Tools, formats and services for efficient data management, collaboration and reproducibility in neuroscience

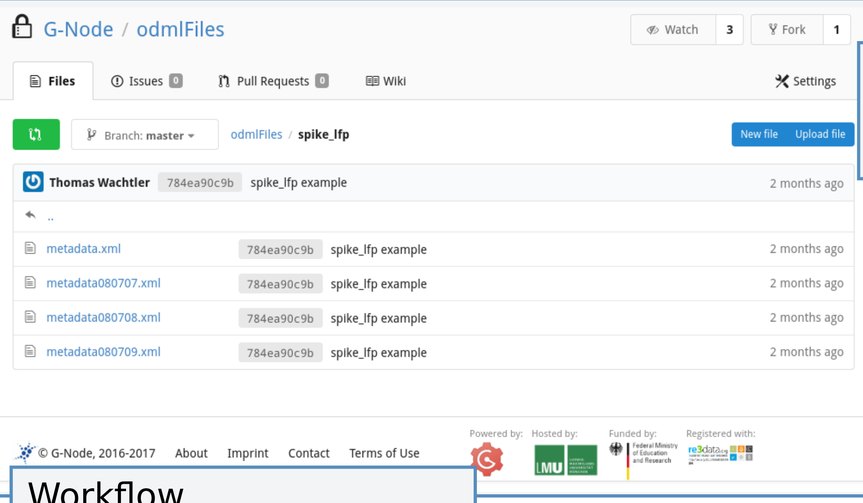
Achilleas Koutsou[1], Michael Sonntag[1], Christian Garbers[1], Christian Johannes Kellner[1], Jan Grewe[2], Thomas Wachtler[1]

[1]German Neuroinformatics Node, Department Biologie II, Ludwig-Maximilians-Universität München, Germany;
[2]Institut für Neurobiologie, Universität Tübingen, Germany

The G-Node Infrastructure (GIN) Services

GIN Web

https://gin.g-node.org



- Platform independent
- Secure access
- Public and private repositories

Main features
- Access data from any location
- Backup
- Built in versioning

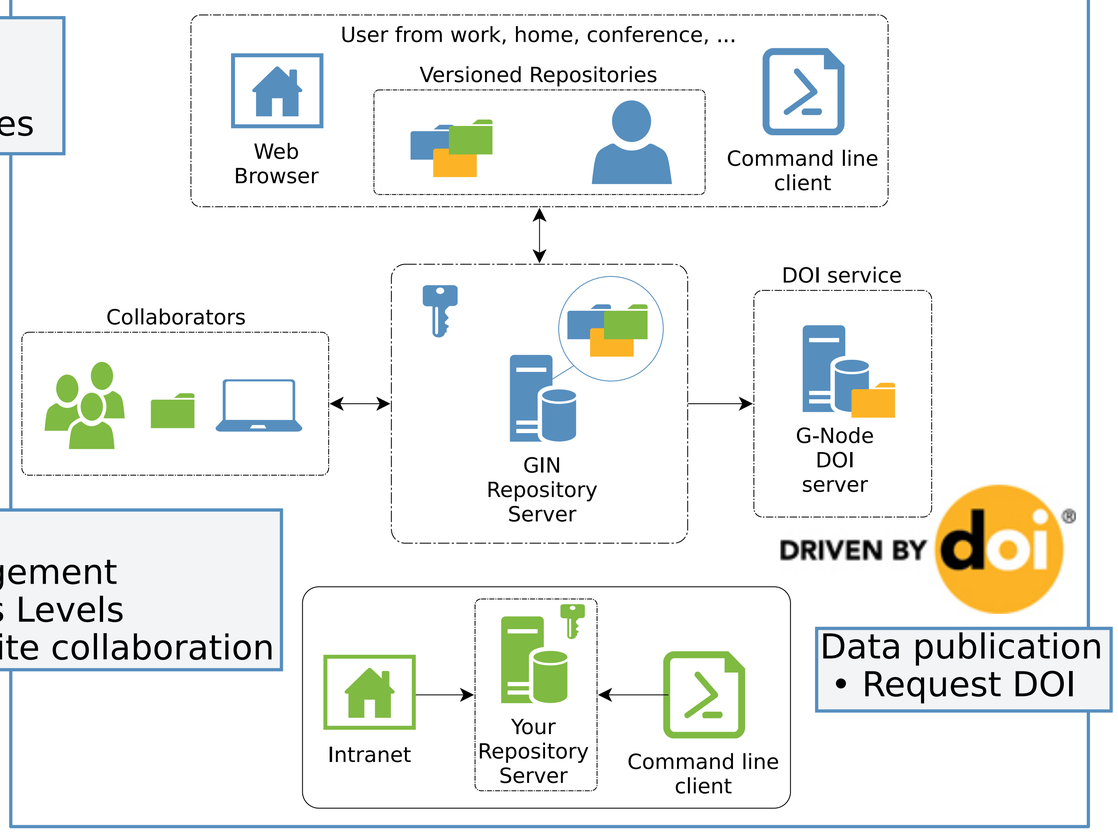
Workflow
- Manual access via web and command line
- Script automation

GIN Client

```
$ gin login
Login: achilleas
Password: **********************
Hello achilleas. You are now logged in.

$ gin get G-Node/odmlFiles
Fetching repository 'G-Node/odmlFiles'... done.

$ gin ls
Synced:

        metadata.xml
        metadata080707.xml
        metadata080708.xml
        metadata080709.xml

$ |
```

Collaboration
- User management
- User Access Levels
- On and offsite collaboration

GIN services diagram

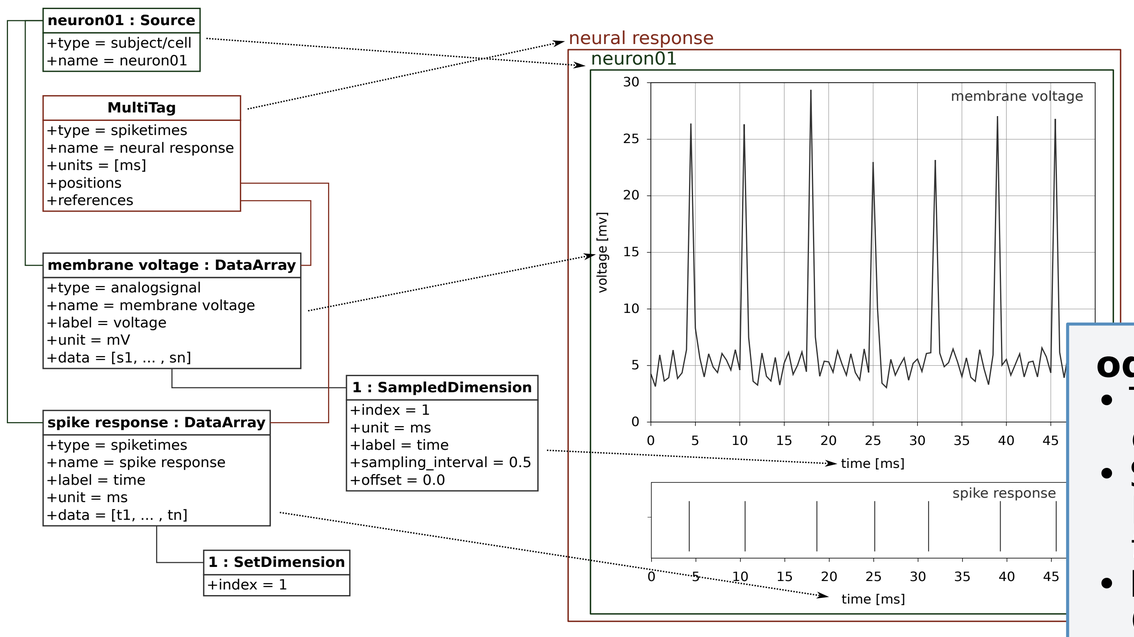


Data publication
- Request DOI

Formats and Data models

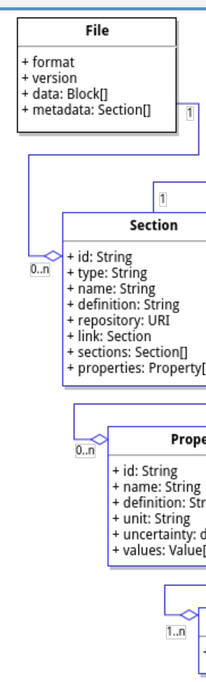
The NIX format
- Open data format
- Store data, analysis results, and metadata conveniently in the same file
- Descriptive associations between data, analysis results, and metadata

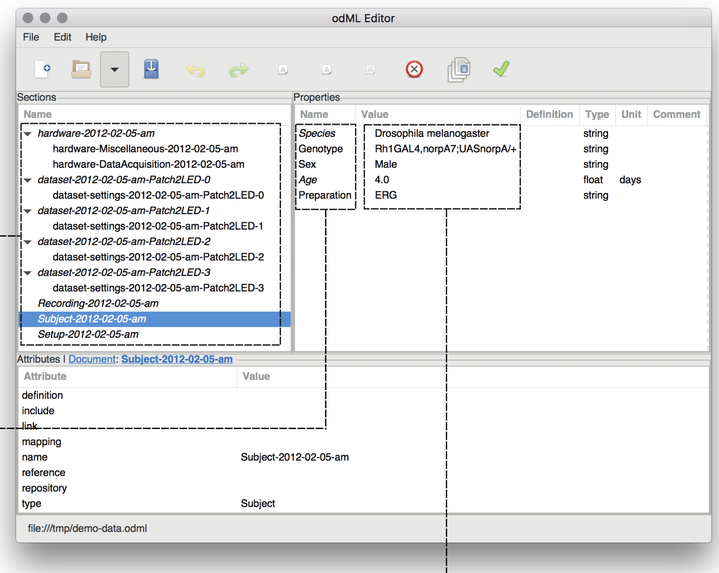
The NIX data model



Libraries
- Free open source libraries for: C++, Python, Matlab, Java
- NIX IO for Neo: Saving and loading fully supported

odML Metadata format: Schema and GUI

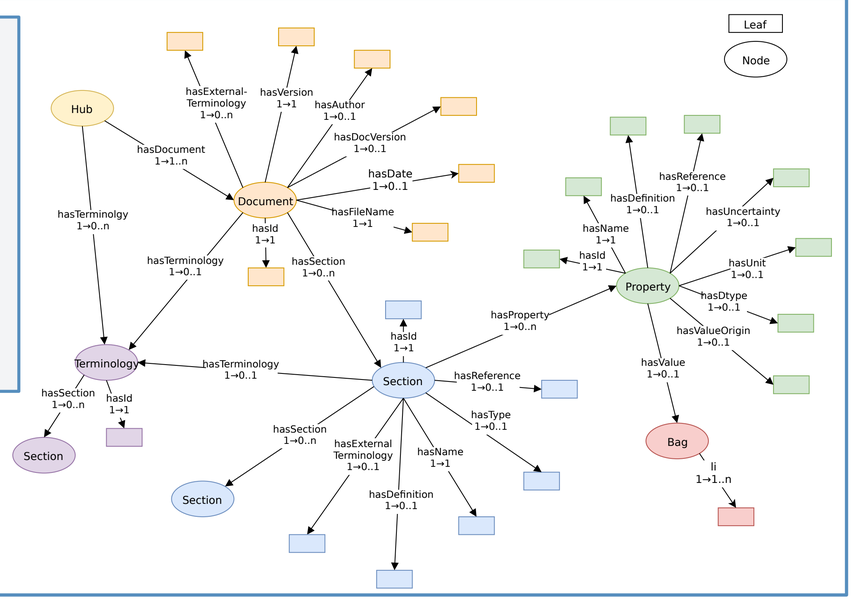




odML

- The metadata format embedded in NIX
- Standalone metadata can be written and read using the odML library
- Export odML data to RDF: Query metadata using semantic web technologies

RDF schema for the odML data model



W3C RDF

Resources

This work was performed in connection with the activities of the HDF5 working group of the INCF Electrophysiology Data Sharing Task Force
Supported by BMBF grant 01GQ1302.

Contact: dev@g-node.org

https://gin.g-node.org
https://github.com/G-Node/nix
https://github.com/G-Node/python-odml
https://github.com/G-Node/gin-cli
https://github.com/G-Node/gogs
http://neuralensemble.org/neo
http://neuralensemble.org/elephant

Federal Ministry of Education and Research