

Monitor and Control for PEFP System using EPICS

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1. Introduction

The construction of PEFP project whose final objective is to build 100 Mev proton accelerator started in 2002 and expected to finish in 2012. In 2005, we have performed 20mA proton beam of 20Mev. For developing the control systems of the 20Mev accelerator as well as 100 Mev accelerator, we chose EPICS(Experimental Physics and Industrial Control System)[1] as the most suitable tool. We have studied EPICS applications for various situation and as the application we developed vacuum control system using EPICS base3.14.4 as the core software and EPICS extensions (e.g., EDM(Extensible Display Manager), MEDM(Motif Editor and Display Manager) etc.)[2] As the user interface.

There are a number of projects using EPICS for a broad spectrum of applications. EPICS began as a collaboration between Argonne National Laboratory and Los Alamos National Laboratory in 1991, building on work that was initially done at the ground test Accelerator[3]. It is now running on accelerators that have as many as 180 distributed front-end controllers and control rooms with 20 consoles and a gateway to make system parameters available to offices, web site, and other remote control stations. It is also used at single controller and one workstation systems.

We use the EPICS tool kit as a foundation of the control system. We developed a vacuum monitor, RFQ, DTL Turbo pump control system for use Ethernet Multi Serial Deice Servers on PEFP control system. The control system now shows stable and reliable characteristics enough to meet our control requirement. However, the control system is continuously being upgraded to accommodate additional control requirements such as vacuum device control.

2. PEFP Control System

EPICS run-time database on the IOC(Input Output Controller) and CA(Channel Access) constitute the core of the EPICS software. EPICS client software accesses the record in this run-time database using the logical name of the record. Read and write accesses to the EPICS run-time database form the EPICS client software triggers the access to the hardware from the IOC. User of EPICS only needs to supply hardware

specific routines. Hardware driver and device support routines. Epics core soft also includes programs such as:

Scanner to scan the status of hardware in the way specified by the user

CA server to handle the database access request from the client program. Configuration files prepared by the user define the actual behaviours of these programs. The figure 1 has showed such process.

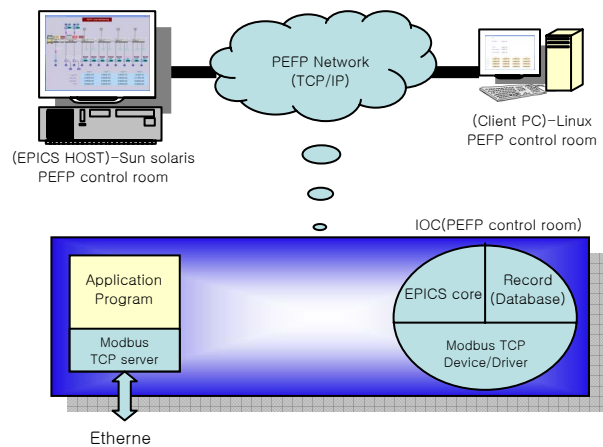


Figure1. Structure of PEFP control software

The EPICS BASE R3.13.X runs the IOC(Input Out Controller) on the vxWorks realtime operation system, but the EPICS BASE R3.14.x supports the multiple operation system. The PEFP control system is considered the stability of control system, we have developed using EPICS in Sun Solaris workstation.

The EPICS is begun the UNIX environment system. We are begun also the UNIX environment system. If we install the EPICS in Solaris system

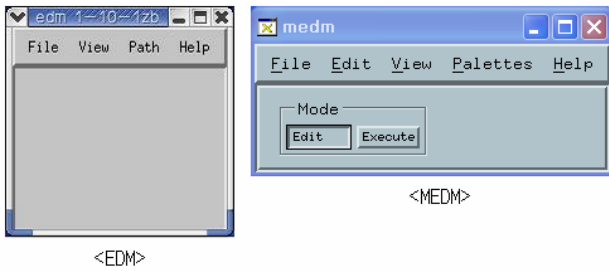
If EPICS Extensions installs in Solaris system, it must compile extensions config files (for base R3.13.x). We must modify the RELEASE file under config directory. For example, BASE path is <top>/usr/local/epics/base.

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EPICS_BASE=/usr/local/epics/base
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We have installed MEDM, EDM of Extensions tool. It is installed under Extensions directory. The following figure is the EDM and MEDM screen.

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<EDM>

Figure2. Screen of EDM and MEDM

The two display tool has similar functions, but we use EDM tool. Because operator requires easily to understand and see the control screen.

The main objective of this control system is to allow accelerator operators to view and control all accelerator subsystems (e.g. vacuum, RF control, timing system, cooling device, etc)

In designing a control system for a large facility like Proton Accelerator, what is the most important and difficult to be controlled the each system. In addition to operating the machine, the control system should supply extra functions such as monitor and control the many control system. For a large facility, it is usual that the components are a collection of various - sometimes even inconsistent - kinds of hardware or software. In this situation, we should find a way to design a consistent control system which applies to all components and which is also secure, accurate and easily expandable.

The following figure is the vacuum monitor, RFQ, and DTL Turbo pump control. It is running at accelerator device for control.



Figure3. PEFP control screen using EDM

3. Conclusion

The vacuum monitor, RFQ, and DTL Turbo pump control system is installed in control room. The Software development/improvement will be continued until, long-term operational experiences even after it. The Designing EPICS database template for each hardware device will be the major effort in the software development. We are upgrading and modifying the control system to accommodate new control requirement and to apply long-term operational experiences.

REFERENCES

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- [2] <http://www.aps.anl.gov/epics/extensions>
- [3] L. R. Dalesio, 2001. EPICS: Recent Application and Future Directions. PAC, Chicago, pp. 276-278