Interfacing EPICS to the Widespread Platform Management Interface IPMI

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Introduction

The Intelligent Platform Management Interface (IPMI) is a standardized interface to management functionalities of computer systems. The data provided typically includes the readings of monitoring sensors, such as fan speeds, temperatures, power consumption, etc. It is provided not only by servers, but also by µTCA crates that are often used to host an experiment's control and readout system. Therefore, it is well suited to monitor the health of the hardware deployed in HEP experiments. In addition, the crates can be controlled via IPMI with functions such as triggering a reset, or configuring IP parameters. We present the design and functionality of an EPICS module to interface to IPMI that is based on ipmitool. It supports automatic scanning for IPMI sensors and filling the PV metadata (units, meaning of status words in mbbi records) from the IPMI sensor information. Most importantly, the IPMI-provided alarm thresholds are automatically placed in the PV for easy implementation of an alarm system to monitor IPMI hardware.

Implementation

The ipmitool software[1] is used to implement the IPMI protocol. It is wrapped into code that provides access from EPICS.

[1] http://sourceforge.net/projects/ipmitool/

Automatic Scan

On application startup, the IPMI system is automatically scanned for sensors. The implemented algorithm tries hard to find all available sensors on all modules. On completion of the scan, the detected sensors can be dumped to an EPICS database file.

```
epics> ipmiScanDevice 1
found 19 sensors @0x20.
PICMG detected.
found 16 sensors @0x10.
found 79 sensors @0x20.
found 114 sensors @0x82.
found 19 sensors @0x94.
Total sensor count: 228
```

Typical PV for ATCA Crates

```
record(ai, "Vcc 12v FRU0")
{
  field(DTYP, "ipmitool")
  field(INP,  "#L1 A130 C20 S00
@0")
}

epics> dbpr "Vcc 12v FRU0" 2
DESC: Vcc 12v FRU0
DTYP: ipmitool  HHSV: MAJOR
HIGH: 12.331    HIHI: 12.567
HOPR: 15.045    HSV: MINOR
HYST: 0.118
INP:AB_IO #L1 A130 C20 S0 @0
LLSV: MAJOR     LOLO: 11.387
LOPR: 0         LOW: 11.623
LSV: MINOR      RVAL: 204
VAL: 12.036
```

Application in Belle II PXD

The PXD readout system "ONSEN" uses FPGA cards hosted in an ATCA crate. The crate's IPMI interface is used to monitor the overall status of the crate. **Custom-built AMC cards** provide a low-level interface to the FPGAs via IPMI.

The **servers** that run the slow-control system will also be monitored via IPMI to include hardware defects into the detector-wide alarm system.

CSS showing an OPI with sensor readings from an ATCA Carrier Board.

Availability

The IOC will be released under an open license pending discussions with the University's legal department. Watch for an anouncement on the EPICS mailing lists.

IPMI

The Intelligent Platform Management Interface (IPMI) is a common interface to monitoring and management data of servers, ATCA and µTCA crates and similar devices. Monitoring data is provided as analog or digital sensor readings. The sensor metadata provided includes several alarm thresholds that can be used in a monitoring system. Server management is performed via messages sent to the IPMI device from the control PC.

When custom hardware is built for IPMI-enabled platforms such as ATCA crates, the IPMI system can be extended with new sensors. The required wires are provided on the backplane's connectors.

DEPFET
Active Pixel Detector

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