

OPC UA to DOOCS Bridge:
A Tool for Automated Integration of Industrial
Devices Into the Accelerator Control Systems at
FLASH and European XFEL

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Project Goal: Device-Integration into DOOCS System

- DOOCS Control System at FLASH and European XFEL
 - Large free-electron laser facilities
 - 1000s of devices, 100s of computer nodes, kms of FEL
- Implementation costs
 - Time = €€€ / \$\$\$
 - Nerves ☹️
- How can we minimize integration effort?



OPC UA Protocol

- Open Platform Communications, Unified Architecture
- Standardized Protocol for Industrial Automation
 - Machine data
 - Integrated information model: structure, types, names
- Accepted Standard
 - Reliability
 - Availability of support
- DOOCS server / OPC UA client
 - Automatically map between data models
 - Open-source FreeOpcUa library
 - Goal: no additional programming required



Achievements and Conclusion



- Performance (Beckhoff CX5140 PLC)
 - Burst-to-burst feedback in 10Hz-operated FLASH and European XFEL
 - $>10^4$ data change events per second (worst-case protocol overhead)
- Success Stories
 - Commercial laser amplifier
 - PLC-based laser protection system
 - PLCs for monitoring and control
- Single piece of software integrates many devices
 - Dev-time: week(s) of programming/testing -> minutes of configuration
 - Quick, inexpensive, reliable
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