FrontBase 7 for iOS and Mac OS X

1 Introduction
FrontBase is a high performance, scalable, SQL 92 compliant relational database server created in the for universal deployment.

On Mac OS X FrontBase can run as a service available to clients across the network. On iOS and Mac OS X FrontBase can be embedded into the applications, providing the full FrontBase functionality to the application without the complexity of network connection to a server.

2 The FrontBase installation

2.1 The FrontBase server
The components needed for a FrontBase server installation are installed in the FrontBase installation directory, /Library/FrontBase, the executables in the bin subdirectory, the auxiliary files in the Library, the Translations, and the Collations subdirectories.

2.1.1 /Library/FrontBase/bin/FBExec
The FBExec is a service background process that is started when the computer is restarted. The FBExec provides status, management and access information to the client applications.   The FBExec is started by the launch daemon by a launch daemon plist, com.frontbase.fbexec.plist, which is installed in /Library/LaunchDaemons. The plist does contain absolute references to the FBExec executable, so the plist must be updated if the FBExec is moved.

2.1.2 /Library/FrontBase/bin/FrontBase
FrontBase is the database server executable. There is a FrontBase process running for each running database. A FrontBase process is typically started by various management tools, but can also be started from the command line. Clients communicates with the FrontBase server across a TCP/IP connection established to a listen port created by the server.

FrontBase is a symbolic link to either FrontBase64, the default for all 64-bit capable machines, or to FrontBase32, the default when the machine does not support 64-bit.

2.1.3 /Library/FrontBase/bin/FBReplicator
The replication daemon distributing transactions from a replication master, to its replication clients.

2.1.4 /Library/FrontBase/bin/FBTLogs
A command line tool for summarizing the transaction log of a database.

2.1.5 /Library/FrontBase/bin/FBTLog
A command line tool for displaying parts the transaction log of a database as SQL statements.

2.1.6 /Library/FrontBase/bin/FBKeyGenerator
A command line tool for generating encryption keys. FrontBase database can be encrypted when stored on disk, the FBKeyGenerator is used to generate the necessary keys.

2.1.7 /Library/FrontBase/bin/FBInfoCenter
A command line tool which prints out details about your FrontBase installation and your machine.

2.1.8 /Library/FrontBase/bin/FBBackup
A command line tool for creating a backup of a FrontBase database without the need to start the server.

2.1.9 /Library/FrontBase/bin/FBRestore
A command line tool for restoring a backup of a FrontBase database.

2.1.10 /Library/FrontBase/bin/FBListContent
A command line tool for verifying the the content of a FrontBase backup.

2.1.11 /Library/FrontBase/Translations
Translation are unicode character to unicode character mappings. Translanslation are created and maintained by the FBUnicodeManager. By default two translations are installed, ToLower.trans and ToUpper.trans.

2.1.12 /Library/FrontBase/Collations
Collations specifies a named ordering of unicode character. A collation is create and maintained by the FBUnicodeManager. By default the collations CaseInSensitive.coll1 is installed.

2.1.13 /Library/FrontBase/Library
Contains bootstrap files used when a database is created, and error message definitions.

2.2 The iOS library and headers for devices and simulators
The Cocoa and C client API's providing general access to FrontBase databases from iOS application running on a iOS device. The iOS library is installed in /usr/lib/libFrontBase-iOS<release-number>.a and the headers are installed in /usr/include/FBCAccess and /usr/include/FBAccess in the device SDK. The library is build fat so it can be used for both the simulator and the devices.

2.4 The FBAccess framework
The FBAccess framework is the Cocoa client API providing general access to FrontBase databases. The FBAccess framework is installed in /Library/Frameworks, but the framework is prepared to be copied to Frameworks subdirectory in an application bundle.

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2.6 The FBCAccess developer library
The FBAccess developer library is C client API but in the form of a static library. The developer library is installed in /Library/FrontBase/lib directory and corresponding headers are installed in the /Library/FrontBase/include directory.

2.7 The FrontBaseJDBC
The JDBC java driver for accessing FrontBase database servers. The driver is installed in /Library/java.

2.8 The sql92 command line tool
A command line tool for managing and accessing databases. sql92 will let you create, start stop, delete databases, connect to databases, and execute SQL statements.

The sql92 command line tool is installed in the base installation directory structure, the executable is installed in /Library/FrontBase/bin/sql92 and auxiliary files describing 8 bit character set are installed in /Library/FrontBase/Library/*.ucm.

2.9 The FrontBaseManager
A Cocoa application for managing databases, database schemas and content. The FrontBaseManager also contains an "sql92" functionality; i.e. SQL statements can be sent to a FrontBase database for execution. Please note that the FrontBaseManager can manage databases on all hosts in a network with a FrontBase installation.

The FrontBase manager is installed in the /Applications directory, but can be moved around freely.

2.10 The FBUnicodeManager
A Cocoa application for managing Collations and Translations. Collations are used to specify an ordering of the unicode characters, and translations define translation from unicode character to unicode characters.

The FBUnicodeManager is installed in the /Application directory, but can be moved around freely.

3 The innards of a FrontBase database

A FrontBase database is a wrapper containing all dynamic data pertaining to a FrontBase database.   The extension is .fb by default but can be chosen freely.

3.1 The database file
The database file contains the current state of the database, and is name FrontBase.fb. You cannot copy the database file when a server or an application is accessing it, the server and applications will access and update the data in in random order, thus making it impossible for sequential copy to guarantee correctness .

3.2 The tlog directory
FrontBase may be requested to maintain a transaction log, which records all changes made to the database in the for of SQL statement. The transaction log is a directory and is named TLog.tlog. The transaction log provides the necessary redundancy such that database may be recovered even in case of catastrophic failure. The transactions in the transaction log is also read by the FBReplicator when it push changes to its clients.

3.3 The bck directory
FrontBase may be requested to produce a backup, and the backups are written to the default backup directory. The default backup directory is named Backups.bck

3.4 The log directory
The log directory contain logs files, and is names Log.log

3.5 The options file
If present contains the options to be used when the database is started without explicit options, the options files is named Options.opt. If this options does not exist an attempt to read the options form the <installation-directory>/etc/Options.opt file.

4 Download and installation

The latest version of FrontBase can always be downloaded from the http://www.frontbase.com ,

Once you have downloaded the .dmg file, locate the file according to the preferences of your browser. The .dmg file is expanded with the disk utility to a .pkg file, by selecting the .dmg file and double clicking. To install the .pkg, select the file, double click, and the Installer will be launched, ready to install FrontBase. The Installer will provide you with further directions.

Please note that the FBExec is installed to be automatically started when the computer is restarted. The FBExec is also started as part of the installation process, i.e. there is no need to restart the computer after installation.

5 Post installation

Once you have installed FrontBase it is a good idea to include /Library/FrontBase/bin in the search path of the various accounts that will use the FrontBase tools. This step is not necessary, but it can make your command line tool life easier.

There is no need to restart the computer after an installation, but it is a good idea to verify that the FBExec process is running by doing (from a terminal window):

    ps axc I grep FBExec

which should produce output like the following example:

    374 ? S 0:00 FBExec

If for some reason the FBExec isn't running, try to launch it from the command line:

    /Library/FrontBase/bin/FBExec &;

In case of problems, you can e-mail mailto:support@frontbase.com and ask for directions.

6 sql92 - super brief introduction

sql92 is an interactive command line tool which allows you to manage and access all databases on the local machine and available on the network. sql92 is launched by issuing the following shell command:

    /Library/FrontBase/bin/sql92

To create and start a database:

    sql92> create database firstdb;

To connect to a database:

    sql92> connect to <database-name> [on <host-name>] [user <user-name>];

If you omit the host name, the current host name is used, and if the user name is omitted, the _system.

Always terminate sql92 commands with a ';', the command is not send to the server before the ';' is entered.

Quit sql92 by entering quit<enter> or by pressing Ctrl-D.

The sql92 help command:

    sql92> help;

will print a summary of the available sql92 specific commands.

7 Getting started

Small examples on how to get started

7.1 URLs

When a connection to a database is established the database and connection method is identified by a URL with the syntax;

    <URL>   :==   <schema>://[<usert>][<host>][:<database>][/<path] |
                       <database>@<host>
    <user>   :==   <user>[:[<database-password>:]<user-password>]@
    <schema>   :==   frontbase | file
    <database>   :==   <name> | <port>
    <path>   :==   <name> | <path>/<name>
    <port>   :==   ... number in the range from 1 to 65565
    <name>   :==   ... anything which is not a number and does not contain /

The passwords defaults to the empty password, user to _system, and hostname to localhost. The database defaults to the path and vice-versa. The only meaningful

hostname in the file schema is localhost. If the file schema is used the path has preferences and if the frontbase schema is used the database has preference.

7.2 The FrontBaseManager

Locate the FrontBaseManager application (in /Applications) and double-click on the icon to launch it.

Click on the "File" menu, and then "New Database" (File -> New Database).

Provide a name for your new database and click "Create".

Double click the new database icon which appears in the Monitoring Window (this starts a connection).

Click "Open" at the Open Database Window (using the default login settings).

In the SQL Interpreter text view which comes up, type: values(server_name);

Click the "Execute SQL" button.

Close the database connection window.

Select your new database in the Monitoring Window and click the "Stop" button. Confirm.

Now click the "Delete" button.
Confirm.

Congratulations! You have just created a database, connected to it, performed a simple fetch, stopped, and deleted it. It is as simple as that!

7.3 sql92 command line tool

First open a terminal window and launch the sql92 tool:

    /Library/FrontBase/bin/sql92

Enter the following sql92 commands (the semicolons are important):

    create database firstdb;
    connect to firstdb;
    values(server_name);
    disconnect current;
    stop database;
    delete database firstdb;

Congratulations! You have just created a database, connected to it, created a new user, committed a transaction, and deleted a database. It is as simple as that!

7.4 sql92 command line tool, embedded server

First open a terminal window and launch the sql92 tool:

    /Library/FrontBase/bin/sql92

Enter the following sql92 commands (the semicolons are important):

    connect to file://localhost/./seconddb;
    values(server_name);
    disconnect current;
    quit;

Congratulations! You have just created a database with the server embedded in the sql92 tool. The database is created in current directory, you verify that with the command

    ls seconddb.fb

8. Transactions - please read

A transaction is a grouping of a sequence of SQL statements into a unit; execution of the unit as a whole either succeeds completely, or, if one of the commands fails or is a ROLLBACK command, the database is left unchanged.

Transactions are initiated automatically by the server when needed. Most SQL statements need a transaction. A COMMIT or a ROLLBACK command ends the current transaction.

Most of the FrontBase tools use, as default transaction settings, SERIALIZABLE, WRITE, PESSIMISTIC, which has the consequence that access to referenced tables is effectively serialized.

The user may change the defaults according to the SQL 92 specification.

When you are working with the FrontBase tools, you should always remember to COMMIT or ROLLBACK transactions in order not to block access to the database.

If you try to access a table and it seems that your application or tool doesn't do anything, it is most likely waiting for some other session to COMMIT or ROLLBACK an active transaction. Neither your application/tool nor the FrontBase server is hanging!

FrontBase offers a feature called AUTO COMMIT, i.e. a way to tell the server that it should automatically commit each statement that is successfully executed. The sql92 command line tool uses, as default, this feature.

You can control the AUTO COMMIT feature by executing the following statements:

    SET COMMIT FALSE; -- Turns off AUTO COMMIT
    SET COMMIT TRUE; -- Turns on AUTO COMMIT

10 Documentation

The documentation for the FrontBase database server can be downloaded from the http://www.frontbase.com and click the documentation tab.

Please take the time to peruse this documentation, so you at least have a good feeling for what's in there.