extreme Photonics Applications Centre (EPAC). Apart from a modern look and feel, our GUI software will enable cross-platform use across Windows, Linux, Apple Mac and mobile devices, offering users, a well-designed, secure, easy to use and accessible laser control system.

Background

Traditionally, the control system GUIs for EPICS are built using a combination of different tools such as CS-Studio or its most recent iteration, CS-Pheobus. Consequently, this approach resulted in a fragmented landscape of various programming languages and frameworks. However, Blazor enables the developers to write back-end and front-end code using the same programming language. In this case C#, a modern type-safe, high level programming language.

To enable all of this, over the last couple of years, the CLF Software Controls team has built an ecosystem of libraries which support C# to EPICS communication. In collaboration with the Technology group at Daresbury we have built C# Channel Access libraries.

Building a Blazor application

The CLF has built a collection of Blazor Components which can be easily embedded into a Blazor application as a plug-n-play widgets. This encompasses all the essential laser controls system widgets such as LEDs, textboxes, graphs, camera image viewers, motion indicators… etc. In keeping with EPICS standards, this library allows developers to specify the PV (Process Variable) name, and the components will automatically update themselves on connection state or value change in real-time. Unlike CS-Pheobus, our widgets do not need hidden scripts. All complex logic is done at the C# level, using modern Model View View-Model (MVVM) standards of separating the business logic from the UI. Hence, going forward our control system software will be easy to debug and test.

Furthermore, as Blazor benefits from the existing ecosystem of Microsoft .NET libraries, we have incorporated a well-managed and secure Azure based authentication. We have been working with STFC's Digital Infrastructure (DI) on enabling login and authorisation using the site wide FED IDs and multi-factor authentication.

Conclusion

Overall, our new Blazor based control system GUI provides a modern, streamlined, and secure control system which can be rolled out with any EPICS installations we support across the CLF.

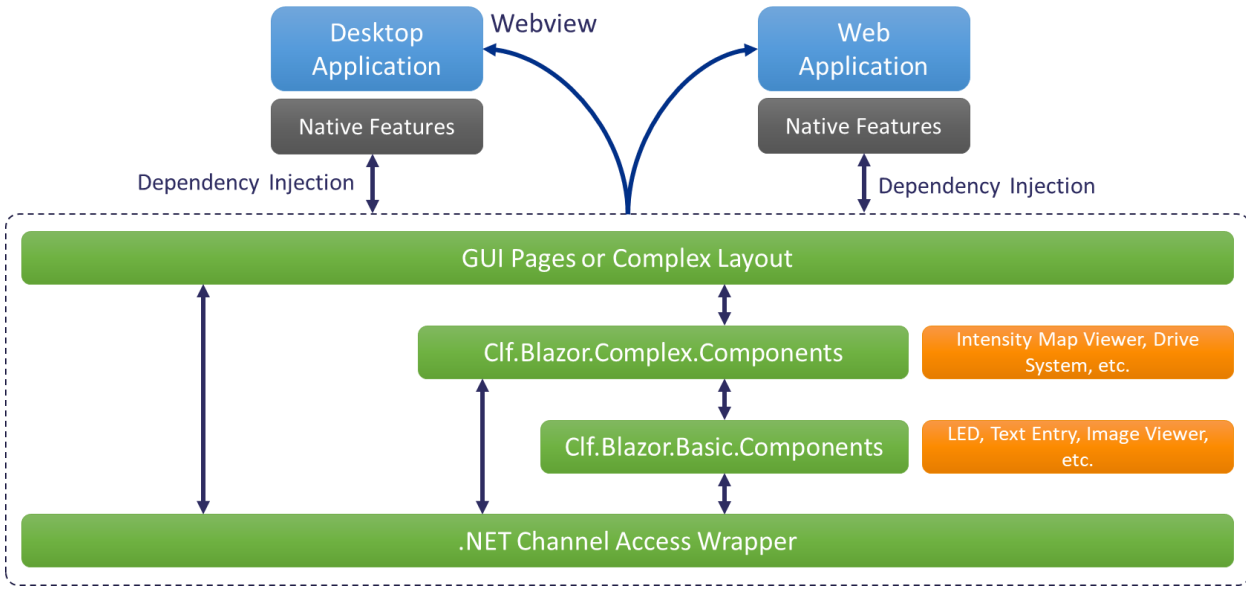

Figure 1: Architecture of the Control system user-interface application for EPAC

Figure 2: The summary view of the Front end for the Pump Laser in EPAC