Tools for Managing MySQL

The MySQL database engine comes with command-line tools to manage the data structures, user security and to add, drop and modify records in the databases. It's worthwhile to learn enough about these tools, since you can be assured they'll be available in every installation, and "one quick change" is much faster in a text-based tool. However, for much of your daily work, you may find that some graphical 3rd party tools make the work easier, more productive and more pleasant.

Moving to MySQL means that you'll need to learn to work with the tools included with MySQL database for maintenance, security, monitoring and data access. It's wise to get familiar with the basic set of command-line tools, as you never know when you may find yourself with a minimal installation to manage or a slow dial-up connection to your server. You will also want to consider some of the very attractive add-on tools that can make the job easier. This chapter starts by covering the basic tools,and then shows some of the other utilities available for downloading.

At a minimum, programmers should be familiar enough with a command-line interface to feel comfortable using it for some work. Some will find that the shell interface is all that's needed. A quick and simple change can be easily implemented that way. However, when learning a new tool, nothing beats the "explorability" of a graphical interface to discover what sorts of features and options are available.

The Tools Supplied with MySQL

In keeping with the Unix tradition, everything that you'll need to do with the MySQL database, you can do from the command line of a shell. Many installations offer no other interface. It has the advantage of speed, ease of use in slow bandwidth situations, and ease of secure remote access. However, command lines tend to be unforgiving: they require either a proficiency that comes with daily use, or lots of trips to "man" or paper manuals or searches of the "HOWTOs" to make effective use of the tool. For less frequent work and for an easy-to-explore interface, the MySQL developers provide both a complete set of command-line utilities and a graphical tool in the MySQL Command Center.

Shell commands

You can use shell commands to create, manage, secure and query your database. **Table 1** lists common shell commands. The most common, mysql, is used to initiate an interactive active session with the database, similar to a command window or immediate window interaction in other languages. To start a session, issue the command "mysql". An informational message appears telling you the database connection, reminding you to complete commands with a semi-colon, and presenting a prompt of "mysql>" to remind you that you are no longer talking to your shell. An example session is shown in **Listing 1**.

Command-line tools let you do anything you need to the database, let you work faster over slow connections, and are almost always installed even with a minimal installation.

Listing 1: A sample interactive mysql session.

```
[root@Nereus root]# mysql
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 99 to server version: 3.23.58

Type 'help;' or '\h' for help. Type '\c' to clear the buffer.

mysql> help

MySQL commands:
Note that all text commands must be first on line and end with ';'
help     (\h)    Display this help.
?        (\?)    Synonym for `help'.
clear    (\c)    Clear command.
connect  (\r)    Reconnect to the server. Optional arguments are db and host.
edit     (\e)    Edit command with $EDITOR.
ego      (\G)    Send command to mysql server, display result vertically.
exit     (\q)    Exit mysql. Same as quit.
go       (\g)    Send command to mysql server.
nopager  (\n)    Disable pager, print to stdout.
notee    (\t)    Don't write into outfile.
pager    (\P)    Set PAGER [to_pager]. Print the query results via PAGER.
print    (\p)    Print current command.
quit     (\q)    Quit mysql.
rehash   (\#)    Rebuild completion hash.
source   (\.)    Execute a SQL script file. Takes a file name as an argument.
status   (\s)    Get status information from the server.
tee      (\T)    Set outfile [to_outfile]. Append everything into given outfile.
use      (\u)    Use another database. Takes database name as argument.

Connection id: 99  (Can be used with mysqladmin kill)

mysql> use test
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
mysql> select last_name, first_name, birth_date from employee order by 3 desc;
+-----------+------------+------------+
| last_name | first_name | birth_date |
+-----------+------------+------------+
| Smith     | Tim        | 1973-06-06 |
| Patterson | Caroline   | 1972-09-11 |
| Dodsworth | Anne       | 1966-01-27 |
| Pereira   | Laurent    | 1965-12-09 |
| Leverling | Janet      | 1963-08-30 |
| Suyama    | Michael    | 1963-07-02 |
| Brid      | Justin     | 1962-10-08 |
| Martin    | Xavier     | 1960-11-30 |
| King      | Robert     | 1960-05-29 |
| Hellstern | Albert     | 1960-03-13 |
| Callahan  | Laura      | 1958-01-09 |
| Buchanan  | Steven     | 1955-03-04 |
| Davolio   | Nancy      | 1948-12-08 |
| Fuller    | Andrew     | 1942-02-19 |
| Peacock   | Margaret   | 1937-09-19 |
+-----------+------------+------------+
15 rows in set (0.00 sec)

mysql> quit;
```

```
Bye
```

Table 1: Common commands available from the shell prompt.

Command	Significance
mysql	Interactive commands to create and drop databases, tables, query and modify data.
mysqld	Command to start, stop and restart daemon
isamchk	Checks and repairs validity of tables
mysqlaccess	Report and modify user and host rights to a database.
mysqladmin	Administrative interface to add/drop databases, check status, flush caches, troubleshoot processes or shut down.
mysqldump	Dumps a SQL script to text file useful for creating or backing up a database.
mysqlshow	Display databases, tables and column structural information.
perror	Return a text explanation of a numeric error code.

Command-line tools provide all of the facilities necessary to install, configure, and maintain a MySQL database application. As the ad says “Who could ask for anything more?” I could. I'm fumble-fingered and lousy at remembering commands I'm not using on a daily basis. And for those those just starting up with the tool, wouldn't you like a few clues about what sort of commands are available? Enter the graphical interface tools of the MySQL Control Center and some other third-party products.

MySQL Control Center

MySQL Control Center

Version: 0.9.4, April 2004

License: GPL / commercial

Platforms: Windows, *Nix, OS X promised in the future

Features: Like commercial “Enterprise Managers,” complete tool for creating, modifying and maintaining databases.

http://www.mysql.com/products/mysqlcc/

The MySQL Control Center (MySQLcc) is a separate download from the MySQL data engine, but it's written and supported by same group who wrote the engine. MySQLcc has an interface similar to the “Enterprise Manager” tool supplied with Microsoft SQL Server or Oracle's database tools.

With the Control Center, you can view multiple databases and drill down into the table and field level. Check out the menus and the context-sensitive (right-mouse-click) menus at each level to see the tools available to you. **Figure 1** shows the main window, with server Neresus accessed, the database test opened, and the employee table selected, showing the structure of the table in the right pane. **Figure 2** shows the query window where interactive SQL commands can be executed, and the results examined. The columns window lets you control which fields are displayed, and the grid of data showing the results of the query can be sorted by clicking on the column headers.

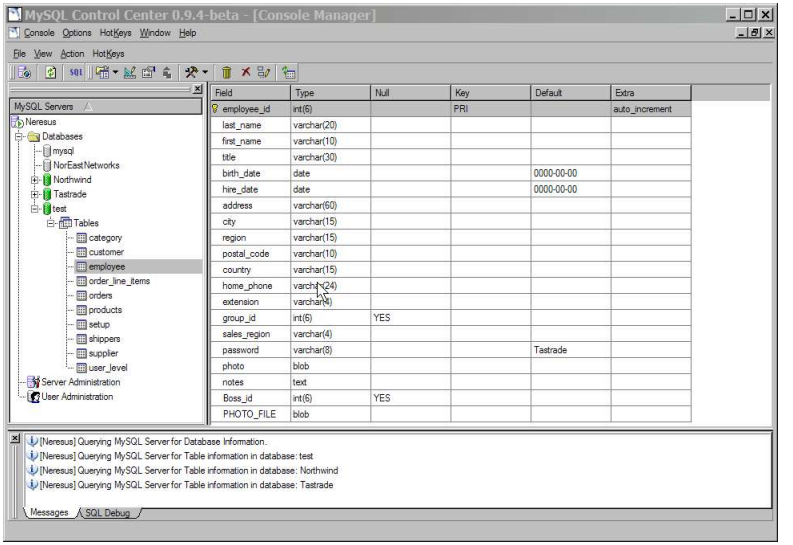

Figure 1: The MySQL Control Center lets you explore and maintain MySQL databases.

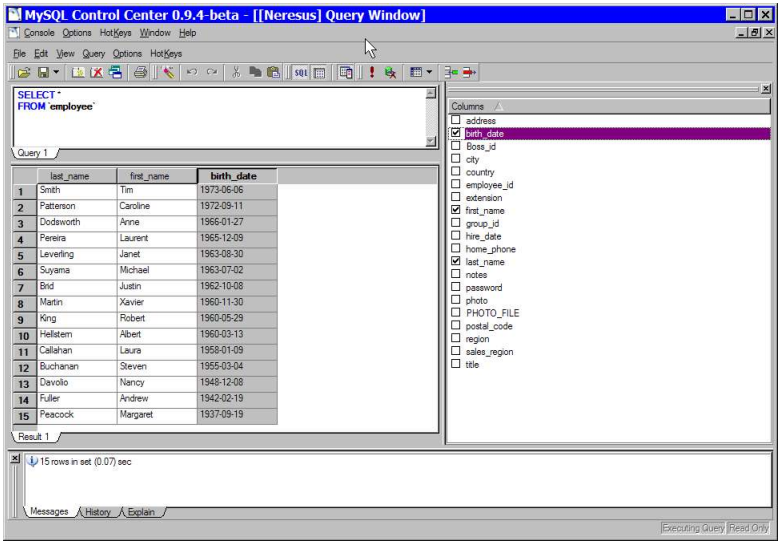

Figure 2: The MySQL Control Center's Query window lets you create and execute queries, and then manipulate the result set by filtering and sorting the displayed fields.

MySQL Administrator

At the time of this writing, the MySQL Administrator was a promising product, but at version 1.0.1 alpha, it was not yet ready for deployment in a production environment. Check out the

links and screen snapshots at http://www.mysql.com to see what the future holds. This promises to be a powerful product for database administrators.

Third Party Tools for MySQL

Third-party tools for MySQL include those available under free licenses as well as commercial products. While it's often desirable to use free software, not everything may yet be available or in production quality, so commercial software can provide a valuable alternative.

There are many packages available but I'll show two in a little more detail, to demonstrate the range of tools available and the features they contain.

Webmin

WebMin is not a MySQL specific tool, but rather a utility that provides web-based administration of a Linux machine. Available from http://www.webmin.com (not .org), the application runs on your MySQL server and manages its own web server on port 10000. Logging into the application lets you administer many aspects of the machine, from users to firewall to email to MySQL.

Webmin offers the advantage of a graphical user interface. It can be secured by several means, explained on the Webmin web site, to use SSL or tie into the machines user login mechanism for security. The big advantage of a tool like Webmin is that it is universally available from any machine with a web browser.

Webmin

Version: 1.140-1, April 2004

License: BSD-like

Platforms: Windows (with Cygwin), *Nix, OS X

Features: Secure and easy-to-use administrative tool for a server. Plug-ins for tools: Apache, MySQL, PostGreSQL, Qmail, many others.

http://www.webmin.com/

Webmin walk-though

Selecting the MySQL option from the main WebMin page presents a web page like that in **Figure 3**. If no databases are displayed, check that the button at the bottom on the screen is labeled “Stop” and not “Start.” If it's “Start,” you'll need to start the database before you can work on it.

Select a database or create a new one. Creating a new database will bring up the dialog shown in **Figure 4**. This simple dialog lets you name the new database and optionally create the initial table in the database. Following this, you're returned to the screen in **Figure 3** to select the database to work on. Selecting a database with no tables allows you to create one, as shown in **Figure 5**, or to pick from the existing tables, as shown in **Figure 6**.

Drilling further into the interface, selecting a table will show you the table structure, as in **Figure 7**. Clicking on an individual fieldname will bring up the dialog of **Figure 8**, with options to rename the field, change the type or enable or disable other features. Way back in Figure 6, there's also an option for “Execute SQL.” Pressing that button brings up the interface in **Figure 9**, where you enter and execute SQL statements. (Curiously, the bottom of that page also lets you import tab-delimited data files. This could probably be put somewhere more obvious, say, an Import button off the front page, perhaps.) If you enter a SQL statement into the edit box and choose Execute and results are returned, Webmin will generate a page similar to **Figure 10**, displaying the SQL statement and the results in tabular format.

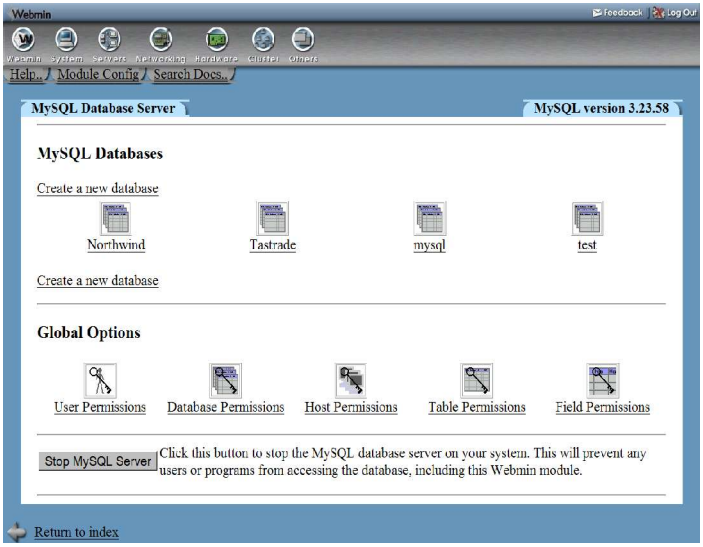

Figure 3: Selecting the MySQL tool in Webmin presents you with the databases you can administer. The "Stop" button will be a "Start" button if MySQL is not running.

Webmin presents a reasonable web interface for MySQL. While day-to-day operations will it could get to be somewhat tiresome, with the constant loading and refreshing of pages, the universal accessibility of the product certainly makes it one to considering adding to your toolbox.

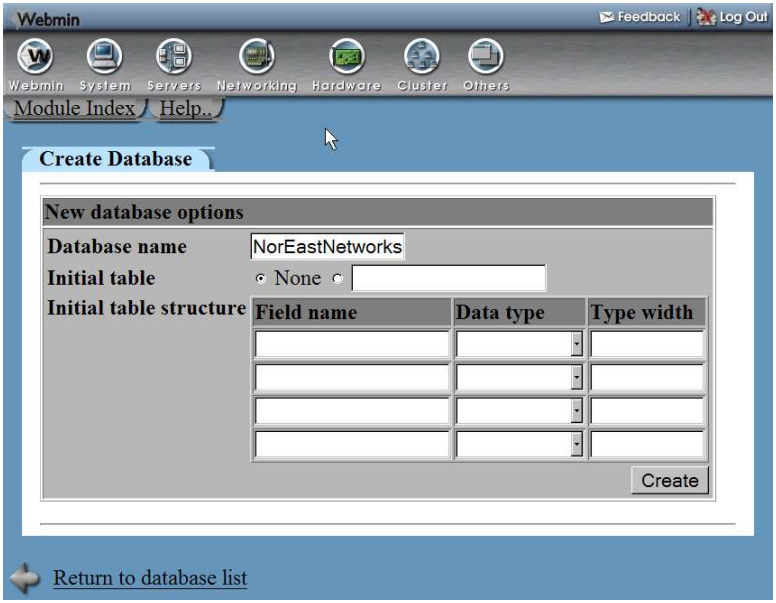

Figure 4: Selecting the "Create Database" button on the main screen presents a simple dialog for naming a new database and (optionally) creating the initial table.

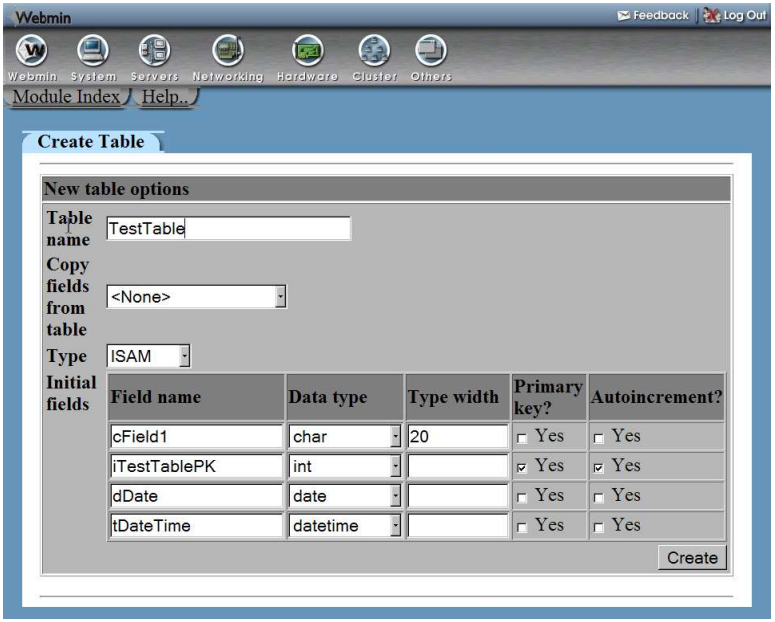

Figure 5: Creating a new table involves selecting the table type, naming the fields, and specifying a few of the field characteristics.

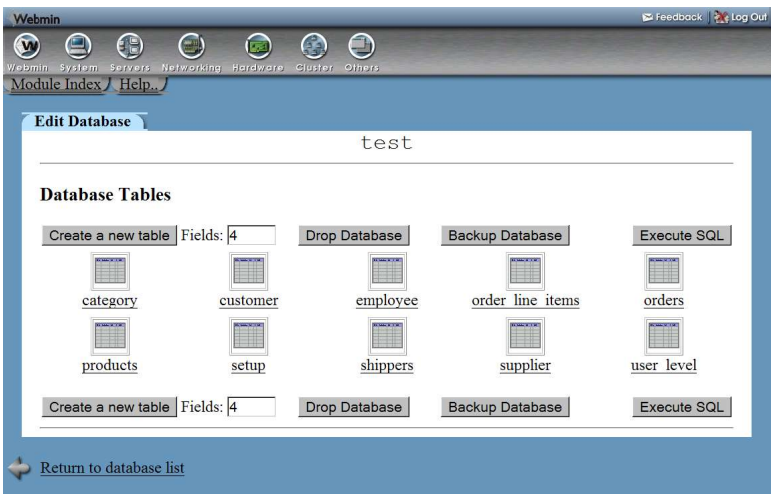

Figure 6: The Table dialog lets you create a new table, drop the database, backup the database, execute SQL against any table, or pick a table to maintain.

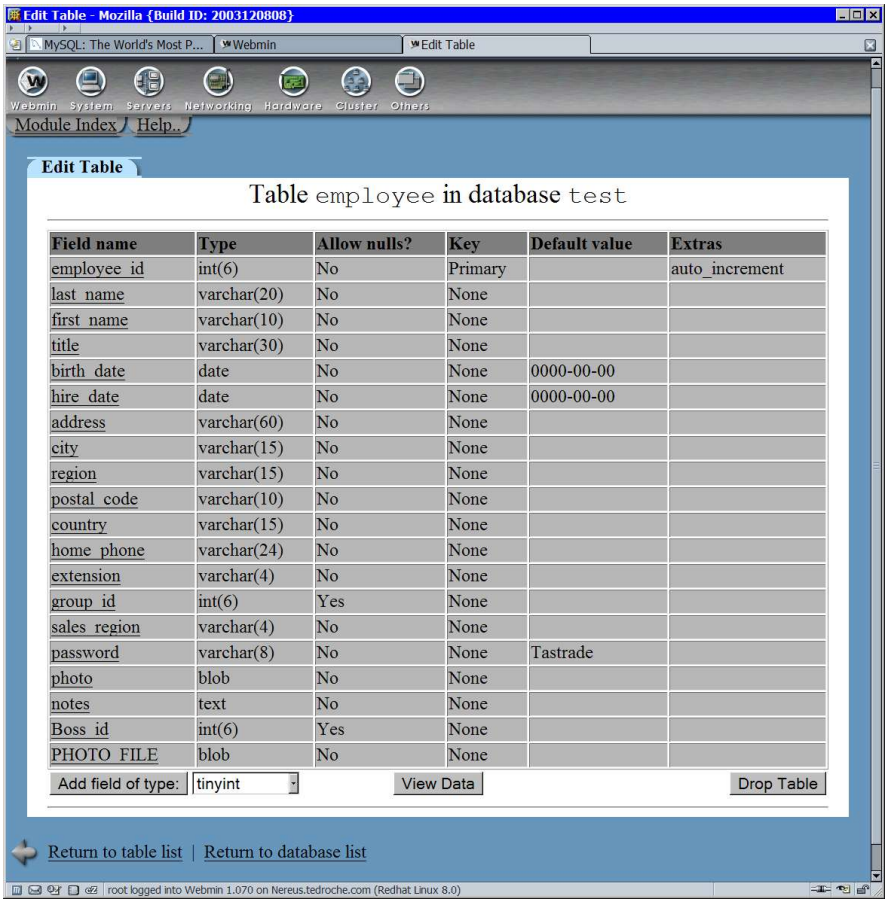

Figure 7: Choosing a table lets you view the field structure of the table. Clicking on a field name will let you change its characteristics.

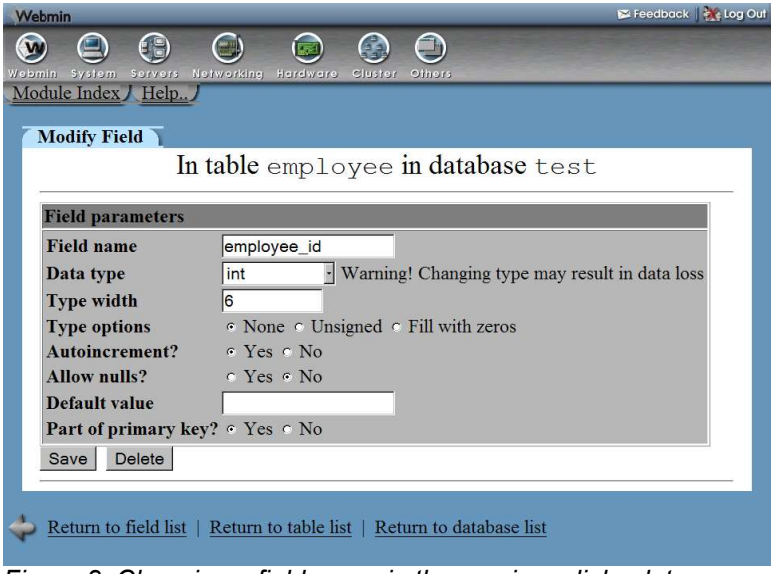

Figure 8: Choosing a field name in the previous dialog lets you modify the characteristics of the field.

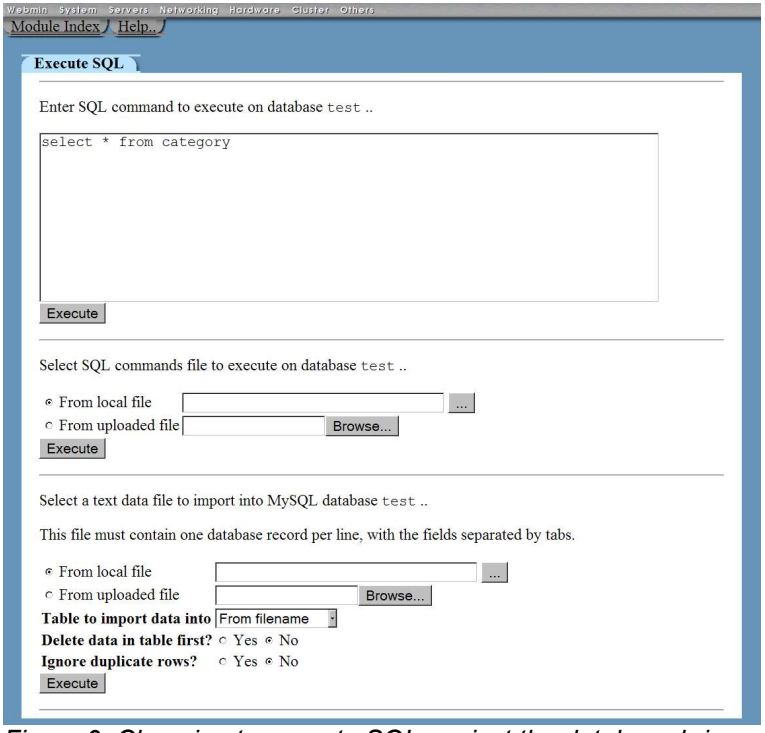

Figure 9: Choosing to execute SQL against the database brings up this dual-purpose dialog: SQL statements can be executed in the top portion, and tab-delimited text files imported in the bottom portion.

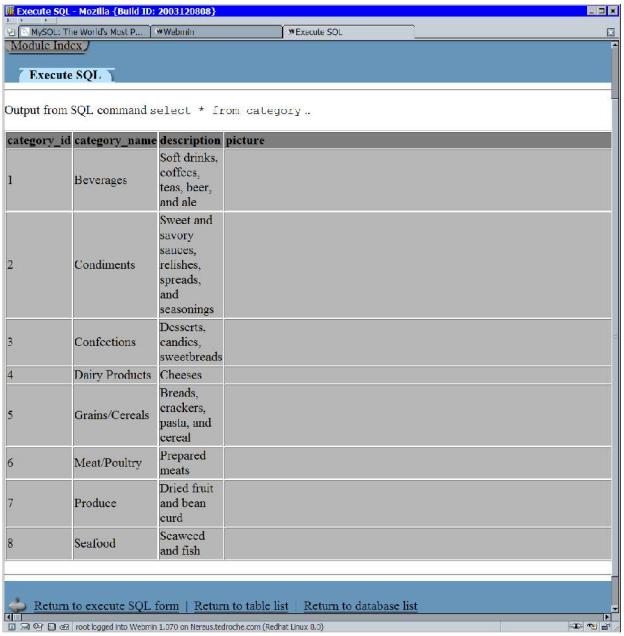

Figure 10: The results returned from the query displayed at the top of the form.

xCase

xCase is a commercial tool, one of the few covered in this paper. I use it as an example because of its great utility and many features. I have been unable to find a tool of similar functionality in the Open Source / Free Software world. xCase is a tool for Computer-Aided Software Engineering (hence the CASE part of the name) that can read and write various database structures. From the xCase web site, the list of supported databases is impressive: SQL Server, Oracle, Sybase, SQL Anywhere, Informix, DB2, Interbase, Firebird, FoxPro, VFP, MySQL and Jet (VB and Access). xCase lets you:

xCase

Version: 7.4, April 2004

Price: $399 (Fox) to $799 (Professional) in several different packages

License: commercial, 1 per user

Features: two-way design interaction & scripting, color printing, data migration, target data server switching, much more

http://www.xcase.com

- read in the structure from one database,
- save and print the model or diagrams (a very effective communication tool!),
- two-way synchronize the model with a live database,
- convert the target database from one type to another,
- generate scripts for the creation and modifications of databases,
- perform the actual transfer of data from source to target database,

- and more.

Like the GUI tools mentioned above, xCase is good at providing the "discoverability" within a data model, offering you choices and options you might not have been aware of, and can then show you the script equivalent of the commands you perform.

phpMyAdmin

phpMyAdmin

Version: 2.5.6, May 2004

License: GNU General Public License (GPL)

Features: Complete control of a MySQL database: security, database and table creation, browsing and editing data, ad-hoc querying as well as form-driven queries.

http://www.phpmyadmin.net

phpMyAdmin is another web-based tool, like WebMin above, but specifically designed for the management of MySQL only. If you are already hosting a PHP application for MySQL, this add-on can give you full remote administrative abilities without the overhead or exposure of the WebMin application described above.

A typical installation of phpMyAdmin involves downloading and decompressing the files from the web site onto your web site, modifying the configuration files for your site, establishing security for the application, and running the application. Installation instructions are also on the phpMyAdmin site, under documentation.

If you plan to make your phpMyAdmin interface available over the Internet (versus exposing it only internally via an intranet), you'll need to be aware that the application could provide a security hole leading directly to your corporate data. Some caution in configuring and securing the program is in order.

- Enable security by requiring web-server authenticated logins for your database administrators.
- Disable the 'root' and 'guest' user ids or provide them with passwords/
- Consider creating a user id solely for access to the phpMyAdmin tool to minimize the damage that could be done to the machine if that id was compromised.
- If you'll be supporting multiple databases with different administrators, grant the DBAs just the rights they will need to their databases and limited rights to the mysql database.

A Visual Tour of phpMyAdmin

Figure 11 shows the phpMyAdmin interface: a frame on the left contains links to the phpMyAdmin web site, a dropdown list of the databases available, and a list of the tables in the currently selected database. The link at the bottom of the frame, labeled "Query window" displays a pop-up window with query capabilities similar to that available on the "SQL" tab. The right-hand frame shows one of the tabbed dialogs listed across the top of the page. Note that these dialogs are different, depending on whether you select a database or a table in the left pane. If you select a database, the dialogs operate across the entire database and show you options for tables; if you select a single table, the dialogs focus on that table and the fields within that table. The following pages illustrate the different pages that are available within phpMyAdmin, and describes what they can do. The tabbed pages include:

- Structure, **Figure 13**, to alter the structure of tables, fields and indexes.
- Browse, **Figure 15**, to view and edit data in the tables.
- SQL, **Figure 16**, to excute commands against the data.

- Search, **Figure 17**,to locate records matching search criteria.
- Insert, **Figure 14**, to add data.
- Export, **Figure 18**, to copy data into different formations.
- Operations, show in **Figure 11**, to perform various maintenance operations on the data.
- Empty to remove all data items from the table. A confirmation dialog (**Figure 19**) confirms.
- Drop to drop the table or database from MySQL completely. A confirmation dialog (**Figure 20**) confirms you really want to completely remove the table from the database.

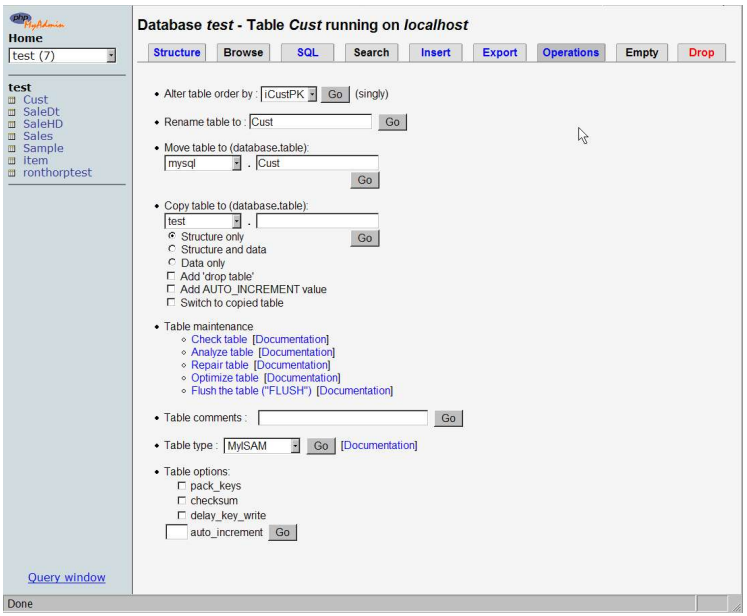

Figure 11:The main phpMyAdmin browser interface has a frame on the left to select databases and tables, and a frame on the right with tabs to perform various function.

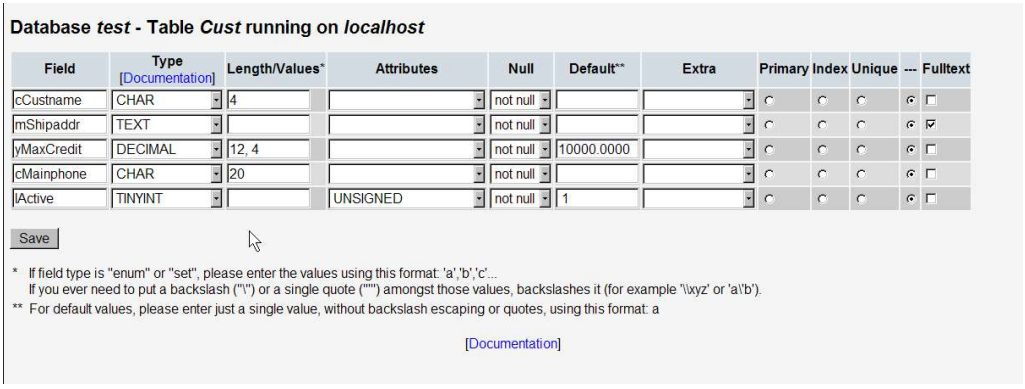

Figure 12: Selecting the "Add Field" option on the table structure page (see Figure 13) gives you a dialog to add fields and specify their type and characteristics.

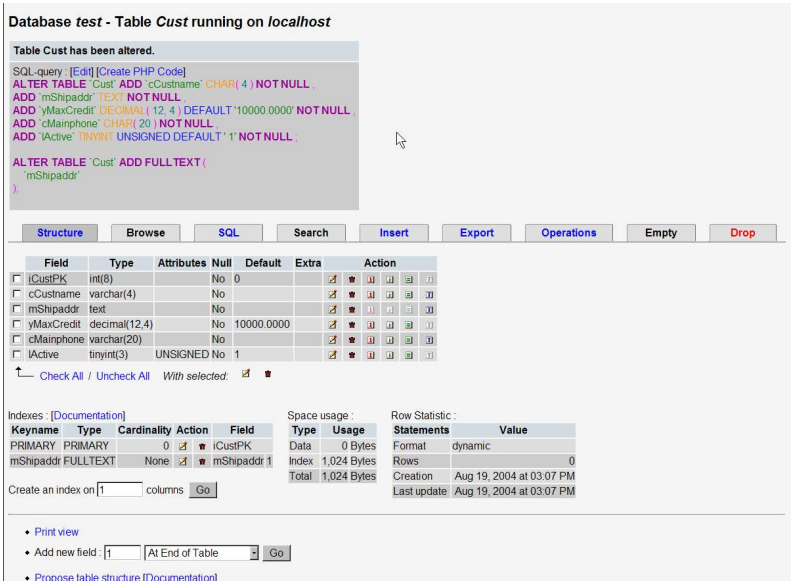

Figure 13: The "Structure" tab shows you the fields and index in a table and allows you to modify, add or drop fields and indexes. The grey box at the top of the page shows the results of the structure changes made in Figure 12.

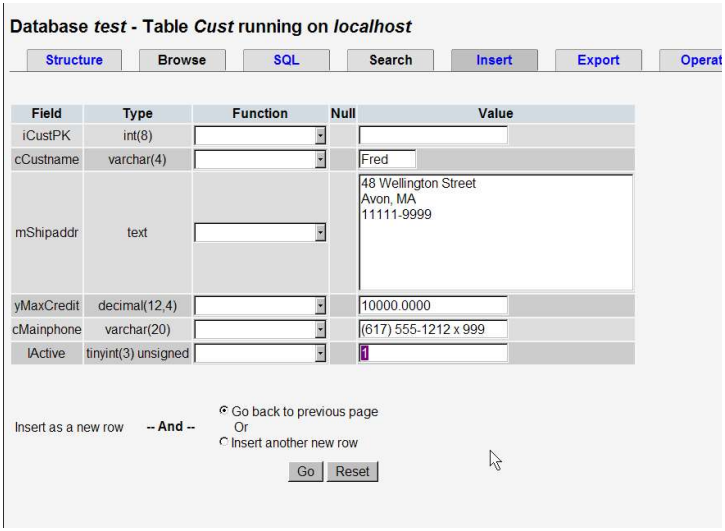

Figure 14: The Insert Tab prompts you for values for a new record.

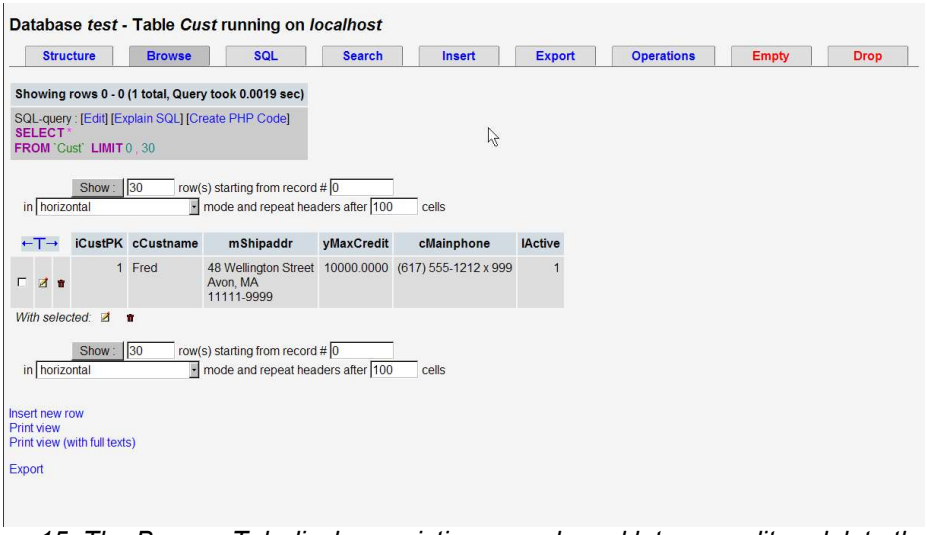

Figure 15: The Browse Tab displays existing records and lets you edit or delete them.

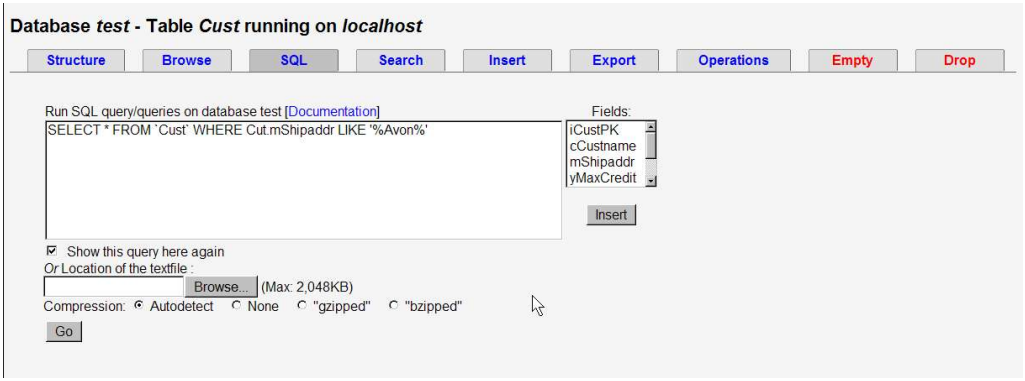

Figure 16: The SQL Tab lets you perform many operations against the table – inserts, updates, deletes or complex queries – using the SQL language.

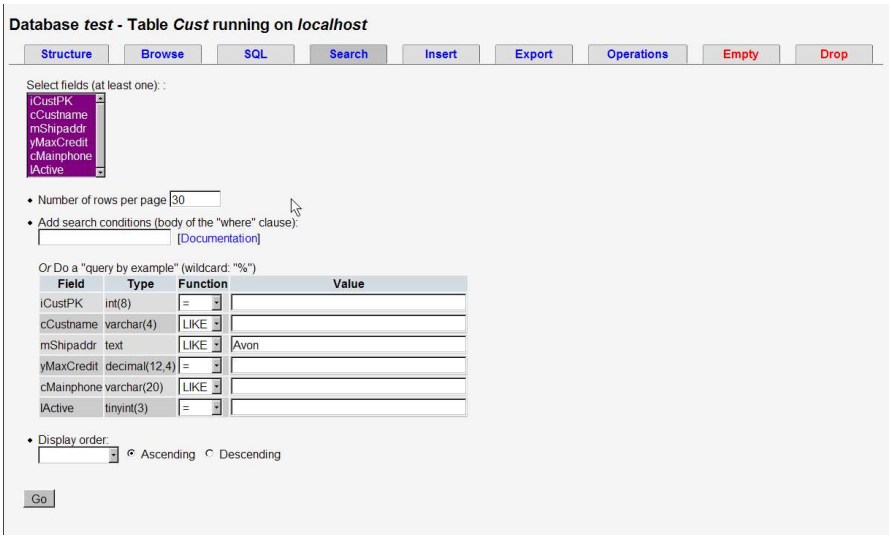

Figure 17: The Search Tab lets you search using a "Query By Example" interface.

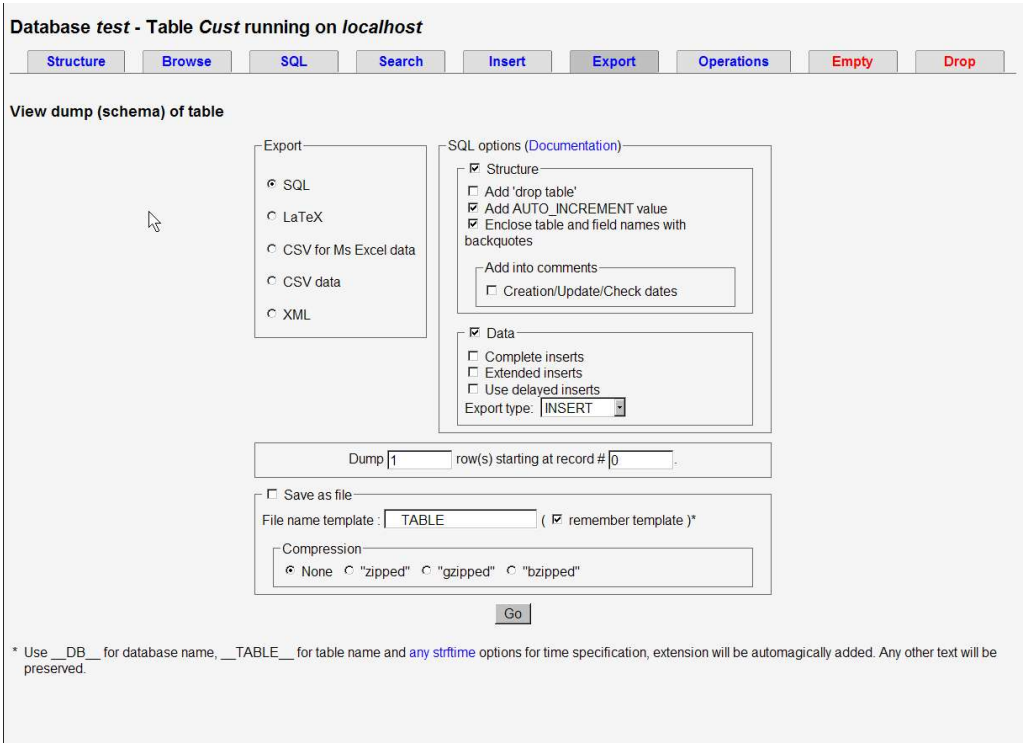

Figure 18: Export Tab

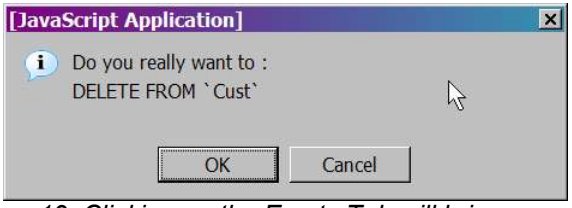

Figure 19: Clicking on the Empty Tab will bring up a confirmation dialog.

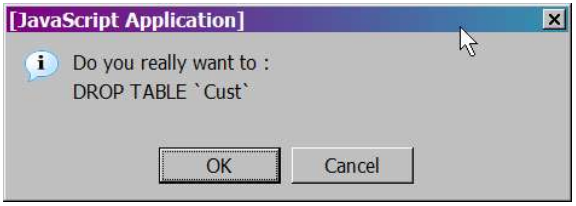

Figure 20: Clicking on the DROP Tab also brings up a confirmation dialog.

Which Tool Should You Use?

The choice of tools involves several factors. First, if there's only one available, for political or logistical reasons, most of the tools in this chapter will provide you with the functionality you'll need. If you are looking for a general purpose maintenance tool for the entire machine, network and many other applications, WebMin has that support. If you need to design and maintain database structures and port them to other database target, xCase is the way to go. If you need a graphical user interface, either mySQLcc or phpMyAdmin will provide that functionality. MySQLcc requires a direct port 3306 connection, but phpMyAdmin requires the installation of PHP on the machine and careful security settings.

Conclusion

MySQL ships with a set of command-line tools that can provide all of the functionality you need to set up, configure and maintain a MySQL database. However, there are advantages to graphical tools in providing the “discoverability” of finding functionality you were unaware of. Command-line tools require precise adherence to the proper parameters and command sequences, and can be difficult to learn and challenging to use infrequently. The MySQL Control Center provides a rich environment for maintaining a MySQL installation. The Webmin interface provides an easy-to-use remote interface that does not require installation on the remote machine. The xCase tool is aimed at specialists in data modeling. The phpMyAdmin tool is ideal if you already plan to use PHP on the machine and need remote and secure access for database maintenance.

For More Information

For Mac OS X users, you might want to check out YourSQL at http://www.mludi.net/YourSQL/ as a replacement for the MySQL Control Center. I haven't tried the tool myself, but it is recommended on the MySQL web site.

phpMyAdmin can be downloaded from, and is supported at, http://www.phpmyadmin.net/home_page/