Upgrade of CS-Studio Phoebus and Alarm System Core Support Programs

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The CS-Studio Phoebus alarm system development computer has been upgraded to the latest version of Phoebus and the alarm system core support programs. The updates have been successfully configured, installed, and tested.

The Linux computer system hosting the CS-Studio Phoebus alarm system being developed [1] has been upgraded to the latest production release of CS-Studio Phoebus 4.7.1, which incorporates the most recent features of all Phoebus applications and which supports the latest versions of the alarm system core support programs Apache Kafka and Apache Maven. A summary of the programs upgraded on the alarm system development computer is shown in Table I.

The software upgrades require writing configuration scripts, installing, and testing the 2.13-3.3.1 versions of Apache Kafka ZooKeeper and Kafka server. The Apache Kafka programs host the alarm system message streams that are used to communicate between all sections of the alarm code.

The Kafka configuration scripts execute once during the upgrade and generate the initial Phoebus alarm system interprocess communication infrastructure by implementing the specific Kafka message streams for the Phoebus 4.7.1 version of the alarm system. Kafka Zookeeper was checked by verifying whether the management of the server and generation of log files were correct. Kafka server was checked by verifying whether the generation of the three Phoebus alarm system message streams were correct.

As a prerequisite for the build from source code, Phoebus configuration files were written to define the alarm system operating parameters. In the *alarm_preferences.properties* file, settings and options such as the name of the alarm server, communication port numbers, time-out limits for EPICS process variables (PVs), and customization of the alarm user interface menus, Fig. 1, were defined.

Program name	Installed version	Upgraded version	Program function summary
Apache Maven	3.8.6	3.9.0	project management tool used to build Phoebus from source code
Kafka Zookeeper	2.13-3.2.0	2.13-3.3.1	manages Kafka cluster system
Kafka server	2.13-3.2.0	2.13-3.3.1	hosts alarm system message streams
Kafka message monitoring	2.0	3.0	monitors Kafka system health
Alarm server	4.6.10	4.7.1	monitors EPICS PVs for alarm conditions via channel access; stores alarm configuration settings for each PV
Alarm server monitoring	2.0	3.0	monitors alarm server health
Alarm system user interface	4.6.10	4.7.1	user alarm monitoring and system configuration

TABLE I. Program upgrade summary.

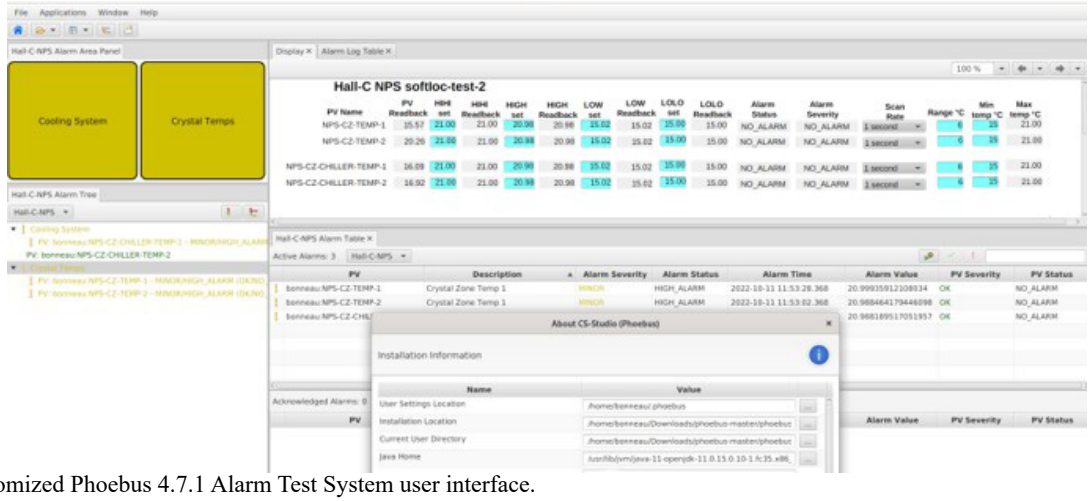

FIG. 1. Customized Phoebus 4.7.1 Alarm Test System user interface.

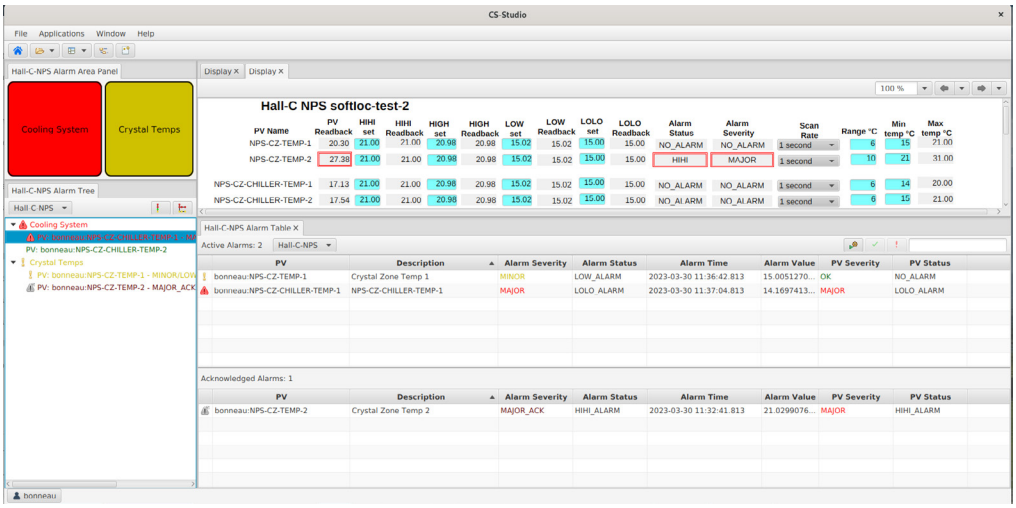

FIG. 2. User interface for the Phoebus 4.7.1 Alarm Test System.

Apache Maven 3.9.0 is the project management tool used to build Phoebus from source code. Once the Maven upgrade was completed, it was used to build the Phoebus core program and applications. After building each section of the Phoebus source code (called a unit), Maven runs a test of the unit to verify the proper operation of code in that section. Upon completion, the 13K+ line build log file was reviewed. No errors were reported in the log file.

To verify the correct operation of the build, the Phoebus applications and alarm core support programs were tested, first the automated startup sequencing of the alarm system core support programs [2]. Next, using the Phoebus alarm test system softIOC [3], and the user interface for the alarm test system, Fig. 2, a series of tests [4] were run on the alarm system development computer. All tests passed.

In conclusion, the CS-Studio Phoebus alarm system development computer has been upgraded to version 4.7.1, as have the alarm system core support programs. The upgrades have been successfully configured, installed, and tested.

[1] P. Bonneau, et al., *Proposal to Implement Alarm System in Control System Studio Phoebus for the Hall C Neutral Particle Spectrometer*, DSG Note 2021-37, 2021.

[2] P. Bonneau, et al., *Automated Startup and Sequencing of the CS-Studio Phoebus Alarm System Core Programs*, DSG Note 2022-16, 2022.

[3] P. Bonneau, et al., *Development of the EPICS Software Input/Output Controller for Testing the Phoebus Alarm System of the Hall C Neutral Particle Spectrometer*, DSG Note 2022-06, 2022.

[4] P. Bonneau, et al., *Testing of the CS-Studio Phoebus Applications and Alarm System Core Programs*, DSG Note 2023-06, 2023.