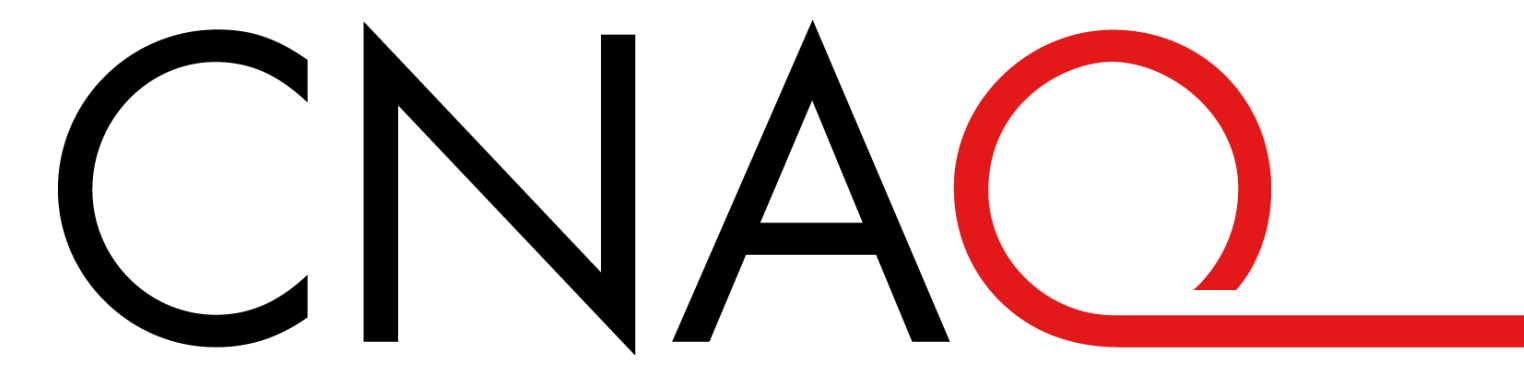# Light ion therapy software for data exchange

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Abstract

CNAO (National Centre of Oncological Hadrontherapy) is a facility for the treatment of tumors with carbon ions and protons using a synchrotron accelerator. The initial design documents for the control system of the accelerator were written in 2003, with the development starting in 2004, and finally, it was fully operational in 2011.

Framework2020 will allow present and future software applications to interconnect in CNAO's complex and widely distributed control environment. The project involves the specification of protocols for data exchange, discovery of devices, as well as libraries to support application development. This poster presents Framework2020's architecture, some of its components, and a set of applications to be developed in this project using the framework.

Framework2020

Framework2020 aims to provide a standardized platform for development of desktop and mobile applications on CNAO's control system slow environment. Framework2020 has been developed using the Xamarin framework, allowing applications developed on .Net target Windows and Android platforms.

Framework2020 libraries implement the communication between slow environment applications and all other components in the control system, ensuring standardized access ensuring the implementation of the necessary security measures.
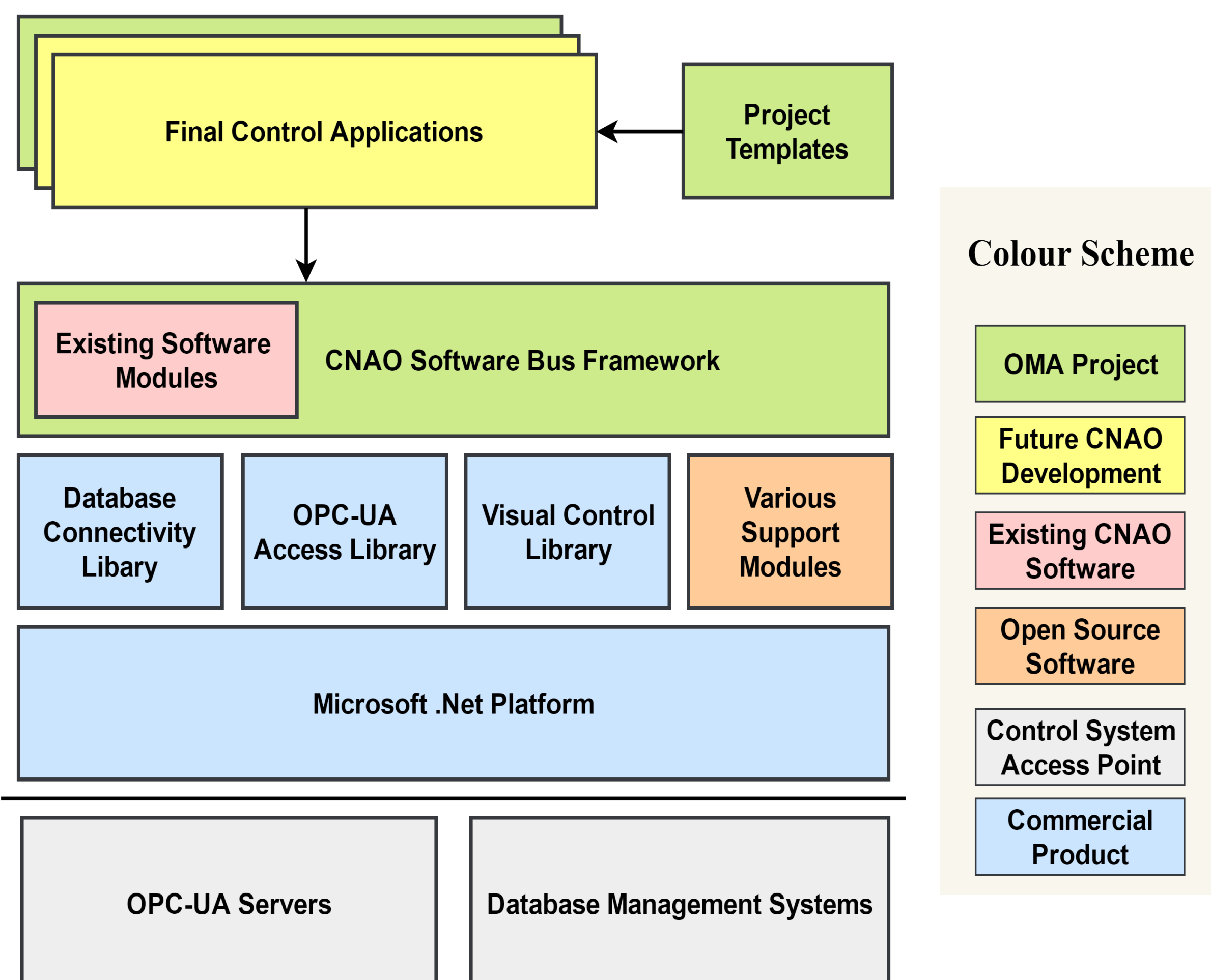

Fig1. Diagram of Framework2020's software stack.

Planned Flagship Applications

In order to provide future developers with concrete examples of applications developed with Framework2020, flagship applications are expected to also be developed during the project.

One such application is an Accelerator Cycle Event Designer, which aims to provide a visual designer for designing accelerator cycles. Other planned applications are a new patient scheduling system information client, and a resource authorization management application.

Framework2020 Application Architecture

The main quality attributes Framework2020 seeks to improve over the previous generation of slow environment applications are separation of concerns, maintainability, and security.

Control system applications developed using Framework2020 should follow a pre-defined reference architecture.
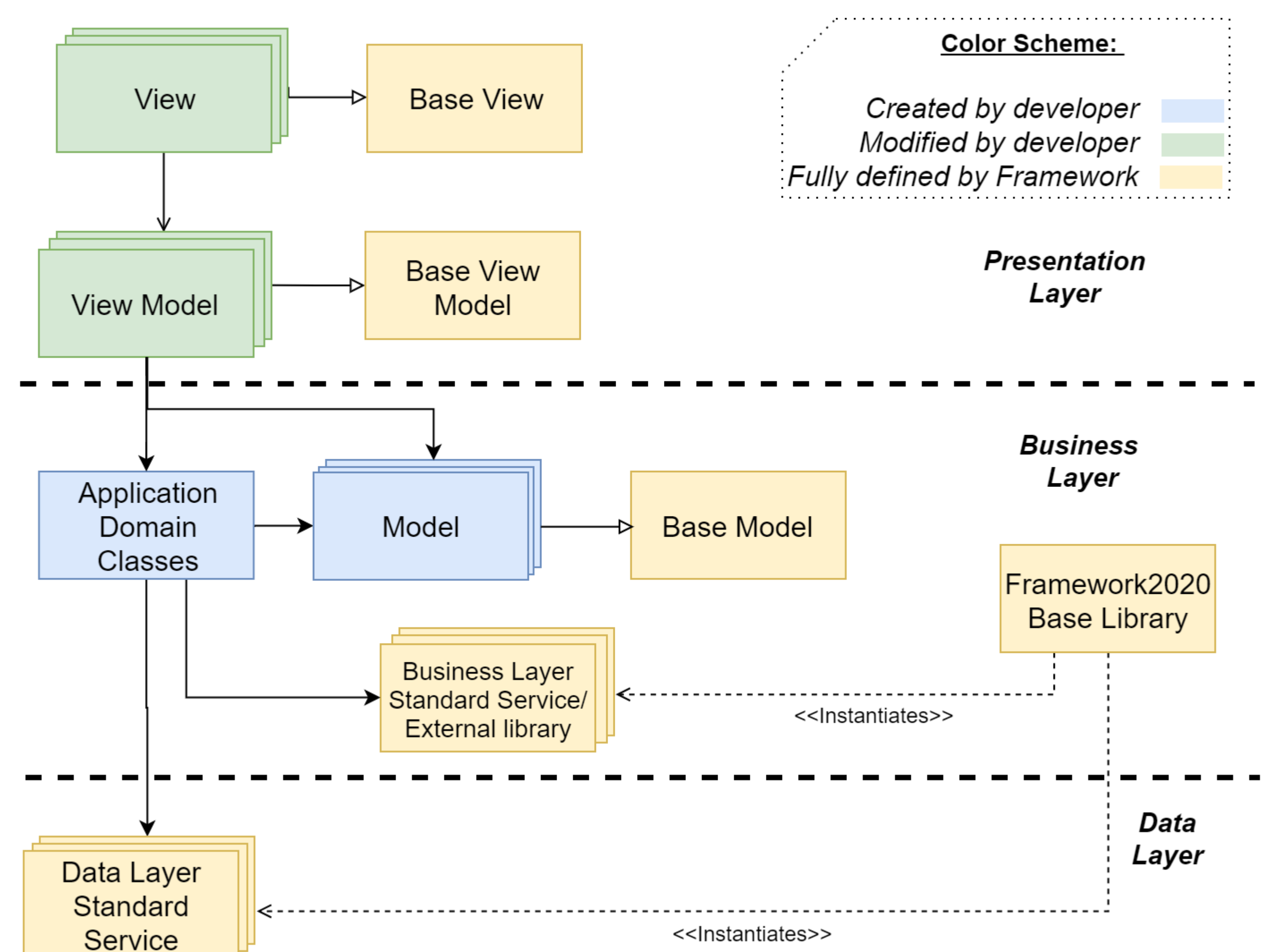

Fig2. Software architecture of a Framework2020 application.

Medical Software Certification

By isolating a series of applications that contain similar requirements, and developing libraries to standardize common operations, one of the main objectives of Framework2020 is to minimize the lengthy medical software certification process.

Certification of Framework2020's libraries and modules should produce artefacts that can be used as the basis for several tasks of the final application's certification process.

Additionally, by adopting the reference architecture, design documentation provided alongside the architecture can be used for documenting the final application. Additionally developers use the architecture to argue that the application contains an effective separation of concerns between services and business layer classes.

References

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