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MORGEN



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Recapitulation of NeXus and NeXus @ PSI

Four Different Things

- Brief intro NeXus
- NeXus at SINQ
- NeXus at SLS
- NeXus at SwissFEL

- Solve the predicament of the traveling scientist
 - Variety of data file formats
 - Often data is distributed across many different files in different formats
- Long term storage of scientific data
- Standardized interfaces between data producers
- Target communities: neutron, X-ray and muSR scattering

What do we Need?

- A physical file format
- Platform independent
- Self describing
- Cater for a wild variety of instrumentation and use cases
- Ontology of well defined names
- Quick visualization

- HDF-5 as physical file format
 - Platform independent
 - Self describing
 - Public domain
- Rules for organizing domain specific data in an HDF-5 file
- A dictionary of domain specific fields expressed in the form of base classes
- Strict validatable standards in the form of application definitions

- Groups
 - For organizing data in a hierarchy much like a file system
 - NeXus adds a type to groups, prefixed with NX
- Datasets
 - n-dimensional arrays of numbers in a variety of types
- Attributes
 - meta data items to be added to groups and datasets
- Links
 - Like unix filesystem links
 - For organization
 - For linking external data

entry:NXentry

SANS:NXinstrument

source:NXsource

collimator:NXcollimator

detector:NXdetector

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.

user:NXuser


sample:NXsample

data:NXdata

data

powder_diffraction:NXsubentry

NeXus Processed Data Structure

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```
entry:NXentry
  process:NXprocess
    input:NXparameter
    output:NXparameter
  sample:NXsample
  data:NXdata
    data
```


More NeXus Features

- Scan rules
- Crystallographic transformations for positioning components in the McStas coordinate system
- **new:** NXoff_geometry for describing the geometry of components
 - Working on CSG
- Associating axis with data
- Streaming data acquisition

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data:NXlog

time[]

@start_time

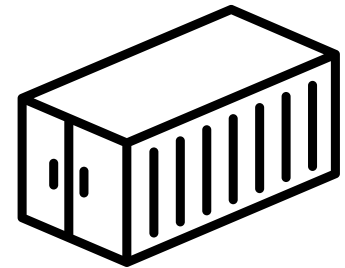
@scaling_factor

value[][][]...

cue_timestamp_zero[]

cue_index[]

NeXus is a container, I contain everything



NeXus is a validatable standard through Application Definitions



An application definition defines the minimum content of a file for a given scientific use case

- expressed in NXDL
- available for many scientific use cases already
- NeXus is open to community provided application definitions
- File validation through `cnxvalidate` available
- Most successful application definition: NXmx

- Progress with the adoption of NeXus is slow
 - But when new things are done it is usually done with NeXus
- We have seen people doing a file format themselves and ending up with formats looking very much like NeXus
- Work has started with people from the electron microscope community to expand the use of NeXus
- NeXus is overseen by the NIAC
 - You are invited to join
- www.nexusformat.org

- SINQ has been writing NeXus files since 1996
 - First HDF-4, now HDF-5
- NAPI was developed largely at SINQ
- SINQ got > 2 million files which have been written, analyzed, and scientific results obtained from
 - Here you have your argument if anyone doubts that NeXus can be made to work
- The NeXus files written at SINQ represent an outdated state of NeXus now
- SINQ has decided to move from SICS to NICOS-3 as experiment control system
 - In the process we will make SINQ NeXus files comply with NeXus application definitions
 - We start with neutron event streaming reusing the ESS architecture

- Most files written via NAPI
- NXDICT
 - Description of the structure
 - Code generates structure from description
 - Scripted
- With NICOS: template based NeXus file generation through h5py
- Many bespoke tools for reducing and analyzing NeXus file data
- Mantid

- There were good intentions to use NeXus...
- Overrun in the rush to get the facility going
- Now:
 - Pollux uses NeXus full-time
 - cSax sometimes
 - ELGER-detector writes NeXus per default
- SLS-2 is coming up
 - We try again with good intentions...
 - New detectors → more data → NeXus more attractive

- Decided to do their own stuff, driven by detector manufacturers
 - They also did not have dedicated IT staff for a long time
 - Very dynamic instrumentation
- Still considering to use NeXus to store the machine state
- Insufficient resources to do this

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- Questions?