Elettra Sincrotrone Trieste
Scientific Computing

12th NOBUGS 2018
New Opportunities for Better User Group Software
Brookhaven National Laboratory
October 22-26, 2018

h5nuvola: Web Interface and Services for Remote Data Browsing and Visualisation of HDF5 Files

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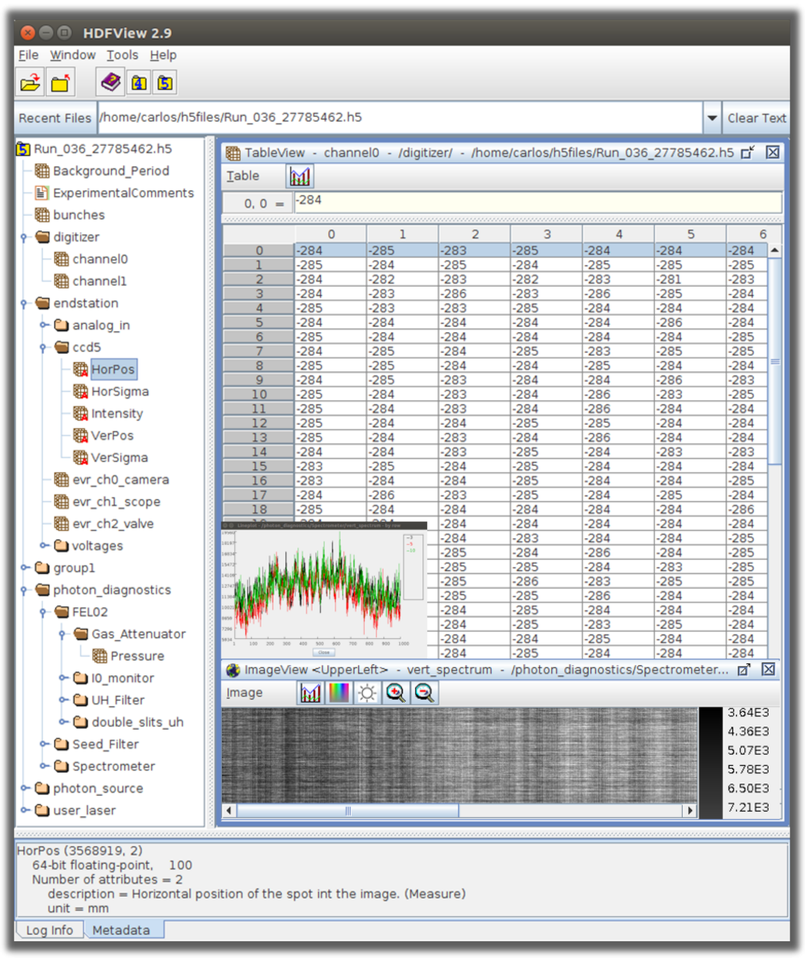
HDF5 [1] has become the standard scientific data and metadata container in neutron and photon facilities. There is a large number of supporting tools ranging from standalone browsers like **HDFView** to python modules like h5py. We designed and developed a web-based equivalent for HDFView which adds additional functionality. We call it **h5*nuvola***. Cloud **file browsing**, data **visualisation** services, and selective **exporting of data** are allowed. Its modular architecture includes an API facilitating data and metadata exploration through REST services. Back-end tasks are based on the Python framework Flask. HDF5 files are accessed through h5py. Bokeh plotting library handles the visualisation. The front-end uses HTML5, CSS, and JavaScript. A fully functional prototype of **h5*nuvola*** is planned to be integrated with Elettra's **Virtual Unified Office** [2]. Integration with Jupyter is in the roadmap.

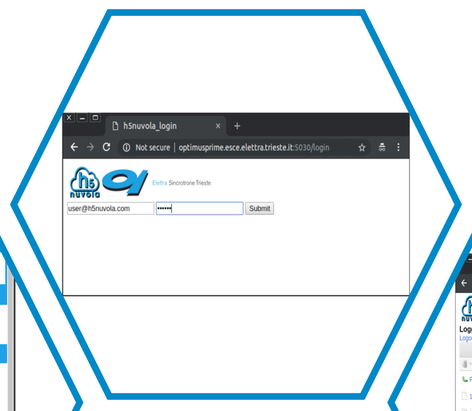
HDFView... *in the cloud*



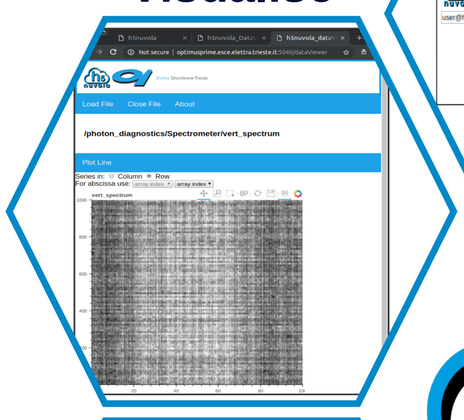
- HDF Java browser
- Tree structure view
- Files, groups and datasets editing
- Attributes / metadata manipulation
- Table, chart and image visualisers

- Remote storage
- Web
- API / REST
- New tools

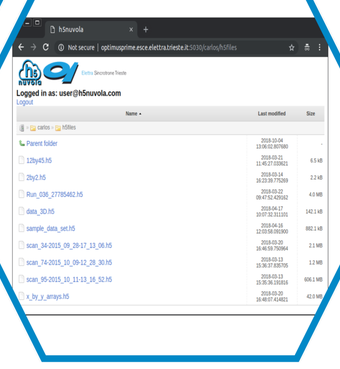
Login



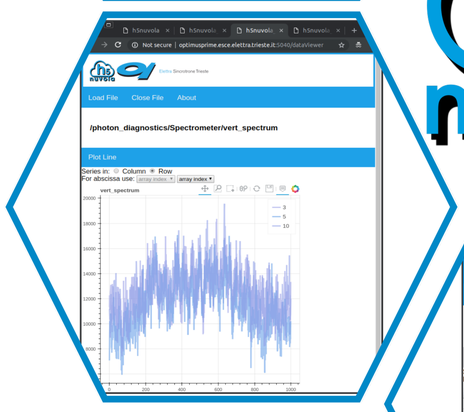
Visualise



Browse



Plot



Content

Table

API

✓
```
geth5data(nuvolaurl = 'http://h5nuvola.elettra.trieste.it/h5data/',
          h5path = '/opt/test/files1.h5',
          dsetname = '/group4/dataset0',
          slicing = '[10:20, :, ::2, :-1]')
```

✓ Pythonic dataset exporting

✓ Numpy **slicing** support

Server-side

✓ Flask microframework

✓ Flask-AutoIndex - remote file browsing

✓ h5py – HDF5 file access

Client-side

✓ HTML5, CSS, and JavaScript (jQuery)

✓ JsTree

✓ Bokeh - plotting

VUO integration

[1] The HDF Group, HDF View, https://www.hdfgroup.org/downloads/hdfview/.
[2] F. Billè et al., "Data Lifecycle in Large Experimental Physisc Facilities: The Approach of the Synchrotron and the Free Electron Laser FERMI", in Proc. ICALEPCS'15), doi: 10.18429/JACoW-ICALEPCS2015-WEPGF037.

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