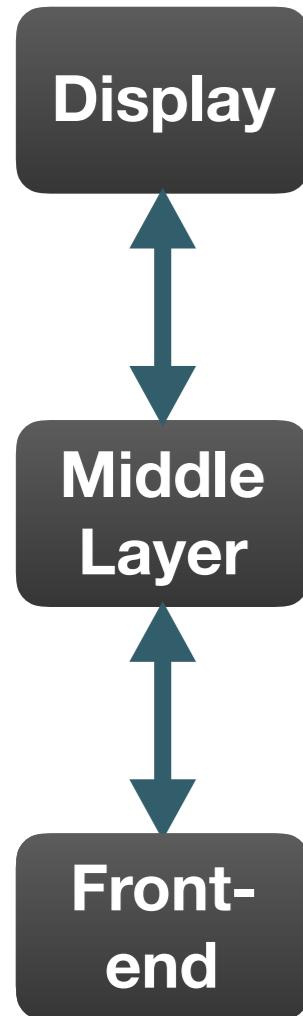


# DOOCS Overview

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Kay Rehlich, DESY MCS4



- **Distributed Object-Oriented Control System**
- Runs on self-contained server processes
- With a rich set of library functions
- Multi-threading provided by the server library
- Allows dynamically add and delete of objects
- Supported by a name server based on LDAP
- User based access control on server
- Has a full integrated Data Acquisition System
- Can access other control systems
- Has C++, Java, MATLAB, Python interface

- Get data
- Set Data
- Get Names

## Network

## Device Properties

- Status Register
- Float Value
- Float with History
- Waveform
- Polynominal Transformation
- Digital Filter
- ....

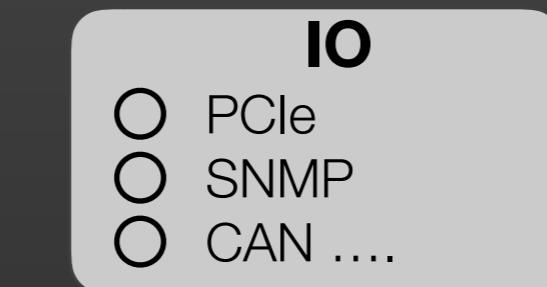
## Archive

- Read
- Write
- Configure

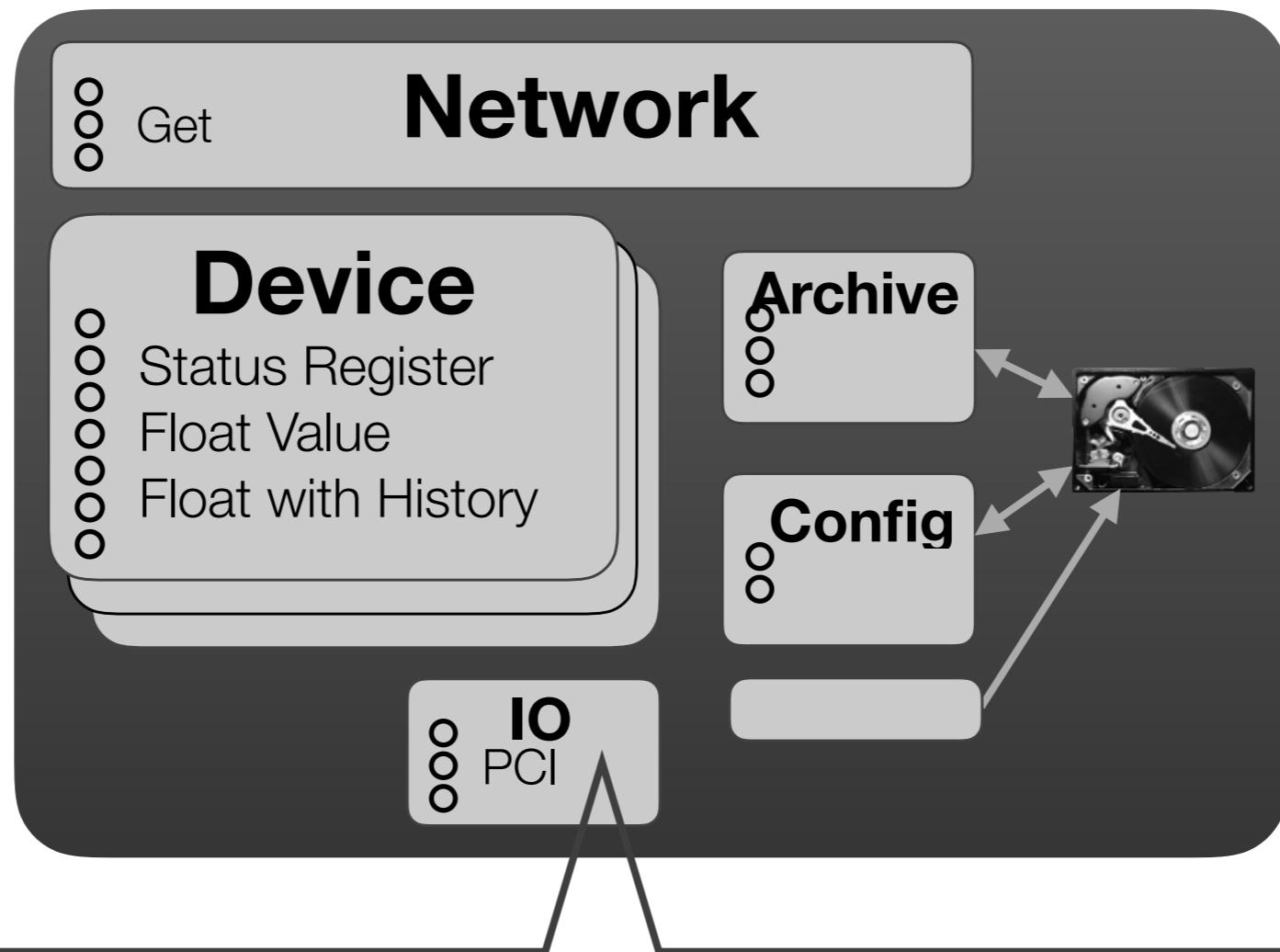


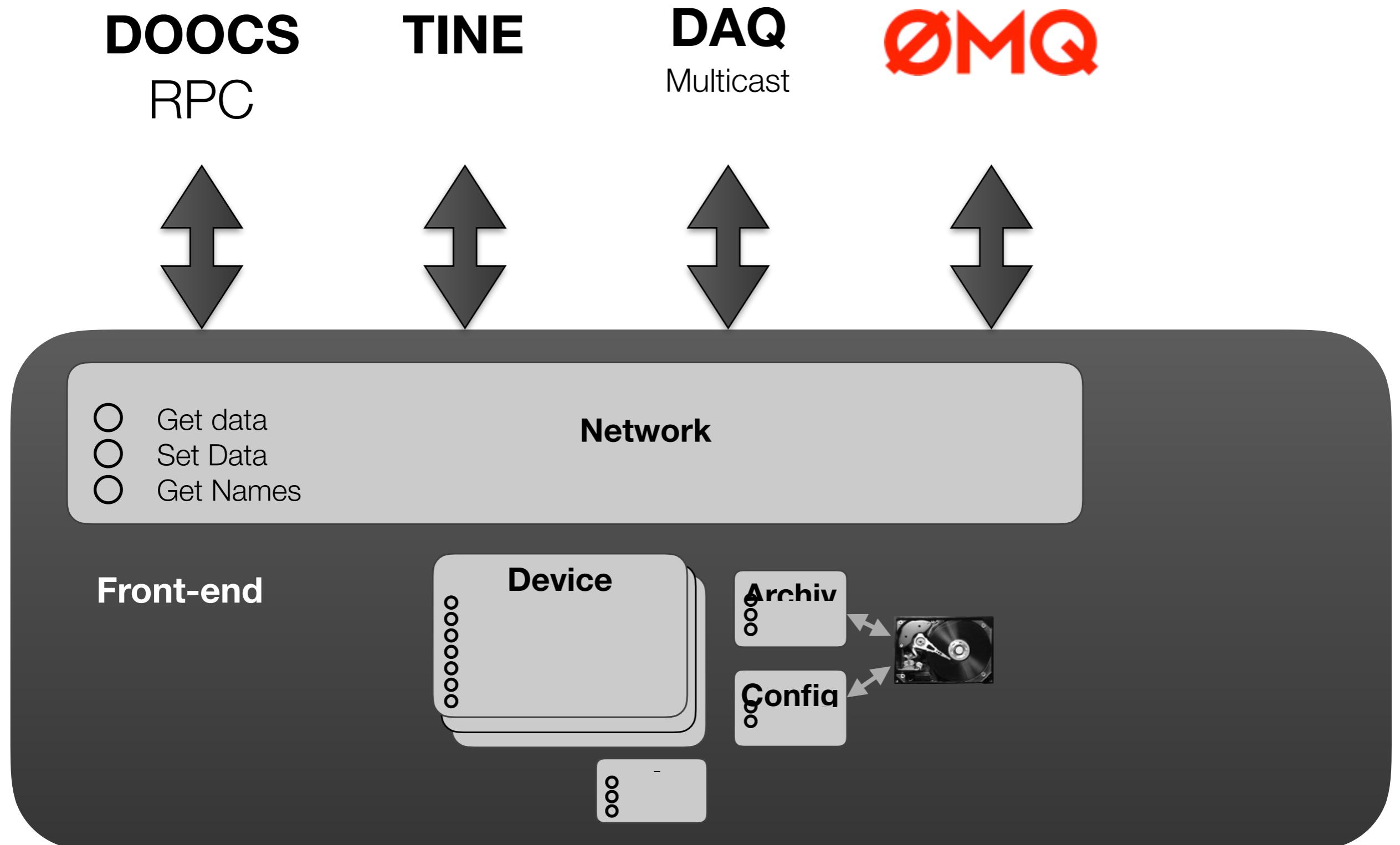
## Configuration

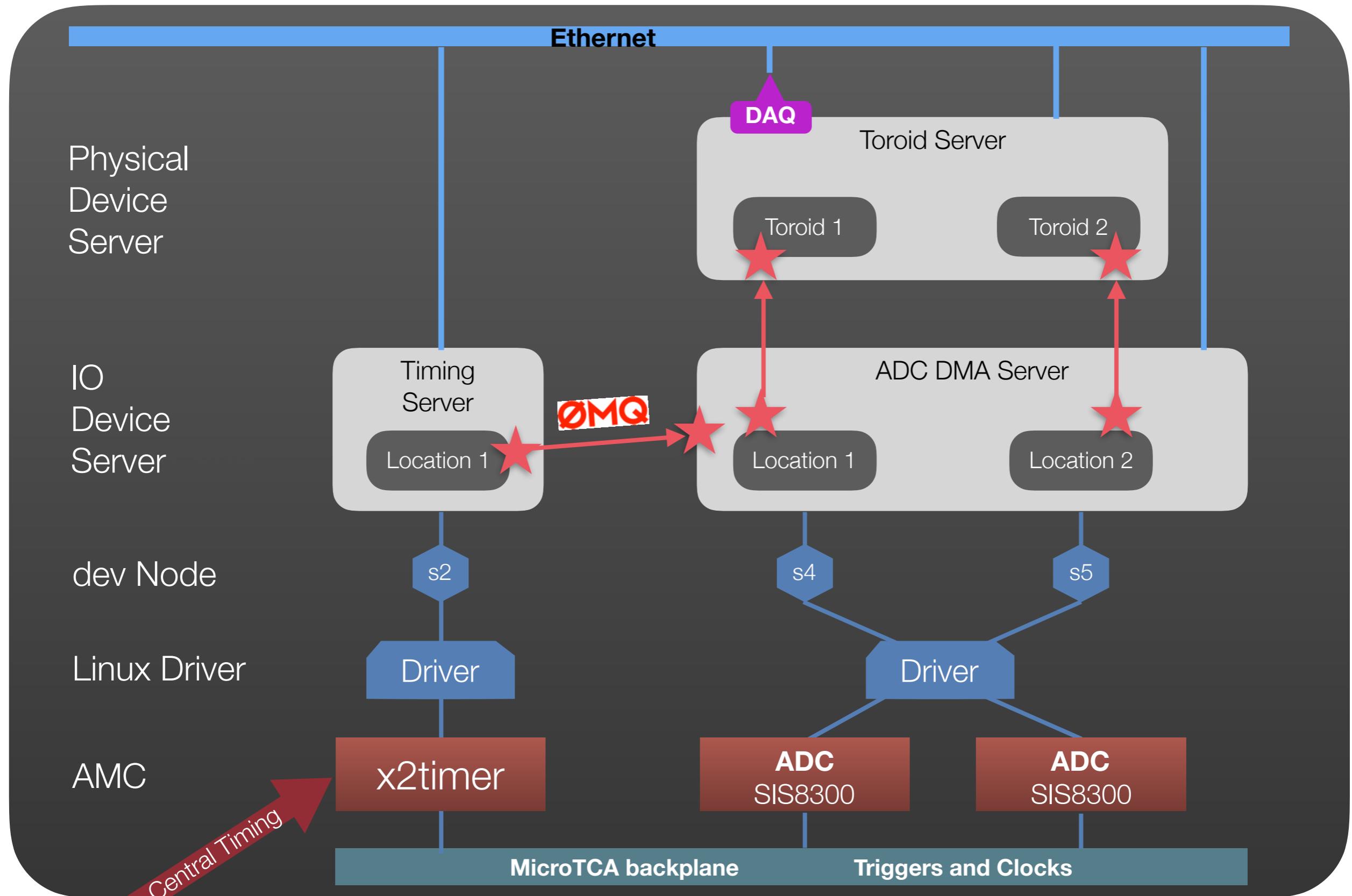
- Restore
- Save

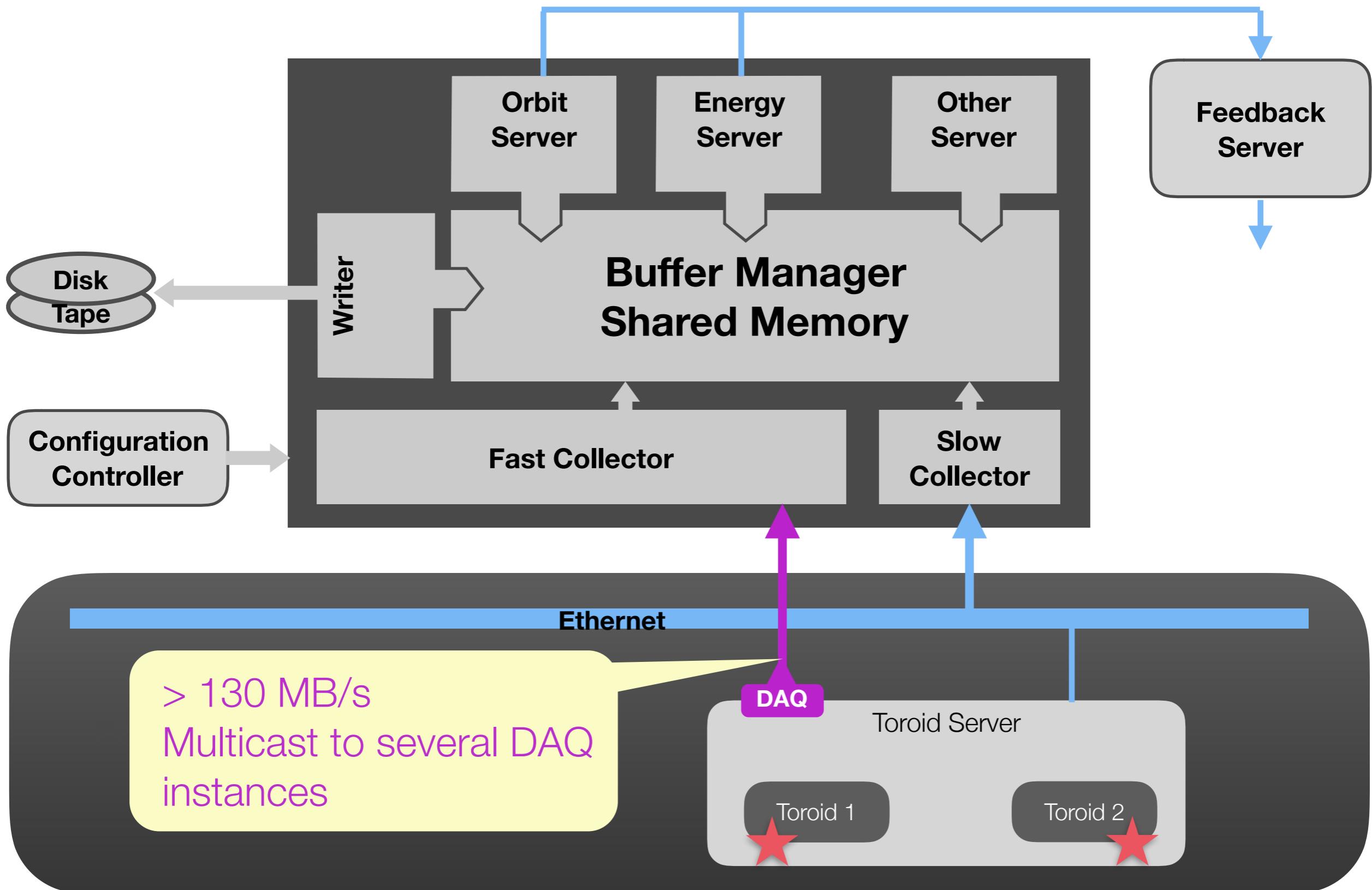


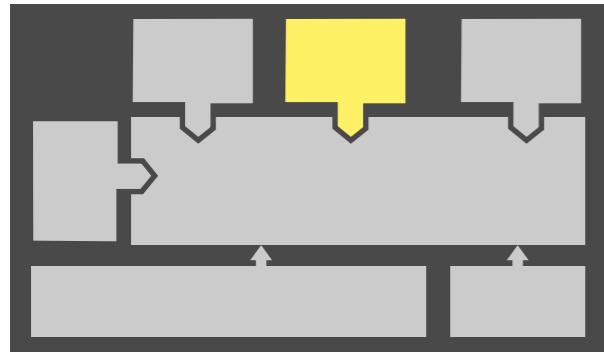
## Logging



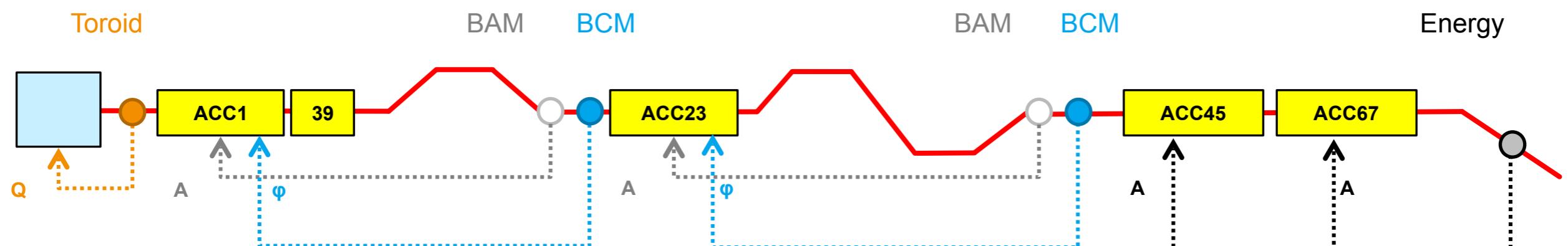








- Longitudinal RF feedback controls compression (phase) + Energy (amplitude)
- Subscribes to 6 DAQ channels
  - Data driven processing
  - FIR filter —>  $R^{-1}$  —> P-controller —> out



#### Charge FB

**Monitor:** Toroid directly behind the laser driven photo injector (GUN)

**Actuator:** rotatable  $\lambda/2$  plate in laser beam line

#### Compression FBs

**Monitor:** pyro-electric detector (BCM)  
**Actuator:** RF phase of nearby module

#### Beam arrival FBs

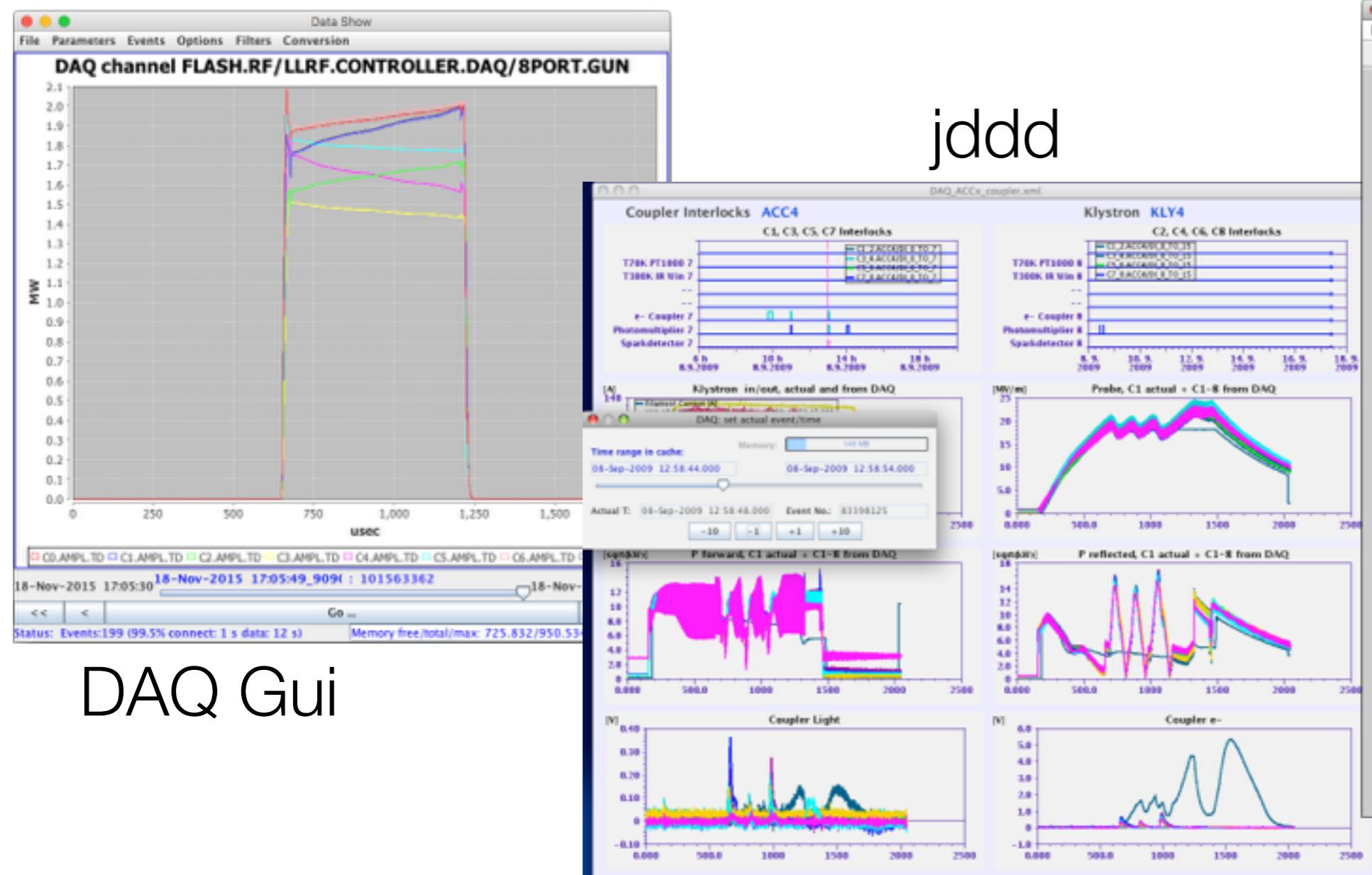
**Monitor:** beam arrival time monitor (BAM)  
**Actuator:** RF amplitude of nearby module

#### Energy FB

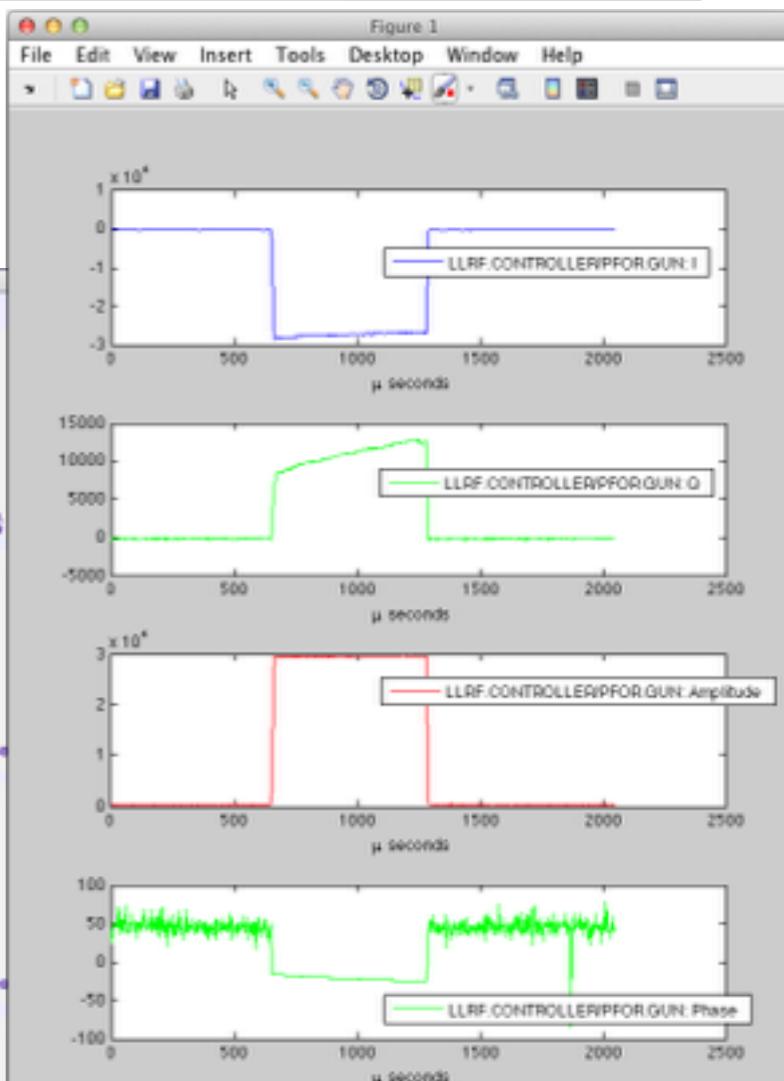
**Monitor:** Energy measurement in dispersive section

**Actuator:** RF amplitude of last modules

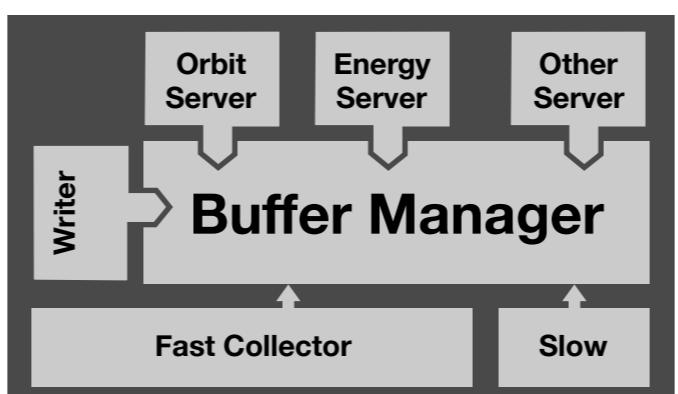
# DOOCS DAQ Tools



jddd



MATLAB





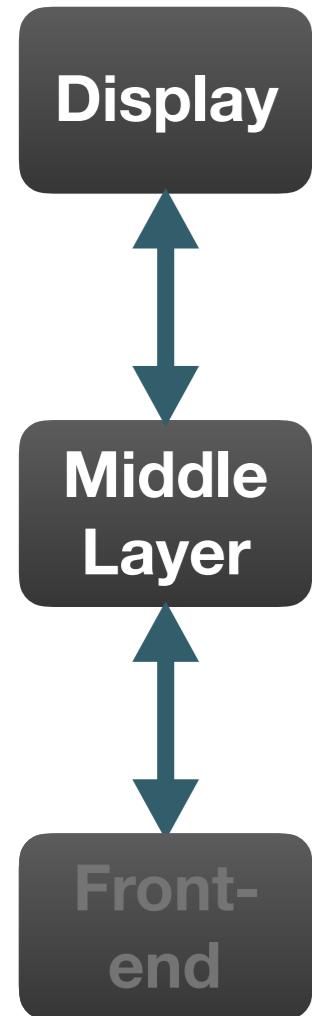
# Storage Streams

# Attached Processes

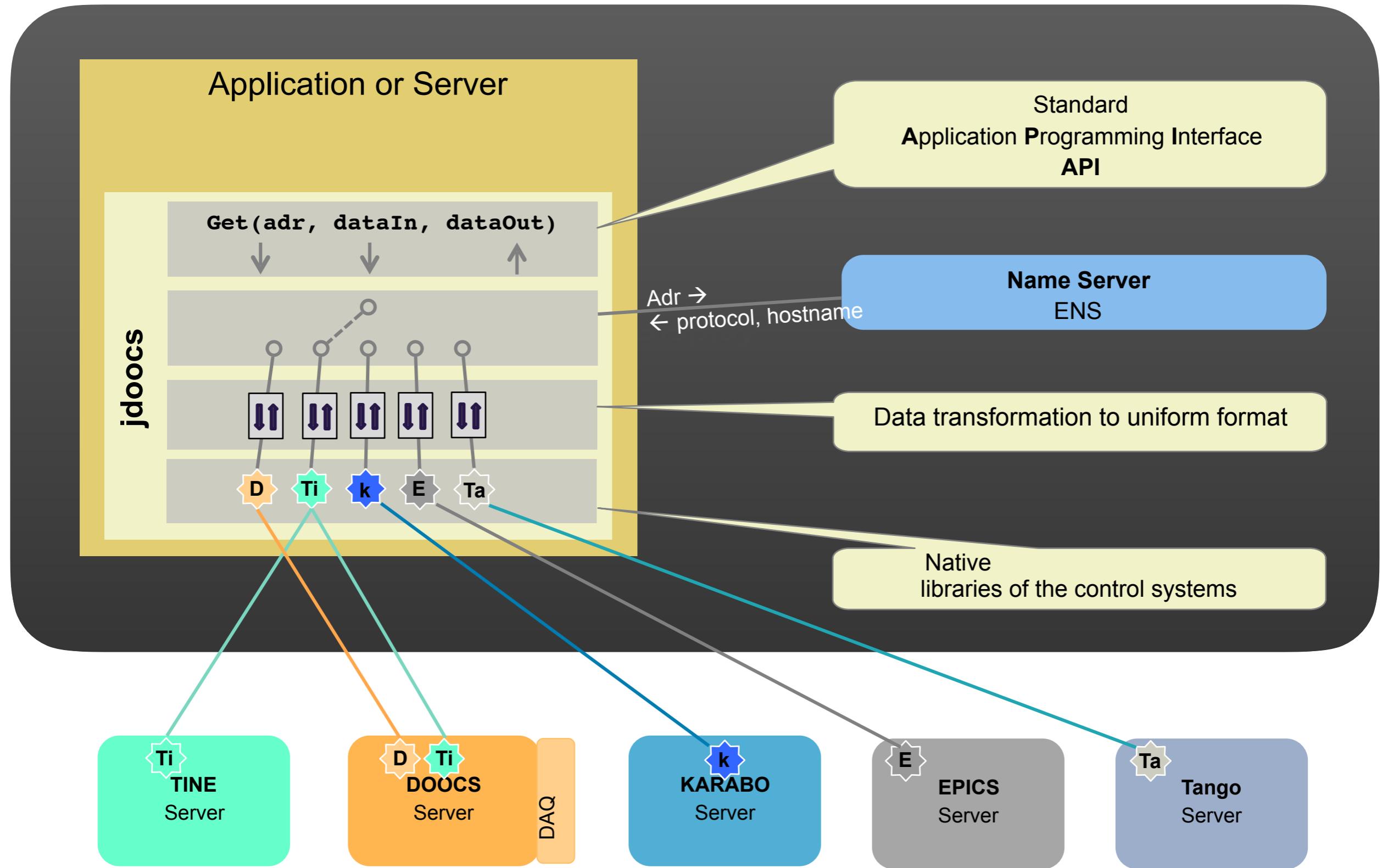
# Data Collectors

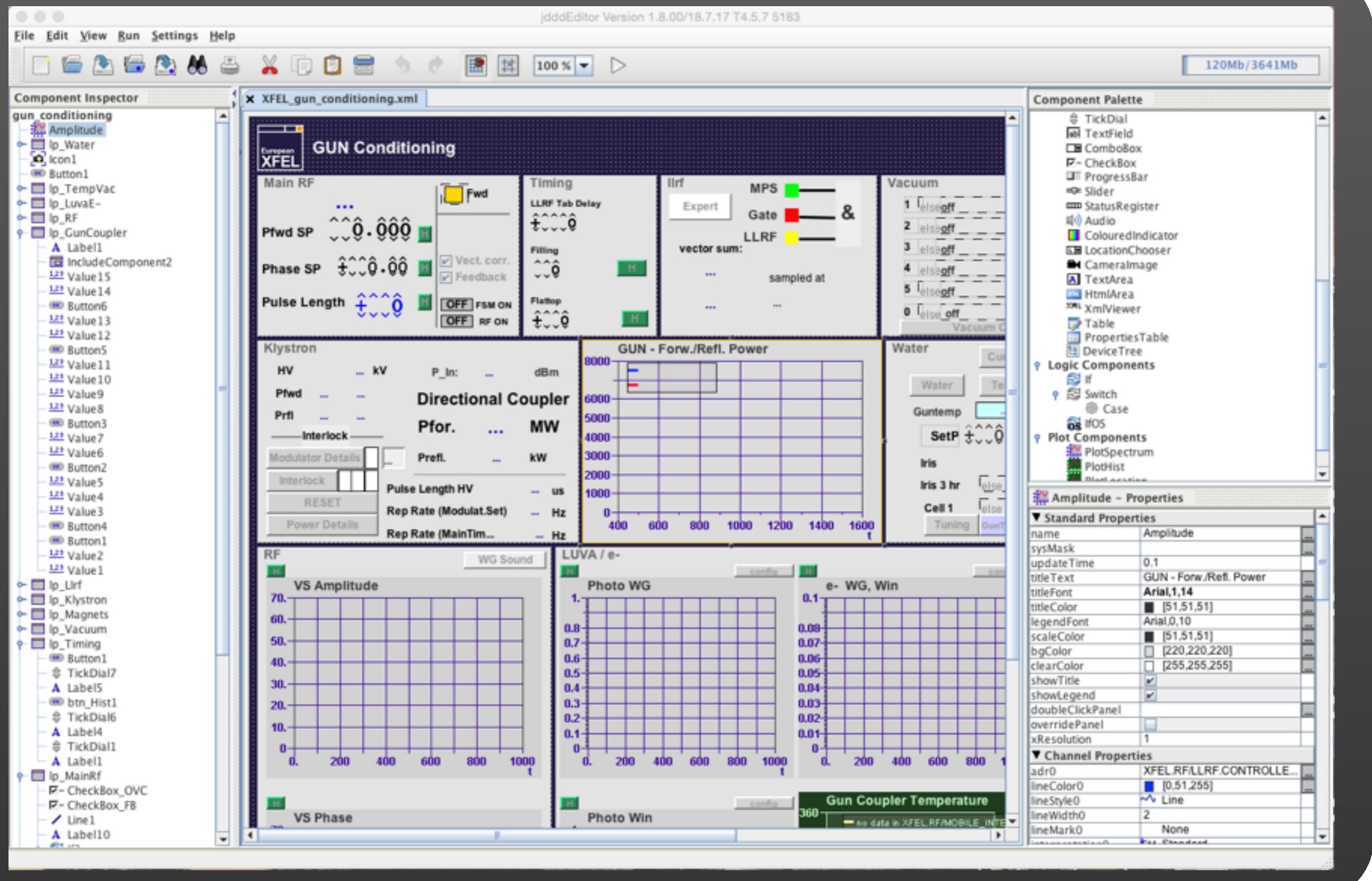
# Distributed Front-ends

| FLASH MAIN DAQ Disk Cache Copy and dCache |       |                    |             |                            |              |                          |              |                  |           |                  |         |                  |            |                  |         |                  |               |                       |               |         |
|---|-------|--------------------|-------------|----------------------------|--------------|--------------------------|--------------|------------------|-----------|------------------|---------|------------------|------------|------------------|---------|------------------|---------------|-----------------------|---------------|---------|
| DAQ Expert                                |       |                    |             | Eventbuilder Writer Status |              |                          |              |                  |           |                  |         | Idle             |            |                  |         |                  |               |                       |               |         |
| Procedures                                |       | Eventbuilder       |             |                            |              |                          |              |                  |           |                  |         |                  |            |                  |         |                  |               |                       |               |         |
| (Re)-Start DAQ                            |       | RUN                |             |                            |              |                          |              |                  |           | RUN              |         |                  |            |                  |         |                  |               |                       |               |         |
| ALL to INIT                               |       | Stream:            | main        | GMD_DATA...                | IMAGE_DATA   | EOS_Thz                  | BAMDIAG      | linac_slow       | Off       | State:           | idle    | Files copied:    | 17820      | Time expired:    | 30      | /space/POOL      | 7.169 TB free | 82.09 %               |               |         |
|   |       | Experiment:        | linac       | GMD_DATA...                | IMAGE_DATA   | EOS_Thz                  | BAMDIAG      | linac_slow       | snapshot  | Events:          | 6998478 | 2936200          | 4983       | 4983             | 4983    | 52808            | 0             | /daq_data/flash/LINAC | 7.169 TB free | 82.09 % |
| Run Control                               |       | DAQ ML Server      |             |                            |              |                          |              |                  |           |                  |         |                  |            |                  |         |                  |               |                       |               |         |
| State: RUN                                |       | BLM ML Server      | 862139      | 3464                       | RUN          | Photonflux Server        | 864899       | 55               | RUN       | State:           | idle    | Files copied:    | 17820      | Time expired:    | 30      | /space/POOL      | 7.169 TB free | 82.09 %               |               |         |
| Run:                                      | 12196 | Toroid ML Server   | 865683      | 26                         | RUN          | GMD Provider Server      | 864903       | 0                | RUN       | Stream:          | main    | GMD_DATA...      | IMAGE_DATA | EOS_Thz          | BAMDIAG | linac_slow       | snapshot      | /daq_data/flash/LINAC | 7.169 TB free | 82.09 % |
| Run Mode:                                 | Real  | Orbit ML Server    | 831509      | 0                          | RUN          | Photonenergy Server      | 768333       | 5                | RUN       | Experiment:      | linac   | GMD_DATA...      | IMAGE_DATA | EOS_Thz          | BAMDIAG | linac_slow       | snapshot      |                       |               |         |
| Processes:                                | 1     | Charge ML Server   | 141924      | 0                          | RUN          | Photonwavelength Server  | 547351       | 85               | RUN       | Events:          | 6998478 | 2936200          | 4983       | 4983             | 4983    | 52808            | 0             |                       |               |         |
| Sample Rate:                              | 1000  | Beam Power Server  | 865730      | 1                          | RUN          | THZ ML Server            | 865340       | 10               | RUN       |                  |         |                  |            |                  |         |                  |               |                       |               |         |
|   |       | Energy ML Server   | 861644      | 1261                       | RUN          | Pass Server              | 865645       | 8                | RUN       |                  |         |                  |            |                  |         |                  |               |                       |               |         |
|   |       | FL1 Long. Feedback | 786229      | 382                        | RUN          | Beam Profile Measurement | 769877       | 2268             | RUN       |                  |         |                  |            |                  |         |                  |               |                       |               |         |
|   |       | FL2 Long. Feedback | 140152      | 100                        | RUN          | BCM MLServer             | 865695       | 36               | RUN       |                  |         |                  |            |                  |         |                  |               |                       |               |         |
|   |       | Slow LOLA Feedback | 0           | 0                          | RUN          | BLM HLC Server           | 865182       | 511              | RUN       |                  |         |                  |            |                  |         |                  |               |                       |               |         |
|   |       | LLRF_ML_EnergyGain | 142508      | 2                          | RUN          | SASE Statistics Server   | 864643       | 315              | RUN       |                  |         |                  |            |                  |         |                  |               |                       |               |         |
|   |       | Energy from Dipole | 865729      | 2                          | RUN          |                          |              |                  |           |                  |         |                  |            |                  |         |                  |               |                       |               |         |
| Experiment Run Control                    |       | DAQ FSM            |             |                            |              |                          |              |                  |           |                  |         |                  |            |                  |         |                  |               |                       |               |         |
| EOS & THz                                 |       | Distributor        | Snapshot ML |                            |              |                          |              |                  |           |                  |         |                  |            |                  |         |                  |               |                       |               |         |
| State: RUN                                |       | Stream:            | DAQ_LINAC   | DAQ_STREAM.2               | DAQ_STREAM.3 | DAQ_STREAM.4             | DAQ_STREAM.5 | DAQ_STREAM.6     | DAQ_LINAC | State:           | RUN     | RUN              | RUN        | RUN              | RUN     | RUN              | INITIALIZED   |                       |               |         |
| Processes:                                | 40    | Events:            | 1102650     | 2936203                    | 4983         | 4983                     | 4983         | 52808            | 1         |                  |         |                  |            |                  |         |                  |               |                       |               |         |
| Slow Collector                            |       | Fast Collector     |             |                            |              |                          |              |                  |           |                  |         |                  |            |                  |         |                  |               |                       |               |         |
| State: RUN                                |       | Stream:            | Normal      | BAM (BL1)                  | BAM ML (BL3) | WS                       | Image        |                  |           |                  |         |                  |            |                  |         |                  |               |                       |               |         |
| Events:                                   | 42843 | State:             | RUN         | RUN                        | RUN          | RUN                      | RUN          |                  |           |                  |         |                  |            |                  |         |                  |               |                       |               |         |
|   |       | Events:            | 865723      | 865349                     | 850384       | 0                        | 1069268      |                  |           |                  |         |                  |            |                  |         |                  |               |                       |               |         |
|   |       |                    | Connections | Connections                | Connections  | Connections              | Connections  |                  |           |                  |         |                  |            |                  |         |                  |               |                       |               |         |
|   |       |                    |             |                            |              |                          |              |                  |           |                  |         |                  |            |                  |         |                  |               |                       |               |         |
| Front-End Server                          |       | Toroid Loss Rate   |             |                            |              |                          |              |                  |           |                  |         |                  |            |                  |         |                  |               |                       |               |         |
|   |       | FLASH_VMEADI1      | 864989      | VMEDIAG2                   | 863477       | VMEDIAG3                 | 865668       | VMEDIAG4         | 864899    | VMEDIAG5         | 862991  | VMEDIAG6         | 865273     | VMEDIAG7         | 288465  | VMEDIAG8         | 853970        | FLASHCPUDIAG8         | 865683        |         |
|   |       | FLASH_BPM_TOROID   | 865663      | FLASH_BPM_TOROID           | 865665       | FLASH_BPM_TOROID         | 865664       | FLASH_BPM_TOROID | 865667    | FLASH_BPM_TOROID | 864631  | FLASH_BPM_TOROID | 861697     | FLASH_BPM_TOROID | 865665  | FLASH_BPM_TOROID | 198395        | FLASH_BPM_TOROID      | 864442        | HALO    |
|   |       | VMEPM1             | 865648      | VMEPM2                     | 865645       | VMEPM3                   | 865667       | VMEPM4           | 864631    | VMEPM5           | 861697  | VMEPM6           | 865664     | VMEPM7           | 864442  | VMEPM8           | 864614        | VMEPM9                | 860944        | HALO    |
|   |       | VMEKLY2            | 865642      | VMEKLY3                    | 865473       | VMEKLY4                  | 865650       | VMEKLY5          | 120041    | VMEKLY6          | 131126  | VMEKLY7          | 865650     | VMEKLY8          | 864442  | VMEKLY9          | 864614        | VMEKLY10              | 860944        | HALO    |
|   |       | MSKOPUACC139       | 865664      | MSKOPUACC139               | 865663       | MSKOPUACC145             | 865664       | MSKOPUACC145     | 865663    | MSKOPUFRGUN      | 865664  | MSKOPUFRGUN      | 865664     | MSKOPUFRGUN      | 865664  | MSKOPUFRGUN      | 865664        | MSKOPUFRGUN           | 865664        | HALO    |
|   |       | CPL_A_LURF_KLY_A   | 864790      | CPL_A_LURF_KLY_A           | 864800       | CPL_A_LURF_KLY_A         | 864893       | CPL_A_LURF_KLY_A | 864492    | CPL_A_LURF_KLY_A | 865069  | CPL_A_LURF_KLY_A | 864492     | CPL_A_LURF_KLY_A | 865069  | CPL_A_LURF_KLY_A | 864492        | CPL_A_LURF_KLY_A      | 865069        | HALO    |
|   |       | FLASH_BPM_TOROID   | 860944      | FLASH_BPM_TOROID           | 141798       | FLASH_BPM_TOROID         | 860943       | FLASH_BPM_TOROID | 287968    | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860944     | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860945        | FLASH_BPM_TOROID      | 860944        | HALO    |
|   |       | FLASH_BPM_TOROID   | 860944      | FLASH_BPM_TOROID           | 141798       | FLASH_BPM_TOROID         | 860943       | FLASH_BPM_TOROID | 287968    | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860944     | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860945        | FLASH_BPM_TOROID      | 860944        | HALO    |
| FLASH2                                    |       | FLASH2             |             |                            |              |                          |              |                  |           |                  |         |                  |            |                  |         |                  |               |                       |               |         |
|   |       | FLASH_BPM_TOROID   | 860944      | FLASH_BPM_TOROID           | 141798       | FLASH_BPM_TOROID         | 860943       | FLASH_BPM_TOROID | 287968    | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860944     | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860945        | FLASH_BPM_TOROID      | 860944        | HALO    |
|   |       | FLASH_BPM_TOROID   | 860944      | FLASH_BPM_TOROID           | 141798       | FLASH_BPM_TOROID         | 860943       | FLASH_BPM_TOROID | 287968    | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860944     | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860945        | FLASH_BPM_TOROID      | 860944        | HALO    |
|   |       | FLASH_BPM_TOROID   | 860944      | FLASH_BPM_TOROID           | 141798       | FLASH_BPM_TOROID         | 860943       | FLASH_BPM_TOROID | 287968    | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860944     | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860945        | FLASH_BPM_TOROID      | 860944        | HALO    |
|   |       | FLASH_BPM_TOROID   | 860944      | FLASH_BPM_TOROID           | 141798       | FLASH_BPM_TOROID         | 860943       | FLASH_BPM_TOROID | 287968    | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860944     | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860945        | FLASH_BPM_TOROID      | 860944        | HALO    |
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|   |       | FLASH_BPM_TOROID   | 860944      | FLASH_BPM_TOROID           | 141798       | FLASH_BPM_TOROID         | 860943       | FLASH_BPM_TOROID | 287968    | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860944     | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860945        | FLASH_BPM_TOROID      | 860944        | HALO    |
|   |       | FLASH_BPM_TOROID   | 860944      | FLASH_BPM_TOROID           | 141798       | FLASH_BPM_TOROID         | 860943       | FLASH_BPM_TOROID | 287968    | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860944     | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860945        | FLASH_BPM_TOROID      | 860944        | HALO    |
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|   |       | FLASH_BPM_TOROID   | 860944      | FLASH_BPM_TOROID           | 141798       | FLASH_BPM_TOROID         | 860943       | FLASH_BPM_TOROID | 287968    | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860944     | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860945        | FLASH_BPM_TOROID      | 860944        | HALO    |
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|   |       | FLASH_BPM_TOROID   | 860944      | FLASH_BPM_TOROID           | 141798       | FLASH_BPM_TOROID         | 860943       | FLASH_BPM_TOROID | 287968    | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860944     | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860945        | FLASH_BPM_TOROID      | 860944        | HALO    |
|   |       | FLASH_BPM_TOROID   | 860944      | FLASH_BPM_TOROID           | 141798       | FLASH_BPM_TOROID         | 860943       | FLASH_BPM_TOROID | 287968    | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860944     | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860945        | FLASH_BPM_TOROID      | 860944        | HALO    |
|   |       | FLASH_BPM_TOROID   | 860944      | FLASH_BPM_TOROID           | 141798       | FLASH_BPM_TOROID         | 860943       | FLASH_BPM_TOROID | 287968    | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860944     | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860945        | FLASH_BPM_TOROID      | 860944        | HALO    |
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|   |       | FLASH_BPM_TOROID   | 860944      | FLASH_BPM_TOROID           | 141798       | FLASH_BPM_TOROID         | 860943       | FLASH_BPM_TOROID | 287968    | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860944     | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860945        | FLASH_BPM_TOROID      | 860944        | HALO    |
|   |       | FLASH_BPM_TOROID   | 860944      | FLASH_BPM_TOROID           | 141798       | FLASH_BPM_TOROID         | 860943       | FLASH_BPM_TOROID | 287968    | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860944     | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860945        | FLASH_BPM_TOROID      | 860944        | HALO    |
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|   |       | FLASH_BPM_TOROID   | 860944      | FLASH_BPM_TOROID           | 141798       | FLASH_BPM_TOROID         | 860943       | FLASH_BPM_TOROID | 287968    | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860944     | FLASH_BPM_TOROID | 860944  | FLASH_BPM_TOROID | 860945        | FLASH_BPM_TOROID      | 860944        |         |



- Multiple Control System Interfaces
- jddd: GUI Editor and Run-time
- Scripting:
  - MATLAB
  - Python
  - Command line (e.g. doocsget)
- Generic Browser: jDTool, rpc\_test





- Create complex control system panels without programming
- Rich set of widgets:
  - incl. dynamic layouts
  - IF / Switch components
  - Animated size / position from device data
  - Plots with online analysis
- Panels are stored in a SVN repository
- Reusable graphics:
  - As component in panels
  - With complex address inheritance and string manipulation
- Access from Web Browser in preparation

jddd 1.8.00/18.7.16 T4.5.7 rehlich@mcsrehlich.desy.de rpc\_test.xml FLASH.DIAG/BPM/10DUMP/  
File View Help 67Mb/1820Mb

Facility Filter Device Filter Location Filter Properties Filter filtered □ Read -> File  
sorted □ sorted □ sorted □ sorted □ sorted □ Show All Locations

FLASH.DIAG BPM 10DUMP 9MHZ\_DIV Refresh Table Show Value

|                                    | FLASH.DIAG/BPM/10DUMP/*               | Value | type |
|------------------------------------|---------------------------------------|-------|------|
| NAME = location                    | 10DUMP                                | ABC   |      |
| STS gen.Status word                | 12                                    | 123   |      |
| ERROR general error code           | 0                                     | 123   |      |
| ERROR.STR error as string          | 0 0.0 576.0 1438758829 ok             | U STR |      |
| SYS_MASK bit mask: systems the     | 0                                     | 123   |      |
| FCT_CODE the location code         | 999                                   | 123   |      |
| X_POS the position in meter in the | 5.5                                   | 0..3  |      |
| Z_POS the position in meter in the | 250.764                               | 0..3  |      |
| Z_POS.STRING the position as       |                                       | ABC   |      |
| DEVICE.INFO edit info about the    | 0 0.0 0.0 0 None                      | U STR |      |
| LAST_UPDATE last online time 1.    | "19. Nov. 2015 18:07:42.000" 1447...  | TTFI  |      |
| LAST_USR1 last online time 1. Sec, | "01. Jan. 1970 01:00:00.000" 0 "0..." | TTFI  |      |
| SPN subscription port number       | 0 0.0 0.0 0                           | U STR |      |
| STS.ERROR pending error status     | 0                                     | 0/1   |      |
| STS.NEWERROR new error detected    | 1                                     | 0/1   |      |
| STS.ERRORMASK disable new_error    | 0                                     | 0/1   |      |
| STS.ONLINE device on-line status   | 1                                     | 0/1   |      |
| SET.ONLINE command to set on-line  | 1                                     | 123   |      |
| SVR.ADDR string to the server      | FLASH.DIAG/BPM/VMEDIAG8._SVR...       | ABC   |      |
| PRE_SAMPLES number                 | 100                                   | 123   |      |
| PRE_SAMPLES.ZMQNAME the full       | TTF2.DIAG/ADCDMA/DIAG8.3/PRE...       | ABC   |      |
| SAMPLE_FREQ of the locale data     | 1.0030864                             | 0..3  |      |
| SAMPLE_FREQ.ZMQNAME the full       | TTF2.DIAG/ADCDMA/DIAG8.3/SA...        | ABC   |      |
| 9MHZ_DIV 9.3.2.1 divider of the    | 9                                     | 123   |      |

SysMask Filter Read 11177.5261 20.0 0.0 Send

DOOCS hosts= vmediag8 lib = 610589783 (server\_mask = 4 auth\_mask = 0 options = 0 status = 0)

Facility

Device

Location

Property

# DOOCS A Simple Java Client Example

```

public class TestDoocsAsync implements EqCallback {

    static TestDoocsAsync instance = new TestDoocsAsync();

    public static void main(String[ ] args) throws Throwable {
        EqAddr addr1 = new EqAddr("PETRA/NEG.ABSCHNITTE/PU8+9/UNDL");
        EqAddr addr2 = new EqAddr("TEST.DOOCS/SINGENERATOR/COS/DATA");

        EqCall call = new EqCall();
        EqData data = new EqData();
        EqData result1 = new EqData();
        EqData result2 = new EqData();

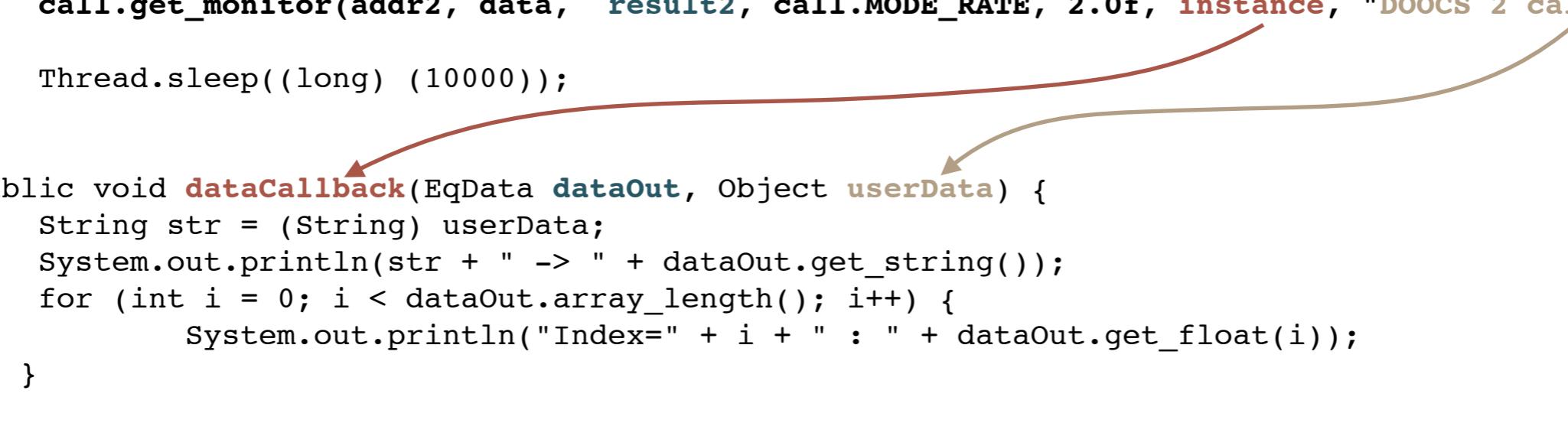
call.get(addr, ed, data);
        System.out.println("Sync read -> " + data.get_string());

        call.get_monitor(addr1, data, result1, call.MODE_RATE, 1.0f, instance, "TINE 1 callback");
call.get_monitor(addr2, data, result2, call.MODE_RATE, 2.0f, instance, "DOOCS 2 callback");

        Thread.sleep((long) (10000));
    }

    public void dataCallback(EqData dataOut, Object userData) {
        String str = (String) userData;
        System.out.println(str + " -> " + dataOut.get_string());
        for (int i = 0; i < dataOut.array_length(); i++) {
            System.out.println("Index=" + i + " : " + dataOut.get_float(i));
        }
    }
}

```





```
>> A = doocsread( ,TTF2.DIAG/BPM/70RS/X.TD' );           or with a parameter      A = doocsread( 'NAME' , B )
>> A

A =
  data: [1x1 struct]
  error: ''
  type: 'SPECTRUM'

>> A.data

ans =
  comment_len: 11
  comment_val: 'BPM 70RS X'
            tm: 1.3977e+09
  s_start: 0
    s_inc: 1
    status: 35544570
d_spect_array_len: 2048
d_spect_array_val: [2048x1 double]

>> A.data.d_spect_array_val

ans =
-6.5609
-6.5634
-6.5601
-6.5601
-6.5634
-6.5660
-6.5703
-6.5592 ...
```



# DOOCS Python Client Example

```
# Reading a DOOCS property with * operation. Returns X.FLASH1 property of all locations in a list
x = doocs.read("TTF2.DIAG/BPM/*/X.FLASH1")
print(x)

# Making a names call for a ion pump location starting with MT*
names = doocs.names("TTF.VAC/ION_PUMP/MT*")

# Print all IonPumps with location names starting with MT
print(names)
```

**recorder\_server.h:**

```
class EqFctRecorder : public EqFct {
protected:
    D_string adr_;
    char    adrname_[STRING_LENGTH];
    D_floathist value_;
    D_polyynom polynom_;
    D_dig_filter dfilt_;
public:
    EqFctRecorder ( );           // constructor
    ~EqFctRecorder ( ) { }      // destructor

    void update ();
    void init (); // started after creation of all Eq's
    void online();
};
```

Defines one device server class

**recorder\_server.cc:**

```
EqFctRecorder::EqFctRecorder ( ) :
    EqFct ("NAME = location"),
    adr_ ("ADR doocs channel name",
          adrname_, STRING_LENGTH, this ),
    value_ ("VALUE value",
            this ),
    polynom_ ("POLYPARA meter for data correction of channel", this),
    dfilt_ ("DIG_FILTER digital filter",
            this),
}

void EqFctRecorder::update ( ) {
    strncpy(adrName, adr_.value(), ADDR_STRING_LENGTH);
    ea.adr (adrName );
    eq->get_monitor (&ea, &ed, &dst, UPDATE_NORMAL ); // read
    val = dst.get_float();
    val = polynom_.evaluate(val);
    val = dfilt_.evaluate(val);
    value_.set_value ( val );
}
```

The instances are created from a configuration file during start-up

Defines the properties of a device

The start-up values are read from a configuration file that is kept actual during run-time

Complex Data Function with multiple properties:

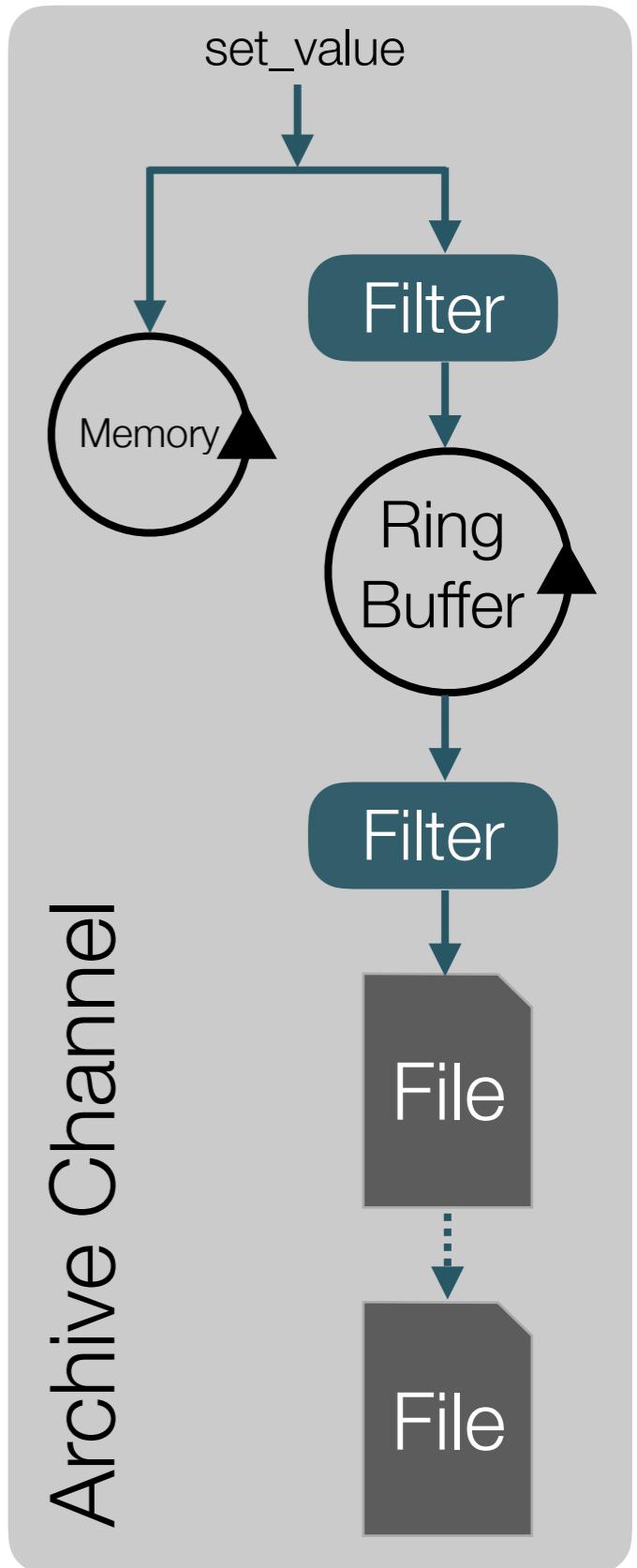
VALUE actual value

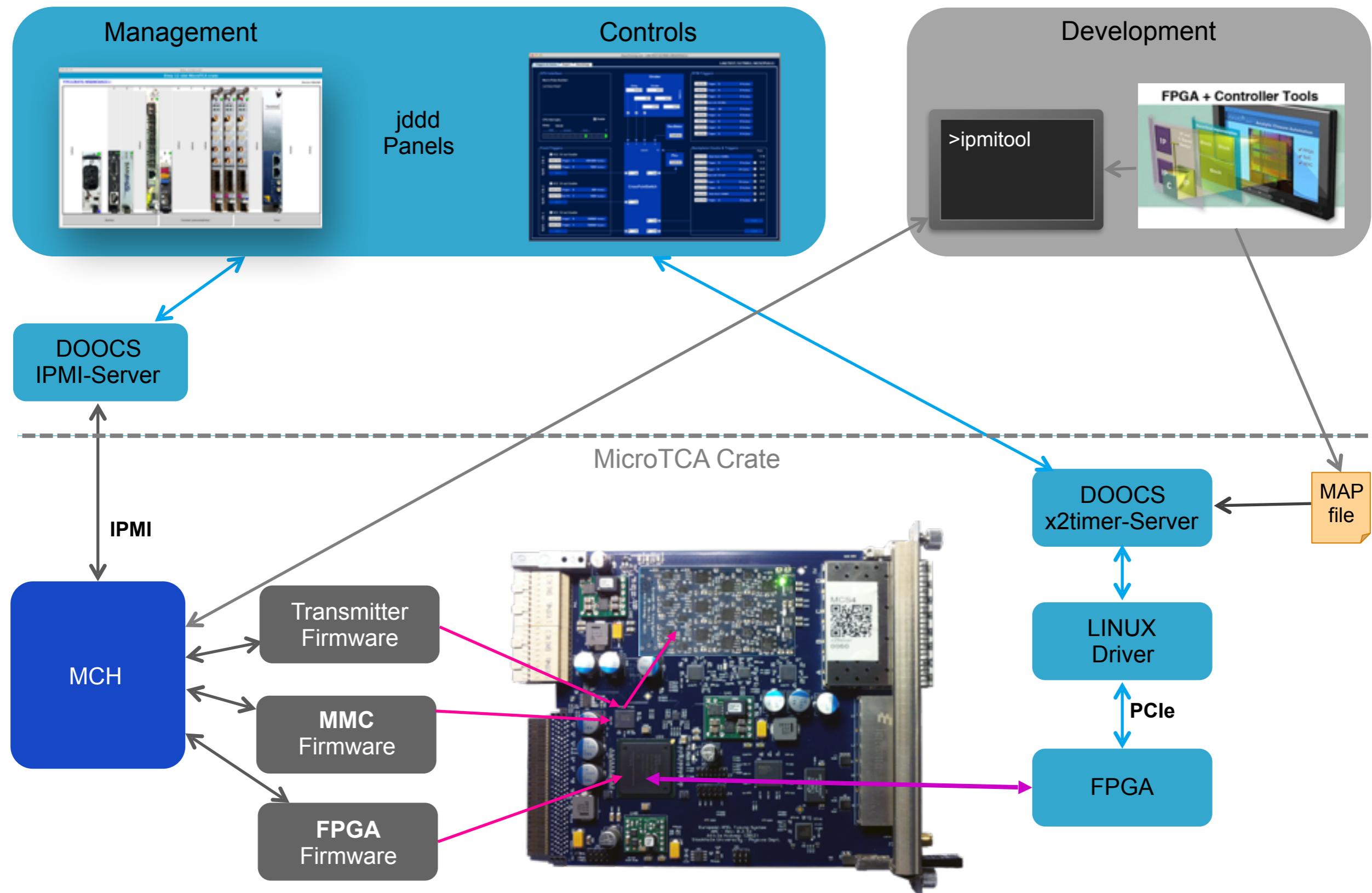
VALUE.HIST archive

VALUE.EGU Engineering units and scales

VALUE...

- Distributed: part of the server library
- No extra configuration required
- FLASH: > 100 000 archived channels
- Click or Drag&Drop on any value to show History





- Central GIT source code repository with external access
- Releases every ~two months
- „Nightly Builds“ to verify consistency and access to new libraries before a release
- Distributed with a packet system
- Distribution tool in preparation
- Main server platforms:
  - Linux, Mac OS X, Solaris ▼, RaspberryPi ▲

- Object-oriented design
- Efficient server design and coding
- Complex functions are available in library:
  - multi-threading, archiving, data transfers, ...
- Integrated high performance DAQ system
- Good supported MicroTCA hardware
- Auto-restart and lot of maintenance features build-in
- Powerful and simple to use GUI editor jddd
- Mature:
  - in operation since 20 years, DAQ 10 years
  - used for FLASH, XFEL, Laser / Plasma / Exp. / CW R&D

Thank you!

More information:

[doocs.desy.de](http://doocs.desy.de)  
[jddd.desy.de](http://jddd.desy.de)



**DOOCS Developer:**  
Releases  
Installation Manual  
Programmer's Manual  
Source Code Repository  
Developer Mailing List