NeXus data collection and OpenDaVE, a graphical tool for analysis

Jörn Beckmann

Technische Universität München

FRM-II

(Joern_Beckmann@frm2.tu-muenchen.de)

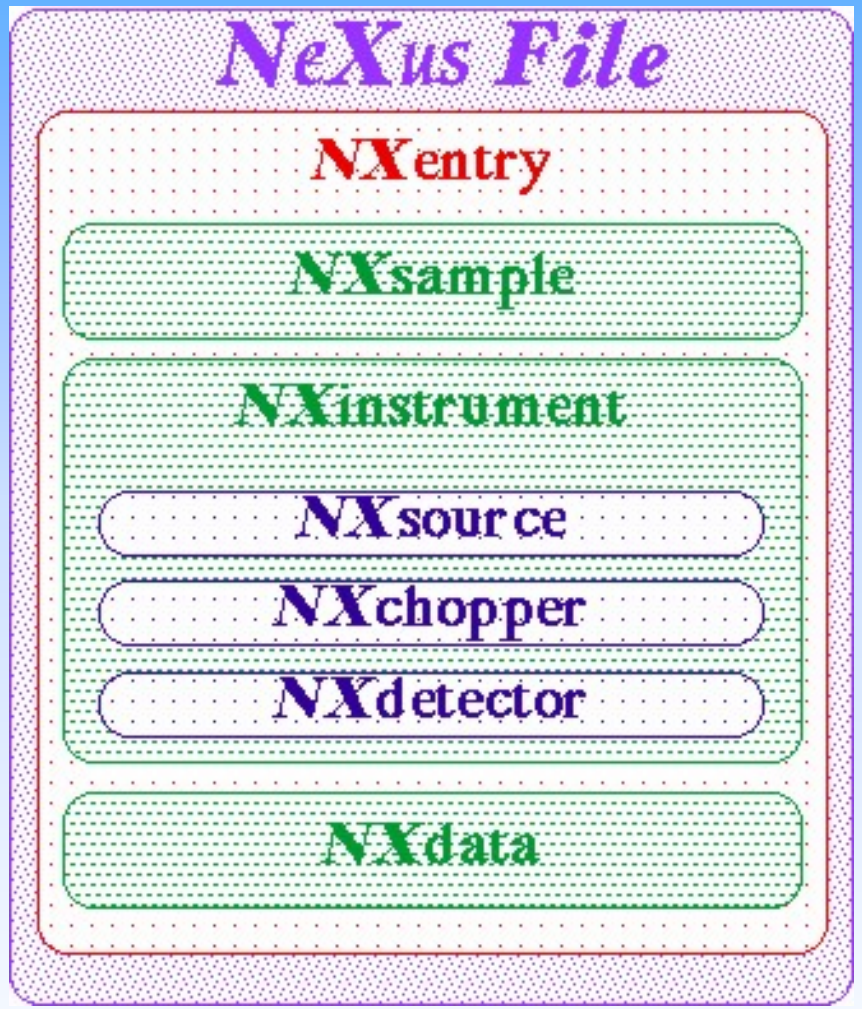
Overview

- The NeXus Data Format
  - Purpose of NeXus
  - File Structure
  - Further Development
- Data handling at FRM-II
  - A Taco Server for data access
- OpenDaVE, a framework for data analysis
  - Purpose of OpenDaVE
  - Architecture of the software
  - Current Status
  - An example

The NeXus Data Format

- Structured, self-describing file format.
- Based on HDF4 (HDF5 support is in beta state).
- Developed by several Neutron and Xray centers like IPNS, ISIS, NIST, PSI and APS.
- Data access is provided by means of an API.
- API is available for Fortran77, Fortran90, C, Java, (C++).
- High-Level-API (NXdict, NXutil).
- Further Information: http://lns00.psi.ch/NeXus

The Structure of NeXus Files



- Two components: Groups and Data.
- Groups starting with NX are defined in the NeXus standard.
- File structure should reflect instrument setup.
- Additional groups could be added.

Further Development

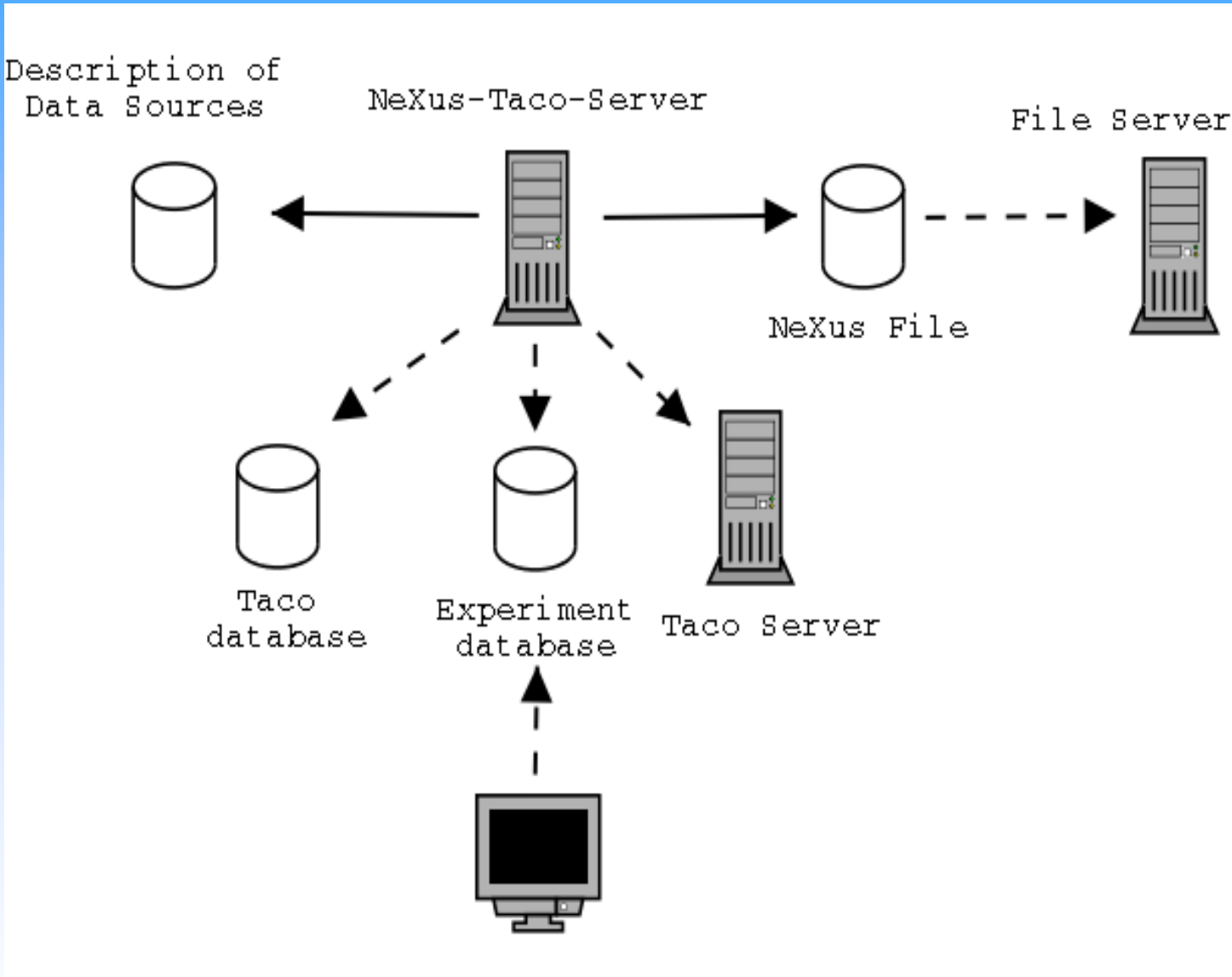
- Support for HDF5 and XML as underlying file formats (beta version available).
- A minimal set of subgroups in NXinstrument should be defined for instrument classes.
- NeXus files could be validated against these definitions, so software can rely on them.
- Routines for automatic plotting of NeXus data sets should be incorporated into the NeXus package.

Data Handling at FRM-II

- All instruments at FRM-II should provide a uniform view to the user.
- Different data sources at each instrument.
- Automatic data collection, storage and retrieval for all instruments at FRM-II as part of the instrument control software.

- NeXus-Taco Server

The NeXus-Taco-Server



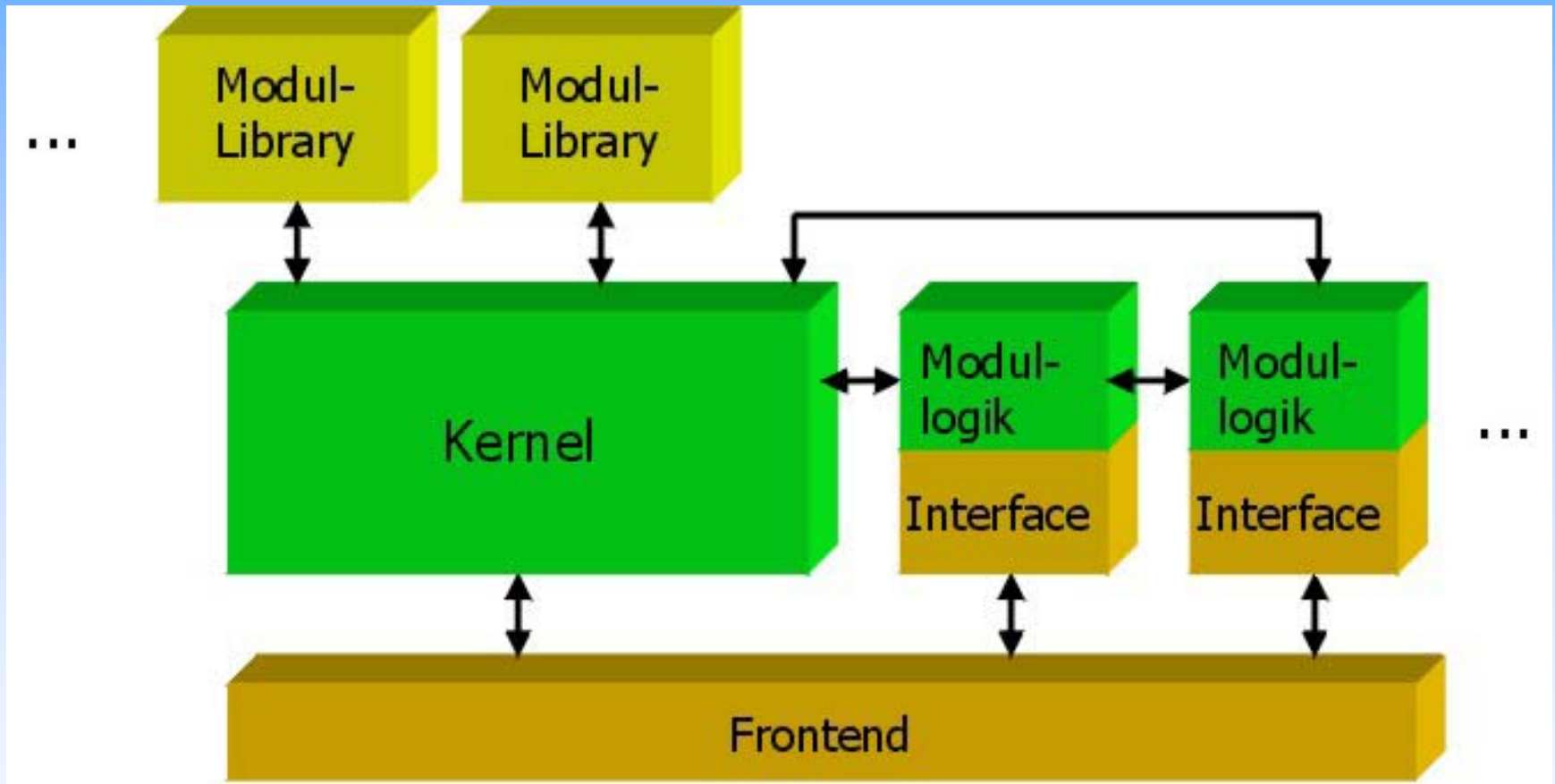
Purpose of OpenDaVE

- Requirements for an data-analysis tool:
  - Modular and extendable
  - Platform independent
  - Open source
  - Support of multiple data formats
  - User should be able to add own routines
- OpenDaVE was created as framework for reading, writing and displaying of data. Functionality should be added by the user community.
- http://sisyphos.frm2.tu-muenchen.de/openDaVE

Components of OpenDaVE

- Separation of logic, presentation and communication:
  - Kernel
  - Frontend
  - Modules
- Three types of modules:
  - Source
  - Filter
  - Sink
- Different types of frontend:
  - GUI
  - Text-based
  - Web-based

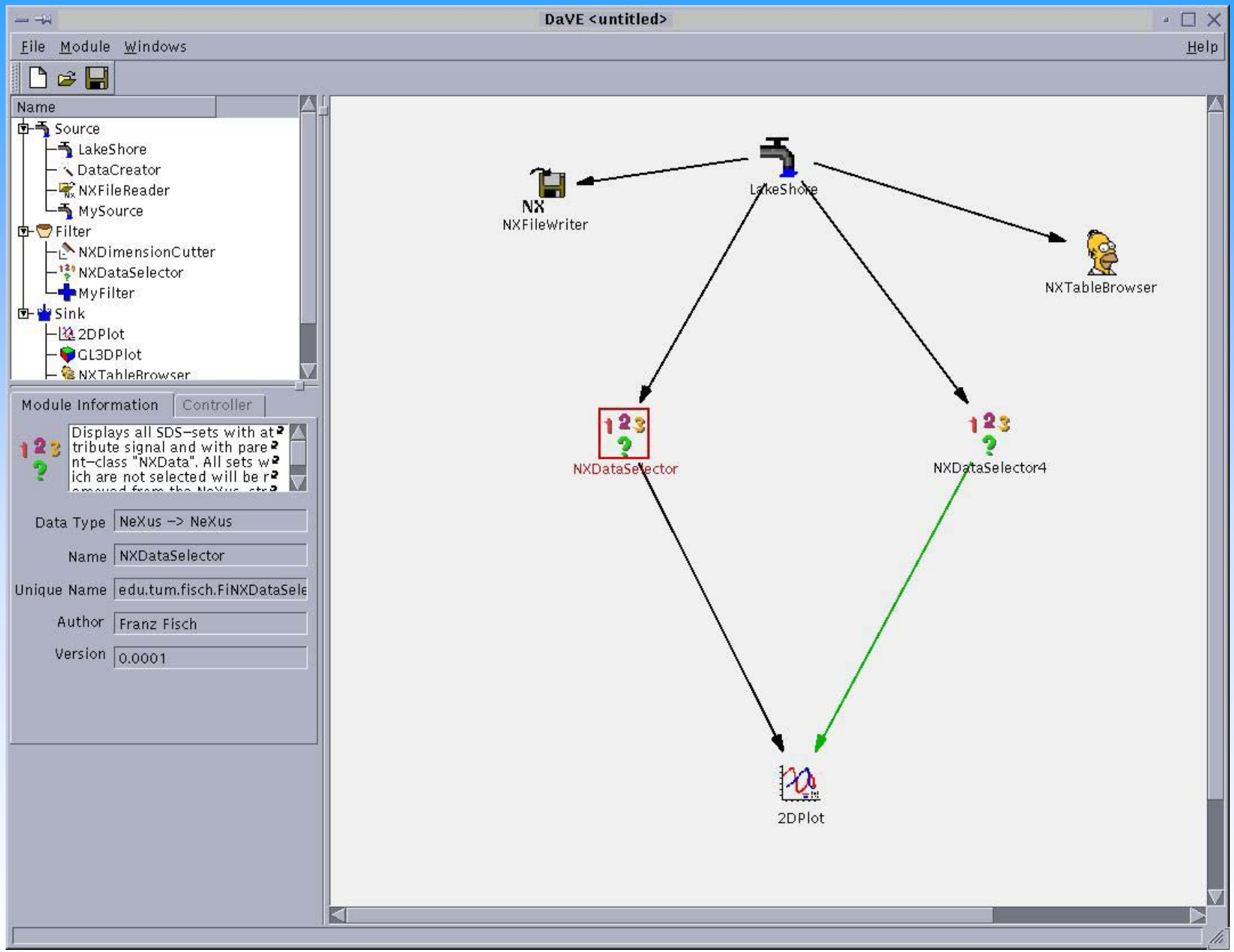
Architecture of OpenDaVE



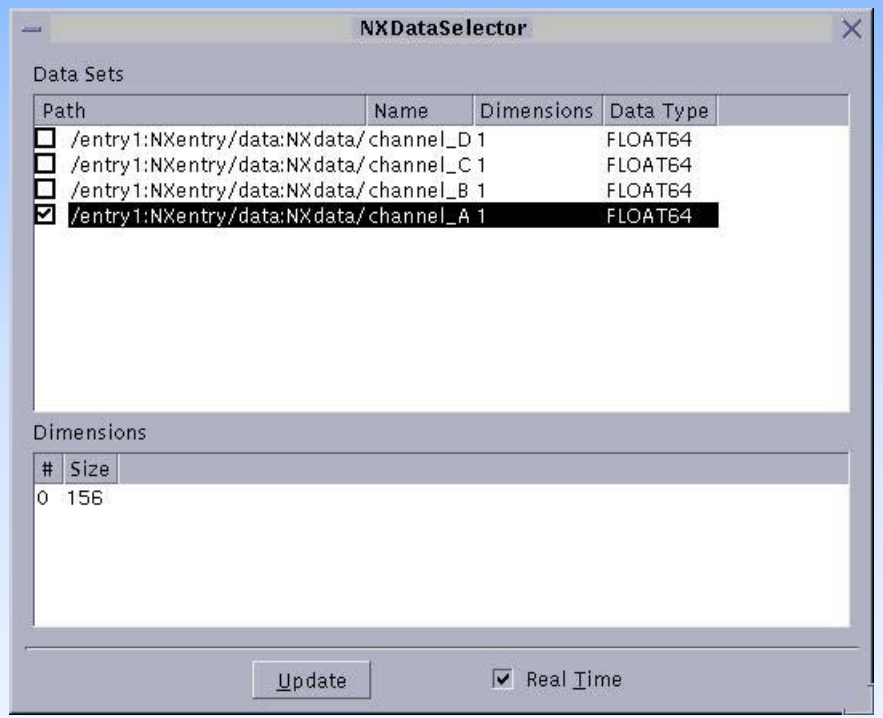
Current Status of OpenDaVE

- Written in C++.
- Kernel for local communication stable.
- Frontend, threads and list-templates done with Qt
- Modules for reading, writing and browsing NeXus files, data selection, 2D /3D visualization.
- Current version runs on Linux, porting to windows and IRIX under progress.
- Further development: control structures, distributed module handling, saving of module arrangements.

An Example


DaVE <untitled>
File Module Windows
Help
Name
Source
LakeShore
DataCreator
NXFileReader
MySource
Filter
NXDimensionCutter
NXDataSelector
MyFilter
Sink
2DPlot
GL3DPlot
NXTableBrowser
Module Information
Controller
Displays all SDS-sets with at
tribute signal and with pare
nt-class "NXData". All sets w
ich are not selected will be r
Data Type
NeXus -> NeXus
Name
NXDataSelector
Unique Name
edu.tum.fisch.FiNXDataSele
Author
Franz Fisch
Version
0.0001
NX
NXFileWriter
LakeShore
NXTableBrowser
NXDataSelector
NXDataSelector4
2DPlot

An Example


NXDataSelector
Data Sets
Path
Name
Dimensions
Data Type
/entry1:NXentry/data:NXdata/channel_D 1 FLOAT64
/entry1:NXentry/data:NXdata/channel_C 1 FLOAT64
/entry1:NXentry/data:NXdata/channel_B 1 FLOAT64
/entry1:NXentry/data:NXdata/channel_A 1 FLOAT64
Dimensions
#
Size
0 156
Update
Real Time


NXTableBrowser
Name
Class
DataType
Value
entry1 NXentry
data NXdata
time SDS INT32 –
units Attribute CHAR s
axis Attribute INT32 1
channel_D SDS FLOAT64 –
signal Attribute INT32 1
channel_C SDS FLOAT64 –
signal Attribute INT32 1
channel_B SDS FLOAT64 –
signal Attribute INT32 1
channel_A SDS FLOAT64 –
signal Attribute INT32 1
Update
Real Time

An Example


2DPlot
25
24.5
24
23.5
150
200
250
300
350
400
s
1
2
3
4
5
6
logarithmic x-Axis
Curve Style
logarithmic y-Axis
Line
x=333.435 y: 23.3047
Ok
show Marks
Unzoom
Update
Real Time

Persons involved

Franz Fisch

Uli Grasemann

Zhen Zhang

Sebastian Huber

Jens Krüger

Björn Pedersen

Tobias Unruh