AIDA-2020-MS33

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Advanced European Infrastructures for Detectors at Accelerators

Milestone Report

Environmental control system hardware installed

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Advanced European Infrastructures for Detectors at Accelerators

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MILESTONE REPORT

ENVIRONMENTAL CONTROL SYSTEM HARDWARE INSTALLED

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Abstract:

More and more system tests are being conducted in the DESY-II Test Beam Facility, culminating in the test of an entire slice of the BELLE-II tracking system and the test of an engineering prototype of the CALICE AHCAL. All these tests require logging of all environmental parameters in the detector as well as in the experimental area. As part of the upgrade of the facility, a central monitoring system will be set up with a suite of sensors and software to readout and to integrate this into the slow control system of the user group. This would provide all user groups with a ready-to-use and reliable logging system centrally maintained and supported by DESY.

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Delivery Slip

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Executive summary

More and more system tests are being conducted in the DESY-II Test Beam Facility, which require logging of all environmental parameters in the detector and as well as in the experimental area. As part of the upgrade of the facility, a central monitoring system will be set up with a suite of sensors and software to read out and to integrate this into the slow control system of the user group.

The user requirements were discussed at several general AIDA meetings and also with user groups doing test beam campaigns at DESY. At the end of this process, a set of requirements was defined.

The decision was made to buy an industry-grade slow-control system from Ahlborn. Several of these systems are already in use on the DESY campus and there is existing experience in using both the hardware and the associated software.

The hardware has been purchased and is currently being assembled and installed at DESY..

1. INTRODUCTION

More and more system tests are being conducted in the DESY-II Test Beam Facility, culminating in the test of an entire slice of the BELLE-II tracking system and the test of an engineering prototype of the CALICE AHCAL. All these tests require logging of all environmental parameters in the detector and as well as in the experimental area. Currently the visiting groups try to maintain their own solutions and have difficulties integrating in a common DAQ like EUDAQ.

As part of the upgrade of the facility, a central monitoring system will be set up with a suite of sensors and software to read out and to integrate this into the slow control system of the user group. This would provide all user groups with a ready-to-use and reliable logging system centrally maintained and supported by DESY. This would then also tremendously simplify the integration of the slow control into a common DAQ like the EUDAQ

The user requirements where discussed at several general AIDA meetings and also with user groups doing test beam campaigns at DESY. At the end of this process, a set of requirements was defined (see Chapter 2).

2. THE SLOW CONTROL SYSTEM

2.1. GENERAL REQUIREMENTS

For the general test beam users, the availability of up to 100 channels per area is more than sufficient and, since this is a “slow-control” system, a readout speed between 10 s up to 1 min is deemed sufficient for the vast majority of the use cases.

As this is a permanent installation, this should be rack-based. The sensors can be moved around, but the core of the system needs to be kept together in one place. For each area, we can distinguish three distinct sets of sensors:

- Common Sensors, which we have in all areas
- Area-specific sensors
- User-configurable

A basic sketch of the planned system is shown in Figure 1.

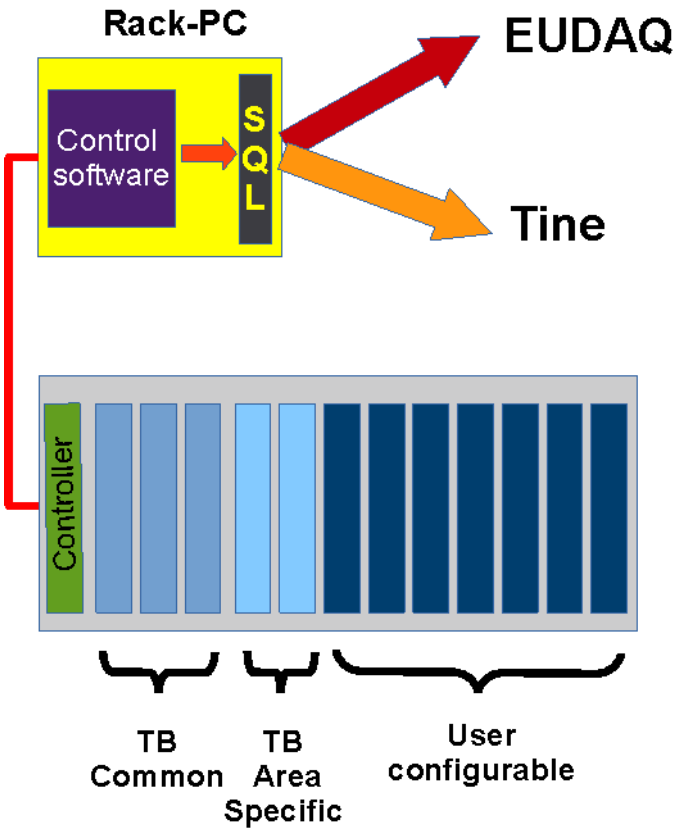

Figure 1 Schematic view of the proposed lLow Control System at the DESY-II Test Beam Facility,

Another important requirement was the use of already existing expertise and infrastructure at DESY, with the goal to significantly simplify long-term maintenance and support.

2.2. SENSORS

For each system, we foresee the use of common set of sensors, potentially a set of area-specific sensors and of course also user-specific sensors, which the users can choose according to their needs out of the pool of available sensors.

E.g. for each area, there will be Temperature, Humidity, Dew Point and Air pressure available, while a set of other sensors like CO_2 sensors or hall probes will be available if needed.

2.3. INTEGRATION IN EUDAQ

The data is stored by the control software into an SQL database, which can then be queried by a EUDAQ Producer[1] and the data can then be easily integrated in the Data stream. Having dedicated Slow-Control produces is now possible in both EUDAQ and EUDAQ2. Another requirement was the

[1] A EUDAQ Producer is the interface been the specific hardware and the central EUDAQ (Data logging, Run Control, Monitoring)

system should be easy to integrate in the general DESY Accelerator Slow Control System TINE[2], which is rather straightforward, as this has been done for other systems before.

2.4. LONG-TERM SUPPORT

Another important factor in the decision process was to use a system where there is existing expertise and infrastructure already existing at DESY, because we envisage, that this system will have a life-time way beyond the AIDA2020 project, long-term support and local expertise is then essential.

3. INSTALLED SYSTEM

Taking all the Requirements and considerations mentioned in Section 2 into account, the decision was made to buy an industry-grade slow-control system from Ahlborn. Several of these systems are already in use on the DESY campus and there is existing experience in using both the hardware and the associated software. The Ahlborn System e.g. also offers the possibility of cascading crates to extend the total channel count.

The core of the system is based on an ALMEMO 5690-1CPUBT8 [1] data logger which is accompanied by a suite of sensors. The Windows-based WinControl [2] package is installed on rack-mounted computers, which will be connected to the network. The users can then interact with the system using the remote-desktop functionality of Windows.

The data can be exported either locally to ASCII (CSV), Microsoft Excel files and further formats. Data can be exported to any SQL database proving ODBC[3] access or accessed via TCP/IP with a well-documented text-based protocol.

The hardware has been bought and is currently being assembled and installed at DESY.

4. REFERENCES

[1] Ahlborn, “ALEMO Data Logger Data Sheet,” 17 10 2016. [Online]. Available: http://www.ahlborn.com/download/pdfs/kap01/5690cpun.pdf. [Accessed 17 10 2016].

[2] Ahlborn, “WinControl DataSheet,” 17 10 2016. [Online]. Available: http://www.ahlborn.com/download/pdfs/kap05/WinControl.pdf. [Accessed 17 10 2016].

[2] http://adweb.desy.de/mcs/tine/

[3] Open Database Connectivity