

Norwegian National Seismic Network

Technical Report No. 10



**The 'Seismo Group'
IT system**

by

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Introduction

The objective of this report is to give an overview of the current set-up of the Seismo-group (SG) computer system at the Institute of Solid Earth Physics (IFJF), University of Bergen (UiB). The computer system is the backbone of the Norwegian National Seismic Network (NNSN). This report will describe the software set-up, the accounts, the file structure and the database of earthquake data that is organised on the Sun Solaris system at IFJF. The main server of the SG is turmalin (129.177.55.5), but the services are also available from most of the other computers that are part of the IFJF computer network.

Accounts

The users in the SG at IFJF belong to the *seismo* user group. There are a number of accounts that are in use for various purposes, as explained below:

seismo: The main account for processing of the earthquake data as recorded by the NNSN. This is the only account that has permission to write to the Bergen (BER) database. The account also defines the general set-up for the seismo group and provides some software packages that are used by the seismo group.
Home directory: /net/seismo/seismo

s2000: The SEISAN software is developed on this account. The seismo group is using the SEISAN version that is permanently modified on this account.
Home directory: /net/seismo-DVLP/s2000

seisnet: Account for developing the SEISNET software. The same version is used by the seismo user.
Home directory: /net/seismo-DVLP/seisnet

autodrm: The AutoDRM (automatic data request manager) software is running on the autodrm account. The autodrm user automatically receives e-mail requests for seismic data and replies.
Home directory: /net/seismo3/autodrm

quake: The quake user provides a list of recent earthquake locations provided by the NNSN through the command 'finger quake@ifjf.uib.no'. The quake list is automatically updated by the gmtmap script started from the seismo account.
Home directory: /net/seismo/quake

majordomo: This account is used to organise the mailing lists based on the Majordomo software.
Home directory: /net/bruk/b/majordomo

Passwords: The users seismo, seisnet, majordomo, autodrm and quake currently have the same password. If the seismo password is changed, the others should be changed accordingly.

Common group settings: SG users may source the files /net/seismo/seismo/COM/.SEISAN, /net/seismo/seismo/COM/.LOCAL (both to get the seismo settings and access to SEISAN) and /net/seismo/seismo/COM/.PROG (to get access to other seismo software) from their .cshrc files.

File systems

There is quite a number of partitions that are used by the SG. Most of the disks are physically connected to turmalin. Generally all the partitions are mounted on the other computers. The following list gives an overview and some explanation:

turmalin:

/net/seismo-PROG - contains external software that is not developed by the SG (e.g., SAC, Passcal software, Jpitsa, evalresp, raygui, ...)

/net/seismo-visitor - used for home directories of visitors

/net/seismo-WOR - seismo user work directory

/net/seismo-DVLP - contains home of s2000 and seisnet, also used to store old versions of SEISAN

/net/seismo3 - contains the home of autodrm, india and greece (country related data); directory meron_israel contains 3 days of data from the Meron field experiment

/net/seismo-ARC/arc1 - some Norwegian data from before 1995

/net/seismo-ARC/arc2 - data from Central America, see Technical report by Mario V.

/net/seismo-ARC/arc3 - -----

/net/seismo-ARC/arc5 - -----

/net/seismo-Africa - the africa user's home directory

/net/seismo-stud - students' user directories

/net/seismo-WAV-BER - waveform database BER, containing data since 1982

/net/seismo-DATA - used for data storage by the SG

/net/seismo - used by seismo user, also user directory of quake

/net/seismo-users - SG users

/net/seismo-WAV-REA - contains the seismo user's main WAV directory, *and in future will also contain the REA directory*

/net/seismo-WAV-CONT1 - disk to store continuous data from selected NNSN stations

emerald (alk):

/net/emerald1 - data transferred from the NNSN stations by SEISNET is temporarily stored here to have fast access to the data for first inspection from emerald

SEISAN

(on seismo CD)

For details on SEISAN, the reader is referred to the manual. SEISAN is developed at IFJF and therefore the main processing system used by the SG for processing earthquake data. The software (source code and executables) are located under the directory:

/net/seismo-DVLP/s2000/seismo/PRO

In order to get access to the BER database and the standard definition files, the user may use /net/seismo/seismo as the SEISAN_TOP directory. In case the user wants to have his/her own set-up of SEISAN, it is possible to work with local databases, or to create the SEISAN structure under the user's home directory. The user needs to create the directories CAL, DAT (with the definition files), REA and WAV, preferably under a seismo directory. Instead of copying the executables, the user should either link or include the path to the s2000 user.

Seismo set-up

The seismo account is the owner of the BER database and used for processing of the NNSN data. The SEISAN_TOP for seismo is /net/seismo/seismo. There is a number of REA and WAV databases. The main REA database is BER, in addition there is PDE and ISC and some others. Also, there is one database for each station that is used for data transfer by SEISNET. For waveform data there is the WAV directory from where the data is manually moved to the BER WAV-database. In addition there is a number of WAV-databases that are used for continuous data.

Making a new distribution (s2000)

New distributions are made on the *s2000* account using the *new_version* command. The *new_version* command uses the *~s2000/seismo/INF/seisan.all* file as a complete list of all files that need to be copied, ASCII files for the Windows version are converted (by *new_version*) to Dos ASCII using *unix2dos*. The Windows and Linux versions have to be transferred to the respective platforms, which is done using *ws_ftp* for Windows (binary transfer) and *tar/ftp* for Linux. Next, the software is compiled on

all platforms, object files should be deleted before the distribution file is made. When the compiled distributions (Sun and Linux) are available, the *new_tar.exp* (under `~s2000/seismo/PRO`) can be used to create various distribution files (full, source, supplements). *Note:* The *new_tar.exp* still needs to be tested and improved.

SEISNET

(on seismo CD)

SEISNET is the software that manages the data transfer from the seismic stations and that enters these data into the SEISAN system, details are given in the user's manual. The software is located on the *seisnet* account, but parameter files are on the *seismo* account under `/net/seismo/seismo/NSEISNET/seisnet/`. There are currently four parameter files:

<code>seisnet.par</code>	- the main parameter file
<code>cont.par</code>	- set-up of parameters for continuous transfer from RUND, MOL and MOR
<code>jmicont.par</code>	- set-up of parameters for continuous transfer from JMI

Note: These parameter files could be merged, but are kept separate for practical reasons!

<code>seisnet_cron.par</code>	- set-up of parameters needed for running <i>seisnet</i> with cron
-------------------------------	--

SEISNET can be started interactively with the command '*seisnet*', or in the background, see section on Background processes. The set-up of the interactive commands is done in the file `/net/seismo/seismo/COM/.SEISNET`. The interactive commands to start *seisnet* with the parameter files `cont.par` or `jmicont.par` are *cont* and *cjmi* respectively.

All SEISNET processes are set to write to the same log files. The log files can be accessed from the LOG database (SEISAN).

Web pages

The SG pages are part of the IFJF web server, which is running on *turmalin*. The top directory for the *seismo* pages is:

`/usr/local/apache/htdocs/seismo`

For the contents of the SG pages, check <http://www.ifjf.uib.no/seismo/index.html>. As with any web page, regular updating is required. New software changes should be indicated on the *software development* pages.

There are two main processes that provide information on recent seismicity:

- Information on recent individual earthquakes within Norway (normally $M > 2.0$) is updated automatically, after initiation by the user, from the *seismo* account with the *gmtmap* script
- Seismicity maps of recent activity (Norway and world) are automatically updated

The files and directories can be owned by either the *seismo* or *www* user. Normally, they should be owned by *seismo*, since the recent earthquake pages are automatically updated by the *seismo* user, so that there has to be write access. However, when modifying the web pages with Microsoft FrontPage, the files have to be owned by *www*. There is a small script to change the owner and to fix the mode of files and directories, which is *set_mode* (under `/usr/local/apache/htdocs/seismo/`, has to be done by *root* user).

The web server contains the directories that are part of the CD titled 'University of Bergen software collection', which contains SEISAN, SEISNET, SEISLOG and other software. The CD's top directory is: `/usr/local/apache/htdocs/seismo/SOFTWARE` (directory owned by *seismo* user).

Seisweb

The SEISWEB software, which is an interactive web interface to seismic databases, is running on the IFJF web server (turmalin). The SEISWEB files are installed under `/usr/local/apache/htdocs/Seismologi/seisweb/` (*seisweb.jar*) and `/usr/local/apache/cgi-bin/` (*seisweb_manager.exp*). See the SEISWEB manual (on the web server) for more details.

Anonymous FTP

The SG gives access to software and earthquake data through anonymous ftp (*aftp*), the address is `ftp.ifjf.uib.no` (the IFJF ftp server). The ftp server used is *ncftpd*, which is located on *services* in the directory `/export/ncftp`. Anonymous access is given through login *ftp* and mail address as password. The checking of the mail address to be valid is disabled, since ORFEUS (who extracts data), cannot handle it.

The software and data are physically not on the ftp server, the respective directories are mounted through the network under the *aftp* directory structure. This way, the partitions are mounted with read-only access.

The directories mounted under the *aftp* are (mount point and partition):

```
/export/ncftp/ftproot/pub/seismo/SOFTWARE(turmalin:/usr/local/apache/htdocs/seismo/SOFTWARE)
/export/ncftp/ftproot/pub/seismo/DATA/WAVEFORM/WAV(turmalin:/net/seismo-WAV-REA)
/export/ncftp/ftproot/pub/seismo/DATA/PARAMETRIC(turmalin:/net/seismo/seismo/REA/BER__)
```

/export/ncftp/ftproot/pub/seismo/DATA/WAVEFORM/BER(turmalin:/net/seismo-WAV-BER/BER)
/export/ncftp/ftproot/pub/seismo/DATA/WAVEFORM/CONT(turmalin:/net/seismo-WAV-CONT1)
/export/ncftp/ftproot/pub/seismo/autodrm(turmalin:/net/seismo3/autodrm/ftp)
Users from outside IFJF can use the pub/incoming directory to upload files.

Creating software CD

(on seismo CD)

As explained above, the content of the CD titled 'University of Bergen software collection', which contains SEISAN, SEISNET, SEISLOG and other software, is located in the directory: /usr/local/apache/htdocs/seismo/SOFTWARE

The CD is written from *emerald*, to which the SCSI CD writer is connected. This can be done by any user. The command for creating one CD is:

```
createdc 1 /SEISMO_CD
```

To create more Cds than one, give the required number instead of '1'. The createdc script is written by Karl Magnus Kolstoe, and is located on emerald (only) under /usr/local/bin/. It works in two steps, first it creates the ISO image, then the image is burnt to CD. Of course, other paths can be used as well.

AutoDRM

(on seismo CD)

The AutoDRM is running on the *autodrm* account. The program is running as a cronjob, and starts automatically every minute. For details on the AutoDRM-SEISAN interface, see the manual.

The AutoDRM software is the same as the version provided by Urs Kradolfer from ETHZ (Zurich), but with the local routines added to interface to the SEISAN system. The details on how the system works and what the parameter files are, are given in the manual. The source code of the local modifications is given under /net/seismo3/autodrm/prog/src, the files that were modified contain '_local'. The cronjob for the AutoDRM is running on turmalin. The BER AutoDRM is accessed by WAVES4U, which is running at ETHZ, check <http://seismo.ethz.ch/waves4u/>.

Gmtmap

(on seismo CD)

Gmtmap is an Expect script to interactively generate GMT scripts. GMTMAP on the seismo account is located under /net/seismo/seismo/GMTMAP/. Details can be found

in the help function of gmtmap. For interactive use, the script is started with 'gmtmap'. Gmtmap has a function to update lists of recent earthquakes on the web pages and to produce html files showing maps and details of the event. The input for this feature is a Seisan S-file. Gmtmap can also be started as a background process to generate maps automatically. Another function of gmtmap is to create the finger-quake list.

Background processes

There is a number of processes that are running in the background on the *turmalin*, owned by the *seismo* user. These processes are started by the cron command. To work with cron, two basic commands are:

```
crontab -e (edit crontab list)
crontab -l (show crontab list)
```

The list itself contains information on the processes that are currently running. The following list only gives an overview of what is done:

- SEISNET: all stations, normal mode, twice per day
- SEISNET: create list for noise extract, once per week
- SEISNET: transfer log_idx files, once per day
- SEISNET: continuous transfer RUND, once per hour
- SEISNET: continuous transfer MOL and MOR, three time per day
- SEISNET: continuous transfer JMI, three time per hour restart CISCO boxes, twice per week (otherwise it seems that they hang after a while)
- hang-up modem if connected and not used : not active
- GMTMAP: create map for Norway, once per hour
- GMTMAP: create finger quake list for Norway, once per hour
- GMTMAP: create map for world, PDE, not active (finger at PDE at the moment not available)
- delete TMP directory (/net/seismo/seismo/TMP), everything older than 3 days

Mailing lists

There are a number of mailing lists that are maintained automatically by the majordomo software, which is operating on the *majordomo* account. For administration of the software, the reader is referred to the documentation (<http://www.majordomo.com/>). Some user sepcific help can be obtained by sending the message 'help' to majordomo@ifjf.uib.no. Some basic commands are (send the given command by mail as message to the majordomo address):

```
lists          - get the available lists
info <list>    - get info on a list
who <list>     - get the users on a list
```

The majordomo home directory is /net/bruk/b/majordomo. The lists are set-up under the directory /net/bruk/b/majordomo/lists.

Other software

GMT: GMT is maintained by the IT group at IJFJ, it is installed under `/prog1/gmt/`. The SG has collected some topographic files, which can be found under `/net/seismo-PROG/GMT`, also see the README file in that directory.

SAC: The Seismic Analysis Code (SAC) software is installed under `/net/seismo-PROG/sac`, in order to set-up SAC on a user account, check the file `/net/seismo/seismo/COM/.PROG`. The SAC distribution is placed under `/net/seismo-PROG/SAC`.

JPITSA: Java Pitsa is installed under `/net/seismo-PROG/JPITSA`.

Passcal software: This software is installed under `/net/seismo-PROG/passcal1.9`. The package includes the plotting tool PQL.

Raygui: The ray-tracing package is installed under `/net/seismo-PROG/raygui`.

Ammon's receiver function package: Installed under `/net/seismo-PROG/AMMON`

Evalresp: Program by IRIS to evaluate SEED response files, `/net/seismo-PROG/evalresp-3.2.17`.

Cdlook: Program by ORFEUS to plot SEED volumes, `/net/seismo-PROG/CDLOOK`.

gse2seed: Conversion from GSE to SEED by ORFEUS, `/net/seismo-PROG/GSE2SEED`.

Herrmann's programs: Well-known package, `/net/seismo-PROG/HERRMANN`.