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A GUIDE TO REQDATA: AUTOMATED REQUESTING AND PARSING OF GSE FORMATTED DATA

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This document is a guide to a set of programs that can be used to submit GSE2.0 formatted waveform requests to an autoDRM site and automatically parse the email responses. Given an event time and location, travel times are used to compute request-time-windows for a list of stations. Waveform data received in GSE2.0 format are converted to CSS3.0 format and stored in a user-defined directory structure. Multiple requests for separate events can be submitted simultaneously. The status of multiple requests can be monitored through the system's log files. A GUI to the log files is included.

Seismic waveforms; autoDRM; GSE 2.0 format; CSS 3.0 format
Contents

Introduction .................................................. 1

Installation ............................................... 3
  Getting The Package .................................. 3
  Activating Automatic Email Parsing .............. 4
  Optional Installation Step ......................... 5
  Testing The Installation ............................ 5

Sending Requests .......................................... 7
  Basic Operation ...................................... 7
  Optional Arguments to ReqData .................. 9
  Updating Station Information with reqchan ... 12

Managing Requests ........................................ 12
  Basic Operation ..................................... 12
  Reqstat Options .................................... 15
    Main Window ....................................... 15
    Station Request Window ......................... 17
    Confirm Re-request Window ..................... 17

Handling Errors .......................................... 18

Acknowledgments ......................................... 22

Reference List .......................................... 22

List of Figures

  1  The main window of reqstat. All requested events are listed. .... 14
  2  The reqstat station request window. The status of each station/channel request for one event is displayed. .................. 14
  3  The reqstat messages window. A copy of the autoDRM-formatted request is followed by information resulting from the processing of the autoDRM response. ................................. 16
INTRODUCTION

This document describes ReqData, a package for requesting and receiving seismic waveform data from Internet sites running an auto DRM \(^1\) (automatic Data Request Manager; Kradolfer, 1993). The ReqData package simplifies the task of formatting the email requests for the user's list of events and stations. ReqData automatically parses the email responses from the auto DRM, converts GSE2.0 format to CSS3.0 and installs data in directories as specified by the user. Also included with ReqData is a GUI for managing the progress of the responses. To help manage station files, two programs are included in the ReqData package: one for querying the auto DRM about stations and one to parse the responses into CSS3.0 station files.

Parameters to the waveform request program, reqdata are: an approximate time and location of events to request, a list of stations and channels to request and the directory in which to install the data. To limit the size of the individual email responses, requests are formed separately for each station. A status file and a log file are created in the data directory using the data prefix specified by the user. The log file initially contains a copy of the auto DRM-formatted email requests sent to the specified auto DRM site. The status file records the requested times for each channel, the date of the request and the status (waiting, received-data, no-data-available, etc.). As email responses are received from the auto DRM, both the log and status files are updated.

The log and status files are ASCII text and can be viewed by hand. An X-Windows program, reqstat, is provided as a convenient tool for viewing these files. With reqstat, the user can easily see the status of all event-requests and the status of all individual channel-requests. From reqstat, requests can be resubmitted to the same or a different auto DRM site.

The software that automatically parses GSE2.0-formatted responses from an auto DRM consists of three parts: a mail delivery program named deliver\(^2\), the shell script that controls deliver, named .deliver, and the conversion programs gse2css and gse2site.

After ReqData is installed, a user's incoming email is automatically filtered by the .deliver script to catch all GSE2.0 formatted messages. These messages are removed from the user's email and processed by ReqData conversion programs. All

---

\(^1\)Since no strict standards exist for auto DRM, ReqData may not work equally well at all sites. ReqData was designed and tested primarily with the auto DRM implemented at USGS and uses GSE2.0 auto DRM commands defined in CRP 243.

\(^2\)Chip Salzenberg, ComDev/TC Telemanagement
messages not recognized as GSE2.0 are forwarded to the user’s regular mailbox.

At the time of request, each request is logged and given a unique request-id that is returned by the autoDRM as the REF_ID in the email response. The REF_ID allows the email parsing programs to match incoming data with the request-ids and install the data in the appropriate directory.

The .deliver script compares the REF_ID of each GSE2.0 message to the request log created by reqdata. If the REF_ID is valid, a conversion program is executed to process the message. If the REF_ID of a GSE2.0 message is not found in the request log, the message is forwarded to the user’s regular mailbox. It is an installation option to have all processed GSE2.0 email messages either saved in a file or discarded. When any message fails to be processed for any reason, all processing error messages are logged and the message can be either forwarded to the user's mailbox or saved, depending on installation options.

Each site operating an autoDRM places restrictions on the size of the email response to the user. In order to facilitate email transfer of large responses, some sites employ the CONTINUE command, which is part of the GSE2.0 autoDRM command set. The .deliver script can handle autoDRM responses that are continued over two or more separate email messages. Frequently, the individual messages of a continued response will arrive out of order. The .deliver script holds continued messages until the first message of the response, which contains the REF_ID, is received before processing all the continuations.

The waveform parsing program, gse2css, converts GSE2.0 WID2 headers and CM6 compressed waveform data to CSS3.0 format. An origin file is created from the event information input at request time. Individual waveform files are created for each channel following the naming convention of sta.chan.epochaltime.w. If a request is repeated, the incoming data will write over the older data if the sta, chan and epochal time are the same.

Another request program, reqchan, requests station and channel information from an autoDRM. When the .deliver script finds keywords DATA_TYPE STATION or DATA_TYPE CHANNEL in the autoDRM response, a different conversion program, named gse2site, is executed. Gse2site creates or updates the system’s CSS3.0 site and sitechan tables if new station and/or channel information arrives from an autoDRM.

ReqData supports multiple, simultaneous users. A CSS3.0 lastid table-file is updated with orid, wfid, chanid and msgid records. A central request-file logs request-ids for all users. A Unix file locking mechanism insures that all files being written to by
the message conversion programs, including lastid, origin, wfdisc, status and data files, are updated correctly. This is necessary not only to allow multiple users, but even for a single user, since the processing of sequentially arriving email messages can overlap in time, resulting in the execution of multiple instances of the conversion programs.

INSTALLATION

Getting The Package

The ReqData package can be obtained by anonymous FTP from es2.multimax.com. In the directory pub/gtdb/reqdata, you will find compressed tar files containing executables for SunOS-4.1.3, Sun-5.3 (Solaris-2.3), and IRIX-5.3:

reqdata1.0.bin.sun4.1.3.Z
reqdata1.0.bin.sun5.3.Z
reqdata1.0.bin.irix5.3.Z

These tar files also contain tables of station locations, travel times and autoDRM addresses. This document is included as a PostScript file, and there are Unix “man” pages for the programs. The complete source code is also available as a separate compressed tar file:

reqdata1.0.src.Z

The directories in the ReqData package (excluding the source) are:

reqdata/bin
reqdata/continued
reqdata/doc
reqdata/info
reqdata/logs
reqdata/man/man1

3
reqdata/man/man3
reqdata/man/man5
reqdata/save
reqdata/tables/static
reqdata/tables/dynamic

Install this directory tree in a location available to all users and make sure that the directories tables/dynamic, logs, continued, and save are writable by all users of the package. Add reqdata/bin to each user's PATH environment variable and add reqdata/man to the MANPATH environment variable. Each user must also set the environment variable REQDATA_HOME to the location of the reqdata directory.

Activating Automatic Email Parsing

There are just a few steps necessary to activate the automatic parsing of GSE-formatted email. First, edit the file reqdata/.deliver and change the line
REQDATA_HOME=/path/reqdata to be the actual location of the reqdata directory.
Then copy reqdata/.deliver to each user's home directory (or make a link to it).
Create a file named .forward in each user's home directory containing the line:

"/path/reqdata/bin/deliver username || exit 75".

Include the quotes. Substitute for /path/reqdata the actual location of reqdata and substitute for username the user's login name. Mail must be deliverable locally to username, so it cannot be an address to another machine (NO &). If the user's mailbox file is not in the directory /var/spool/mail, then specify the mailbox directory with a -m option. For example, if the user's mailbox file is in the directory /var/mail, then create a .forward file with:

"/path/reqdata/bin/deliver username -m /var/mail || exit 75".

Leave a space between the -m and /var/mail.

The .forward file will instruct the Unix mail receiving program (sendmail) to execute the deliver program and pass all email to it. The deliver program will use the .deliver script to detect GSE formatted mail and execute the appropriate
parsing program. If `reqdata/bin/deliver` is unavailable (perhaps because a file server is down or an automounter failed), the "|| exit 75" in the `.forward` file instructs `sendmail` to requeue mail for later delivery. Normally, this is a sufficient safeguard against bouncing mail back to an autoDRM. But if the `deliver` program is unavailable for a long time (more than a few hours), `sendmail` will reply to senders that it is having a delivery problem and eventually return messages to senders.

**Optional Installation Step**

The following optional installation step will prevent mail from being returned to the sender when the `deliver` program is unavailable for a long time. Instead of requeuing messages, we can instruct the `sendmail` program to bypass the `.forward` file and send mail directly to the user's mailbox whenever the `deliver` program is unavailable. First remove the "|| exit 75" from the `.forward` file. Edit the `sendmail` aliases file, usually `/etc/aliases`. (You will probably need root permission to edit this file. If it is not in `/etc`, check for its location in the configuration file `/etc/sendmail.cf`.) Look for a line in `/etc/aliases` that begins with `username:`, where `username` is your login name. After that line, add (substituting your login name for `username`):

```
    owner-username: \username
```

If there isn’t a line beginning with `username:`, then add the following two lines to the file:

```
    username:   username
    owner-username: \username
```

The "owner-username:" line in the aliases file will prevent email from being bounced back to the sender, in the event that the `deliver` program is unavailable or fails to execute correctly. If `deliver` fails for any reason, `sendmail` will send the mail along with an error message directly to the user’s mailbox.

**Testing The Installation**

It is a good idea to test the installation "locally" before sending a request to an autoDRM. After you have completed the installation steps of the previous section (installed the `reqdata` directory, edited and installed the `.deliver` and `.forward` files), try the following test:
setenv REQDATA_HOME /path/reqdata

cd /path/reqdata

bin/reqdata par=test_parfile

The file test_parfile contains:

stachanlist=AAE/B*
address=user
retaddr=me@mymachine.address
basedir=/tmp/test_reqdata
time=96/06/19 00:18:02
lat=36.11
lon=35.80
depth=10.0

This will instruct reqdata to form a request and mail it to you. Check your mail for the test request message. If you do not receive it after a few moments, look in logs/deliver.log for error messages and check the mail queue to see if the test message could not be delivered. If you do receive the test request message, you can delete it and continue. Check to see if the directory /tmp/test_reqdata was created, and if it is there, proceed with:

bin/reqstat /tmp/test_reqdata &

The reqstat main window should display one event in its Requested Events list with status “waiting” and prefix “test_reqdata”. Select the event with a mouse click and select the Stations... button to display the channel listing. There should be three lines for AAE and channels BHE, BHN and BHZ.

Continue the test of the mail parsing programs by mailing a GSE-formatted message to yourself:

mail username < test_msg
After a few seconds, the reqstat status fields for channels BHN and BHZ should change to "response", and the files

```
/tmp/test_reqdata/w/AAE.BHE.835143783.02.w
/tmp/test_reqdata/w/AAE.BHZ.835143783.02.w
```

should be created. If they are there, the installation is good.

SENDING REQUESTS WITH ReqData

Basic Operation

The program reqdata requests waveform data from one or more autoDRM's, given an approximate event time and location and a list of stations. This information can be input on the command line, or the user can place arguments in a file and input the filename on the command line with reqdata.par=parfile. A simple parfile for reqdata looks like:

```
retaddr=username@myaddress
basedir=/disk1/data/event01
stachanList=AAM/*,ALQ/B*,BLA/BHZ,NORES/*,ESDC/b*
time=96/05/13 04:53:47
lat=7.19N
lon=76.88W
depth=27.0
```

Specify your email address with the retaddr argument, and specify the directory where the data will be installed with the basedir argument. The stachanList argument is a list of station/channel or network/element pairs. The list can contain the "*" wildcard character as the final character of the channel or array element name. When a wildcard character is encountered, the program first searches the affiliation table $REQDATA_HOME/tables/static/global.affiliation for a matching network name. In the example above, NORES/* will expand to include all the elements of
the NORES array and all the channels of each element. Array expansion can also be limited. In the example above, ESDC/b* expands to include only the broad-band channels at the ESDC array: ESLA/BHZ, ESLA/BHN, ESLA/BHE. The program also searches the sitechan file $REQDATA_HOME/tables/static/global.sitechan for a matching station name, and if found expands the "*" character to include all channels for the matching station. AAM/* expands to include all channels AAM/HLZ, AAM/HLN, AAM/HLE, AAM/BLZ, AAM/BLN, AAM/BLE, AAM/LLZ, AAM/LLN, AAM/LLE, whereas ALQ/B* expands to only the broadband channels ALQ/BHZ, ALQ/BHN, ALQ/BHE. Station and channels names are case insensitive, so for example, you could specify alq/b* instead of ALQ/B*.

Input an approximate event time and location with the arguments time, lat, lon and depth. The format for time is yyyy/mm/dd hh:mm:ss.s, but reqdata also recognizes a two digit year-1900, as shown above, or an epochal time as in CSS3.0 origin tables. Input the latitude and longitude using N, S, E, W for north, south, east or west or input a positive number for north and east and negative number for south and west.

Reqdata searches $REQDATA_HOME/tables/static/global.site for station locations and computes request time windows. The default time window for each station starts one minute before the first P arrival time and ends 30 minutes after the LR arrival. The user can change the default by using the optional arguments begPhase and endPhase. The format for these arguments is phase+/-seconds. Using this format, the default time window looks like:

begPhase=P-60.

endPhase=LR+1800.

To request a four-minute time window centered on the P arrival time, for example, add the following lines to the parfile:

begPhase=P-120.

endPhase=P+120.

Other standard phases in the IASPEI table are also recognized for begPhase and endPhase.

Once reqdata has computed time windows for all station/channel pairs, it searches the address file $REQDATA_HOME/tables/static/global.address for the address of
an autoDRM associated with each individual channel. The address file contains free-
formatted lines with sta, chan, address, format information. For example, the
following lines

ALQ BHZ autodrm@gldfs.cr.usgs.gov GSE2.0
ALQ BHN autodrm@gldfs.cr.usgs.gov GSE2.0
ALQ BHE autodrm@gldfs.cr.usgs.gov GSE2.0
NRAO shn messages@cdidc.org GSE2.0
NRAO shn messages@cdidc.org GSE2.0
NRAI shh messages@cdidc.org GSE2.0
NRAI shh messages@cdidc.org GSE2.0
... 

instruct reqdata to request ALQ broadband channels from autodrm@gldfs.cr.usgs.gov
and request NORES channels from messages@cdidc.org. If two different addresses are
listed in the address file for one station/channel, reqdata uses the first line en-
countered.

Optional Arguments to ReqData

stachanFile This optional argument can be used in place of
stachanList to specify a list of stations and channels to request. Simply list
the station/channel and network/element pairs in a file, one pair per line, and
input the filename using stachanFile=filename. Only the first two-columns
of this file are used by reqdata. Everything on the line after the channel name
is ignored. The wildcard character can be used in the file. The ‘#’ character
can be used to comment-out lines. This allows one to easily use a channel list-
ing obtained from an autoDRM (see reqchan below) as a stachanFile, which
might look like:

#autodrm@gldfs.cr.usgs.gov
#Sta Chan Aux Latitude Longitude Elev Depth Hang Vang
AAE BHZ IU 9.02917 38.76556 2.442 0.000 0.0 0.0
AAE BHN IU 9.02917 38.76556 2.442 0.000 0.0 90.0
AAE BHE IU 9.02917 38.76556 2.442 0.000 90.0 90.0
AAE LHZ IU 9.02917 38.76556 2.442 0.000 0.0 0.0
AAE LHN IU 9.02917 38.76556 2.442 0.000 0.0 90.0
AAE LHE IU 9.02917 38.76556 2.442 0.000 90.0 90.0
| AAM | HLZ US | 42.29972 | -83.65611 | 0.249 | 0.000 | 0.0 | 0.0 |
| AAM | HLN US | 42.29972 | -83.65611 | 0.249 | 0.000 | 0.0 | 90.0 |
| AAM | HLE US | 42.29972 | -83.65611 | 0.249 | 0.000 | 90.0 | 90.0 |
| AAM | BLZ US | 42.29972 | -83.65611 | 0.249 | 0.000 | 0.0 | 0.0 |
| AAM | BLN US | 42.29972 | -83.65611 | 0.249 | 0.000 | 0.0 | 90.0 |
| AAM | BLE US | 42.29972 | -83.65611 | 0.249 | 0.000 | 90.0 | 90.0 |

prefix When reqdata is executed it creates the files prefix.reqlog and prefix.reqstatus in the directory specified by basedir. When gse2css processes a response to the data request, it creates prefix.origin and prefix.wfdisc in the same directory. The default value of prefix is the directory name. For example, the parfile above would cause the following files to be created.

/disk1/data/event01/event01.reqlog
/disk1/data/event01/event01.reqstatus
/disk1/data/event01/event01.origin
/disk1/data/event01/event01.wfdisc

dir This is the directory where waveform files are installed using the naming convention sta.chan.epochal_time.w. It is relative to basedir, if it does not begin with '/'. The default for dir is w. Before it sends any requests, reqdata confirms that the data directory exists or can be created.

mb This body wave magnitude is recorded in the prefix.origin file.

ms This surface wave magnitude is recorded in the prefix.origin file.

ml This local magnitude is recorded in the prefix.origin file.

origin An alternative method of specifying the event time and location is to input a free-formatted CSS3.0 origin record with the origin argument. All the fields of the origin record must be specified (null values may be substituted), and they will be recorded in the prefix.origin file. The origin argument can also be set to the name of a file containing one or more CSS3.0 origin records. Data requests will be made for each origin in the file.

maxChan The maximum number of channels per email request. The default is 3 channels. Three email requests will be sent for a station that has 9 channels.

address If this argument is specified, all requests will be sent to the value of address, and $REQDATA_HOME/tables/static/global.address will not be used.
ttonly  If this argument is set to 1, the start and end times of each waveform that
would be requested are printed, but no requests are sent.

verbose  Controls information printed during execution. Set to 0, 1 or 2.

start_time  Overrides begPhase for the computation of the requested waveform start
times. If specified, this will be the start time of all waveforms requested for all
stations.

der_time  Overrides endPhase for the computation of the requested waveform end
times. If specified, this will be the end time of all waveforms requested for all
stations.

sendmail  The location of the sendmail program can be specified with this argument.
The default value is /usr/lib/sendmail. (Sendmail is a standard Unix mail
daemon, responsible for routing mail.)

sleep  Time in seconds that reqdata sleeps between executions of sendmail. De-
defaults to two. A sleep is frequently necessary to prevent mail queues from filling
up or prevent exhausting other Unix system resources, such as total number of
processes.

tableDir  This is the directory containing the two subdirectories
static and dynamic with table-files used by reqdata and associated programs.
If tableDir is not specified, the directory $REQDATA_HOME/tables will be used.
The following files are needed by reqdata:

  static/global.address
  static/global.affiliation
  static/global.site
  static/global.sitechan
  static/iasp91.hed
  static/iasp91.tbl

and the following files will be created by reqdata or conversion programs:

  dynamic/global.lastid
  dynamic/global.request
  dynamic/global.continued

addressTable  Overrides the default address-table file.
affiliationTable Overrides the default affiliation-table file.

siteTable Overrides the default site-table file.

sitechanTable Overrides the default sitechan-table file.

iaspeiTable Overrides the default IASPEI table prefix.

lastidTable Overrides the default lastid-table file.

requestTable Overrides the default request-table file.

Updating Station Information with reqchan

The ReqData package comes with global.site, global.sitechan, global.address and global.affiliation files which contain station and channel information for several autoDRM sites. If the user wishes to request data from stations at a new autoDRM site, the program reqchan can be used to update all of these station files, except global.affiliation. Another use for the reqchan program is to update the station files for any autoDRM site to catch new stations that may have been added to the site's database. A simple parfile for reqchan looks like:

    retaddr=username@myaddress

    address=autodrm.name@autodrm.address

    log=logfile

Reqchan sends a request for a complete station and channel listing to the specified autoDRM. The response is processed by the program gse2site, which creates or updates the site, sitechan and address files. The response is also forwarded to the user's mailbox, so it can be saved for use as stachanFile input to reqdata.

MANAGING REQUESTS WITH REQSTAT

Basic Operation

When data requests are made by reqdata, the files prefix.reqlog and prefix.-reqstatus are created in the basedir directory. For the example reqdata parfile shown above, the following two files would be created:
/disk1/data/event01/event01.reqlog
/disk1/data/event01/event01.reqstatus

The information in these files can be reviewed with the program reqstat. You can execute reqstat with no command line arguments, with a .reqstatus file, or with a directory name. For example, the following are valid execution statements:

reqstat
reqstat /disk1/data/event01/event01.reqstatus
reqstat /disk1/data

If no files or directories are on the command line, the user has the option to input .reqstatus files with the File/Open option, discussed below. If reqstat is executed with a filename as a command line argument, it reads the contents of that file only. On the other hand, if a directory name is input on the command line, reqstat recursively searches for all .reqstatus files in the input directory and in all subdirectories beneath the input directory.

Figure 1 shows the main window of reqstat displaying a list of requested events. In addition to the status of each event request, other information about the event is displayed including time, location, date requested, and all fields in the origin table-file. The status field displays “done” when autoDRM responses have been received for each individual station request associated with the event.

The status of individual stations will be displayed in another window when the user selects an event line and selects the Stations option button. Figure 2 shows the reqstat station request window for one event. Each station/channel requested for the event is listed. The status field displays “waiting” or “response”. The limits for the time window requested and the time window actually received are displayed. If no data has been received for a channel, the received-tbeg will display additional status information, such as NO RESPONSE, NOT AVAILABLE or REQUEST ERROR. The address of the autoDRM to which the request was sent is displayed along with the time of the last activity.

The reqstat station request window has a Re-request option that allows the user to re-request all selected channels, all channels with a NO RESPONSE status, or all channels with a NOT AVAILABLE status. The Re-request option generates a Confirm Re-request window that lists all the channels that will be re-requested and allows the user to edit the time window limits and the autoDRM address. Use
Figure 1: The main window of reqstat. All requested events are listed.

Figure 2: The reqstat station request window. The status of each station/channel request for one event is displayed.
a right-mouse-button click in any field of the **Confirm Re-request** window to enter edit mode. An autoDRM address can be entered for each channel or one can be selected from a list. After a re-request is confirmed, a new line for each channel re-requested is be added to the station request window.

From the reqstat station request window the Messages option can be used to display a copy of the exact autoDRM-formatted request that was sent and detailed information on the response that was received for the selected channel. Figure 3 shows an example of the content in a reqstat messages window. The time that gse2css was executed to process the autoDRM response is displayed followed by message identification lines and all DATA,TYPE LOG lines that were in the message.

**Reqstat Options**

All options for each reqstat window are listed below with a brief explanation of their function.

**Main Window**

**File/Open** Displays the standard X11 file selection popup. Select an individual .reqstatus file to view, or select a directory (double click on the directory name in the Directories list).

**File/Warnings** Displays a list of all warnings encountered.

**View/Attributes** This popup allows the user to customize the information displayed for each requested event. Click on an attribute Name to add or remove that attribute from the display line. Attributes can be reordered by deselecting all of them and then selecting in the order you want them displayed. Click in the **Format** field to edit the format used to display the attribute.

**View/Clear** Remove the current event listing from reqstat.

**View/Sort** Select the sort option for the events: sort by **Prefix**, by **Event Time** or by **Request Date**.

**View/Stations** Display the reqstat station request window for the selected event.

**Option/Re-request** This option will re-request stations for the selected events. There are two types of re-requests: re-request all stations for which no response has been received, or re-request all stations for which a NO DATA
msg_id=2521 requested Tue Apr 23 09:06:09 1996
Abernathy/sendmail autodrm@gldfs.cr.usgs.gov
BEGIN GSE2.0
MSG_TYPE REQUEST
MSG_ID 2521 reqdata
E-MAIL thenson@multimax.com
STA_LIST ARU
CHAN_LIST bhz.bhn.bhe
WAVEFORM GSE2.0
STOP.
msg_id=2521 executing gse2css at Tue Apr 23 09:16:38 1996
MSG_TYPE DATA
MSG_ID 96114_4_125748_multima USA_NDC
REF_ID 2521 reqdata
DATA_TYPE LOG
This message was generated by the U. S. Geological Survey (USA_NDC)
Automatic Data Request Manager (AutoDRM).
Request received at: Apr 23 06:57:48 1996 (local).
987 waveform channels are currently available.
Command syntax GSE2.0 selected.
Time range: 28 JAN 1996 08:47:25.00 to 28 JAN 1996 09:12:33.00 (WAVEFORM).
Channels selected (WAVEFORM):
ARU: BHZ, BHN, BHE

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ARU/BHZ</td>
<td>1996/01/28 08:47:29.434</td>
<td>1996/01/28 08:57:34.434</td>
</tr>
<tr>
<td>ARU/BHN</td>
<td>1996/01/28 08:47:29.434</td>
<td>1996/01/28 08:57:49.834</td>
</tr>
</tbody>
</table>

Figure 3: The reqstat messages window. A copy of the autoDRM-formatted request is followed by information resulting from the processing of the autoDRM response.
AVAILABLE response was received. Before the re-requests are actually sent, a Confirm Re-request window will list the channels that will be re-requested. The requested time limits and the autoDRM addresses can be changed before a Confirm option sends the re-requests. A Cancel button is also available.

Station Request Window

View/Attributes This popup allows the user to customize the information displayed for each requested station/channel. Click on an attribute Name to add or remove that attribute from the display line. The attributes can be reordered by deselecting all of them and then selecting each attribute in the order you want them displayed.

View/Messages Display the exact GSE-formatted request message that was sent to the autoDRM and display any DATA_TYPE LOG or DATA_TYPE ERROR messages received from the autoDRM. Error messages from gse2css are also displayed.

Option/Re-request This option will re-request data for the specified stations or channels. There are three types of re-requests: re-request all selected stations, re-request all stations for which no response has been received, or re-request all stations for which a NO DATA AVAILABLE response was received. Before the re-requests are actually sent, a Confirm Re-request window will display all the stations and channels that will be re-requested along with Confirm and Cancel buttons. The requested time limits and the autoDRM addresses can be changed in the Confirm Re-request window.

Confirm Re-request Window

This window is generated by a Re-request option from either the reqstat main window or the stations request window. The time limits of the re-request, tbeg and tend, and the autoDRM address can be changed before confirming the re-request. Enter edit-mode with a right-mouse-button click in any text field. The Address option is a tool for changing the autoDRM address for multiple channels in the Confirm Re-request window. First select channels in the Confirm Re-request window with a left-mouse-button (or ctrl-left-mouse-button) click. Enter an address in the Enter New Address text field of the Address popup or select one from the list of autoDRM sites. The list of autoDRM addresses is generated from the unique addresses in the $REQDATA_HOME/tables/static/global.address file.
HANDLING ERRORS

Error messages from reqdata and reqchan are written directly to the screen (stderr). Most of the errors are caused by missing arguments, missing table files, invalid file permissions or invalid file formats. The fatal errors from the programs reqdata and reqchan and the exit codes generated are listed in the following two tables.

<table>
<thead>
<tr>
<th>Code</th>
<th>reqdata Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Missing argument retaddr</td>
</tr>
<tr>
<td>2</td>
<td>Missing argument basedir</td>
</tr>
<tr>
<td>3</td>
<td>Invalid time argument</td>
</tr>
<tr>
<td>4</td>
<td>Missing stachanList or stachanFile argument</td>
</tr>
<tr>
<td>5</td>
<td>No stations or channels found in stachanFile</td>
</tr>
<tr>
<td>6</td>
<td>No stations or channels found in stachanList</td>
</tr>
<tr>
<td>7</td>
<td>Invalid begPhase argument</td>
</tr>
<tr>
<td>8</td>
<td>Invalid endPhase argument</td>
</tr>
<tr>
<td>9</td>
<td>No iaspeiTable specified</td>
</tr>
<tr>
<td>10</td>
<td>No siteTable specified</td>
</tr>
<tr>
<td>11</td>
<td>No sitechanTable specified</td>
</tr>
<tr>
<td>12</td>
<td>No affiliationTable specified</td>
</tr>
<tr>
<td>13</td>
<td>No addressTable specified</td>
</tr>
<tr>
<td>14</td>
<td>No lastidTable specified</td>
</tr>
<tr>
<td>15</td>
<td>No requestTable specified</td>
</tr>
<tr>
<td>16</td>
<td>Cannot open iaspeiTable.hed</td>
</tr>
<tr>
<td>17</td>
<td>Cannot open iaspeiTable.tbl</td>
</tr>
<tr>
<td>18</td>
<td>Cannot open tmpfile</td>
</tr>
<tr>
<td>19</td>
<td>CSS3.0 origin free-format error in origin input string</td>
</tr>
<tr>
<td>20</td>
<td>Origin time value missing or null</td>
</tr>
<tr>
<td>21</td>
<td>Origin lat value missing or null</td>
</tr>
<tr>
<td>22</td>
<td>Origin lon value missing or null</td>
</tr>
<tr>
<td>23</td>
<td>Origin depth value missing or null</td>
</tr>
<tr>
<td>24</td>
<td>Cannot open origin input file</td>
</tr>
<tr>
<td>25</td>
<td>Malloc error.</td>
</tr>
<tr>
<td>26</td>
<td>CSS3.0 origin format error in origin input file</td>
</tr>
<tr>
<td>27</td>
<td>Cannot stat origin input file</td>
</tr>
<tr>
<td>28</td>
<td>No origins specified</td>
</tr>
<tr>
<td>29</td>
<td>Both stachanList and stachanFile specified</td>
</tr>
<tr>
<td>30</td>
<td>Cannot open stachanFile</td>
</tr>
<tr>
<td>Code</td>
<td>reqdata Errors Continued</td>
</tr>
<tr>
<td>------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>31</td>
<td>Cannot stat affiliationTable</td>
</tr>
<tr>
<td>32</td>
<td>Cannot open affiliationTable</td>
</tr>
<tr>
<td>33</td>
<td>CSS3.0 Format error in affiliationTable</td>
</tr>
<tr>
<td>34</td>
<td>Cannot stat sitechanTable</td>
</tr>
<tr>
<td>35</td>
<td>Cannot open sitechanTable</td>
</tr>
<tr>
<td>36</td>
<td>CSS3.0 format error in sitechanTable</td>
</tr>
<tr>
<td>37</td>
<td>Cannot open addressTable</td>
</tr>
<tr>
<td>38</td>
<td>Cannot stat siteTable</td>
</tr>
<tr>
<td>39</td>
<td>Cannot open siteTable</td>
</tr>
<tr>
<td>40</td>
<td>CSS3.0 format error in siteTable</td>
</tr>
<tr>
<td>41</td>
<td>Requested station not found in siteTable</td>
</tr>
</tbody>
</table>
| 42   | No autoDRM address for requested sta/ch
| 43   | Unknown format field in addressTable |
| 44   | Cannot open requestTable |
| 45   | No travel time for begPhase at requested station |
| 46   | No travel time for endPhase at requested station |
| 47   | Cannot open prefix.reqstatus file |
| 48   | Cannot open prefix.reqlog file |
| 49   | Error computing travel time |
| 50   | Error getting nextid |
| 51   | Cannot execute sendmail program |
| 52   | Sendmail program failed |

<table>
<thead>
<tr>
<th>Code</th>
<th>reqchan Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Missing argument retaddr</td>
</tr>
<tr>
<td>2</td>
<td>Missing argument address</td>
</tr>
<tr>
<td>3</td>
<td>No lastidTable specified</td>
</tr>
<tr>
<td>4</td>
<td>No requestTable specified</td>
</tr>
<tr>
<td>5</td>
<td>Cannot open requestTable</td>
</tr>
<tr>
<td>6</td>
<td>Cannot open log file</td>
</tr>
<tr>
<td>7</td>
<td>Cannot get nextid</td>
</tr>
<tr>
<td>8</td>
<td>Cannot execute sendmail program</td>
</tr>
<tr>
<td>9</td>
<td>Sendmail program failed</td>
</tr>
</tbody>
</table>

When an error occurs during the processing of an autoDRM email response, the error is logged and the email response is saved. The message can be saved in a file or forwarded to the user's mailbox. To instruct the deliver program to forward all email that fails to be processed to the user's mailbox, set the variable FORWARD_FAILED_MSG to 'yes' in the .deliver script.
FORWARD_FAILED_MSG=yes

By default, autoDRM email that is successfully processed is discarded. To save all autoDRM email messages, set the variable SAVE_ALL_GSE_MESSAGES to ‘yes’ in the .deliver script.

SAVE_ALL_GSE_MESSAGES=yes

Each autoDRM message will then be saved in a separate file in the directory $REQDATA_HOME/save.

An error in the .deliver script which prevents the processing of all messages causes a description of the error to be mailed to the user. Other less severe errors encountered by the .deliver script are logged in the file $REQDATA_HOME/logs/deliver.log. Error messages from the message parsing program gse2css are logged in the prefix.reqlog file in the basedir directory. These can be reviewed with the program reqstat. Error messages from the autoDRM are also logged in the prefix.reqlog file. The fatal errors from the programs gse2css and gse2site and the exit codes generated are listed in the following two tables.
<table>
<thead>
<tr>
<th>Code</th>
<th>gse2css Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cannot open reqLog</td>
</tr>
<tr>
<td>2</td>
<td>Missing argument basedir</td>
</tr>
<tr>
<td>3</td>
<td>Missing argument prefix</td>
</tr>
<tr>
<td>4</td>
<td>Missing argument dir</td>
</tr>
<tr>
<td>5</td>
<td>Length of argument dir &gt; 64</td>
</tr>
<tr>
<td>6</td>
<td>Missing argument lastidTable</td>
</tr>
<tr>
<td>7</td>
<td>Cannot open input file</td>
</tr>
<tr>
<td>8</td>
<td>Cannot open reqstatus file</td>
</tr>
<tr>
<td>9</td>
<td>Cannot open tmpfile</td>
</tr>
<tr>
<td>10</td>
<td>CSS3.0 origin format error</td>
</tr>
<tr>
<td>11</td>
<td>Get nextid failed</td>
</tr>
<tr>
<td>12</td>
<td>Cannot open .origin file</td>
</tr>
<tr>
<td>13</td>
<td>Write to .origin file failed</td>
</tr>
<tr>
<td>14</td>
<td>Cannot open .wfdisc file</td>
</tr>
<tr>
<td>15</td>
<td>GSE WID1 format error</td>
</tr>
<tr>
<td>16</td>
<td>GSE WID2 format error</td>
</tr>
<tr>
<td>17</td>
<td>No GSE WID header found</td>
</tr>
<tr>
<td>18</td>
<td>Malloc error</td>
</tr>
<tr>
<td>19</td>
<td>GSE CHK2 line not found</td>
</tr>
<tr>
<td>20</td>
<td>Unknown compression format</td>
</tr>
<tr>
<td>21</td>
<td>Cannot open dfile (.w file)</td>
</tr>
<tr>
<td>22</td>
<td>Write to .wfdisc file failed</td>
</tr>
<tr>
<td>23</td>
<td>Write to dfile failed</td>
</tr>
<tr>
<td>Code</td>
<td>gse2site Errors</td>
</tr>
<tr>
<td>------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Missing argument address</td>
</tr>
<tr>
<td>2</td>
<td>Missing argument lastidTable</td>
</tr>
<tr>
<td>3</td>
<td>Missing argument siteTable</td>
</tr>
<tr>
<td>4</td>
<td>Missing argument sitechanTable</td>
</tr>
<tr>
<td>5</td>
<td>Missing argument addressTable</td>
</tr>
<tr>
<td>6</td>
<td>Cannot open input file</td>
</tr>
<tr>
<td>7</td>
<td>Cannot open logFile</td>
</tr>
<tr>
<td>8</td>
<td>Cannot open siteTable</td>
</tr>
<tr>
<td>9</td>
<td>Malloc error</td>
</tr>
<tr>
<td>10</td>
<td>CSS3.0 format error in siteTable</td>
</tr>
<tr>
<td>11</td>
<td>Cannot open sitechanTable</td>
</tr>
<tr>
<td>12</td>
<td>CSS3.0 format error in sitechanTable</td>
</tr>
<tr>
<td>13</td>
<td>Cannot open addressTable</td>
</tr>
<tr>
<td>14</td>
<td>Format error in addressTable</td>
</tr>
<tr>
<td>15-19</td>
<td>Error parsing DATA_TYPE STATION</td>
</tr>
<tr>
<td>20</td>
<td>Write to siteTable failed</td>
</tr>
<tr>
<td>21-25</td>
<td>Error parsing DATA_TYPE CHANNEL</td>
</tr>
<tr>
<td>26</td>
<td>Write to sitechanTable failed</td>
</tr>
<tr>
<td>27</td>
<td>Write to addressTable failed</td>
</tr>
</tbody>
</table>

ACKNOWLEDGMENTS

ReqData was designed and tested primarily with the autoDRM currently implemented by USGS (autodrm@gldfs.cr.usgs.gov). The authors gratefully acknowledge the help of Ray Buland in testing ReqData. This project was funded through grant F19628-95-C-0094.

REFERENCE LIST


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