ODC for the full LST installation

Nick Sinev

University of Oregon

Limitation of existing IFR ODC hardware

- 2 IOCs of MVME177 type (Motorola 68060 processor with 32 MB of memory) – ifr-mon and ifr-hv.

- IFR RPC HV system has controlled / monitored 100 HV channels in 5 CAEN crates. LST HV system needs to control / monitor 1600 channels (20 OSU HVPS boxes)

- So far we activated 7 OSU HVPS (560 channels), and we are at the limit of the ioc memory usage.

- Production of the MVME177 has been discontinued. The memory for this boards is extremely expensive.

Suggestions

- Use IOC based on PowerPC CPU. It has much larger memory and is faster than MVME177. It's production is unlikely to be stopped in the nearest future.

- Use another operation system in IOC. RTEMS is suitable operation system, which is distributed under GPL, so it is free, and it can run on the variety of CPUs, including PowerPC.

- To move to RTEMS we will need to migrate to EPICS 3.14.xx release (3.14.6 is the latest).

IOC components

Current ifr iocs

- CPU – Motorola 68060
- OS – VxWorks
- Epics core software (support for Epics database records) R3.13.6
- Board Support Package (BSP) to drive VME bus
- Hardware device support
  - CANbus
  - CAEN
  - SIAM
  - Struck scalars
  - VSAM

Suggested ifr-mon

- CPU – PowerPC
- OS – RTEMS
- Epics core software R3.14.6
- Board Support Package for VME bus is developed at SSRL
- Hardware device support
  - Only CANbus support is available now
  - We will not need CAEN HV, SIAM, VSAM and Struck scalars support for ifr-mon ioc
  - We will need CAEN V260 and V462 drivers, though

What is RTEMS and it's current status

- RTEMS = Real Time Executive for Multiprocessor System. (Initially M stood for Missile, then for Military and now for Multiprocessor)
- Open source philosophy.
- GNU General Public License (GPL)
- No export restrictions .
- Is used at SLAC (SSRL) for Spear 3 electron storage ring control system (using EPICS).
- Is one of the supported platforms in Epics release 14
- So far only limited set of hardware drivers implemented (including Industry Pack and Tews 810 support)

What needs to be done

- Migrate to Epics release 14. We did it for CEH test stand, and are gaining experience. So far we can't migrate to release 14 any of our production iocs (ifr-mon or ifr-hv), as not all hardware support needed is available in this release. SLAC Epics group will need to build drivers for CAEN scalar (V260) and Dual Gate generator (V462) before we can migrate ifr-mon
- Build and load RTEMS for mv177 and test it in CEH lst-test ioc.
- Acquire PowerPC based ioc (Matthias has one, so we can start testing, but we need spare anyway) and run lst-test ioc on it (Epics 14 in RTEMS).
- Replace ifr-mon ioc with this one and enjoy worry-free life