AutoDRM − SEISAN interface

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Introduction

The Automatic Data Request Manager (AutoDRM) is an e−mail based data request mechanism for exchanging seismic data (waveform data, parametric data and station data). Data is requested from an AutoDRM server through an e−mail message, which is processed automatically by the AutoDRM. The requested data is either sent via e−mail, or can be transferred from the server through ftp. Presently it is well established as a standard request tool within the international seismological community.

The AutoDRM software is written and maintained by Urs Kradolfer, ETHZ Zürich, (1993, 1996 and 2000) and can be obtained from http://seismo.ethz.ch/autodrm. This software is the core of the system, however an additional interface between AutoDRM and the local seismic database is needed. This document describes the interface between AutoDRM and SEISAN (Havskov and Ottemöller, 1999 and 2000). It is assumed that the reader is familiar with SEISAN.

The AutoDRM−SEISAN interface is developed by the University of Bergen (http://www.ifjf.uib.no/seismo/main.html) and the Orfeus Data Center (http://orfeus.knmi.nl).

Overview of supported data types

The AutoDRM−SEISAN interface supports the following request commands:

WAVEFORM GSE2.0
WAVEFORM SEED
BULLETIN
STATION
CHANNEL

RESPONSE

Requirements

This version of the AutoDRM−SEISAN interface has been tested with AutoDRM version 2.95 and SEISAN 7.1.2, under Sun Solaris. In order to run AutoDRM, you need to have cron and e−mail on your machine. C and FORTRAN compilers are required. An anonymous ftp−server is needed for storing large datafiles which will not be transferred by e−mail. This ftp−server can be running on the same machine as AutoDRM, or on another machine where the AutoDRM directories are mounted.

To provide waveform data in SEED format, the conversion program gse2seed (http://orfeus.knmi.nl/other.services/conversion.html) is required.

Installation

SEISAN

You need to have SEISAN version 7.1.2 or higher installed on your system, see the SEISAN manual for instructions on installation.

AutoDRM

With the AutoDRM software you obtain instructions on installation and a description of the AutoDRM structure, which will not be repeated here. Every directory contains a README file. The main steps in the installation are:

1) Follow the instructions given in the file '**prog/INSTALL**', skip the step 'Modify the most important *_local.f files in the prog/src directory', since this is given by the AutoDRM−SEISAN interface
2) Create directory for ftp, which is used for large data files
3) Modify file **adm/autodrm.help**
4) Set mail command in file '**mail.setup**'
5) Set command to backup e−mail in file '**prog/savemail.cmd**'

Follow the instructions on how to activate AutoDRM using the cron command, and test that the core installation of AutoDRM is working.

Example of cron file (edit with 'crontab −e' ; list with 'crontab −l')

```
#! /bin/sh
#
# Run AutoDRM every minute, every day (if there is new mail for AutoDRM):
#
* * * * * ‘echo $HOME/prog/autodrm.com‘
#
# check, if an old AutoDRM lock−file is here; if yes, remove it:
#
2 * * * * ‘echo $HOME/prog/autodrm_watcher.com‘ >/dev/null 2>/dev/null
22 * * * * ‘echo $HOME/prog/autodrm_watcher.com‘ >/dev/null 2>/dev/null
42 * * * * ‘echo $HOME/prog/autodrm_watcher.com‘ >/dev/null 2>/dev/null
#
```

```
#
# Delete files older than 5 days
#
15 0 * * * cd work;find . -mtime +5 -type f -name '*' -exec rm {} \; > /dev/null
16 0 * * * cd ftp;find . -mtime +5 -type f -name '*' -exec rm {} \; > /dev/null
```

AutoDRM −SEISAN interface

First, you need to create the SEISAN library archive, if it is not already available. Check for the file '**seisan.a**' in the SEISAN '**LIB**' directory. If '**seisan.a**' does not exist, type '**make**' in the LIB directory to create it.

The AutoDRM−SEISAN interface software is given as a gziped tar file. In order to extract the individual files, copy the file '**autodrm−seisan.tar.gz**' to the autodrm user's home directory. To extract the files, use

```
gunzip autodrm-seisan.tar.gz
```

and

```
tar xvf autodrm-seisan.tar
```

Now, files are added to the prog/src, and a local directory is created. Check the README.SEISAN file in the autodrm home directory for a list of files.

The bin/autodrm.exe executable needs to be recompiled with the new write*local.f routines. To do this, in the **prog/src** directory do the following:

1) Edit the Makefile (**prog/src/Makefile**):

Add the following 2 lines (near the top of the file), where seisan_top refers to the SEISAN top−directory:

```
SEISAN = seisan_top/LIB/seisan.a autodrm_seisan_local.o
SEISAN_INC = -Iseisan_top/seismo/INC
```

and modify the following line

```
FFLAGS    =  -O -Nx300 -Nl80 $(SEISAN_INC) -lgen
```

and modify the lines

```
$(EXE): $(OBJS) $(MAKEFILE) $(SEISAN)
        $(LD) $(FFLAGS) $(OBJS) $(OBJS3) $(SEISAN) -o $(EXE)
```

2) Now, use the command '**make**' to compile the local routines and to generate the ../bin/autodrm.exe executable.

In case of problems, check for possible errors:

- you have not done all changes needed in the Makefile
- SEISAN is under a different top−directory
- the SEISAN archive, seisan.a does not exist
- you may have a SEISAN older than version 7.1.2

3) Depending on the setup of your local network, your aftp server may not have direct access to the AutoDRM user's directories. In this case, you need to modify the '**subroutine push_seed**' in '**writewaveform_local.f**'.

4) Modify '**prog/autodrm.com**':

Check if your '**prog/autodrm.com**' has the line

```
. $HOME/prog/autodrm.env
```

if not, add it. This line means that every time autodrm.com is started, the file prog/autodrm.env is sourced, which makes it possible to set environmental variables. This is needed when AutoDRM is running with SEISAN.

5) Modify '**prog/autodrm.env**' to setup your path definition and the SEISAN top−directory. The path should contain the directory of the GSE2SEED program, in case the 'WAVEFORM SEED' option should be supported.

6) Settings in directory '**local**':

- **autodrm_seisan.par** : This file defines the SEISAN databases used with AutoDRM, the translation of station and component codes between AutoDRM and SEISAN, and some other parameters. Only databases and stations defined here can be accessed through the AutoDRM, so you may use this to restrict access for databases and stations.
- **channel−list** : List of channels available through AutoDRM in GSE2.0 format.
- **station−list** : List of stations available through AutoDRM in GSE2.0 format.

The channel_list and station_list files only provide information.

Additional settings

In order to automatically delete files from the working directory after e.g. 10 days you can add the following line to your crontab file:

```
15 0 * * * cd work;find . −mtime +10 −type f −name '*' −exec rm {} \; >
/dev/null
```

How it works

The AutoDRM handles the incoming requests, calls the respective subroutines and returns the requested data through e−mail or ftp server, in case of too large data files. The AutoDRM−SEISAN interface provides the local routines needed to extract data from the SEISAN system, and defines the databases, station codes and component codes. The data types that can be extracted from the SEISAN system are bulletin, waveform, station and channel information, and instrument response.

Bulletin

The AutoDRM−SEISAN interface expects the parametric event data to be organized in a SEISAN database, which is located under the '**REA**' directory, local database, which is a flat file structure in some directory is not supported. The routine for extracting bulletin information starts the select program, which extracts data from the 'CAT' database. Note, that the CAT files are only updated when running the UPDATE program. The following request options for bulletin are supported:

DEPTH, MAG, LAT and LON

The data that is extracted by SELECT, is then converted to GSE by the NORGSE program.

Waveform

In SEISAN, there are several ways, in which waveform data can be stored. The place in the system, where waveform data can be stored are defined by the SEISAN reading routine for waveform data, and are as follows:

- in the WAV directory
- in a database under WAV
- in some other directory

The data can be stored in different formats (see SEISAN manual) and may be stored in some compressed format. Continuous waveform data in SEISAN is stored like event data, with an entry for every continuous waveform file in the parametric database.

The AutoDRM−SEISAN waveform extraction routine, searches in the parametric database(s) for available data using the COLLECT program. The COLLECT output file is read, and for every entry, the EXTRACT program is run, which reads the headers of the waveform files, and makes a list of available trace segments. This list is compared to the request list for waveform data. If there is a match between available and request list, an input file for the EXTRACT program is written, and the data extracted by EXTRACT. When all requested data is extracted the routine will stop. If requested data is not found, this information is added to the e−mail that will be send to the user.

The list of available databases and channels is given by the '**local/autodrm_seisan.par**' file. Since the order given in this file is used, when looking for waveform data, it is recommended to put the databases with continuous data first. It is important to set the translation between GSE and SEISAN station and component codes correctly. Also check the SEISAN file '**DAT/gsesei.def**', which defines the conversion of station and component codes when waveform data by SEISAN is written in GSE format.

If the waveform data is requested as SEED, all information needed (waveform data, station information, channel information and response) is written to a file, which is then converted to SEED by the GSE2SEED program, and pushed onto the anonymous ftp server.

Response

The instrument response in SEISAN can be stored in either GSE or SEISAN format, however, the AutoDRM−SEISAN interface can only extract the response, if given in GSE format. The response extract routine, searches for the response file, which in GSE format has an ending '_GSE'. The time in the request is used as parameter when searching for the response, so it is possible to have the response history in time for a particular channel.

Station/Channel

The list of available stations or channels is given in the '**local/station−list** and **local/channel−list**' files. These files have to be provided by the user. If station or channel information is requested, the respective files are returned.

Installation sites

The following list gives the e−mail address of installed AutoDRM−SEISAN interfaces:

Institution	***Autodrm email address***
Institute of Solid Earth Physics, University of Bergen, Norway	autodrm@ifjf.uib.no

Examples of request messages

Waveform data

```
BEGIN GSE2.0
MSG_ID test
MSG_TYPE REQUEST
E−MAIL your.email@your.domain
```

```
TIME 2000/10/22 09:00 TO 2000/10/22 09:50
STA_LIST *
CHAN_LIST BHZ
WAVEFORM GSE2.0
STOP

BEGIN GSE2.0
MSG_ID test
MSG_TYPE REQUEST
E-MAIL your.email@your.domain
TIME 2000/10/22 09:00 TO 2000/10/22 09:50
STA_LIST *
CHAN_LIST BHZ
WAVEFORM SEED
STOP
```

Bulletin data

```
BEGIN GSE2.0
MSG_ID test
MSG_TYPE REQUEST
E-MAIL your.email@your.domain
TIME 2000/10/01 00:00 TO 2000/10/31 24:00
BULLETIN GSE2.0
STOP
```

Response data

```
BEGIN GSE2.0
MSG_ID test
MSG_TYPE REQUEST
E-MAIL your.email@your.domain
TIME 2000/10/22 09:00 TO 2000/10/22 09:50
STA_LIST *
CHAN_LIST BHZ
RESPONSE GSE2.0
STOP
```

Station data

```
BEGIN GSE2.0
MSG_ID test
MSG_TYPE REQUEST
E-MAIL your.email@your.domain
STA_LIST *
STATION GSE2.0
STOP
```

Channel data

```
BEGIN GSE2.0
MSG_ID test
MSG_TYPE REQUEST
E-MAIL your.email@your.domain
STA_LIST *
CHAN_LIST *
CHANNEL GSE2.0
STOP
```

References

Havskov, J. and Ottemöller, L., SeisAn earthquake analysis software, Seism. Res. Let., 70, 532−534, 1999.

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Kradolfer, U., Waves4U: Waveform Availability through AutoDRM's, Seism. Res. Let., 71, 79−82, 2000.