EPICS: CSS-Phoebus

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EPICS Alarm System in Phoebus

I am developing an EPICS alarm system based on CS-Studio Phoebus. Phoebus will be used for new EPICS system development and will replace the existing Eclipse-based CS-Studio systems as detailed in my note DSG Note 2021-37 and talk DSG Talk 2021-17.

A new production release of CS-Studio Phoebus is now available. CS-Studio Phoebus 4.6.10 incorporates the latest features of all the Phoebus apps. In addition, it now supports the latest versions of the support programs such as Kafka and Apache Maven. The Phoebus versions before 4.6.10 required the use of outdated support programs that did not allow updating of the operating system. Figure 1 shows the sections of the code that are being updated.

I started the rebuild by installing and testing the latest version of Kafka ZooKeeper and Kafka server (2.13-3.2.0). Kafka hosts the alarm system message streams that is used to communicate between all sections of the alarm code. I wrote and tested the scripts that implemented the message streams specific to NPS.

I tested my code for Kafka Zookeeper by verifying the correct management of the server and generation of logfiles. I tested the code for Kafka server by verifying the correct generation of the three Phoebus alarm system Kafka streams.

Next Apache Maven was updated. Maven 3.8.6 is the project management tool used to build Phoebus from source code. After updating Maven, I used it to build the Phoebus core program and the Phoebus apps. After compiling each section of code (called a unit), Maven runs a unit test on that section to verify proper operation. I wrote scripts that customized menus and applications specific to NPS as shown in figure 2 and figure 3.

- **Developing CS-Studio Phoebus based controls, monitoring, and alarm system - to be implemented on Hall C detectors**
- **System rebuild to the latest release of CS-Studio Phoebus from source code**
- **Plan to develop a high PV signal count IOC for the Phoebus test station**

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I tested the sections of the upgrade shown in figure 1 using my host-based softIOC detailed in DSG Note 2022-06 to perform an integrated alarm system software test of the development work I have accomplished.

The synopsis for each of the alarm system upgrade verification tests is summarized in Table 1.

Program Name	Upgraded to version	Program Function Summary	Upgrade Verification Test Summary
Apache Maven	3.8.6	Project management tool used to build Phoebus from source code	• Tested the upgrade by building version 4.6.10 of CS-Studio Phoebus from source code. All unit tests worked correctly.
Kafka Zookeeper	2.13-3.2.0	Kafka cluster system management	• Tested the upgrade by verifying correct management of the server and generation of logfiles.
Kafka server	2.13-3.2.0	Hosts the alarm system message streams	• Tested the upgrade by verifying the correct generation of the three Phoebus alarm system Kafka streams.
Kafka message monitoring	2.0	Monitors the health of the Kafka system	• Tested the upgrade by verifying the correct syntax and operation of the state, configuration, and command Kafka streams.
Alarm server	4.6.10	Monitors EPICS process variables (PVs) for alarm conditions via channel access. Stores alarm configuration settings for each PV.	• Tested the monitoring of PVs from test IOC, alerts users and latches PV value and time upon an alarm condition. • Verified monitoring and UI settings /read-back values for alarm severity, PV alarms on HIHI, HIGH, LOW, LOLO conditions. • Tested alarm acknowledgment, PV alarm configuration, PV status indicators.
Alarm server monitoring	2.0	Monitors the health of the alarm server	• Verified the server correctly reports PV alarm configurations stored in server
Alarm system user interface	4.6.10	User alarm monitoring and system configuration	• Tested the UI control and monitoring of IOC and Phoebus alarm system.

Table 1. Program Upgrade Summary

I plan to design and implement a high PV signal count IOC for the test station as the next step in the development of the Phoebus alarm system.

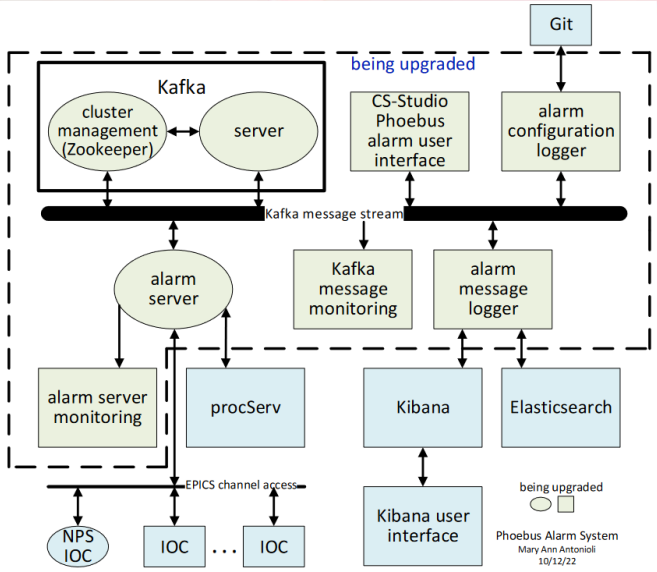

FIG.1. Sections of code being upgraded to latest version

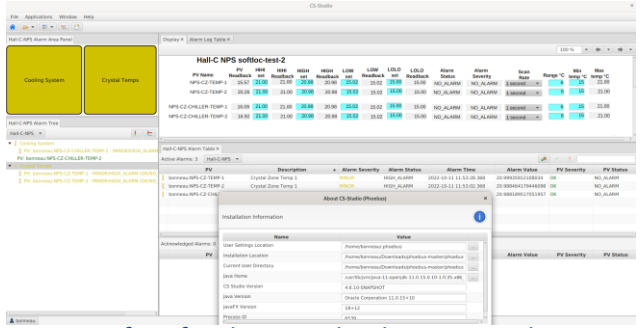

FIG.2. User Interface for the NPS Phoebus 4.6.10 Alarm Test System

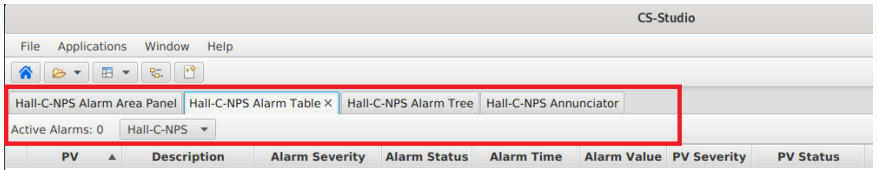

FIG.3. Custom Phoebus 4.6.10 Alarm System User Interface for Hall C NPS