

LEDA Instrumentation Environment

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I/O Interfaces

IOC

EPICS/VME

EPICS/VXI

EPICS/ISA

Labview/ISA

Intellution/ISA

Residual Gas Application/ISA*

Buses

Industry PAC

Serial/Modicon PLC

Stepper motors

Industry PAC

VXI Custom DSPs

Industry PAC

Serial/Modicon PLC

VXI Custom DSPs

Allen-Bradley PLC

Serial

Analog I/O, Binary I/O, Fast Protect, Timing

Analog I/O, Binary I/O

Analog I/O, Binary I/O, Fast Protect, Timing

high speed analog

Analog I/O, Binary I/O, Fast Protect, Timing

Analog I/O, Binary I/O

high speed analog

Analog I/O, Binary I/O

Analog Inputs

*All other "IOCs" have channel access servers - this does not.

EPICS VME

- Broad range of cards supported
- Synchronized Analog Inputs Available
- Timestamps done in close synchronization to data read
- Native EPICS environment makes integration easier
- All data is available to all channel access servers
- Must be EPICS knowledgeable to use
- Field wiring uses ribbon cable to get from the VME

EPICS VXI

- Instrumentation bus supports high speed/low noise applications
- Broad range of cards supported
- Synchronized Analog Inputs Available
- Timestamps done in close synchronization to data read
- Native EPICS environment makes integration easier
- All data is available to all channel access servers
- Must be EPICS knowledgeable to use
- Field wiring uses ribbon cable to get from the VME

EPICS ISA

- Inexpensive industrial backplanes available
- Broad range of cards supported
- Synchronized Analog Inputs Available
- Timestamps done in close synchronization to data read
- Native EPICS environment makes integration easier
- All data is available to all channel access servers
- Must be EPICS knowledgeable to use
- Field wiring uses ribbon cable to get from the VME

Industry Pac - VME, VXI, ISA

- Custom board designs can be used in all bus formats
- Timestamps done in close synchronization to data read
- Native EPICS environment makes integration easier
- All data is available to all channel access servers
- Must be EPICS knowledgeable to use
- Field wiring uses ribbon cable to get from the carrier boards is even less convenient than VME

Programmable Logic Controllers

- Readable from VME, VXI, ISA

- Field hardened designs that allow wide distribution
- Timestamps are not done in close synchronization to data read - latency of PLC scan cycle + IOC read cycle + database scan.
- PLC programming environment does not require EPICS knowledge
- Only explicitly exported values are available to the control system.
- Need to know the PLC programming language
- Field wiring is typically very convenient

Labview VXI

- Instrumentation bus supports high speed/low noise applications
- Broad range of cards supported
- Timestamps difficult to synchronize with remote I/O
- Portable server required to integrate with an EPICS system
- Only explicitly exported data is available outside of Labview. Program change required to export new data.
- Must be Labview knowledgeable
- Labview is simple to learn and use for simple applications.
- Complex applications are hard to create and manage.

Intellution ISA

- Driver support for many PLCs
- Timestamps difficult to synchronize with remote I/O
- Portable server required to integrate with an EPICS system
- Only explicitly exported data is available outside of Intellution. Program change required to export new data.
- Must be Intellution knowledgeable
- The Intellution database is very similar to the EPICS database as they have the same ancestry.

Conclusions

- If you let everyone choose what they will, you end up with a collection of subsystems that may be the fastest way to complete each subsystem. They are not the fastest to integrate or easiest to maintain.
- Each of these choices had some advantages when viewed from the subsystems perspective, a higher level view would probably result in different decisions.
- Different I/O can live in the same system and in many cases is a good idea. Cost/benefit discussions are required.
- Many sins can be forgiven in a prototype accelerator. Do not try this with a production facility.