

7.0 FEMIS Data Exchange Interface (DEI)

The FEMIS/EMIS Data Exchange Interface (DEI) system is used to support the transfer of data from EMIS to FEMIS.

The FEMIS/EMIS DEI system consists of one main program (`femisdei`) for processing data sent from EMIS and a utility program (`fprofdei`) for maintaining the encrypted password file for File Transfer Protocol (FTP). Both programs run on the FEMIS onpost UNIX computer, the former usually as a background process.

The files are sent from EMIS via FTP to an Internet Protocol (IP) address and some files come back from them in a particular directory. At most, two changes need to be made to EMIS, both on the UNIX computer.

1. The `setup.ini` file may need to be changed to specify the EMIS UNIX user account for incoming files (and the account created if it does not exist).
2. The `template` file in the EMIS UNIX user's home directory needs to be changed to point to the new IP address, FEMIS UNIX user account, and account password.

7.1 Software and Hardware Components

7.1.1 Software Components

The two DEI software components are

1. FEMIS/EMIS Data Exchange Interface program – `femisdei`
2. FEMIS/EMIS FTP Profile Manager – `fprofdei`

7.1.2 Hardware Components

The two DEI hardware components are

1. FEMIS onpost UNIX computer
2. EMIS computers (PC and UNIX)

7.2 Program Detail – `femisdei`

The `femisdei` program processes files received from EMIS. It is a `PRO*C` program which connects to an Oracle database and loads data into various tables. The program has three distinct phases of operation: startup, processing loop, and shutdown.

7.2.1 Startup Phase

During the startup phase, the program sets some default configuration items, processes the configuration file and overrides the default setup, and then processes the command line options which override all previous settings. If everything is working so far, it connects to the Oracle database. If able to connect, it then checks to see if the specified FEMIS exercise exists. If not, the program displays a warning message and continues. Then, if you want it to run as a background process (the `-clone` command line option or the `CLONE` configuration file option) as it normally does, it moves itself into background.

7.2.2 Processing Loop Phase

Next, the program begins the processing loop, where it waits for a transfer list file, `xferlist.dat`, to appear in the `/home/femx` directory. When the file appears, FEMIS DEI moves the EMIS files to the `from` directory, reads the header, and determines whether the accompanying files are real or exercise data. It reads and processes the entries one file at a time, sends notifications of new data to the FEMIS Notification server via the `fev` client, and sends a `KEY.DAT` file back to EMIS using FTP to acknowledge receipt of the files. Then it waits for another transfer list file.

Generically, processing a data file consists of

1. Reading the file header
2. Adding an entry to the FEMIS journal that the file was received from EMIS
3. Reading the data in the file
4. Converting the data into FEMIS terms
5. Putting the results into the Oracle tables
6. Adding entries to the FEMIS journal that the file was successfully processed
7. Adding entries to the notification list
8. Adding an entry to the acknowledgment key list
9. Sending the acknowledgment back to EMIS.

EMIS can send many types of files, but `femisdei` only loads the data in a few of them. These are `NOTIFY.DAT`, `D2INPnnn.DAT`, `WORKPLAN.DAT`, and `WEATHER.DAT`. A `KEY.DAT` file with a `PLEASE ECHO` key or a `PAR` key will also be processed properly. All files from EMIS will be acknowledged, though the files that `femisdei` ignores will always be said to be good (`DATA_OK`). The other files may or may not be good based on the contents of each file.

NOTIFY.DAT: If the transfer includes a Notification file, `femisdei` processes it first. It reads the entire file and then determines whether this is a new event, an update to an existing event, or closes one or all EMIS events.

To determine if one or more EMIS events are to be closed, the `END EVENT Classification` is used to close the specified event, and `END ALL OPER EVENTS` or `END ALL EXER EVENTS` is used to close all EMIS events. If only closing a single event, then the event in FEMIS with the same EMIS `Event ID` is ended. Otherwise all EMIS events in FEMIS in the proper mode (operations or exercise #n) are ended.

The new versus update notification is determined by looking at the EMIS `Event ID` and the `Notification Reason` field. If there is an event in FEMIS with the same EMIS `Event ID`, the current notification is an update. Otherwise, it is a new event. For new events, the current operational D2PC case is linked to the event if the D2PC case is not older than the value specified in the `D2PC_EVENT_DELTA_MINUTES` field of the `EOC_OBJECTIVE` table. A record for the event notification is added to the `CSEPP_Accident` table. If the notification is an update notification, the `CAI_STATUS_CODE` flag for all previous records for that event are changed, leaving just the new record as the current one.

D2INPnnn.DAT: After processing the notification file, `femisdei` processes the D2PC input file, if sent. First, it calculates the D2PC case number by extracting it from the name of the file (the `nnn`). Then it renumbers or deletes any D2PC cases in the database which have the same D2PC case number. The first available number greater than 1000 is used. (To check which cases were renumbered and which were deleted, check for `KEEPD2` and `NOKEEPD2` in the `FEMISDEI.CFG` file.) If the FEMIS Work Plan points to an old D2PC case with that number, the program makes it point to the new D2PC case, and then it adds an empty record in the database for the new D2PC case. It processes the file, loading the values into the various D2PC tables. If the D2PC case is a real one (not Reference or What-If), then it updates the `Navigator` table to point to the new D2PC case. (In other words, the D2PC case sent from EMIS becomes the current operational onpost case in FEMIS.) Finally, it adds an entry to the `Case_Manager` table for the new D2PC case.

WORKPLAN.DAT: For each activity in the `WORKPLAN.DAT` file, FEMIS DEI reads the data from the file and adds an activity record to the FEMIS database. A number of the fields in this new activity record will be missing information because that information is not supplied by EMIS. A Local ID/MCE **may be created**. Local ID/MCEs are based on D2PC source term information, but the `WORKPLAN.DAT` file only specifies agent and munition. If no Local ID/MCE exists with the specified agent and munition, then a new Local ID/MCE will be created. When it is done processing the file, it sets the new Work Plan as the operational Work Plan.

WEATHER.DAT: For each entry in the Weather file, it reads the record, finds the tower name associated with that tower ID, makes all existing meteorological records for that tower not current, and adds the new record—making it current.

7.2.3 Shutdown Phase

The final phase, `shutdown`, usually will not occur. In fact, it can only occur if you run `femisdei` in `One Pass` mode, if you “kill” it with the kill file, `femisdei.kil`, if Oracle goes down, or if `femisdei`

crashes. The kill file causes `femisdei` to shutdown nicely, committing all outstanding database updates and disconnecting from Oracle.

If you need to stop the `femisdei` program, type `femisdei -kill` to create a “kill” file named `femisdei.kill`. When the `femisdei` sees that this file exists, it will shut down nicely.

While you can use the UNIX `kill -9` command, it simply stops `femisdei` dead in its tracks and does not force database commits or the database disconnect to occur, and two things could happen that you do not want to happen. First, not all the data from EMIS will be saved in the Oracle database. Second, the Oracle connection **may not** immediately go away. This could prevent `femisdei` or other programs that access Oracle from getting a connection.

Therefore, to stop the `femisdei` program, **always use** the `femisdei -kill` option.

7.3 Program Detail – `fprofdei`

The `fprofdei c` program is used to maintain the FTP profile file. This file is usually named `/home/femis/etc/femisdei.prf`. It contains the hostname, username, and encrypted password for the EMIS UNIX computer to which `femisdei` will send acknowledgment files via FTP. It is analogous to the `template` file that EMIS uses to transfer files to FEMIS.

7.4 Configuring the Programs

The FEMIS UNIX Installation scripts configure DEI automatically, you should not need to do anything. However, if you do need to configure the programs, the following procedures detail the configuration procedures for the `femisdei` and `fprofdei` programs.

7.4.1 Configuration – `femisdei`

The `femisdei` program requires the following directory structure:

```
/home/femis/bin      - directory for executables
/home/femis/etc      - configuration files
/home/femis/log      - log files
/home/femx           - incoming files from EMIS
/home/femx/dei/send  - outgoing files to EMIS
/home/femx/dei/from  - saved files from EMIS
```

Note: ALL of the above directories are configurable, but this is the recommended setup.

The UNIX programs and support files are placed in the indicated locations when loaded from tape.

```
/home/femis/bin/femisdei    - executable file
/home/femis/bin/fprofdei    - executable file
/home/femis/etc/femisdei.cfg - configuration file
/home/femis/etc/femisdei.prf - configuration file
```

7.4.1.1 femisdei UNIX User Account

`femisdei` requires a UNIX user account for receiving files from EMIS. The recommended setup is:

- Username is `femx`.
- Home directory is `/home/femx`.
- Directory structure is

```
/home/femx/  
/home/femx/dei/from  
/home/femx/dei/send
```

- The `femisdei` program must be able to read and write to all of the directories.

7.4.1.2 femisdei FTP Profile File

The `femisdei` program requires an FTP profile file, usually named `/home/femis/etc/femisdei.prf`. It is maintained with the `fprofdei` utility, which you should refer to for more information.

7.4.1.3 femisdei Configuration File

The `femisdei` program requires a configuration file, usually named `/home/femis/etc/femisdei.cfg`. This file is automatically configured during installation, but you may need to change it later. Comment lines (blank or beginning with #) are ignored. Refer to the sample configuration file in Table 7-1 at the end of this section.

ORACLE_SID

UNIX Oracle environment variable. This variable should be set correctly before `femisdei` starts.

ORACLE_HOME

UNIX Oracle environment variable. Should be set correctly before `femisdei` starts.

PATH (recommend `/home/femis/bin:/usr/bin`): `$ORACLE_HOME/bin`

UNIX PATH environment variable. Should be set correctly before `femisdei` starts.

ORACLE_BASE

UNIX Oracle environment variable. Should be set correctly before `femisdei` starts.

DEIPATH (recommend /home/femx/dei/)

Top-level directory under which the from and send directories must be located and where `femisdei` puts files from EMIS or files it sends to EMIS. Make sure to include the slash (/) at the end. It can be overridden with the `-dei <path>` command line option.

EMISPATH (recommend /home/femx/)

Home directory of the `femx` user, and directory where EMIS puts its files. Make sure to include the slash (/) at the end. It can be overridden with the `-ep <path>` command line option.

PROFILEFILE (recommend /home/femis/etc/femisdei.prf)

Name of the FTP profile file which contains the hostname, username, and encrypted password of the EMIS account to which `femisdei` will FTP files. It can be overridden with the `-pf <fn>` command line option.

HALTFILE (recommend /home/femis/log/femisdei.hlt)

Name of the halt file that will cause `femisdei` to halt. When the file disappears, `femisdei` will continue processing. This is also the file that gets created with the `femisdei -halt` command.

Note: If the file exists when `femisdei` starts, DEI will halt.

KILLFILE (recommend /home/femis/log/femisdei.kil)

Name of the kill file that will cause `femisdei` to exit gracefully. This is also the file that gets created with the `femisdei -kill` command.

Note: If the file exists when `femisdei` starts, DEI will immediately exit, deleting this file.

LOGFILE (recommend /home/femis/log/femisdei.log)

Name of the output log file. It can be overridden with the `-log <fn>` or `-nolog` command line options.

FEVHOST, FEVPORT

Name of the FEMIS UNIX onpost computer and port number for use by the `fev` client for sending notifications of new data to the FEMIS Visual Basic applications. It can be overridden with the `-fev <host> <port>` command line option.

FTPHOST, FTPUSER, FTPPATH (recommend ./)

Name of the EMIS UNIX computer, username, and path where `femisdei` will FTP files. It can be overridden with the `-ftp <host> <user> <path>` command line option.

EXERCISE (recommend 1)

Exercise number into which exercise data from EMIS will be loaded. The exercise number does not necessarily have to be a valid exercise in FEMIS—the data will be loaded anyway. It can be overridden with the `-exercise <n>` command line option.

SLEEP (recommend 1)

The time interval that `femisdei` waits between checking for the `xferlist.dat` file from EMIS. It should not be more than 10 seconds. It can be overridden with the `-sleep <seconds>` command line option.

DAIINT (recommend 60)

The number of sleep intervals the `femisdei` should wait before checking for data acknowledgments to be forwarded to EMIS. The period of data acknowledgment checks may be calculated by multiplying the `SLEEP` and `DAIINT` values. For example, if the `SLEEP` parameter is set to 2 seconds and the `DAIINT` is set to 30, then data acknowledgments will be checked once every $2 * 30 = 60$ seconds.

It can be overridden with the `-daiint <number sleep intervals>` command line option.

DEBUG (recommend DEBUG 0)

The debug mode, which controls the detail of messages from `femisdei`. After you get `femisdei` running properly, you should run in `nodebug` mode, which only lists the name of each file from EMIS as it gets processed. Debug level 0 gives slightly more detailed messages, and debug level 2 gives very detailed messages, which would be useless to anyone but the developer. It can be overridden with the `-debug`, `-debug 1`, `-debug 2`, and `-nodebug` command line options.

CLONE (recommend CLONE)

Controls whether `femisdei` runs as a foreground (`NOCLONE`) or background (`CLONE`) process. For testing purposes, you may want to run it in the foreground; but that means when you want to logout, the process will have to be killed. Normally, `femisdei` should be run as a background process. It can be overridden with the `-clone` and `-noclone` command line options.

CLEAN (recommend CLEAN)

Controls whether temporary files and files are deleted or left around. Both `fev.csh` and `ftp.csh` are temporary files created and executed from the `/home/femx/dei/send` directory. `ftp.csh` contains the password for the EMIS account, so the file should be deleted. That means that during normal operations, `femisdei` should clean temporary files. It can be overridden with the `-clean` and `-noclean` command line options.

SAVEEMIS (recommend SAVEEMIS)

Controls whether files from EMIS are saved by renaming them to include a time stamp, or whether they are simply deleted. It can be overridden with the `-saveemis` and `-nosaveemis` command line options. If there is a problem with the EMIS to FEMIS interface, then you should turn this option on. Otherwise, turn it off and run DEI with the `-purge` option to clean out the directory.

If you run DEI with the `SAVEEMIS` option turned on, then the `from` directory will actually include the date as part of its name, e.g., `/home/femx/dei/from-1996-10-31`. The `send` directory will be the same way. All files received from and sent to EMIS will be saved. However, the

`NOSAVEEMIS` option saves just the last set of files from/to EMIS and does not include the date as part of the directory names. If you run `DEI` with the `SAVEEMIS` option, you should occasionally delete the old `from` and `send` directories or they will fill up the list.

`NEWLOG` (recommend `NONEWLOG`)

Controls whether log messages are written to a new log file (see `LOGFILE`) or appended to an existing one when you restart `femisdei`. It can be overridden with the `-newlog` or `-nonewlog` command line options.

`DOTZ` (recommend `DOTZ`)

Controls whether dates are converted from local time to GMT. `DOTZ` does time conversion, and `NODOTZ` does not. It can be overridden with the `-dotz` or `-nodotz` command line options. There is no reason you should ever need to use the `-nodotz` option. It is only used for testing purposes.

`KEEPD2` (recommend `NOKEEPD2`)

Controls whether `real run` D2PC cases from EMIS which have the same number as the new case are saved (renumbered) or deleted. It can be overridden with the `-keepd2` or `-nokeepd2` command line options. If you want to keep `real run`, every case that EMIS sends, then use the `-keepd2` option, bearing in mind that it will eventually fill up the database.

`DUPMET` (recommend `NODUPMET`)

Controls whether meteorological data is duplicated to both real and exercise mode as it arrives for processing. The `DUPMET` setting might be used if an EOC needs to simultaneously run an exercise and yet still have live meteorological in real mode. For the sake of conserving database space, it is recommended that this be set to `NODUPMET` unless an exercise is being run requiring meteorological data.

`KEEPWIFD2` (recommend `NOKEEPWIFD2`)

Controls whether `what if` D2PC cases from EMIS which have the same number as the new case are saved (renumbered) or deleted. It can be overridden with the `-keepwifd2` or `-nokeepwifd2` command line options. Since `what if` cases generally come from EMIS every fifteen minutes, it is highly recommended that you use the `-nokeepwifd2` option to avoid filling up your database.

`WIFREPRUN` (recommend `NOWIFREPRUN`)

Controls whether `what if` cases can overwrite “real run” cases from EMIS which have the same number as the new case to be saved. It is highly recommended that you use `NOWIFREPRUN` to avoid having `what if` cases overwrite `real run` cases.

`EMISSITE` (recommend `NOEMISSITE`)

The `EMISSITE` and `-emissite` options say to use EMIS site codes, not FEMIS site codes. `NOEMISSITE` means the EMIS codes are translated to FEMIS codes.

7.4.2 Configuration – fprofdei

The `fprofdei` program requires no configuration.

7.5 Operation

The operating instructions for the `femisdei` and `fprofdei` programs are discussed in the following sections.

7.5.1 Operation – femisdei

First, a configuration file is required. If you do not specify one, the default is `./femisdei.cfg`. If it does not exist, `/home/femis/etc/femisdei.cfg` is used. If that file does not exist, `femisdei` will not run. A properly setup configuration file means that `femisdei` can be run as follows:

```
% femisdei
```

However, even if the configuration file exists, `femisdei` may not run. When testing, you can override most of its settings with command line options. See Table 7-2, at the end of this section, for a list of `femisdei` command line options.

Note: `femisdei` is normally started automatically when the system boots from `/etc/init.d/femis`.

`femisdei` should be manually restarted after any server time change.

7.5.2 Operation – fprofdei

The first step when running `fprofdei` is deciding where you are going to put the FTP profile file. If you do not specify the name of the file on the command line, it will create/modify the `femisdei.pr` file in your current directory. However, the recommended location is `/home/femis/etc/femisdei.pr`. If you put it elsewhere, you must modify the DEI configuration file, `/home/femis/etc/femisdei.cfg`.

Next, you need to know the hostname, username, and password of the EMIS UNIX account to which `femisdei` will FTP files. The password in that file is not encrypted.

You are now ready to run `fprofdei`.

Note: `fprofdei` is automatically run during the FEMIS installation process by the FEMIS UNIX installation script, which creates the appropriate `.pr` file.

Syntax : `fprofdei [-f <profilefile>] <hostname> <username> [<password>]`

where: `<profilefile>` = name of the profile file. If not specified, the default is
./femisdei.prf. The recommended name:
/home/femis/etc/femisdei.prf.

where: `<hostname>` = name of the EMIS UNIX computer

where: `<username>` = username of the account on the EMIS UNIX computer

where: `<password>` = password of the account on the EMIS UNIX computer. If you do not specify it, you will be prompted.

Example:

```
fprofdei -f /home/femis/etc/femisdei.prf tadsun1 emisxfer emisx
```

The specified host, user, and password (encrypted) will be placed in the FTP profile file. If you run `fprofdei` more than once for the same host and user, it will replace the earlier entry with the new one.

While the FTP profile file can have multiple entries, the `femisdei` program only uses the one entry that corresponds to the EMIS host from which it receives files. It determines the EMIS host by extracting the name from the header of the transfer list file, `xferlist.dat`, which accompanies all files from EMIS.

7.6 Purging Old Data

If the `SAVEEMIS` parameter in the `/home/femis/etc/femisdei.cfg` file is set, DEI will keep a copy of all files received from EMIS and all file sent to EMIS. These files will be kept indefinitely. While the individual files are small, they will require a significant amount of disk space if not purged on a regular basis.

The best way to purge the files is to set a cron job to run on a nightly or weekly basis that deletes the DEI files that are older than a certain threshold. Use the following command to accomplish this.

```
find /home/femx/dei -type d -mtime +30 -exec rm -rf {} \;
```

This will delete all of the DEI files that are more than 30 days old. This could also be set to 60, 90, or any number of days.

7.7 DEI Troubleshooting

The troubleshooting instructions for the `femisdei` and `fprofdei` programs are discussed in the following sections.

7.7.1 Troubleshooting – `femisdei`

For `femisdei`, make sure

- `femis` account is correct.
- `femx` account is correct.
- Oracle is accessible.

7.7.2 Troubleshooting – `fprofdei`

If DEI does not add an entry to the recommended FTP profile file, `/home/femis/etc/femisdei.prf`, check the following:

- If you used the `-f` option, you probably did not specify the correct file name.
- If you did not use the `-f` option, then you were probably not in the `/home/femis/etc` directory when you ran the program.

Table 7.1. Sample femisdei.cfg File

```
#
# $Id: femisdei.cfg,v 1.15 1998/05/14 18:12:52 femis Exp $
#-----
# Purpose:
#   Configuration file for FEMISDEI.
#
#   For more information, see the FEMIS System Administration Guide.
#
#   Setup the following environment variables before running FEMISDEI.
#   ORACLE_SID
#   ORACLE_HOME
#   PATH
#   LD_LIBRARY_PATH
#-----
#...Other settings
ORACLE_USER <db code>/<db passwd>
DEIPATH      /home/femx/dei/
EMISPATH     /home/femx/
PROFILEFILE  /home/femis/etc/femisdei.prf
HALTFILE    /home/femis/log/femisdei.hlt
KILLFILE     /home/femis/log/femisdei.kil
LOGFILE      /home/femis/log/femisdei.log
FEVHOST      temblor
FEVPORT      9021
FTPHOST      temblor
FTPUSER      emisx
FTPPATH      . /
EXERCISE     1
SLEEP        1
DAIINT       60

#...On/Off settings
DEBUG        0          # [NO]DEBUG 0-2
CLONE        # [NO] CLONE
CLEAN        # [NO] CLEAN
SAVEEMIS     # [NO] SAVEEMIS
NONEWLOG     # [NO] NEWLOG
DOTZ         # [NO] DOTZ
NOKEEPD2    # [NO] KEEP2
NODUPMET     # [NO] DUPMET
NOKEEPWIFD2 # [NO] KEEPWIFD2
NOWIFREPRUN # [NO] WIFREPRUN
NOEMISSITE   # [NO] EMISSITE
```

Table 7.2. femisdei Command Line Options

Use: femisdei <options>...		
-I	<config file>	: configuration file name
-0		: zero pass (just show settings)
-v		: show version of FEMISDEI
-V		: show RCS version of FEMISDEI
-help		: show help messages
-halt		: halt other version of femisdei
-kill		: kill other version of femisdei
-purge		: delete saved files from/to EMIS
-[no]keepd2		: keep vs. delete existing D2PC cases [keep D2]
-[no]keepwifd2		: keep vs. delete exiting "what if" D2PC case
-[no]wifreprun		: allow "what if" cases to replace "run" cases
-[no]dupmet		: duplicate Met in both exercise and real
-[no]dotz		: convert times to GMT [convert to GMT]
-[no]onepass		: one pass (process one file) [multi-pass]
-[no]clone		: clone a background process [do not clone]
-[no]clean		: cleanup temporary files [do not cleanup]
-[no]saveemis		: save EMIS files [do not save]
-[no]emissite		: use EMIS site codes [do not]
-[no]newlog		: create new log [append to log]
-[no]log	<log file>	: name of log file [no log file (screen)]
-[no]debug	<level>	: debug level (0,1,2) [no debug]
-sleep	<seconds>	: number of seconds to sleep
-daiint	<num sleep iter>	: num sleep iterations between DAI checks
-exercise	<number>	: exercise number
-ep	<emis path>	: directory for incoming EMIS files
-pf	<profile file>	: profile file name
-fev	<host> <port>	: fev host port
-ftp	<host> <user> <path>	: ftp host username path
-dei	<dei path>	: top-level directory for DEI output files
-ora	<user/pass>	: Oracle username and password