microIOC: PC AND CONTROL
SYSTEM LONGEVITY

Aljaz Podborsek
aljaz.pod borsek@cosylab.com

PCaPAC 2006PCaPAC 2006
Long-lived control system

Simple equation:

reliability of HW and SW
+ availability of HW and SW
+ maintainability of SW

= LONG-LIVED CONTROL SYSTEM
Flexible and user customizable interfaces are required.
Peripheral part of CS

At peripheral part of CS quite different conditions and requirements apply then in control part:

- demanding industrial environment,
- large number of end nodes,
- wide range of required interfaces towards controlled devices,
- and different system roles.

Not required:
- Complex data processing

A stress must be put onto:
- flexibility of connectivity
- modularity
- reliability
- durability
Possible HW Solutions on the market

- **VME or VXI**
  - High performance and large number of channels
  - Good and price efficient solution for large system with a high density of channels
  - Empty or half empty VME crates raise the cost of control system

- **normal PC**
  - High computing power and highly flexible SW support
  - The choice of peripheral control cards is not so rich
  - Industrial environments? Moving parts? It’s size?

- **embedded PC**
  - Flexible HW platform, offering common PC functionality
  - Standardized operating system and extension buses
  - Can be made reliable through good design (no disk/ fan, good PS)
  - Mass production of embedded peripheral SBC and variety of extension cards
Standalone IOC in CS?

- Close proximity to the controlled device is needed (e.g. due to limited cable lengths)

- Sensitive devices are controlled – influence of other systems needs to be minimized

- Problematic devices – minimize the influence on other systems (example: a GPIB driver may hang the whole VME crate)
microIOC was especially designed with a length-of-service in mind

**What is it:**

- Embedded PC based peripheral device
- Turn-key solution for any kind of end-point devices being controlled
- Build for use in remote control applications
- Use in industrial environments and longer lifetimes
- Minimized interfacing and installation effort
- Included support for integration into higher level
Reliable microIOC

**HW components**
- Using reliable and long-lived components
- No maintenance is required
- Perfectly suited for integration into demanding industrial environment
- Avoiding all moving parts:
  - Fan less CPU
  - No hard disk – booting from a Compact Flash (CF) disk
  - A higher quality power supply
  - high-quality standard components are used

**SW platform**
- Open source SW (Embedded Linux, EPICS...)
- Q: Reliability? Flexibility? Applicability?
A: Linux OS: stable, reliable
microIOC build from long-life industrial components

- SBC (65 years MTBF)
- PS (55 years MTBF)
- Industrial grade Compact flash
- Wide range of communication interfaces
  - RS232/485
  - Analog/Digital IO
  - GPIB
  - IP devices integration (e.g. PLC)
  - Combination of different I/O interfaces
The choice to use Linux is obvious to many readers, but the reasons are not always the same!

What kind of OS is used in microIOC?

- highly configurable,
- easy to program when it comes to writing device drivers,
- it must supports modern programming standards (e.g. EPICS, ACS, TANGO, CORBA, Java, etc.)
- it must be stable
- available in the future.
- Support for various end-point devices and integration into higher-level CS is provided
microIOC tests

Why?
To prove:
• Compatibility
• Long operation under different conditions

How?
• Component tests: (manufacturer/Cosylab)
  – AOI tests (automatic optical inspection)
  – Function testing
  – Environment testing (temperature/humidity/vibration/drop test)
  – Static and dynamic burn in test
• Compact flash random test
• Temperature stress test
What the Final User Needs:

The microIOC is a black box for installation:
- with a built-in EPICS database, or TANGO server
- already with preconfigured records
- but also with easy to use developing environment
- everything must be very user friendly, with wizards, in a plug&play manner..
Equation again

\[ \text{reliability of HW and SW} \]
\[ + \text{ availability of HW and SW} \]
\[ + \text{ maintainability of SW} \]

\[ = \text{LONG-LIVED CONTROL SYSTEM} \]

LONG-LIVED CONTROL SYSTEM = possible with microIOC
Other microIOC products

You are welcome to visit us at poster session where other microIOC products will be presented

microIOC family → WEP34

Answers to your questions can be found on:

www.microioc.com