

Nettabs—how we maintain metadata at GEOFON DC

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Introduction

SC3 needs station parameters like latitude, longitude, but also frequency responses to convert digital counts to physical units. This is called metadata or “inventory”. Inventory can be provided in native SC3 XML format or imported in several other formats.

Importing metadata to SC3

- From SEED dataless volume:

```
dlsv2inv -f mynetwork.seed >etc/inventory/mynetwork.xml
```

- From SC3-XML with filtering:

```
invextr -f --chans 'NE.STA.*' mynetwork.xml >etc/inventory/mynetwork.xml
```

- From Arclink-XML:

```
arclink2inv -f inventory.xml >etc/inventory/mynetwork.xml
```

- From (FDSN) StationXML:

```
staxml2inv -f station.xml >etc/inventory/mynetwork.xml
```

- Alternatively, the import function of the GUI can be used.

Nettabs: creating metadata from scratch

- We at GEOFON DC maintain metadata of few thousand stations (permanent network and temporary experiments), so using dataless SEED or native inventory XML as the primary metadata format would be a maintenance nightmare.
- We needed a compact, human readable plain text metadata format that can be used together with revision control systems like SVN to keep track of changes.
- In the “nettab” format that we developed, a network file contains one line per station/sensor/epoch. This line refers to seismometer and datalogger that are defined in a separate file.

The nettab V2 format

- The original nettab format supported only a small subset of SC3 inventory attributes. Some required attributes were added later, using CSV (comma-separated values) files.
- Recently the “nettab V2” format was developed to support all SC3 inventory attributes in a clean way. Moreover, the format is generic enough to support any attributes that might be added to the SC3 inventory schema in the future.

Layout of a network file

Each line in a network file has two-character type specifier at the beginning of the line:

Nw: Network

Na: Network attribute

Sl: Station

Sa: Station attribute (applies to station, location or channels)

Files are processed sequentially and it is expected to have only one network definition per file. Attributes defined in a file are valid for the current file only.

Defining a station

Network definition

Nw: GE 1980/001

Apply network attributes

Na: Description="GEOFON Program, GFZ Potsdam, Germany"

Na: NetClass=p

Apply a station attribute

Sa: Affiliation="GEOFON" *

Apply a channel attribute

Sa: Restricted=True *,*,HH*

Station lines (one line per station/sensor/epoch)

code description datalogger%sn seismometer%sn

SI: WLF "Walferdange/Luxembourg" Q330/HR%xxxx STS-2/N%yyyy ...

sampling orientation lat. lon. elev. depth. start end

...100/20/1/0.1 ZNE 49.6646 6.1526 295.0 80.0 2012/342:1800

Layout of the instrument file

Layout of the instrument file is similar to a network file. The following line types are used:

- Se:** Sensor
- DI:** Datalogger
- CI:** Calibration
- Ff:** FIR filter
- If:** IIR filter
- Pz:** Poles & Zeros
- la:** Instrument attribute (applies sensor, datalogger, calibration, FIR filter, IIR filter, and poles&zeros filters)

Defining a sensor

Apply sensor attributes

la: Model="STS-2/N" STS-2/N

la: Type="VBB" STS-2/N

la: Unit="M/S" STS-2/N

la: Manufacturer="Streckeisen" STS-2/N

Sensor definition

```
# name gain gain freq. norm. fac. n.f. freq. n.z. n.p. zeros poles
Se: STS-2/N 1500.0 0.02 6.0077e7 1.0 2 5 2(0.0,0.0) ...
...(-0.037004,0.037016) (-0.037004,-0.037016) (-251.33,0.0) (-131.04,-467.29) ...
...(-131.04,467.29)
```

Defining a datalogger

Apply datalogger attributes

```
la: DigitizerModel="Q330" Q330/N Q330/HR
la: RecorderModel="Q330" Q330/N Q330/HR
la: RecorderManufacturer="Quanterra" Q330/N Q330/HR
la: DigitizerManufacturer="Quanterra" Q330/N Q330/HR
```

Datalogger definition

```
# name gain max. sample rate clock drift filter stages (optional)
DI: Q330/HR 1677720.0 100.0 0.0 Q330 ...
...100_1,50_2,40_3,20_4,1_5,0.1_5/10
```

FIR filters (optional)

```
# name file symmetry n.c. input sample rate dec.fac.
Ff: Q330_FIR_1 q330_b100_100 A 65 0 100.0 1 ...
# delay correction gain gain freq.
0.041607 0.041607 1.0 0.0
```

The “tab2inv” program

The “tab2inv” program is used to convert nettab to SC3 XML:

```
$ tab2inv -f filters/ inst.db ge.tab -g -o ge.xml
Starting tab2inv version 0.1
Parsing file: inst.db
Parsing file: ge.tab
Generating file: ge.xml
Ending.
```

The “tabinvmodifier” program

“tabinvmodifier” reads a “rules file” (network file without station lines) and applies network and station attributes to existing inventory. This method can be used to modify attributes in inventory that originates from dataless SEED or other sources:

```
# Apply changes to database  
$ tabinvmodifier -r ge.rules
```

```
# Apply changes to XML file  
$ tabinvmodifier -r ge.rules --inventory-db ge.xml -o ge-mod.xml
```

Summary

- Using the nettab format, metadata of a large number of stations can be created from scratch and maintained efficiently, especially in combination with revision control systems like SVN.
- The programs “tab2inv” and “tabinvmodifier” are already included in SC3.
- Preliminary Nettab format documentation has been added to the seiscomp3.org wiki.
- Examples of GEOFON nettab files can be provided.