



# Status of the new LMD DAQ

PANDA CM 22/3

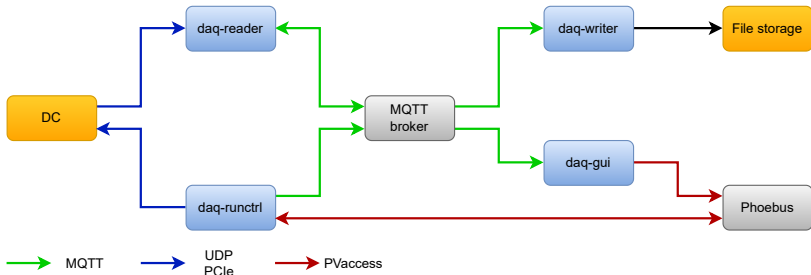
Florian Feldbauer

Ruhr-Universität Bochum - Experimentalphysik I AG

# Why new DAQ?

- Switching from TRB to Kintex7
- Existing DAQ for TRB based readout of MuPix sensors
- Most functionality coded in GUI widgets
- ⇒ No reusable class structure
  - Monolithic, complex program structure
  - Cluttered UI

# New DAQ

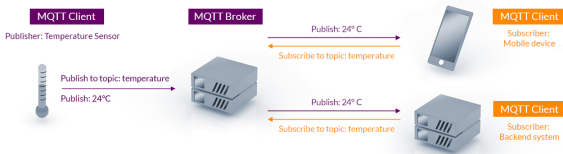


New DAQ composed of Microservices connected via MQTT

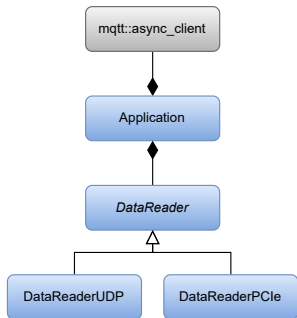
- Simple code structure
- Easy to exchange/add/remove functionalities
- Easy to test/debug/develop individual parts

# Message Queuing Telemetry Transport (MQTT)

- Lightweight
- Reliable message delivery
- Central message server (“broker”)
- Publish/Subscribe pattern
  - ▶ Clients publish data to Topic(s)
  - ▶ Clients subscribe to Topic(s) to receive published data



# Daq Reader and Writer

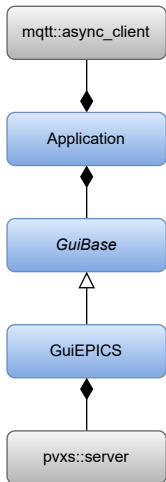


## Daq Reader

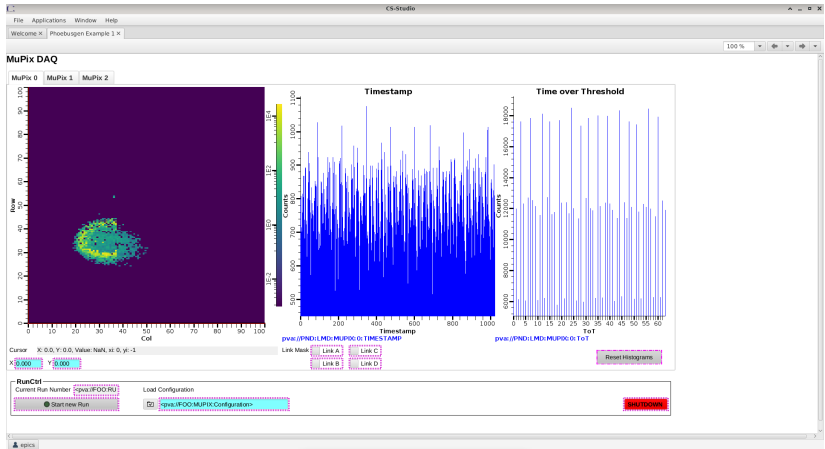
- Receives data from FPGA
- Publishes data via MQTT

## Daq Writer

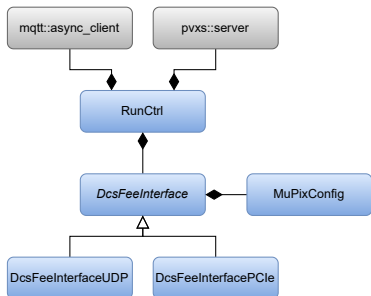
- Subscribes to MQTT
  - ▶ 'daq/MuPix': receive data
  - ▶ 'daq/command': receive commands from RunCtrl (e.g. start/stop run)
- Write received data to disk if Run is active



- Subscribes to MQTT to receive data
- Interprets data and fills arrays (Hitmap, Timestamp, ToT)
- GuiEPICS publishes arrays as PVs via PVaccess protocol



⇒ Graphical UI integrated in DCS Screens



- Send start/stop run commands to DCS and DAQ
- Loads configuration of MuPix and FEE (from JSON files)



## MuPix Configuration stored in JSON format

```
[
  {
    "id" : 0,
    "pixel" : [
      { "col" : 23, "row" : 104, "mask" : true }
    ]
  },
  {
    "id" : 1,
    "vref" : 1.8,
    "config" : {
      "ThHigh" : 0.7
    }
  }
]
```

# Summary

- Had to rewrite DAQ from scratch for Kintex7 based readout
- New DAQ designed as collection of micro services
- MQTT chosen as protocol to interconnect services
- GUI and RunCtrl services use new PVaccess library from EPICS
- Tests with single MuPix8 connected to Kintex7 eval board successful