Firebird Commandline Utilities

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Chapter 1: Introduction

The Firebird 1.5 distribution kit installs a number of useful utility programs to assist in the running of your Firebird server & databases. This book introduces you to the various utilities, some of which are more useful than others.

The utilities can all be found in the `/bin` directory (or `\bin` folder on Windows) under the Firebird installation root. On Linux the utilities can be found in `/opt/firebird/bin` while on Windows, the default location is `c:\program files\firebird\firebird_1_5\bin`.

- FB_LOCK_PRINT is the utility which prints out details of the internal database lock page.

- GBAK is the database backup & restore utility. It also allows various parameters internal to the database to be changed.

- GDEF is a metadata utility which was removed from Interbase 4.0 and returned in the Open Source version 6. GDEF is probably redundant.

- GFIX allows attempts to fix corrupted databases, starting and stopping of databases, resolving 'in limbo' transactions between multiple database, changing the number of page buffers and so on.

- GPRE is the pre-processor which converts source code, which can be written in a number of languages, containing various embedded SQL 'pseudo code' into correctly formatted calls to the Firebird engine.

- GSEC is the security database manipulation utility. It allows the DBA (or any privileged user) the ability to maintain user accounts for various Firebird databases. Using various options, users can be added, amended or deleted from the security database.

- GSPLIT is a filter which allows the limitations on maximum file sizes, found on some operating systems, to be avoided when creating backups of large databases. This utility is supplied on Windows only and, unfortunately, seems not to work. Luckily, GBAK allows backup files to be split into multiple parts, so GSPLIT is not required. On Unix systems there are suitable operating system utilities that can be used instead of GSPLIT, if required.

- GSTAT allows the Firebird administrator the ability to gather statistics about the general health and utilisation of various parts of the database.

- ISQL is the interactive utility that allows ad-hoc queries to be run against a Firebird database. It is console based - as are many of the utilities - and is supplied with all distributions of Firebird. ISQL is usually the best place to try out your scripts and commands in the first instance.

- QLI is the original Query Language Interpreter which was removed from Interbase 4.0 but returned in Interbase 6.0 because of the decision to Open Source Interbase.

> **Note**
>
> This book is a work in progress. Each chapter details a separate utility and as each one is completed to my satisfaction, I shall add it to the CVS repository where it will be available for download. In this manner, there will be a slow and gradual build up of hopefully useful manuals.

Chapter 2: GSEC - Firebird Password File Utility

Introduction

GSEC is the security database manipulation utility. It allows the DBA (or any privileged user) the ability to maintain user accounts for various Firebird databases. Using various options, users can be added, amended or deleted from the security database.

> **Note**
>
> It is possible on some operating systems that users will not be able to run GSEC, even if they know the sysdba password. This is because those operating systems allow the system administrator to set filesystem permissions which prevent execution of certain programs and utilities for security reasons.

The Firebird database holds details of all users in a single security database. This is located on the server in a normal Firebird database named `security.fdb`. The default locations for this file are :

- `C:\Program Files\Firebird\Firebird_1_5` for Windows.
- `/opt/firebird` for Linux and other Unix systems.

The security database has two tables, users and host_info. The host_info table is empty and the users table holds the details of each user allowed to access any Firebird database. Having said that, database roles and privileges will prevent users logging into and manipulating databases to which they have no rights.

The GSEC utility manipulates data in the users table in the security database, and by doing so, allows users to be added, amended and deleted from the system. Not all columns of the users table are able to be displayed, even though they can be amended. The user's password column is never shown by GSEC, but you can change it, for example.

Like most of the command line utilities supplied with Firebird, GSEC can be run in interactive or batch mode and has a help screen showing all of the utility's options, we'll be seeing that a little later on.

Coming up in this chapter, we have :

- Commandline options for GSEC.
- GSEC commands and their parameters.
- Running GSEC in interactive or batch modes, both of which allow you to :
  - Display user details.
  - Amend user details.
  - Add new users.
  - Delete existing users.
- Using GSEC to administer a remote security database.
- Some caveats, gotchas and foibles of GSEC.

Commandline Options

Regardless of the mode that GSEC is run in, there are a number of options that can be supplied on the command line. These are :

- **`-user <username>`**

  Allows the username of the sysdba user to be specified if the database is to be modified, or a normal username if the database is to be displayed only. This need not be supplied if `ISC_USER` and `ISC_PASSWORD` environment variables exist and have the correct values.

- **`-password <password>`**

  Supplies the password for the username specified above. This need not be supplied if `ISC_USER` and `ISC_PASSWORD` environment variables exist and have the correct values.

- **`-role <SQL role name>`**

  Allows the specification of the role to be used by the connecting user.

- **`-database <security database name>`**

  You can specify the full pathname of a security database to GSEC and this will allow you to remotely administer the users for that server. This parameter will be deprecated, in favour of the new **`-server`** parameter, in version 2.0 of Firebird.

- **`-server <server name>`**

  This parameter applies to version 2.0 of Firebird only. However, it can be used to maintain the security database for older Firebird versions and, it is hoped, Interbase versions from 6.0 onwards. This connects you to the security database on the named Firebird server and allows you to maintain user details even without knowing exactly where the security database is located on the remote server.

- **`-z`**

  Displays the version number of the GSEC utility.

- **`-help`**

  Help displays the following screen of information :

  ```
  gsec utility - maintains user password database

  command line usage:
    gsec [ <options> ... ] <command> [ <parameter> ... ]

  interactive usage:
    gsec [ <options> ... ]
    GSEC>
    <command> [ <parameter> ... ]

  available options:
    -user <database administrator name>
    -password <database administrator password>
    -role <database administrator SQL role name>
    -database <security database>
  ```

```
    -z

 available commands:
   adding a new user:
     add <name> [ <parameter> ... ]
   deleting a current user:
     delete <name>
   displaying all users:
     display
   displaying one user:
     display <name>
   modifying a user's parameters:
     modify <name> <parameter> [ <parameter> ... ]
   help:
     ? (interactive only)
     help
   displaying version number:
     z (interactive only)
   quit interactive session:
     quit (interactive only)

 available parameters:
   -pw <password>
   -uid <uid>
   -gid <uid>
   -fname <firstname>
   -mname <middlename>
   -lname <lastname>
```

GSEC Commands

After the assorted options, comes the command that you wish to run. The following commands are available in both batch and interactive modes, but for interactive mode the leading minus sign is not required.

• **-add <name> [<parameter> ...]**

This command adds a new user to the database. You may optionally add other details such as first, middle and last names plus a password for the new user, all in the same **add** command. Alternatively, you may add a user then **modify** it to fill in the missing details.

• **-delete <name>**

This command removes the named user from the database. All details of the user are removed and cannot be undone unless you add the user back again.

• **-display [<name>]**

This command displays the details of a single named user, or all users in the database. The password is never displayed.

• **-modify <name> <parameter> [<parameter> ...]**

The <name> option is how you wish the user to be known when connecting to Firebird databases. Some of the above commands take parameters and these are one, or more, of the following :

- **-pw <password>**

  This parameter lets you supply a new password for the user. If you omit the password, the current one will be removed and the user will be unable to login to any Firebird databases at all. The password can be up to 8 characters long, but when supplying one to GSEC, or logging into databases, the characters after the eighth are simply ignored.

- **-uid <uid>**

- **-gid <gid>**

  -uid and **-gid** are used on some POSIX systems to enter the Unix userid and groupid as found in /etc/passwd and /etc/group configuration files. If not supplied, these default to zero.

- **-fname [<first name>]**

  This parameter allows you to store the user's first name in the database. This helps when identifying users from their login name - which may be abbreviated. You can delete a first name by not supplying a name.

- **-mname [<middle name>]**

  This parameter allows you to store the user's middle name in the database. This helps when identifying users from their login name - which may be abbreviated. You can delete a middle name by not supplying a name.

- **-lname [<lastname>]**

  This parameter allows you to store the user's last name in the database. This helps when identifying users from their login name - which may be abbreviated. You can delete a last name by not supplying a name.

Interactive Mode

To run GSEC in interactive mode, start the utility using the command line :

```
C:\>gsec -user sysdba -password masterkey
GSEC>
```

The GSEC> prompt shows that the utility is waiting for a command. The -user and -password options are those of the user who wishes to manipulate the security database. Obviously, the username supplied must be a valid sysdba user if updates are to be carried out. Normal users may only read the database.

To exit GSEC in interactive mode, the quit command is used :

```
GSEC> quit
C:\>
```

The following sections show how to carry out various commands in interactive mode. It is assumed that you are already running the utility as a sysdba user.

Displaying User Details

To display all users in the security database the command, and it's output are :

```
GSEC> display
     user name                     uid   gid     full name
-----------------------------------------------------------------
SYSDBA                            0     0
NORMAN                            0     0       Norman  Dunbar
EPOCMAN                           0     0       Benoit Gilles Mascia
GSEC>
```

To display details of a single user, pass the username as a parameter to the **display** command.

```
GSEC> display epocman
     user name                     uid   gid     full name
-----------------------------------------------------------------
EPOCMAN                           0     0       Benoit Gilles Mascia
GSEC>
```

If you enter the name of a non-existent user as a parameter of the **display** command, nothing is displayed and GSEC remains in interactive mode.

```
GSEC> display alison
GSEC>
```

Adding New Users

When adding a new user in interactive mode, nothing is displayed to confirm that the user was indeed added. You need to use the **display** or **display <name>** commands to make sure that the user was added successfully.

```
GSEC> add newuser -pw newuser -fname New -lname User
GSEC>

GSEC> display newuser
     user name                     uid   gid     full name
-----------------------------------------------------------------
NEWUSER                           0     0       New  User
GSEC>
```

Deleting Existing Users

When deleting a user in interactive mode, there is no confirmation that the user has been deleted. You should use the **display** or **display <name>** command to check.

```
GSEC> delete newuser
GSEC>

GSEC> display
     user name                     uid   gid     full name
-----------------------------------------------------------------
SYSDBA                            0     0
NORMAN                            0     0       Norman  Dunbar
EPOCMAN                           0     0       Benoit Gilles Mascia
GSEC>
```

If, on the other hand, you try to delete a non-existing user, GSEC will display an error message, and exit.

```
GSEC> delete newuser
record not found for user: NEWUSER

C:\>
```

Amending Existing Users

Existing users can have one or more of their password, first name, middle name or lastname amended. There is no confirmation that your modification has worked, so you must use one of the **display** commands to determine how well it worked.

```
GSEC> modify norman -pw newpassword
GSEC>

GSEC> modify norman -mname MiddleName -fname Fred
GSEC>

GSEC> display norman
     user name                        uid    gid    full name
-----------------------------------------------------------------------
NORMAN                                0      0      Fred MiddleName Dunbar
GSEC>
```

If you wish to remove one or more of a user's attributes, don't pass a (new) value for that attribute.

```
GSEC> modify norman -mname -fname -lname

GSEC> display norman
     user name                        uid    gid    full name
-----------------------------------------------------------------------
NORMAN                                0      0
```

Now I can be known as 'the man with no name', just like Clint Eastwood !

Help

The **help** command, in interactive mode, displays the same help screen as shown above.

Version Information

The version of GSEC can be obtained using the z command.

```
GSEC> z
gsec version  WI-V1.5.0.4306 Firebird 1.5
GSEC>
```

Batch Mode

> **Note**
>
> In the following descriptions of batch mode operations, assume that I have set the `ISC_USER` and `ISC_PASSWORD` environment variables. This allows GSEC to be run without always having to specify the **-user** and **-password** switches. This in turn reduces the amount of code on the command line, which means that when this XML file is rendered into pdf, all the commandline will fit on the width of an A4 page.
>
> It is not secure to have these variables set all the time, so don't do it !

> **Warning**
>
> In batch mode, you may think that you can check the result of an operation by checking `%ERRORLEVEL%` in Windows, or `$?` in various flavours of Unix. This doesn't work. The result always appears to be zero.

In batch mode, the command line to run GSEC is as follows :

```
gsec [ <options> ... ] <command> [ <parameter> ... ]
```

Displaying User Details

To display all users in the security database the command, and its output are :

```
C:\>gsec -display
    user name                        uid   gid     full name
------------------------------------------------------------------------
SYSDBA                               0     0
NORMAN                               0     0       Norman  Dunbar
EPOCMAN                              0     0       Benoit Gilles Mascia
```

To display details of a single user, pass the username as a parameter to the **display** command.

```
C:\>gsec -display epocman
    user name                        uid   gid     full name
------------------------------------------------------------------------
EPOCMAN                              0     0       Benoit Gilles Mascia
```

Adding New Users

When adding a user in batch mode, there is no confirmation that the user has been added. You should use the **-display** or **-display <name>** command to check.

```
C:\>gsec -add newuser -pw newuser -fname New -lname User

C:\>gsec -display
    user name                        uid   gid     full name
------------------------------------------------------------------------
SYSDBA                               0     0
NORMAN                               0     0       Norman  Dunbar
```

```
NEWUSER                                 0      0       New  User
EPOCMAN                                 0      0       Benoit Gilles Mascia
```

Deleting Existing Users

When deleting a user in batch mode, there is no confirmation that the user has been deleted. You should use the **-display** or **-display <name>** command to check.

```
C:\>gsec -delete newuser

C:\>gsec -display
        user name                       uid    gid      full name
-------------------------------------------------------------------------
SYSDBA                                  0      0
NORMAN                                  0      0       Norman  Dunbar
EPOCMAN                                 0      0       Benoit Gilles Mascia
```

Amending Existing Users

Existing users can have one or more of their password, first name, middle name or lastname amended.

```
C:\>gsec -modify norman -pw newpassword

C:\>gsec -modify norman -mname MiddleName -fname Fred

C:\>gsec -display
        user name                       uid    gid      full name
-------------------------------------------------------------------------
SYSDBA                                  0      0
NORMAN                                  0      0       Fred MiddleName Dunbar
EPOCMAN                                 0      0       Benoit Gilles Mascia
```

If you wish to remove one or more of a user's attributes, don't pass a (new) value for that attribute.

```
C:\>gsec -modify norman -mname -fname -lname

C:\>gsec -display
        user name                       uid    gid      full name
-------------------------------------------------------------------------
SYSDBA                                  0      0
NORMAN                                  0      0
EPOCMAN                                 0      0       Benoit Gilles Mascia
```

Now nobody knows who I am :o)

Version Information

The version of GSEC can be obtained using the **-z** command. However, note that it leaves you in interactive mode on completion. It doesn't exit like the other batch mode commands do, so you have to use the interactive **quit** command to exit. There is a way around this problem as shown in the following. The first part shows the problem.

```
C:\>gsec -z
gsec version  WI-V1.5.0.4306 Firebird 1.5
GSEC>
```

The solution is to have a small file containing the command **quit** and force GSEC to read this file when it needs user input, as follows.

```
C:\>copy con fred
quit
^Z
        1 file(s) copied.

C:\>gsec -z <fred
gsec version  WI-V1.5.0.4306 Firebird 1.5
GSEC>
C:\>
```

This could be a good idea for any of the commands which leave you 'stuck' in the interactive mode when you thought you were running in batch mode. By redirecting input from a command file, GSEC will read a line of text from that file any time it requires user input. By forcing it to read the **quit** command, you make it exit.

> **Note**
>
> The -z command doesn't need a **-user** and **-password**, it will display the version details and then tell you that you don't have a username/password - but you can safely ignore this message.

Running GSEC Remotely

GSEC can be used to administer the security database on a remote server. To do this you must supply the remote security database name on the commandline as shown in the following example which connects my Windows XP client version of GSEC to my Linux server named Ganymede and allows me to manage the users on my Linux server.

```
C:\>gsec -database ganymede:/opt/firebird/security.fdb
        -user sysdba -password masterkey
GSEC>
```

> **Note**
>
> In the above example, I have split the full commandline over two lines. This is to prevent it 'falling off' the right side of the page when this chapter is rendered as a PDF document. The whole command should, and must, be typed on a single line.

Once connected to the remote security database, you can manipulate users in the normal manner in either interactive or batch modes as described above.

Coming in Firebird 2.0

Under Firebird 2.0 there is a new commandline option of **-server** which allows the administrator the ability to maintain user details remotely without having to remember the full path name to the security database on all Firebird servers.

Using this new option is similar to the current **-database** option, however, from Firebird 2.0 the **-database** option will be deprecated and may be completely removed in a future version.

Taking the remote access example above, under Firebird 2.0 it will look similar to the example below.

```
C:\>gsec -server ganymede -user sysdba -password masterkey
GSEC>
```

The version of GSEC provided in Firebird 2.0 can be used to maintain the security database on previous versions of Firebird and it is hoped, Interbase from version 6.0 upwards. However, under version 2.0 of Firebird, the format of the security database will be changed and because of this, GSEC from an older version cannot be used to maintain the security database for Firebird 2.0.

GSEC caveats

The following is a brief list of gotchas and funnies that I have detected in my own use of GSEC. Some of these are mentioned above, others may not be. By collecting them all here in one place, you should be able to find out what's happening if you have problems.

Normal Versus Privileged Users

Only a sysdba user can update the security database. Normal users can run the GSEC utility, but can only list the contents. The following shows what happens when trying to update the database when running GSEC as a normal user.

```
C:\>gsec -user norman -password norman
GSEC> add myuser -pw mypassword
add record error
no permission for insert/write access to TABLE USERS
```

A normal users can only display details from the security database.

```
C:\>gsec -user norman -password norman -display
    user name                      uid   gid     full name
--------------------------------------------------------------------
SYSDBA                             0     0
NORMAN                             0     0       Norman  Dunbar
EPOCMAN                            0     0       Benoit Gilles Mascia
```

Differences Between Batch And Interactive Mode

The GSEC commands apply to both modes of operation, however, when running in batch mode, you must prefix the command name with a minus sign (-) or you will get an error message similar to the following :

```
C:\>gsec -user sysdba -password masterkey display
invalid parameter, no switch defined
error in switch specifications
GSEC>
```

Note also that you will be left in interactive mode when an error occurs. The correct commandline should have a minus in front of the **display** command, as follows :

```
C:\>gsec -user sysdba -password masterkey -display
    user name                      uid   gid     full name
--------------------------------------------------------------------
SYSDBA                             0     0
NORMAN                             0     0       Norman  Dunbar
```

```
EPOCMAN                              0    0     Benoit Gilles Mascia
```

This time, GSEC performed its duties, displayed all known users and quit from the utility.

> **Warning**
>
> If environment variables `ISC_USER` and `ISC_PASSWORD` have been defined, and this isn't a very good idea for security reasons, GSEC can be run without passing the **-user** or **-password** options.

> **Warning**
>
> As with all of the command line utilities, it is best to use the version of he GSEC utility that was supplied with your database.

Batch Mode Exit Codes

When running GSEC under windows, you can trap the exit code in `%ERRORLEVEL%` and check it to determine the success or failure of the last command executed.

When your operating system is Unix - whatever flavour - the exit code is to be found in the `$?` variable.

Unfortunately, it appears that GSEC always exits with a zero and this makes it quite unsuitable to build into a properly error trapped batch script on either system. Sad but true.

Errors In Batch Mode Swap To Interactive Mode

Sometimes, when running in batch mode, an error condition in GSEC will result in GSEC switching over to interactive mode. This is not very useful if you started GSEC in batch mode from a script, because your script will just sit there waiting on something to be typed.

Chapter 3: Still to come ...

As this is a work in progress, please excuse the 'sudden' ending to this book. As I research and document the remaining commandline utilities, I shall add new chapters to this book. Until such time as the book is complete, this chapter will give brief details of work I still have to complete.

- FB_LOCK_PRINT is the utility which prints out details of the internal database lock page.

- GBAK is the database backup & restore utility. It also allows various parameters internal to the database to be changed.

- GDEF is a metadata utility which was removed from Interbase 4.0 and returned in the Open Source version 6. GDEF is probably redundant.

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