



EUROPEAN
SPALLATION
SOURCE



Experiment Control and Data Curation Overview

MORTEN JAGD CHRISTENSEN

2023-10

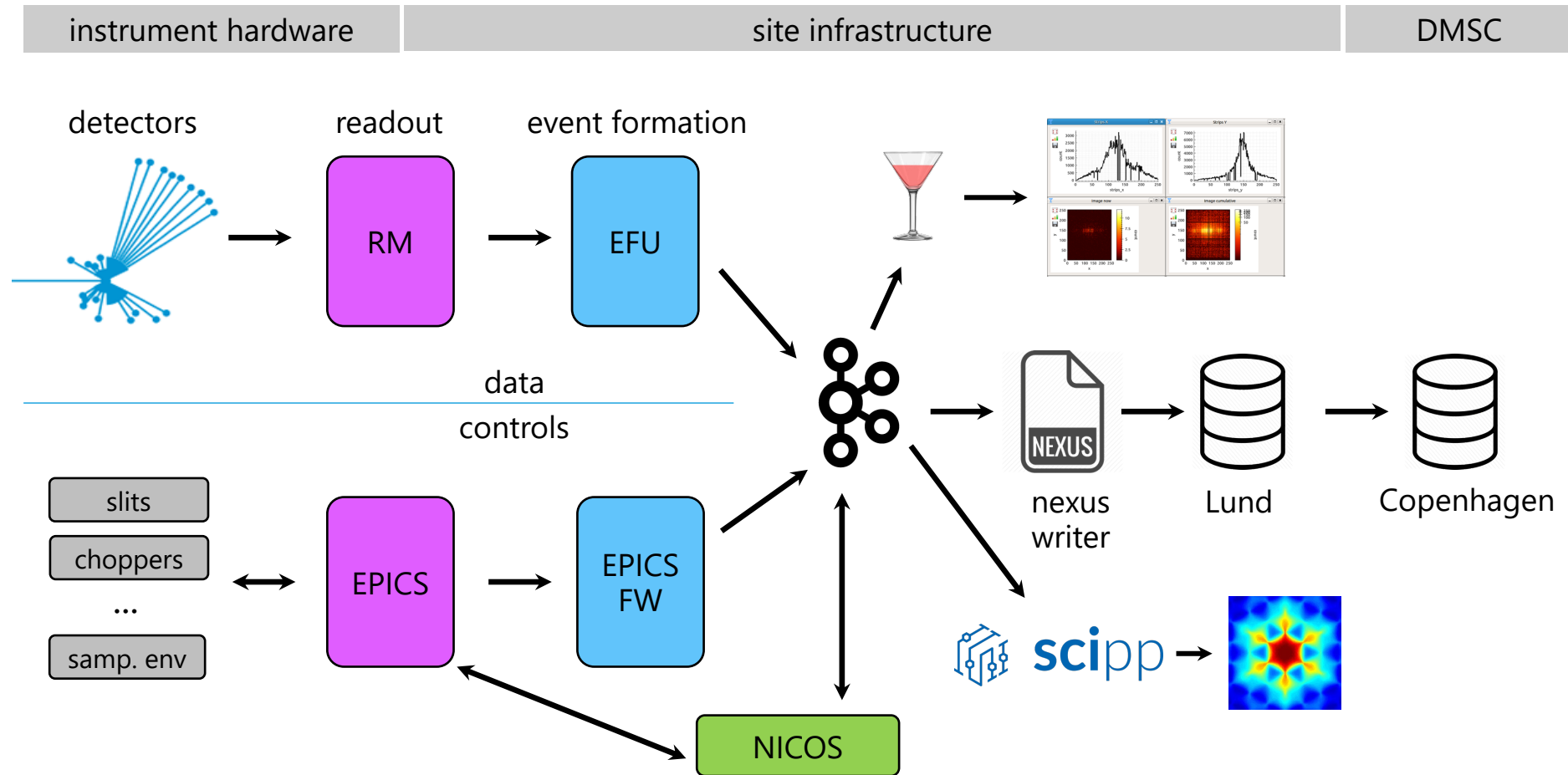
ECDC Scope

Experiment Control and Data Curation

- Experiment Control
- Beamline and Device Controls
- Data Acquisition
- Detector Software Event Formation
- Nexus File Writing
- Data Management / Curation

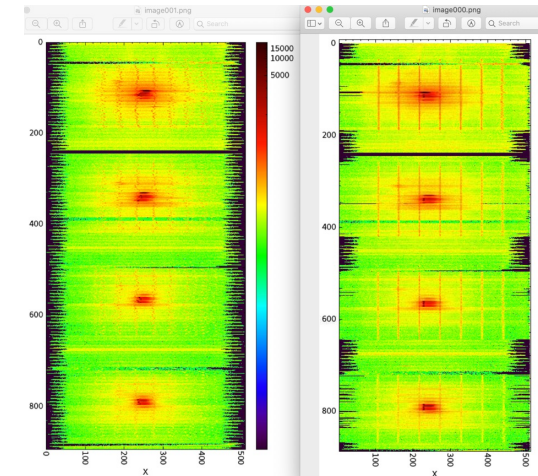
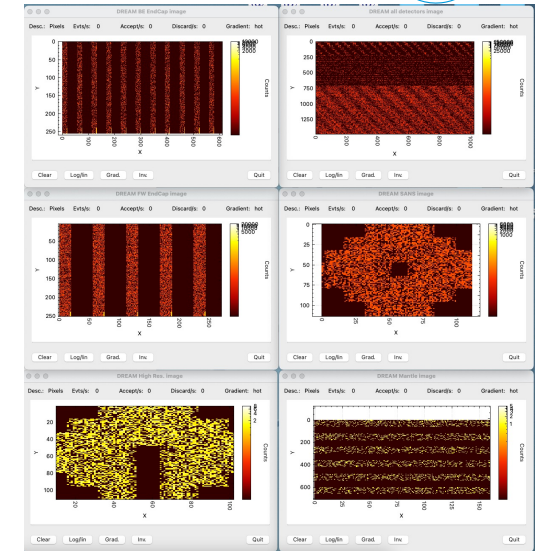
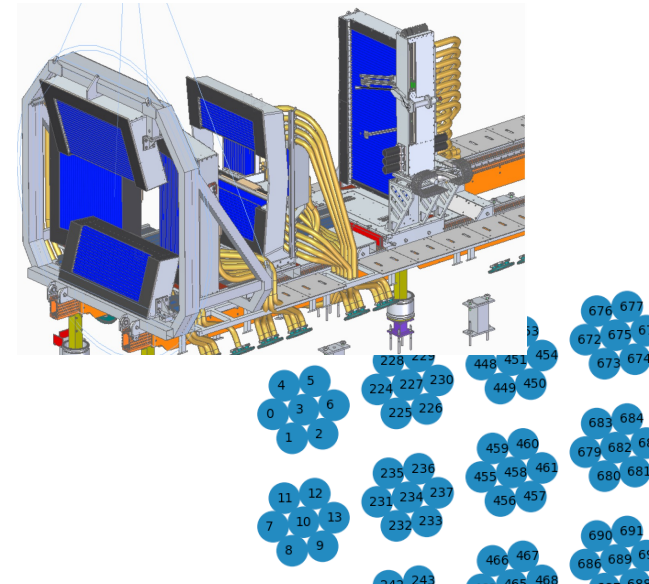
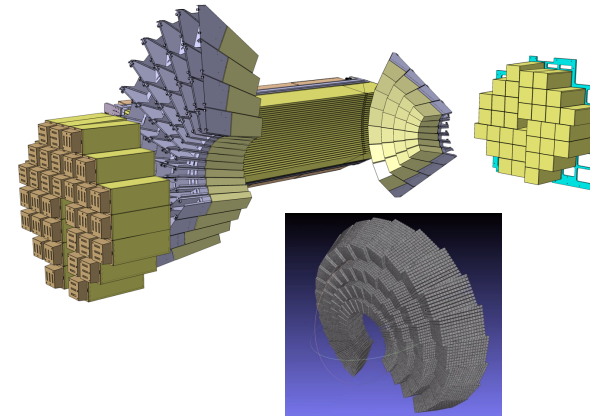
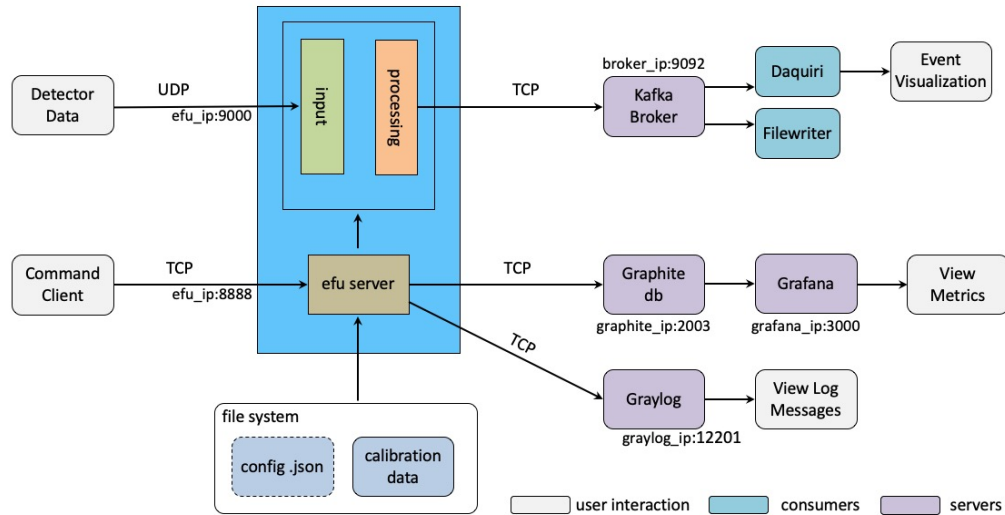


Instrument Data & Controls Architecture



Event formation

Converting digital reading into timestamped pixels



Instrument: Unknown Experiment: Unknown

Experiment
Setup
Samples

>>

+ New Cmd

▶
Run

Enter search expression

Output
Scan Plot
Detector Image
Script Status

```

Instrument interaction
Script Editor
Detector image
History
Logs
Finish Experiment

[08:06:31] 1/1 0.00 2.001 2.001 271000.000
[08:06:31] Finished at: 2020-04-01 08:06:31
[08:06:32] =====
[08:06:32] >>> [event 2020-04-01 08:06:02] scan(s, 0, 1, 10, 1s)
[08:06:32] Starting scan: scan(s, 0, 1, 10, 1s)
[08:06:32] Started at: 2020-04-01 08:06:03
[08:06:32] Scan number: 4
[08:06:32] Filename: _000000004.dat
[08:06:32] =====
[08:06:32] # x T Ts det
[08:06:32] mm K s
[08:06:32] det - Starting counting for 5 seconds
[08:06:39] 1/10 0.00 2.001 2.001 270000.000
[08:06:40] det - Starting counting for 5 seconds
[08:06:46] 2/10 1.00 2.001 2.001 270000.000
[08:06:47] det - Starting counting for 5 seconds
[08:06:53] 3/10 2.00 2.001 2.001 270000.000
[08:06:59] 4/10 3.00 2.001 2.001 270000.000
[08:07:05] 5/10 4.00 2.001 2.001 268900.000
[08:07:11] 6/10 5.00 2.001 2.001 268900.000
[08:07:17] det - Starting counting for 5 seconds
[08:07:23] 7/10 6.00 2.001 2.001 270000.000
[08:07:29] 8/10 7.00 2.001 2.001 269900.000
[08:07:35] 9/10 8.00 2.001 2.001 268900.000
[08:07:41] 10/10 9.00 2.001 2.001 270000.000
[08:07:49] =====
[08:07:49] Finished at: 2020-04-01 08:07:09
[08:07:49] =====
[08:36:18] >>> [event 2020-04-02 07:36:18] count(s)
[08:36:18] det - Starting counting for 5 seconds
[08:36:24] count: det = 270000.000
[08:36:25] >>> [event 2020-04-02 07:36:25] count(s)
[08:36:26] det - Starting counting for 5 seconds
[08:36:31] count: det = 270000.000
[08:36:32] >>> [event 2020-04-02 07:36:32] count(s)
[08:36:32] det - Starting counting for 5 seconds
[08:36:38] count: det = 270000.000

```

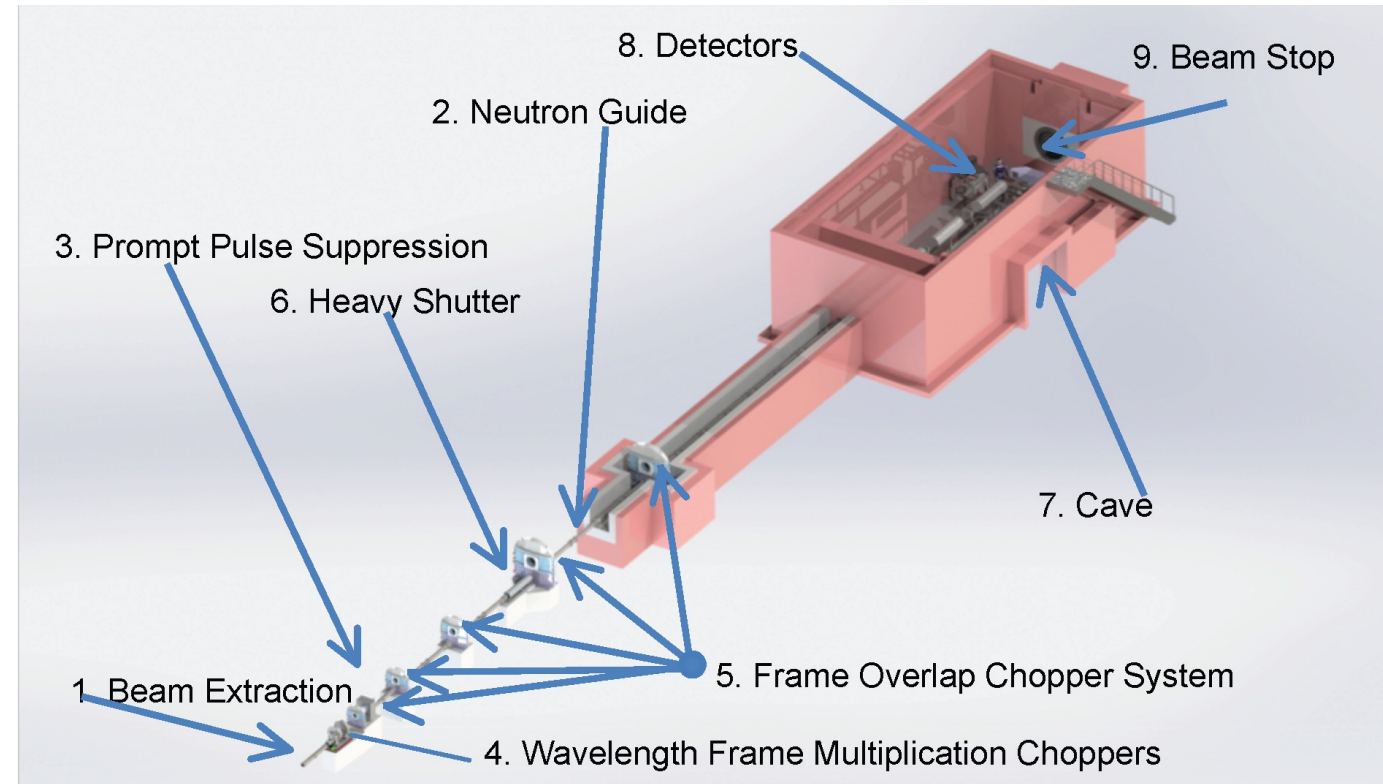
Show only the errors
Value
Status

```

# collimator guide1
# rnc
# cryo 2.001 K
# T 2.001 K
# Ts
# detector 11.29 umin idle
# hv 0.000 V idle
# vacdet 5.06e-04 mbar idle
# wcp
# accel on
# ecurrent 59.879 mA idle
# lightshutter open idle
# power 4.58 MW idle
# just_hb det
# det -wts Connected
# monitors 0 cts idle
# m1 0 cts idle
# m2 0 cts idle
# m2pos in idle
# m3 0 cts idle
# samplecell -1 MPa idle, below user L
# P
# sampleplot
# polgate closed
# vacpet 1.07e-03 mbar idle
# vacpet
# gammashutter open
# monothruster open
# slits 0.00 x 0.00 mm idle
# cspec
# system
# Exp
# lastplot 0
# lastscan 4 idle
# KappaGawader
# NeutroFetmeter
# Sakafo Listening...

```

- Shutters
- Slits
- Choppers
- Sample Movement
- Robotics



ECDC Projects

Project ideas



- Mechanics and environment control software
 - Drivers, interfaces, robotics
- Data path
 - High speed data processing, parallelisation
 - Live visualisations
- Controls
 - User Interfaces, experiment controls,
- Scalable storage
 - Kafka, performance, security, robustness
 - Fast filewriting of scientific data (HDF5)
- Large systems
 - monitoring, visualisations
- Experimental
 - Detector data acquisition
- Operating systems
 - Linux environments
- Languages
 - C++ (data path and filewriting)
 - Python NICOS (and many tools)
 - Bash scripting
 - lua
- Network & Data
 - Network communications
 - Capture, analyse, replay
- Systems
 - Continuous integration
 - Automated deployments

The End

