

Training on Waveform Archive Access Retrieving (meta)data via FDSN-WS

Javier Quinteros and Angelo Strollo

GeoForschungsZentrum
Section 2.4 - GEOFON

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Outline

- ① General features of the services
- ② Station
- ③ Dataselect

Section 1

General features of the services

What are the FDSN web services?

Interfaces for the exchange of time series data, related metadata, event parameter

Namely,

Station: metadata in StationXML and alternate formats.

Dataselect: raw time series data in miniSEED format.

Event: parametric data for events in QuakeML and alternate formats.

Where do we find the web service?

```
<site>/fdsnws/<servicename>/<majorversion>/
```

<site>: domain name of the hosting WS (top institutional level),

<service>: name of the service, as in the previous slide,

<majorversion>: first number describing the WS version.

For instance, <http://geofon.gfz-potsdam.de/fdsnws/dataselect/1/>

How do version numbers work?

<SpecMajor>.<SpecMinor>.<Implementation>

<SpecMajor>: same number implies backward compatibility with prior releases.

<SpecMinor>: incremented if optional parameters are added (backwards compat.)

<Implementation>: integer specific for the datacentre.

SpecMajor and SpecMinor imply a minimum expected behaviour.

Common methods for services

All services must support the following methods:

query: to submit data or information request.

version: to request the full service version.

application.wadl: to request a Web Application Description Layer from the service.

Every service should specify parameters for each method.

Important error codes

- 204** No data - The request was properly formatted but no data was found.
- 400** Bad Request - Wrong parameter, wrong values, etc.
- 401** Authorization required - Data is restricted.
- 404** No data - Alternative error code if 'nodata' parameter is set.
- 413** Too much data - Proper request but result is too large.
- 414** URI too large - A maximum of 2000 characters are allowed from specification.
- 500** Internal Server Error
- 513** Temporary unavailable - Maintenance mode.

Take into account that some error codes will not be visible from a browser, but yes from a command-line tool like "wget".

Use of wildcards and lists

The channel parameters (net, sta, loc, cha) can contain wildcards:

- * matches zero to many characters.

- ? matches exactly one character.

item1,item2,item3 specifies multiple items (they can include wildcards).

Time parameter values

All time values are expressed in UTC and use a variation of ISO 8601.

YYYY-MM-DDTHH:MM:SS.ssssss Date and time values are separated by a "T".

YYYY-MM-DDTHH:MM:SS Microseconds are considered to be 0.

YYYY-MM-DD All components of time are considered to be 0.

Blank location identifier

Usual source of problems

A blank location code in SEED is represented as two space characters (ASCII 32). However, it is recommended to encode this as two minus characters ('-').

Parameters for the "query" method

starttime Epochs starting on or after the specified start time.

endtime Epochs ending on or before the specified end time.

network Network code. Multiple codes are comma-separated.

station Station code. Multiple codes are comma-separated.

location Location code. Multiple codes are comma-separated. Be careful with blank IDs!

channel Channel code. Multiple codes are comma-separated.

minlatitude Latitude larger than or equal to the specified minimum.

maxlatitude Latitude smaller than or equal to the specified maximum.

minlongitude Longitude larger than or equal to the specified minimum.

maxlongitude Longitude smaller than or equal to the specified maximum.

level Level of details for the results.

Controlling the level of detail

Parameter "level"

Controls the amount of detail included in the returned results with the following hierarchy:

Network

↪ Station

 ↪ Channel

 ↪ Response

For instance, if level=station there will be no channel or response information.

Optional parameters

- format** Format of result, either 'xml' (default) or 'text' (defined below). If this parameter is not specified the service must return StationXML.
- startbefore** Epochs starting before the specified start time.
- endbefore** Epochs ending before the specified end time.
- startafter** Epochs starting after the specified start time.
- endafter** Epochs ending after the specified end time.
- latitude** Latitude to be used in a radius search.
- longitude** Longitude to be used in a radius search.
- minradius** Stations within the specified minimum number of degrees from the geographic point defined by the latitude and longitude parameters.
- maxradius** Stations within the specified maximum number of degrees from the geographic point defined by the latitude and longitude parameters.

How to construct a URI

`<site>/fdsnws/station/1/query?<key=value>&<key=value>...`

- site** Domain name of the datacentre
- key** Parameter name from the list in the previous slide.
- value** Value associated to the parameter (or list of comma-separated values).

Output formats - Text

When level = network

Network|Description|StartTime|EndTime|TotalStations

[http://geofon.gfz-potsdam.de/fdsnws/station/1/](http://geofon.gfz-potsdam.de/fdsnws/station/1/?query?net=CX&format=text&level=network) ↔
query?net=CX&format=text&level=network

When level = station

Network|Station|Latitude|Longitude|Elevation|StartTime|EndTime

[http://geofon.gfz-potsdam.de/fdsnws/station/1/](http://geofon.gfz-potsdam.de/fdsnws/station/1/?query?net=CX&format=text&level=station) ↔
query?net=CX&format=text&level=station

Output formats - Text

When level = channel

Network|Station|Location|Channel|Latitude|Longitude|Elevation|Depth|Azimuth|Dip|SensorDescription|Scale|ScaleFrequency|ScaleUnits|SampleRate|StartTime|EndTime

[http://geofon.gfz-potsdam.de/fdsnws/station/1/](http://geofon.gfz-potsdam.de/fdsnws/station/1/?query?net=CX&format=text&level=channel) ↔
query?net=CX&format=text&level=channel

No level = response

Error!

Output formats - XML

Let's see a live demo!

Parameters for the "query" method

- starttime** Time series samples starting on or after the specified start time.
- endtime** Time series samples on or before the specified end time.
- network** Network code. Multiple codes are comma-separated.
- station** Station code. Multiple codes are comma-separated.
- location** Location code. Multiple codes are comma-separated. Be carefull with blank IDs!
- channel** Channel code. Multiple codes are comma-separated.

How to construct a URI for the GET method

<site>/fdsnws/dataselect/1/query?<key=value>&<key=value>...

site Domain name of the datacentre

key Parameter name from the list in the previous slide.

value Value associated to the parameter (or list of comma-separated values).

Try in Linux with a browser

`http://geofon.gfz-potsdam.de/fdsnws/dataselect/1/query`

`net=GE&sta=BNDI&cha=BHZ&start=2015-11-04T03:43:00&end=2015-11-04T03:47:00`

`net=GE&sta=LUWI&cha=BHZ&start=2015-11-04T03:43:00&end=2015-11-04T03:47:00`

`net=GE&sta=MMRI&cha=BHZ&start=2015-11-04T03:43:00&end=2015-11-04T03:47:00`

The POST method

<site>/fdsnws/dataselect/1/query

File to be sent via POST

```
NET STA LOC CHA STARTTIME ENDTIME  
NET STA LOC CHA STARTTIME ENDTIME  
NET STA LOC CHA STARTTIME ENDTIME
```

The POST method

<site>/fdsnws/dataselect/1/query

File to be sent via POST

```
GE BNDI * BHZ 2015-11-04T03:43:00 2015-11-04T03:47:00
GE LUWI * BHZ 2015-11-04T03:43:00 2015-11-04T03:47:00
GE MMRI * BHZ 2015-11-04T03:43:00 2015-11-04T03:47:00
```

Try in Linux with wget

```
wget -post-file=request.txt "http://geofon.gfz-potsdam.de ↔
/fdsnws/dataselect/1/query" -O event.mseed
```

URL Builder

- Good way to create a selection in an interactive way.
- Unfortunately the Data centre is fixed, but you can just replace it.

Check...

<https://service.iris.edu/fdsnws/station/docs/1/builder/>

Thanks a lot for your attention!