

# Database Driven Control System Configuration for the PSI Proton Accelerator Facilities

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At PSI there are two facilities with proton cyclotron accelerators. The machine control system for PROSCAN which is used for medical patient therapy, is running with EPICS. The High Intensity Proton Accelerator (HIPA) is mostly running with the in-house control system ACS. The control of dedicated parts of HIPA runs already with EPICS. Both these facilities are configured through an Oracle database application suite. This paper presents the concepts and tools which are used to configure the control system directly from the database-stored configurations. Such an approach has advantages which contribute for better control system reliability, overview and consistency.

### Oracle database architecture for HIPA/PROSCAN

- PRODB**
  - + Device Reference
  - + Epics configuration
  - + Archiver
  - + Interlock
- HIPADB**
  - + Device Reference
  - + Epics configuration
  - + ACS configuration
  - + Archiver
  - + Interlock
  - + Beamline Reference
- GFAPRD**
  - + EPICS (PVs)
  - + Inventory
  - + ..

GFADDEV // Test

- HIPA /-PROSCAN has its own db-instance
- GFAPRD contains data for all PSI facilities
- Oracle Database Version 11g

### Configuration Infrastructure

- HIPADB/PRODB
  - // Device Reference
  - // EPICS Configuration
  - // ACS Configuration
  - // Archiver
  - // Beamline Reference
- WebForms
- Technology
  - Oracle WebForms
  - PLUSQL
  - Java Stored Procedures
  - php, bash scripting
  - Oracle Reports
- Deployment Server
- CoreDBLIB
- Control system
- NFS/AFS file system

- a prescriptive method with Oracle Webforms
- basic configuration data for IOCs and applications are entered in the web interface
- Configuration files are deployed on to Control systems NFS shared file system

### EPICS PV database

<DEVICE-PROPERTY>, IOC-name,timestamp

- GFADBServer
  - // HIPA-records
  - // PROSCAN-records
  - // SLS-records
  - // SWISSFEL-records
- IOC BootServer
  - //Startup-script
  - //iocBootNotify
- Database Tools
  - findrecords,duprecords
  - capy-view
  - https://inventory.psi.ch
  - https://epics-info.psi.ch
  - Device Browser + Reports

- EPICS records are created at IOC boot process and loaded into database tables
- The information is queried by several database tools

<sup>1</sup> HIPA= High Intensity Proton Accelerator complex    <sup>2</sup> PROSCAN= medical patient therapy

### Epics Template Editor

Macro-definition (\$DEVICE)

Template pool    DriverConfig-mapping

EPICS records    EPICS record fields

- Changes in templates requires reconfiguration of all connected IOCs. Import of plain text files is supported.

### IOC Configuration Setup

Configuration slot

IOC Information    DriverConfig(p1,p2,...)

Parameter description    Substitution info

- Configuration slot is identified by a name ,require statment, driverConfig(p1,p2) + vme slot addressing

### Macro Substitution Editor

Device Reference    EPICS Template

IOC configuration slot

Device

Macro values    Query By IOC, Template

- For a given a Device the IOC configuration slot is mapped to the corresponding EPICS Template

### Workflow

Database Entry

Generate & Deploy

Reboot | Restart

Verify Data Access

### EPIC IOC installation

Select one or more IOCs

After Reboot the current EPICS PVs may be verified e.g epics-info.psi.ch

- generate startup scripts plus substitution file
- deploy it to the IOCs Bootserver file system

### Archiver configuration

Record name (Device:Property)

Record availability

Device Reference

Interval/period

All Records which are marked for archiving are listed into a dedicated configfile and the archiver can be restarted after update