

LivEPICS – An EPICS Linux Live CD for small applications, training and fly tests

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I. INTRODUCTION

EPICS is a software tool-kit originally developed at Los Alamos National Laboratory and Argonne National Laboratory for the control of accelerators and large experiments. Since the version R3.14.1, released in 2002, EPICS was ported to different hardware and software environments and now it is available for many kinds of processors and operating systems.

Despite the installation of EPICS is usually done by a well proven set of automatic procedures, its configuration is not always straightforward for a beginner. To help a new user to get familiar with EPICS tools without installing them on the hard disk, we developed a Linux based live CD that includes most of the EPICS features.

LivEPICS is a bootable CD, which contains a pre-configured EPICS development environment. After booting, the user can access all the utilities required to create a simple control application; at the end of the session he can save his application on a USB mass storage device.

II. EPICS BASICS

The basic idea underlying EPICS architecture is the implementation of a software bus. Process variables are declared, through a graphic tool, as records of a real time data base. The record properties define the method by which the record is processed: usually, a record is associated to a particular hardware device and processing a record means to call a device driver that acquires the variable and writes it in the data base. Record processing is realized by a software module named IOC. Once a variable is stored in the data base it can be accessed by multiple clients through a network infrastructure called Channel Access. Provided the device support for the hardware already exists, a control system can be designed and tested with no need of writing program code.

The toolkit includes a lot of utilities: i.e, the Motif Editor and Display Manager to generate graphic panels, the Alarm Handler, the Data Archiver, the Channel Access Probe and many interfaces to make available the data base variables to non-Epics applications.

III. LivEPICS FEATURES

LivEPICS is a Linux live CD that includes: Epics Base

(release R3.14.7), Extensions tools, introductory documents and manuals. It has the complete functionality to develop a small control system, but it is mainly intended for training classes or to monitor and supervise an EPICS network.

The goal of LivEPICS is:

- Allows to use EPICS without installation on the hard disk.
- Automatic setup of environment variables to compile and test new applications from scratch.
- Includes the basic tools (MEDM, VDCT, etc.) with the related documentation.

The `iocBaseApplication` (the utility that creates the directory structure necessary to develop an application) can be launched immediately after the boot. The OPI tool included in the CD is MEDM (Motif Editor and Display Manager), the alarm manager is AH (Alarm Handler) while the IOC database configuration tool is VDCT (provided by Cosylab). The Channel Access Probe is available to test the status of a record on the network. Asyn and MSI packages allow to create device support applications and medium-sized EPICS DataBases. The CD includes the following documents: Application Developer Guide, IOC Application Building, Record Reference Manual, Channel Access Manual, Channel Access Protocol, State Notation Language Manual.

To develop this live CD, we used, because of its reduced size, Linux SLAX (based on Slackware with kernel 2.6). The file system on the CD is SquashFS, a highly compressed read-only file system that is specifically designed for tiny Linux systems.

In the CD, the standard directory tree of the SLAX Linux filesystem is compressed to a standalone file; all files that constitute the EPICS base tree are installed, compiled and compressed to a module named EPICS-3.14.7-base_Asyn_msi_VDCT.mo not larger than 33MB. This directory structure significantly improves the access time to the files most frequently used in the development process.

CONCLUSIONS

We have created a bootable CD that can be useful for training or monitoring purposes. We also developed the driver support for a generic binary device connected to the PC parallel port to run a real demonstration of a control application.