OGS Istituto Nazionale di Oceanografia e di Geofisica Sperimentale

June 2023
Antelope Users Group Meeting
GeoSphere Austria – Wien

WEBSERVICES FROM A USER PERSPECTIVE

OGS Antelope Server group

AUG Antelope Users Group

GeoSphere Austria

Web Services (WS)

- **What:**

  A software system designed to support machine to machine interaction **over a network**

- **Why:**

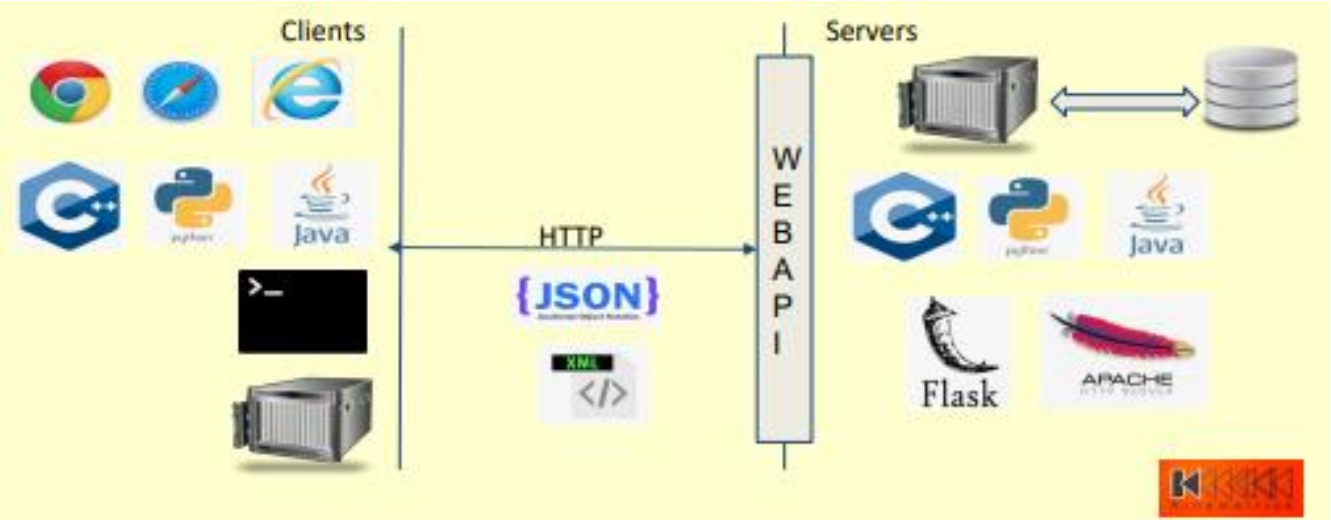
  Interoperability between distributed systems over the internet/intranet

- **How:**

  A web technology (**HTTP**) is used to transfer machine-readable file formats (**XML**/**JSON**) through a well-defined interface (**REST**/**SOAP**)

Web Services (WS)

- **Main advantages:**
  - Decouple client implementation from server implementation
  - Easy and standardized data access
  - Service description information over WADL



From Rohan Ambli presentation, AUG Meeting 2019

FDSN Webservices

- **Specifications:**
  - FDSN WS specification defines common characteristics of RESTful WS interfaces *"for the exchange of time series data, related metadata, event parameter and other data within the context of the International Federation of Digital Seismograph Networks (FDSN)"*:
    - Calling pattern
    - Service path and port
    - Common service methods
    - Minimum functionalities
    - Request URI construction
    - Common service responses and parameter characteristics
  - Full specifications available at http://www.fdsn.org/webservices/FDSN-WS-Specification-Commonalities-1.2.pdf

FDSN Webservices

- **Main services for data export:**

`station/`	access to station metadata in FDSN StationXML and other formats
`dataselect/`	access to time series data in miniSEED and other formats
`event/`	access to contributed earthquake origin and magnitude estimates (QuakeML and other formats)
`availability/`	access to time series data availability

Examples*:*

http://service.iris.edu/fdsnws/station/1/query?network=IU&station=COLA&level=channel

http://service.iris.edu/fdsnws/dataselect/1/query?network=IU&station=COLA&starttime=2012-01-01T0 0:00:00&endtime=2012-01-01T12:00:00

https://service.iris.edu/fdsnws/event/1/query?starttime=2012-01-01T00:00:00&endtime=2012-12-31T23:59:59&minmag=6&format=text&nodata=404

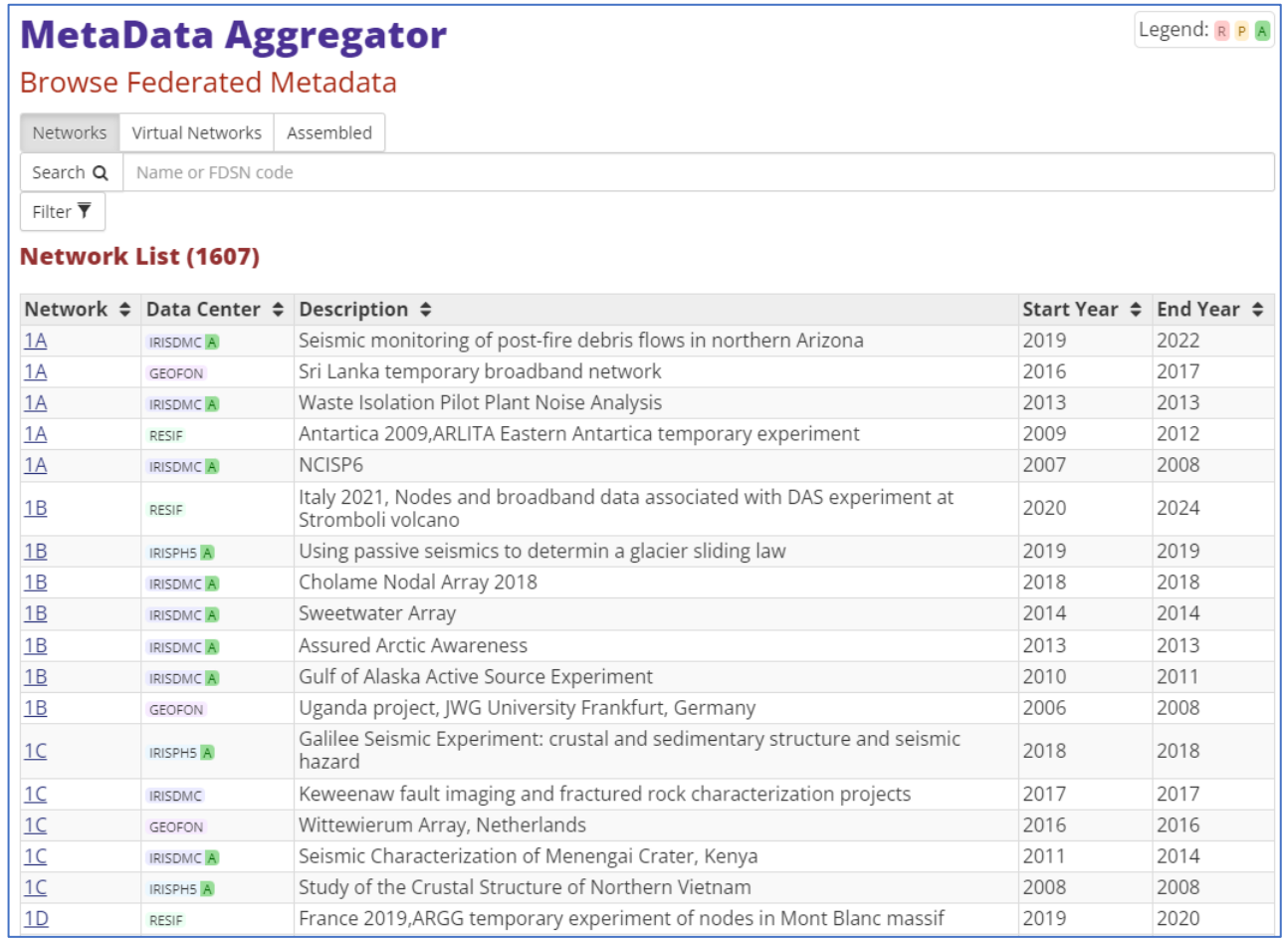
https://service.iris.edu/fdsnws/availability/1/query?format=text&net=IU&sta=COLA&orderby=nslc_time_quality_samplerate&includerestricted=false&nodata=404

http://service.iris.edu/fdsnws/station/1/application.wadl

FDSN Webservices

- **IRIS Federated Metadata Aggregator:**

  Effort to coordinate station siting and provide free and open access to data



MetaData Aggregator

Legend: R P A

Browse Federated Metadata

Networks | Virtual Networks | Assembled

Search | Name or FDSN code

Filter

Network List (1607)

Network	Data Center	Description	Start Year	End Year
1A	IRISDMC A	Seismic monitoring of post-fire debris flows in northern Arizona	2019	2022
1A	GEOFON	Sri Lanka temporary broadband network	2016	2017
1A	IRISDMC A	Waste Isolation Pilot Plant Noise Analysis	2013	2013
1A	RESIF	Antartica 2009,ARLITA Eastern Antartica temporary experiment	2009	2012
1A	IRISDMC A	NCISP6	2007	2008
1B	RESIF	Italy 2021, Nodes and broadband data associated with DAS experiment at Stromboli volcano	2020	2024
1B	IRISPH5 A	Using passive seismics to determin a glacier sliding law	2019	2019
1B	IRISDMC A	Cholame Nodal Array 2018	2018	2018
1B	IRISDMC A	Sweetwater Array	2014	2014
1B	IRISDMC A	Assured Arctic Awareness	2013	2013
1B	IRISDMC A	Gulf of Alaska Active Source Experiment	2010	2011
1B	GEOFON	Uganda project, JWG University Frankfurt, Germany	2006	2008
1C	IRISPH5 A	Galilee Seismic Experiment: crustal and sedimentary structure and seismic hazard	2018	2018
1C	IRISDMC	Keweenaw fault imaging and fractured rock characterization projects	2017	2017
1C	GEOFON	Wittewierum Array, Netherlands	2016	2016
1C	IRISDMC A	Seismic Characterization of Menengai Crater, Kenya	2011	2014
1C	IRISPH5 A	Study of the Crustal Structure of Northern Vietnam	2008	2008
1D	RESIF	France 2019,ARGG temporary experiment of nodes in Mont Blanc massif	2019	2020

http://ds.iris.edu/mda/

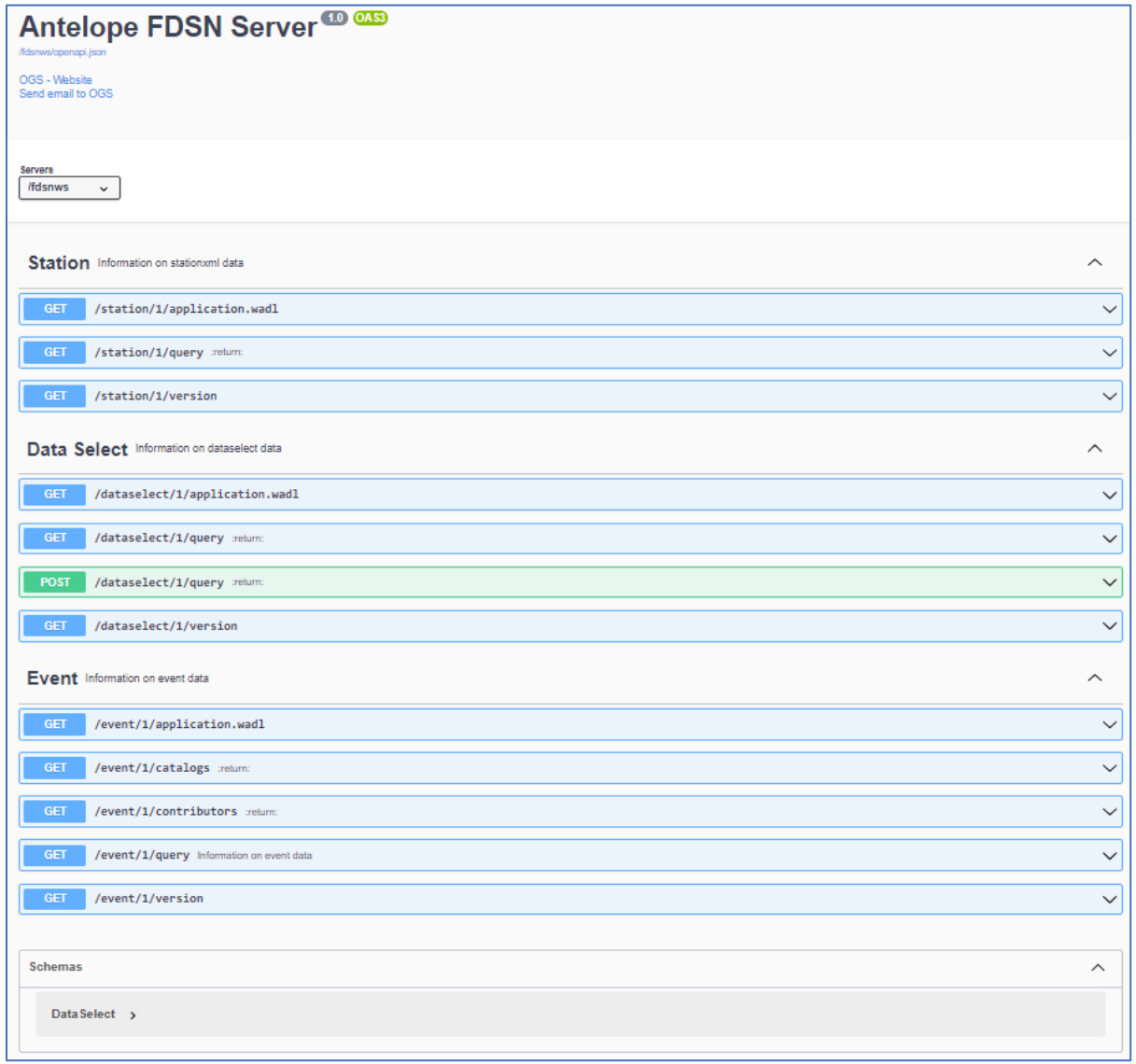
Webservice implementation in Antelope

- Data export handled by **webservice_fdsn(1)** module:
  - `station/` service based on **db2stationxml(3)**
  - `event/` service based on **event2qml(1)**
  - `dataselect/` service based on **trexcerpt(1)**

- **Data import:**
  - Available only for time series data (via *curl*, Web UI, Obspy Python package)
  - Need for a **stationxml2db** feature!

Webservice implementation in Antelope

- **<u>Testing on Antelope 5.12</u>:**
  - Wildcard usage is not standard
    - *HN** returns HNN channel only
    - *HN?* is not recognized
    - *.** is used instead of *
  - Some more optional keyworks would be useful
    - *format* keyword for `station/` service
  - **dbcentral(1)** can be used to handle multiple databases, but they must refer to the same *dbmaster*



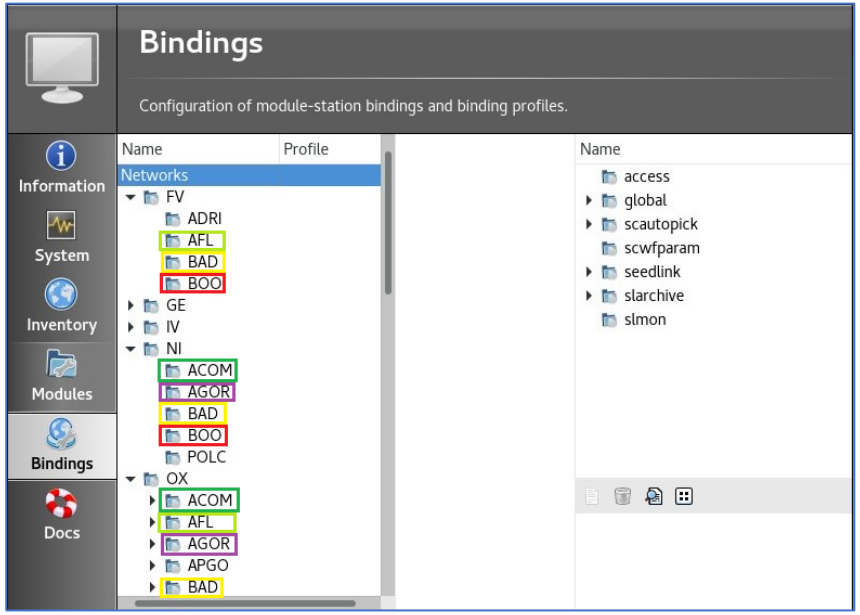
Webservice implementation in SeisComP

- Data export handled by **fdsnws** module, supporting all four FDSN services (`station/`, `event/`, `dataselect/` and `availability/`)

- Data import handled by different utility modules, e.g.:
  - **import_inv** for station metadata (supports dataless SEED, FDSN StationXML, Arclink XML and SeisComP XML formats)
  - **slarchive** for time series data
  - (**ql2sc** for event data)

Webservice implementation in SeisComP

- **<u>Testing on SeisComP</u>:**
  - Some useful optional features are already implemented
  - Can serve additional waveform archives even if they are not part of the database
    - ➢ the database can manage stations with conflicting names (e.g.: stations from NI network, turned to OX network in 2016)



Parent Directory

SeisComP FDSNWS Station Web Service

The station Web service provides access to network, station, channel and response metadata in FDSN Station XML format. The metadata may be filtered e.g. by geographic region and time, also the information depth level is selectable. The request type is *HTTP-GET*. Please refer to http://www.fdsn.org/webservice for a complete service description.

Available URLs

- query
- version
- application.wadl
- builder

Feature Notes

- back-end software: SeisComP
- *matchtimeseries* request parameter only available if dataavailability information is enabled via configuration
- *updatedafter* request parameter not implemented: The last modification time in SeisComP is tracked on the object level. If a child of an object is updated the update time is not propagated to all parents. In order to check if a station was updated all children must be evaluated recursively. This operation would be much to expensive.
- additional request parameters, effective only for xml output:
  - *formatted*: boolean, default: *false*
- additional values of request parameters:
  - *format*
    - standard: [xml, text]
    - additional: [fdsnxml (=xml), stationxml, sc3ml]
    - default: xml

A Webservice user/provider wishlist

- Full implementation of all basic FDSN services and their features
- Additional implementation of some additional features useful for database management, e.g.:
  - (for data export) availability of multiple formats
  - (for data import) dedicated modules capable of translating input files from many formats
- Capability to serve multiple databases and to smartly handle request redirections