cosylab
CONTROL SYSTEM LABORATORY

microIOC: PC AND CONTROL SYSTEM LONGEVITY

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Long-lived control system

Simple equation:

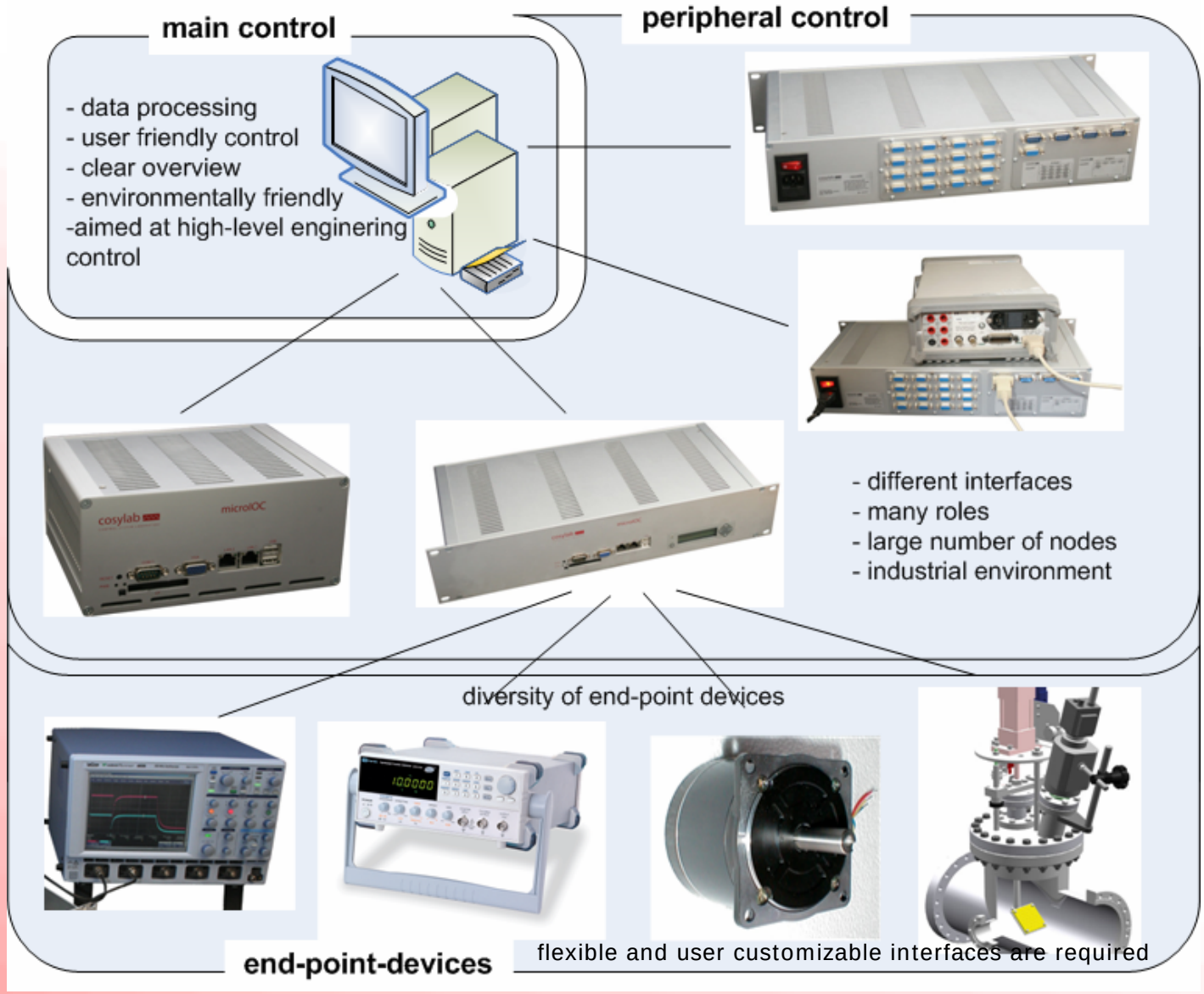
reliability of HW and SW

\+ *availability* of HW and SW

\+ *maintainability of SW*

= LONG-LIVED CONTROL SYSTEM

CS overview


main control
- data processing
- user friendly control
- clear overview
- environmentally friendly
-aimed at high-level enginering control
peripheral control
- different interfaces
- many roles
- large number of nodes
- industrial environment
diversity of end-point devices
end-point-devices
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:

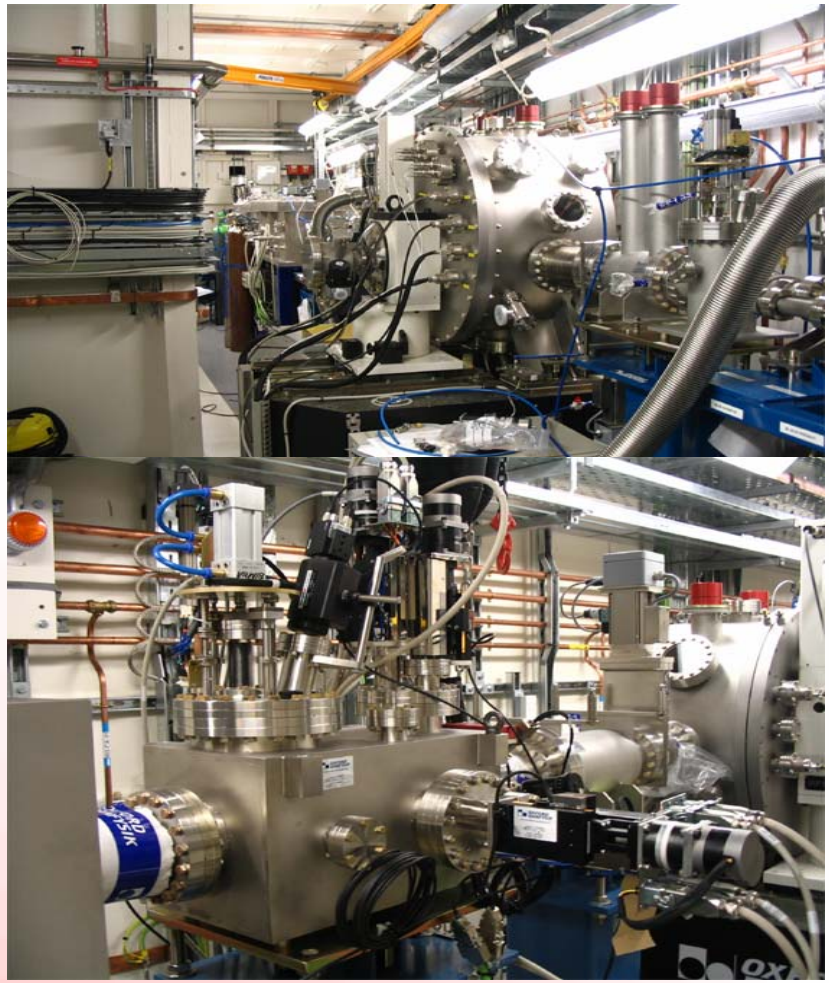
- demanding industrial environment,
- large number of end nodes,
- wide range of required interfaces towards controlled devices,
- and different system roles.

Not required:

- Complex data processing

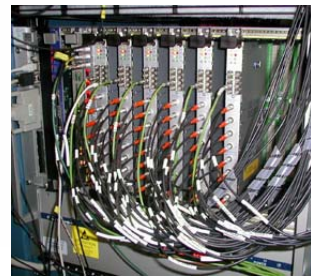
A stress must be put onto:

- 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

microIOC SW

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

reliability of HW and SW

\+ *availability* of HW and SW

\+ *maintainability of SW*

= LONG-LIVED CONTROL SYSTEM

LONG-LIVED CONTROL SYSTEM = possible with microIOC

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