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BE-CO-HT

Future Front-end platforms

For the Control System
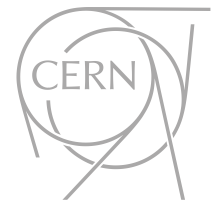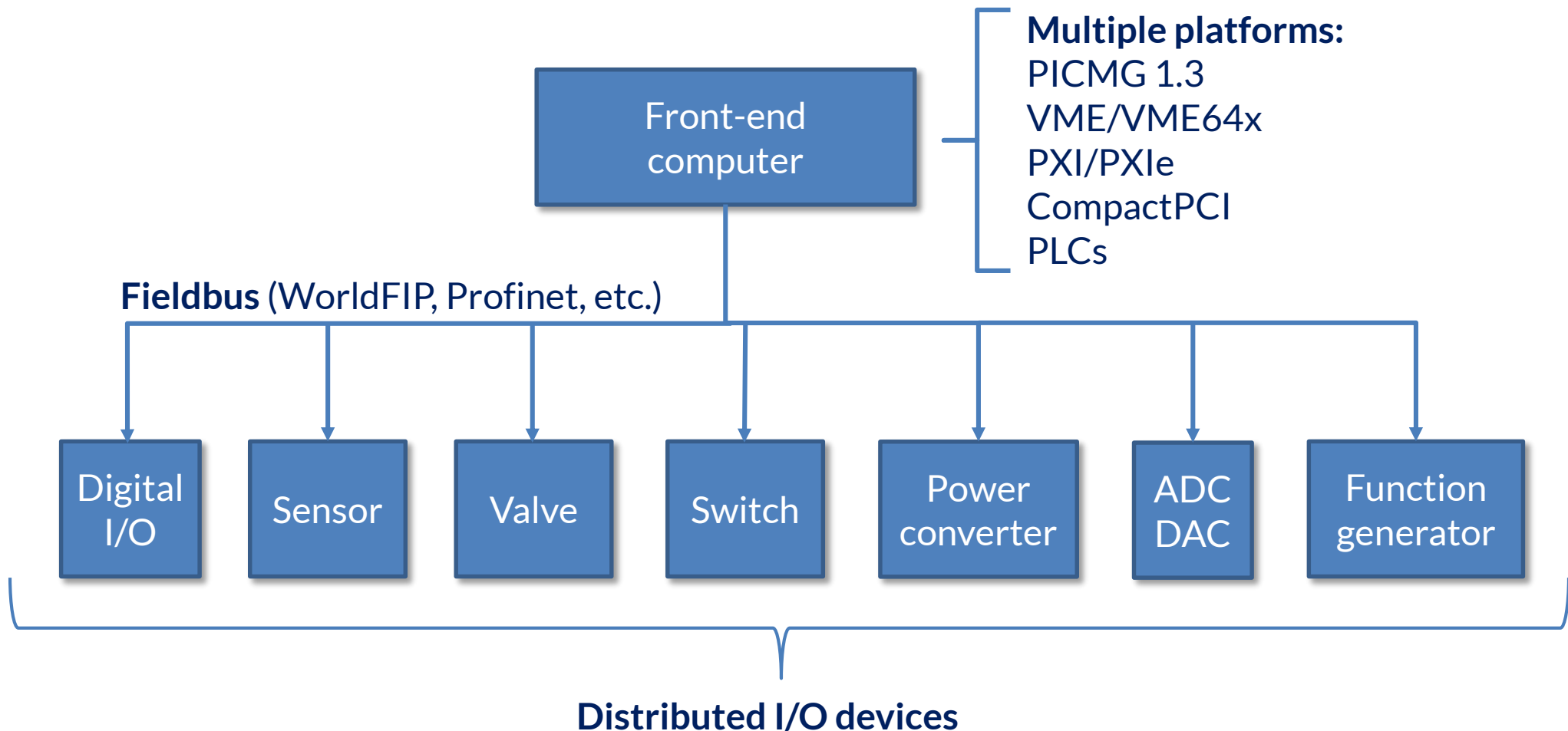
Background - Control System Tiers

Multiple platforms:
PICMG 1.3
VME/VME64x
PXI/PXIe
CompactPCI
PLCs

Front-end computer

Fieldbus (WorldFIP, Profinet, etc.)

| Digital I/O | Sensor | Valve | Switch | Power converter | ADC DAC | Function generator |

Distributed I/O devices

Background – Current platforms

VME/VME64x
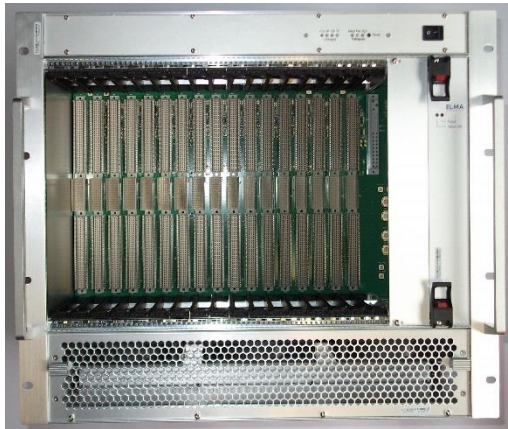
PICMG1.3 Industrial PCs

PLCs

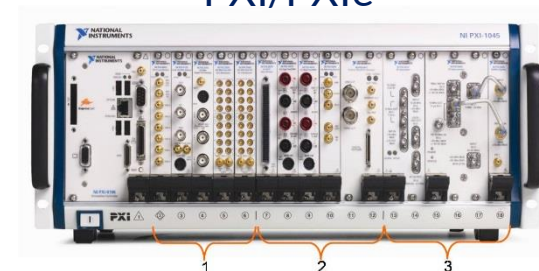### CompactPCI

PXI/PXIe

Purpose

- **Deal with technical drawbacks of VME systems:**
    - Low bandwidth.
    - Heavy power consumption.
    - EMI and noise issues.
    - Lack of standardized timing distribution and inter-card communication.
    - No standard way of crate management.

- **Custom VME derivatives were developed in the past by projects requiring features unsupported by plain VME.**
    - Encourage collaborative work
    - Avoid duplication of efforts

- **Issues with PICMG 1.3:**
    - Maintenance difficulties.
    - Cost vs lifetime.
    - Backplane standardization.
    - Convergence with high performance server platforms.

Purpose

Non-technical reasons:

- VME slowly becoming a legacy standard.
- Core components (VME bridges, CPU modules) being discontinued.
- LHC Experiments and major labs (DESY, SLAC) already departed from VME → shrinking VME community.
- New platforms (MTCA.4, VPX, PXIe) gaining market.
- BE-CO mandate: anticipate user requirements and provide a centrally supported platform that meets them.

Scope of the project

- Determine the technical requirements for new HW projects in the Accelerator sector.

- Compile a list of available front-end technologies & define selection criteria.

- Evaluate the platforms and propose a recommendation.

- Define a set of standard COTS modules that will be centrally supported:
  - Designed at CERN and outside

- Incorporate the new platform in BE-CO IT infrastructure & support services.

MTCA.4: possible benefits

- Fits most of our performance needs.
- Standardized management & diagnostics.
- Growing adoption in physics/scientific community.
- Dedicated high-speed links.
- Timing & trigger distribution as part of the standard.
- Supports RTMs.

MTCA.4: Things to sort out

- Price.

- Inter-vendor compatibility.

- Design complexity of new cards (including MMC).

- Power distribution & dissipation.

- PCB real estate available for user design.

- Mechanical reliability (connectors).

Status & plans

- Established a working group & defined the selection criteria.

- Survey of available technologies in progress.

- Q2 2016: recommendation for the new platforms.

- Design and procurement of new hardware.

- Integration in CO infrastructure.

- Post-LS2: kit available for the users to build their applications.

Thank you!

Questions?