New Linux-x86 EPICS drivers were developed for the VME-EVG230 and VME-EVR230 timing modules from Micro-Research Finland.

Building an EPICS over Ethernet instead of the VME bus has the following benefits:

- Drops the dead weight: The VME CPU card, the RTOS that runs on the CPU card along with any required licenses.
- Lowers the cost of implementation.
- Confines the required development skills to Linux/x86 platforms.

## Abstract

SESAME is a 2.5 GeV synchrotron light source under construction in Allan, Jordan. The control system of SESAME is based on EPICS and CSS. Various developments in EPICS drivers, clients, software tools and hardware have been done. This paper will present some of the main achievements: new Linux-x86 EPICS drivers and soft IOCS developed for the Micro-Research Finland event timing system replacing the VME/VxWorks-based drivers; new EPICS drivers and clients developed for the Basler GigE cameras; an IOC management and development driver developed to monitor the numerous virtual machines running the soft IOCs; and a new EPICS record type (mbbi2) developed to provide alarm features missing from the multibit binary records found in the base distribution of EPICS; a test of feasibility for replacing serial terminal servers with low-cost computers.

### TIMING SYSTEM DRIVER

![Figure 1: VME EVG230](image1)

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### BASLER GIGE CAMERA DRIVER & CLIENT

**Basler GIGE Camera Driver**

- **Purpose:** Speed up scientific analysis, system integration, needed image, gain, exposure, ROI, and trigger control
- **Record types:** bi, bo, lon, long, longout, waveform
- **Device support:** Asynchronous processing (I/O thread)
- **Driver support:** One thread per device, message passing
- **Device driver:** Shared C++ libraries from Basler

**Basler GIGE Camera Client**

- **Uses EPICS client framework**
- **Built using C, OpenGL, SDL, AntTweakBar and EPICS channel access libraries**
- **Provides an interface to control Basler camera parameters such as:** image size, offset, gain, ROI, exposure and trigger source
- **Provides different color maps**

### TERMINAL SERVER

- Terminal server is an experiment to provide simple serial to Ethernet converters using low cost computers.
- The software is running under minimal x86 or x64 Linux systems using libevent2 for asynchronous non-blocking communication.
- The software reads a configuration file and connects to a serial device and starts listening for clients on a TCP port.

### MBBI2 RECORD

- mbbi2 record is the same as an mbbiDirect record except for its ability to specify alarm states for individual bits.
- mbbi2 is used for devices which provide read access to status registers where different bits hold on/off status, others hold warnings and others hold interlock status.

### EPICS DATABASE CHECK TOOL (DB-CHECK)

- A command line tool built to help in reviewing, unifying and maintaining the numerous EPICS databases at SESAME.
- The way the db-check works is by parsing the DB and DBD files using a PEG grammar. The tool is built in D programming language and using pegged library for the parser.

### IOC MANAGER

- The control infrastructure at SESAME uses 12 virtual machines to run the different IOCs and 8 physical machines to run the clients and for development purposes.
- The IOC manager is a Linux/x86 EPICS driver developed for the purpose of managing all the machines that are part of the control infrastructure at SESAME.
- The IOC manager provides the following services:
  - Hostname and user of the IOC
  - Date, time, and uptime of the IOC
  - Drive, memory, and CPU utilization
  - Control over which IOCs to run
  - Enabling/disabling of the IOCs
  - Build system which synchronizes the IOC with the main Git repository

### Figures

- Figure 1: VME EVG230
- Figure 2: VME EVR230
- Figure 3: CSS Timing OPI
- Figure 4: Basler GigE camera client
- Figure 5: Camera client colours mapping
- Figure 6: Camera client colours mapping
- Figure 7: Terminal Server
- Figure 8: CSS IOC Manager OPI