Eiger 16M @BioMAX

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On behalf of MX Group
Mar. 15th, 2017
Eiger at MAX IV

- Eiger 16M at BioMAX
  - Data acquisition in Dec. 2016 due to shutdown
- Eiger 1M at Balder in Feb. 2017
- Growing interest
  - Eiger 4M at CoSAXS, NanoMAX, SoftiMAX?

2. NanoMAX, Nano-imaging & -spectroscopy
3. BALDER, Chemical spectroscopy: real-time & -conditions
4. BioMAX, Protein crystallography
12. CoSAXS, Geometric structure & correlation: (bio) liquids
13. SoftiMAX, Microscopy & method development
Detector control and integration into MXCuBE3

- Eiger Tango Device
  - Extended the one from Teresa Nuñez (DESY)
  - [https://github.com/MaxIV-KitsControls/dev-maxiv-eigerdectris](https://github.com/MaxIV-KitsControls/dev-maxiv-eigerdectris)
  - Support control and FileWriter
  - Streaming under development

- Integrated into MXCuBE3
  - Standard data collection including helical scan
  - Mesh scan not yet
  - ROI vs. resolution / distance
  - ROI vs. shortest exposure time
Issues / surprises

• 6-9s for changing energy / energy_threshold / wavelength
• Use non-default energy_threshold, double time to config
• Arm becomes longer (> 3s) after changing energy
• img number, not configurable after arming
• How about interleave? Repacking the data or virtual dataset?
**MX IT-infrastructure (1)**

**Buffer Server**
- 12 TB SSD
- 500 GB RAM
- 24 cores
- GPFS

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**BioMAX**

**MAX IV**

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**Buffer Server**

- DCU
- 4x10GE
- 2x10GE

**Beamline workstation**

**Onsite users**

**HPC**

**Storage (GPFS)**

**40GE or IB**

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**HX IT-infrastructure (1)**
Storage
- Bulk
  - write from BS ~1.1GB/s
  - 250 TB
- IBM ESS in the future (tested)
MX IT-infrastructure (2)

HPC
- 16 CPU node + 1 GPU node
- 8 x 20 cores + 8 x 24 cores
- Limited RAM, 64 /128 GB
- infiniBand interconnects
- Growing rapidly
- SLURM
NeXus/HDF5

- adding rotation axis, works well with generate_XDS.INP from XDSwiki
- adding beamline name, where is the best place?
  - /entry/instrument
  - /entry/instrument/collection

```python
def add_header(self, filename):
    h5file = h5py.File(filename)
    beamline = h5file.require_group("/entry/instrument")
    beamline.attrs['name'] = 'BioMAX@MAXIV'
    omega = h5file.require_group("/entry/sample/transformations/omega")
    omega.attrs['vector'] = (0.0, -1.0, 0.0)
    h5file.close()
```

Wish: to record the collection trajectory
Benchmark (XDS)

- **EIGER_16M_Nov2015**, 900 images in 9 containers, 0.1 deg, insulin from SLS
  NUMBER OF REFLECTIONS IN SELECTED SUBSET OF IMAGES **131826**
- **Thau_BIOMAX**, 900 images in 9 containers, 0.1 deg, thaumatin from BioMAX (in red)
  NUMBER OF REFLECTIONS IN SELECTED SUBSET OF IMAGES **508739**

<table>
<thead>
<tr>
<th></th>
<th>HPC - 4 nodes (20 cores, CPU E5-2650 v3 @ 2.30GHz)</th>
<th>HPC - 4 nodes (24 cores, CPU E5-2650 v4 @ 2.20GHz)</th>
<th>HPC - 8 nodes (20 cores, CPU E5-2650 v3 @ 2.30GHz)</th>
<th>HPC - 8 nodes (24 cores, CPU E5-2650 v4 @ 2.20GHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buffer Server (10 Gbps)</td>
<td>78.2</td>
<td></td>
<td>53.7</td>
<td></td>
</tr>
<tr>
<td>Buffer Server (40 Gbps)</td>
<td>61 / 86.7</td>
<td>53 / 74.8</td>
<td>44.2 / 62.3</td>
<td>36.3 / 54.8</td>
</tr>
<tr>
<td>ESS (gpfs16m)</td>
<td>60.8 / 88.5</td>
<td>53.6 / 75.2</td>
<td>47.8 / 64.8</td>
<td>38.8 / 56.7</td>
</tr>
</tbody>
</table>

Evaluation of spot finding is on going ...
Tools

- Thumbnail generation
  - Vicente Rey Bakaikoa
  - Binning / summation
  - Eiger 1/4/9/16 M & ROI
  - https://github.com/mxcube/EigerTools

- Hdf5 web viewer
  - Jason Brudvik (MAX IV)
  - Under development
Acknowledgement

MX Group
Uwe Mueller
Thomas Ursby
Johan Unge
Roberto Appio
Christopher Ward
Ross Friel

KITS Group
Mikel Eguiraun
Artur Barczyk
Andreas Mattsson
Vincent Hardion
Zdenek Matej
Jason Brudvik

many others from MAX IV

HDRMX community

Vicente Rey Bakaikoa
Thank you for your attention!

Questions?