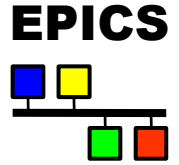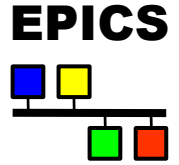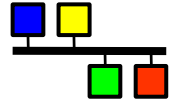# EPICS: IOC Platform Choices

Marty Kraimer

APS/ANL

IOC Platform Choices : PRE OSI

◆ **Before Operating System Independence**

- ◆ VxWorks operating system
- ◆ VME crate with 680xx or powerPC processor
- ◆ Choose appropriate VME I/O modules
- ◆ Other choices more complicated
  - ◆ Serial
  - ◆ CAN
  - ◆ Camac
  - ◆ Ethernet
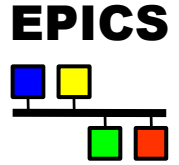 - ◆ Industry Pack
  - ◆ PLCs
  - ◆ ...

OSI IOC Choices

◆ **Many Many Choices**

◆ **Can't explore all possible options**

◆ **Let's discuss the following topics**

    ◆ Computer buses: VME, compactPCI, PCI

    ◆ Hardware Platforms

    ◆ Operating Systems

    ◆ Field Buses

    ◆ Mezzanine Cards

◆ **Discussion of Platform Choices**

    ◆ Large Applications

    ◆ Medium Size Applications

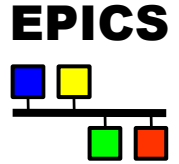   ◆ Small Applications

Bus Choices

- **VME/VXI**
  - Expensive
  - Life expectancy good
  - Large choice for I/O, performance, etc.

- **Compact PCI**
  - Intermediate cost?
  - Life expectancy? Maybe Good?
  - I/O modules?

- **PCI**
  - Low Cost
  - Life expectancy? Perhaps bad?
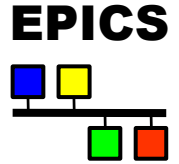 - Lot's of I/O choices

Hardware Platforms

- ◆ VME/VXI Crate

- ◆ Compact PCI Crate
  - ◆ Intel or powerPC?

- ◆ PCI based
  - ◆ Standard PC
  - ◆ Rack Mounted PC: Headless, diskless, etc.
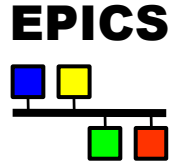
- ◆ PC-104

- ◆ Other?

Operating System Choices

◆ **VxWorks**

 ◆ Good real time operating system

 ◆ Proprietary

 ◆ Expensive

◆ **RTEMS**

 ◆ Good real time operating performance

 ◆ Open Source

 ◆ EPICS community is beginning to use

◆ **Linux**

 ◆ Not real time. Getting better.

 ◆ Open Source

 ◆ Lots of interest

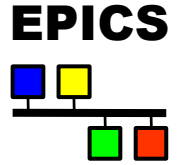◆ **WinXX: Lots of turnkey systems available**

Field Busses

- ◆ Ethernet: More and more I/O available
  - ◆ Protocol is a big issue
    - ◆ UDP/TCP
    - ◆ Grabbag: ONC/RPC, OPC, labView, ...
    - ◆ CIP over ControlNet | DeviceNet | EthernetIP
  - ◆ Serial and GPIB LAN devices available
- ◆ CAN
- ◆ Serial
- ◆ GPIB
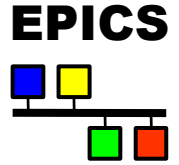- ◆ PLC: Determined by facility PLC choices
- ◆ Other?

Mezzanine Cards

◆ Available on VME, PCI, compactPCI

  ◆ Industry Pack

    ◆ Getting old?

    ◆ IP modules supported by EPICS getting old?

  ◆ PCMIP: Looks like a dead end

  ◆ PMC

    ◆ APS, SNS using

    ◆ Lifetime?
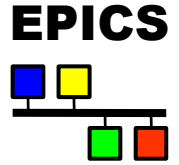
◆ Other?

IOC Applications: Large size

EPICS

- ◆ Accelerator facility is good example
  - ◆ 10<< # IOC's < several hundred
  - ◆ Geographically distributed
  - ◆ Lifetime very important
- ◆ Range of requirements
  - ◆ High performance.
  - ◆ Many I/O points
    - ◆ Sometimes at common location
    - ◆ Small number at given location but many locations
  - ◆ Real time requirements vary
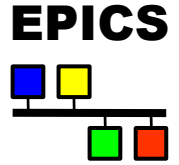- ◆ This is the primary reason EPICS exists

Large Size Platform Choices

- **Main Hardware Platform**
  - VME/VXI
  - CompactPCI: Is lifetime risky?
  - Standard/rack mounted PC: Lifetime bad
- **Operating System**
  - VxWorks
  - Linux/RTEMS should some day replace vxWorks
- **Ethernet devices**
  - GPIB/Serial LAN now
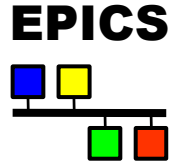 - Other LAN devices becoming attractive
- **Mezzanine cards**

IOC Application: Medium Size

◆ Beamline is good example

- ◆ ~ 10 IOCs
- ◆ Located close together. < 20 meters
- ◆ Lifetime Important

◆ Adaptability to new requirements

◆ Often many users: thousands/year

◆ Non EPICS choices available
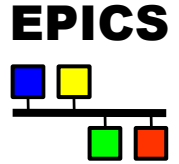
◆ EPICS is a good choice.
We want these users.

Medium Size Platform Choices

- Hardware Platform:
    - VME
    - CompactPCI? attractive for motor support
    - Standard or rack mounted PC?
- Operating system:
    - VxWorks: Support existing users
    - Linux: Lots of interest
    - RTEMS?
    - WinXX turnkey systems in use.
- Ethernet support
    - GPIB and Serial LAN products
    - Other LAN products
- Mezzanine support

IOC Applications: Small Size

◆ **Small Applications: Desktop, Lab, etc.**

   ◆ Single IOC

   ◆ Cost often important

   ◆ Lifetime often not important

◆ **Non EPICS users: Forget them**

   ◆ EPICS learning curve too steep

   ◆ Hard to support random users

◆ **EPICS user: At home lab, teststand, etc.**

   ◆ Uses EPICS at home site or teststand.

   ◆ User wants EPICS environment.
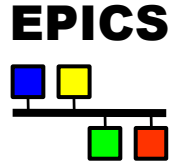
   ◆ We want to support this user.

Small Size Platform Choices
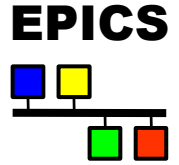
◆ PCI Platform
  - ◆ Standard PC
  - ◆ Rack mounted PC?

◆ Operating System
  - ◆ VxWorks: Usually not interested.
  - ◆ Linux: Lots of interest
  - ◆ RTEMS?
  - ◆ winXX?

◆ Ethernet support
  - ◆ GPIB LAN products
  - ◆ Serial LAN products
  - ◆ Other LAN devices?

◆ Mezzanine Cards

PC-104

◆ Low cost

◆ Easy to distribute

◆ May be attractive for all size applications

◆ Issues

  ◆ Bus

  ◆ Processor

  ◆ Operating system

  ◆ I/O modules