Modular Software for MicroTCA.4 Based Control Applications - The DESY MicroTCA.4 User Tool Kit

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MTCA4U Architecture
MTCA4U Language Bindings

Board Support Package
- Firmware
- Register Map

Linux Driver
- /dev/mtca_slot0

C++ Device API
- Mapping Library

Your Library
- MicroTCA.4 Application
- Command Line Tools
- Python Bindings
- Matlab Bindings
Graphical User Interface

Board Support Package

Firmware

Register Map

Linux Driver

/dev/mtca_slot0

Mapping Library

C++ Device API

Qt Hardware Monitor

Your Library

MicroTCA.4 Application

Command Line Tools

Python Bindings

Matlab Bindings
Testing Framework

Board Support Package

Firmware

Register Map

Linux Driver

/dev/mtca_slot0

Mapping Library

C++ Device API

VirtualLab

Qt Hardware Monitor

Your Library

MicroTCA.4 Application

Python Bindings

Matlab Bindings

Command Line Tools
Linux Driver

Board Support Package

Firmware

Register Map

C++ Device API

/dev/mtca_slot0

Mapping Library

VirtualLab

Qt Hardware Monitor

Your Library

MicroTCA.4 Application

Command Line Tools

Control System Adapter

Control System Middleware Layer

EPICS

LLRF EPICS Server

DOOCS

LLRF DOOCS Server

OPC-UA

LLRF OPC-UA Server

YOUR Control System

YOUR LLRF Server

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Evolution of the MTCA4U beyond MicroTCA.4 scope

- MTCA4U
- ChimeraTK
- PCI Express
- Register based TCP/IP
- DOOCS Control System Middleware
- Dummy/Simulation
VirtualLab and Control System Middleware Adapter Posters

**VirtualLab**

- Test Routines: Simulate operator commands, check server and cavity behavior
- Cavity Model
  - Calculations
    - Value Request
    - Value Request
  - Value Request
    - Value Request
  - Calculations: control loop etc.
- Virtual Device: ADC/DAC card
- Firmware State Machine
- Timer Event
- Virtual Timer
- Signal Source
- Signal Sink
- Dummy Register Set
- State Variable Set
- Control Application (to be tested)

**Session 1: Poster 100**

- Device Logic
  - Adapter Variable Pair "VOLTAGE"
    - Receiver
    - Sender
    - Update
      - Control System Variable "VOLTAGE"
- Communication Thread
  - Adapter Variable Pair "TEMPERATURE"
    - Receiver
    - Sender
    - Update
      - Control System Variable "TEMPERATURE"

**Control System Middleware Adapter**

**Session 1: Poster 132**