

EPICS: CSS-Phoebus

Peter Bonneau

2023-03

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.

A new production release of CS-Studio Phoebus is now available. CS-Studio Phoebus 4.7.1 incorporates the latest features in all of the Phoebus applications. In addition, it now supports the latest versions of the support programs such as Apache Kafka and Apache Maven. The older versions of Phoebus used for alarm system development required the use of outdated support programs that did not allow updating of the operating system.

I started the Phoebus alarm development computer system upgrade by installing and testing the latest versions of Apache Kafka ZooKeeper and Kafka server (2.13-3.3.1). The Apache Kafka programs host the alarm system message streams that is used to communicate between all sections of the alarm code.

I wrote and executed the scripts that implement the alarm system Kafka message streams that are specific to the Phoebus 4.7.1 version. 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 message streams.

As a prerequisite for the Phoebus build from source code, I wrote scripts that customize the menus and applications during the build that are specific to alarm test system as shown in figure 1 and figure 2.

Next I updated Apache Maven. Maven 3.9.0 is the project management tool used to build Phoebus from source code. Once the Maven upgrade was completed, I used it to build the Phoebus core program and the Phoebus applications. After compiling each section of code (called a unit),

- **Developing CS-Studio Phoebus based controls, monitoring, and alarm system**
- **Update of development system to the latest release of CS-Studio Phoebus from source code**

EPICS: CSS-Phoebus

Maven runs a unit test to verify proper operation of the code in that section.

To verify the upgraded system, I tested the Phoebus applications and alarm core programs. Using the Phoebus alarm test system I developed, the softIOC ([DSG Note 2022-06](#)) performed an integrated system software test ([DSG Note 2023-06](#)) of my development work.

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

Program Name	Installed version	Upgraded to version	Program Function Summary	Upgrade Verification Test Summary
Apache Maven	3.8.6	3.9.0	Project management tool used to build Phoebus from source code	<ul style="list-style-type: none"> Tested the upgrade by building version 4.7.1 of CS-Studio Phoebus from source code. All unit tests worked correctly.
Kafka Zookeeper	2.13-3.2.0	2.13-3.3.1	Kafka cluster system management	<ul style="list-style-type: none"> Tested the upgrade by verifying correct management of the server and generation of logfiles.
Kafka server	2.13-3.2.0	2.13-3.3.1	Hosts the alarm system message streams	<ul style="list-style-type: none"> Tested the upgrade by verifying the correct generation of the three Phoebus alarm system Kafka streams.
Kafka message monitoring	2.0	3.0	Monitors the health of the Kafka system	<ul style="list-style-type: none"> Tested the upgrade by verifying the correct syntax and operation of the state, configuration, and command Kafka streams.
Alarm server	4.6.10	4.7.1	Monitors EPICS process variables (PVs) for alarm conditions via channel access. Stores alarm configuration settings for each PV.	<ul style="list-style-type: none"> 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	3.0	Monitors the health of the alarm server	<ul style="list-style-type: none"> Verified the server correctly reports PV alarm configurations stored in server
Alarm system user interface	4.6.10	4.7.1	User alarm monitoring and system configuration	<ul style="list-style-type: none"> Tested the UI control and monitoring of IOC and Phoebus alarm system.

Table 1. Program Upgrade Summary

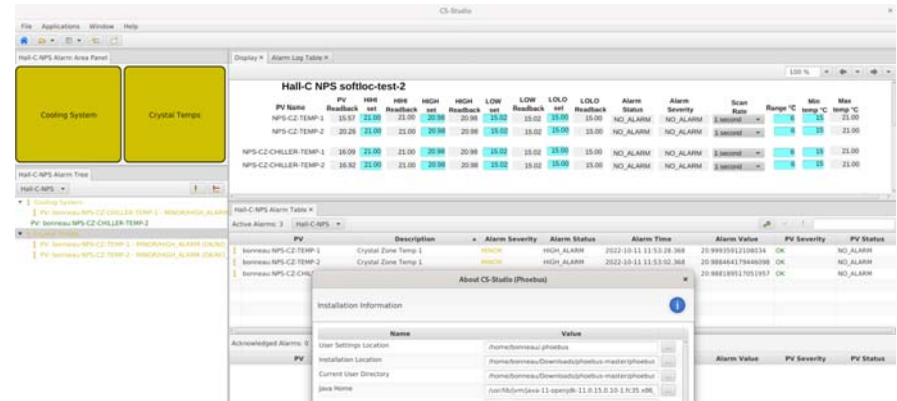


FIG.1. User Interface for the Phoebus 4.7.1 Alarm Test System

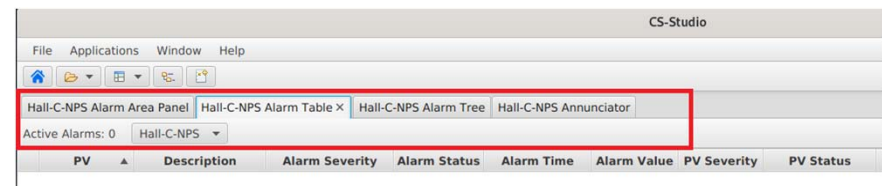


FIG.2. Customized Phoebus 4.7.1 Alarm Test System User Interface