Integrating EtherCAT based I/O into EPICS at Diamond

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Poster Reference WEMAU004
Project Goal

- Diamond Phase III of beamline construction – Transition of Diamond Control System

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Original EPICS Control System Architecture

VME Bus

Hytec IP modules
Hytec IP modules
PMAC VME
Firewire PMC

Analogue & Digital I/O
RS232 & RS45
Motors
Cameras

Ethernet

Display Manager
Alarm Handler

EPICS Archiver
GDA Server

EPICS IOC Server VxWorks/VME

Revised EPICS Control System Architecture

VME Bus

Rem. I/O Modules
Terminal Servers
PMAC GeoBrick
GigE Protocol

Ethernet

EPICS IOC Server x86/Linux

Analogue & Digital I/O
RS232 & RS45
Motors
Cameras
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Solution Outline

**Userspace**
- EPICS IOC
  - EPICS Records
  - Asyn Driver
- Fieldbus Scanner
- libethercat
- EtherCAT Master Module

**Kernelspace**
- Preempt RT
- Linux Kernel
  - Generic Ethernet Driver Module
  - Network Stack
  - Standard Ethernet Driver

**Hardware**
- Hardware (Network Interface Card)

**Diamond ethercat**

**Etherlab (Master)**
Conclusion

• EtherCAT integrated into EPICS. Uses
  • PREEMPT_RT Linux
  • Etherlab Ethercat Master for Linux
  • Asyn

• Scanner broadcast bus data to several Soft IOCs for segregation of areas. Automatic Asyn port creation
  • One port per slave
  • One port for master status

• Implementation tested with slaves from 3 manufacturers

• Transition from VME based IOCs running vxWorks to Linux x86 PC IOCs running EtherCAT is relatively straightforward