CONTROL SYSTEM CONFIGURATION MANAGEMENT
AT PSI LARGE RESEARCH FACILITIES

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Abstract
At the Paul Scherrer Institute, the control system configuration is done in a uniform way for all large research facilities. To achieve this, a set of tools has been developed. This paper describes methodologies and processes used for the control system configuration management.

INTRODUCTION
The control system of the PSI accelerator facilities and their beamlines consists mainly of the so-called Input Output Controllers (IOCs) running EPICS. There are several flavours of EPICS IOCs at PSI running on different CPUs, different underlying operating systems and different EPICS versions. We have hundreds of IOCs which control the facilities at PSI. The goal of the Control system configuration management is to provide a set of tools to allow a consistent and uniform configuration for all IOCs. In this context the Oracle database contains all hardware-specific information including the CPU type, operating system or EPICS version. The installation tool connects to Oracle database. Depending on the IOC-type a set of files (or symbolic links) are created which connect to the required operating system, libraries or EPICS configuration files in the boot directory. In this way a transparent and user-friendly IOC installation is achieved. The control system expert can check the IOC installation, boot information, as well as the status of loaded EPICS process variables by using Web applications. Our implementation software runs on Scientific Linux derived from Red Hat’s Enterprise Linux.

CONFIGURATION AND INSTALLATION
Configuration files and all the software needed to run an IOC are created on the file system. The configuration for specific IOC functionality, (e.g. magnet power supply control system), is defined as a project which is stored using CVS (Concurrent Versioning System). An installation tool, swit [1], retrieves all related data for the IOC, (such as board and CPU architecture, operating system and EPICS version, etc.) from the Hardware Inventory Database [2]. Then swit collects the configuration files stored in the CVS, or in a developer’s directory, and installs the software needed to boot and run the IOC in its boot directory. A uniform IOC boot directory structure is used for all IOCs in large research facilities at PSI (GFA). The installation data flow can be seen in Fig. 1.

Figure 1: Configuration and IOC(s) installation data flow. swit gets the configuration from the file system or from the CVS repository, connects to the Hardware Inventory database for IOC’s specific information and installs the software into the IOC boot directories.

HARDWARE INVENTORY DATABASE
Information about the hardware components is stored in a hierarchical way in a Hardware Inventory Database [2]. The hierarchy facilitates the work flow in which requested hardware components are ordered, labeled, delivered and finally installed. This procedure automatically keeps track of all components used. Inventory data can be modified or viewed by using a Web interface [3]. An example of a user interface representing a VME crate containing several types of cards plugged in the front- and the back-side can be seen in Fig. 2. Moreover, the system stores for each component, a set of attributes, (e.g. location, price, purchase date, test information, etc.). In the case of an IOC there is host related information, for example host name, operating system, EPICS version, as well as information about network and serial connections useful for IOC boot parameters setup and/or for IOC remote access.

The Hardware Inventory Database is to some extend managed manually by the Controls section members. On the other hand data are also automatically collected from the file system by using dedicated programs or by connecting to the standard PSI tools [4].
There are several aspects of information. First, activities on the IOCs installation are automatically logged by `swit` [1] and can be visually inspected via a Web interface.

Next, during the boot process, information such as boot date, directory and boot server name, as well as operating system and EPICS version, is automatically stored in the database. Users can view the information by using the Web interface integrated into the Hardware Inventory Web application, as seen on Fig. 3. They can also use a command-line script which supplies information in a text form.

Finally, after booting, all EPICS PVs loaded on an IOC, are stored automatically in the database. Their names, values, record types, alarm status and load date can be seen by using dedicated Web interface [5] seen in Fig. 4. In this way control system experts can check loaded EPICS PVs on all installed IOCs. Scalar values are accessible for live update as well.

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REFERENCES