Integrating Control Applications Into Different Control Systems. The MTCA4U Control System Adapter



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he MTCA4U Control System Adapter



Sometimes You Need An Adapter





Martin Killenberg (DESY) The MTCA4U Control System Adapter

Sometimes You Need An Adapter





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Control System Adapter

Task

Complex control algorithms should be used with different control systems.



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- Keep application code control system independent
- The algorithm must interact with the control system
- Use functionality provided by the control system
- Minimise device-dependent code on the control system side

Additional Requirements:

- Thread-safety
- Real-time capability
- Must not copy large data objects (arrays)

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First Implementation

• Process variables to transfer data to/from the control system





- Control system data types used inside the algorithm
- Control system variables can be locking/blocking
- Control system variables might not be thread safe
- Threading often handled by control system



































- Lock-free queues
- Pre-allocated buffers for arrays
- Copy references, not buffers



























Adapter for process variables

- Generic part
- Control system specific part
 - Implementations for DOOCS and EPICS

Design Goals

- $\bullet\,$ Control system independent process variables $\checkmark\,$
- Thread safety \checkmark
- Real time capability \checkmark
- Minimise copying \checkmark
- Minimise device-dependent code on control system side (✓)



Access to control system features

- Limits
- History
- Engineering units

Implementations are very different in the various control systems!

• Discussions how to put this into the adapter





MTCA4U Control System Adapter

- Adapter to use device logic with different control systems
- Implementations for DOOCS and EPICS exist
- Planned: support for OPC-UA

Software Repositories

All software is published under the GNU General Public License.

- MTCA4U Control System Adapter: https://svnsrv.desy.de/public/mtca4u/ControlSystemTools/
- EPICS extension: http://oss.aquenos.com/svnroot/epics-mtca4u/
- DOOCS extension: https://svnsrv.desy.de/desy/mtca4u_applications/DOOCS_Adapter/



Backup



Update the queue if the receiver is slow/down



- No free buffers for the sender
- Overwrite the oldest buffer
- Pop the head of the "filled buffers" queue (buffer 1)
- Send the buffer which has just been filled (buffer 3)