MySQL User's Guide

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四零四科技股份有限公司
Moxa Technologies Co., Ltd.

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1. Introduce MySQL

MySQL, the most popular Open Source SQL database management system, is developed, distributed, and supported by MySQL AB. MySQL AB is a commercial company, founded by the MySQL developers. It is a second generation Open Source company that unites Open Source values and methodology with a successful business model.

The MySQL Web site (http://www.mysql.com/) provides the latest information about MySQL software and MySQL AB.

- MySQL is a database management system.

  A database is a structured collection of data. It may be anything from a simple shopping list to a picture gallery or the vast amounts of information in a corporate network. To add, access, and process data stored in a computer database, you need a database management system such as MySQL Server. Since computers are very good at handling large amounts of data, database management systems play a central role in computing, as standalone utilities or as parts of other applications.

- MySQL is a relational database management system.

  A relational database stores data in separate tables rather than putting all the data in one big storeroom. This adds speed and flexibility. The SQL part of "MySQL" stands for "Structured Query Language." SQL is the most common standardized language used to access databases and is defined by the ANSI/ISO SQL Standard. The SQL standard has been evolving since 1986 and several versions exist. In this manual, "SQL-92" refers to the standard released in 1992, "SQL:1999" refers to the standard released in 1999, and "SQL:2003" refers to the current version of the standard. We use the phrase "the SQL standard" to mean the current version of the SQL Standard at any time.

- MySQL software is Open Source.

  Open Source means that it is possible for anyone to use and modify the software. Anybody can download the MySQL software from the Internet and use it without paying anything. If you wish, you may study the source code and change it to suit your needs. The MySQL software uses the GPL (GNU General Public License), http://www.fsf.org/licenses/, to define what you may and may not do with the software in different situations. If you feel uncomfortable with the GPL or need to embed MySQL code into a commercial application, you can buy a commercially licensed version from us. See the MySQL Licensing Overview for more information (http://www.mysql.com/company/legal/licensing/).

- The MySQL Database Server is very fast, reliable, and easy to use.

  If that is what you are looking for, you should give it a try. MySQL Server also has a practical set of features developed in close cooperation with our users. You can find a performance comparison of MySQL Server with other database managers on our benchmark page. See Section7.1.4, "The MySQL Benchmark Suite".

  MySQL Server was originally developed to handle large databases much faster than existing solutions and has been successfully used in highly demanding production environments for several years. Although under constant development, MySQL Server today offers a rich and useful set of functions. Its connectivity, speed, and security make MySQL Server highly suited for accessing databases on the Internet.

- MySQL Server works in client/server or embedded systems.

  The MySQL Database Software is a client/server system that consists of a multi-threaded SQL server that supports different backends, several different client programs and libraries, administrative tools, and a wide range of application programming interfaces (APIs).

  We also provide MySQL Server as an embedded multi-threaded library that you can link into your application to get a smaller, faster, easier-to-manage product.

- A large amount of contributed MySQL software is available.

  It is very likely that your favorite application or language supports the MySQL Database Server.

The official way to pronounce “MySQL” is “My Ess Que Ell” (not “my sequel”), but we don't mind if you pronounce it as “my sequel” or in some other localized way.

2. Release Packages

2.1. MySQL Server

No	Filename	Description
1	mysqld_safe	Scripts to start the MySQL daemon and restart it if it dies unexpectedly.
2	mysqld	MySQL server daemon.
3	mysqladmin	MySQL database management utility.
4	share/mysql/mysql_install_db share/mysql/fill_help_tables.sql share/mysql/mysql_system_tables_data.sql	These scripts creates the privilege tables db, host, user, tables_priv, columns_priv in the mysql database, as well as the func table.
5	mysql_create_system_tables	This script writes on stdout SQL commands to generate all not existing MySQL system tables.
6	mysql.server	MySQL daemon start/stop script.
7	my_print_defaults	Print out MySQL server’s default settings use as argument when MySQL server startup.
8	my.cnf	MySQL server setting file.
9	install.sh	MySQL server install/uninstall script.
10	fill_help_table.sql	Used for MySQL error message.
11	errmsg.sys	Used for MySQL error message.

2.2. MySQL Client

No	Filename	Description
1	mysql	A simple MySQL client utility.
2	libmysqlclient.so.16.0.0	MySQL client library.
3	install.sh	MySQL client install/uninstall script.

2.3. MySQL Utilities:

UC-7400-LX Plus: mysql-5.1.23-rc-linux-xscale.tar.gz

IA-24X / UC-7112-LX Plus / W325-LX: mysql-5.1.23-rc-linux-arm.tar.gz

No	Filename	Description
1	sql-bench\	MySQL server bench mark utilities.
2	Share\	Message file for other language.
3	mysql-test\	MySQL server test procedures.

		Test report please refer to Section 4.
4	bin\	MySQL utilities.

2.4. MySQL Develop environment

No	Filename	Description
1	lib\	MySQL libraries.
2	include\	MySQL Header files.
3	examples\	Some examples to demonstrate how to use C to wirte MySQL apps.

3. Simple Users' Guide

3.1. MySQL Server

3.1.1. Install MySQL Server

If you want to run MySQL server on UC-7400 PLUS, please follow the statements bellow.

1. First of all, using command 'upramdisk' to mount a ram disk at '/mnt/ramdisk' and copying file 'mysql-server-5.1.23.tgz' to '/mnt/ramdisk' on the embedded Linux Computer.
   (If you have another linux box and has ssh server installed already, you can use 'scp' to copy files as the following screenshots, else you can using ftp to transmit file. Each Moxa embedded computer series box has ftp server/client installed.)

```
192.168.30.126 - Putty
root/$Moxa:upramdisk
root/$Moxa: cd /mnt/ramdisk
root/$Moxa: /mnt/ramdisk# scp jared_wu@192.168.30.121:~/mysql-server-5.1.23.tgz .
Password
mysql-server-5.1.23.tgz     100% |……..| 1904 KB        00:04
root/$Moxa: /mnt/ramdisk
```

2. After that, untar 'mysql-server-5.1.23.tgz' and enter 'mysql-server' directory and run 'install.sh' script.

On UC-7400-LX Plus, we support to install MySQL server into embedded flash or CF card.

```
192.168.30.126 - Putty
root@Moxa:/mnt/ramdisk/mysql-server-5.1.23# ./install.sh
Press the number:
1. Install MySQL server into flash.
2. Install MySQL server into CF card.
3. Uninstall MySQL server from flash.
4. Uninstall MySQL server from CF card.
5. Exit.
```

On IA-24X-LX / W325-LX / UC-7112-LX Plus, we support to install MySQL server on the SD card.

```
192.168.30.126 - Putty
root@Moxa:/mnt/ramdisk/mysql-server-5.1.23# ./install.sh
Press the number:
1. Install MySQL server into SD card.
2. Uninstall MySQL server from SD card.
3. Exit.
```

3. Choosing function to install MySQL server, after seeing “MySQL server install success”, you have MySQL server on UC-7400-LX Plus / IA-24X / UC-7112-LX Plus / W325-LX series box.

```
192.168.30.126 - Putty
Installing MySQL system tables...
OK
Filling help tables...
OK

To start mysqld at boot time you have to copy
support-files/mysql.server to the right place for your system

PLEASE REMEMBER TO SET A PASSWORD FOR THE MySQL root USER !
To do so, start the server, then issue the following commands:

/usr/local/mysql/bin/mysqladmin -u root password 'new-password'
/usr/local/mysql/bin/mysqladmin -u root -h Moxa password 'new-password'

Alternatively you can run:
/usr/local/mysql/bin/mysql_secure_installation

which will also give you the option of removing the test
databases and anonymous user created by default.  This is
strongly recommended for production servers.

See the manual for more instructions.

You can start the MySQL daemon with:
cd /usr/local/mysql ; /usr/local/mysql/bin/mysqld_safe &

You can test the MySQL daemon with mysql-test-run.pl
cd /usr/local/mysql/mysql-test ; perl mysql-test-run.pl

Please report any problems with the /usr/local/mysql/scripts/mysqlbug script!

The latest information about MySQL is available at http://www.mysql.com/
Support MySQL by buying support/licenses from http://shop.mysql.com/


MySQL server install success

root@Moxa:/mnt/ramdisk/mysql-server-5.1.23#
```

3.1.2. Test MySQL Server

1. Using the following command to start MySQL server.
   ‘/etc/init.d/mysql.server start’
2. Using the following command to reload the setting of MySQL server.
   ‘/etc/init.d/mysql.server reload’
3. Using the following command to stop MySQL server.
   ‘/etc/init.d/mysql.server stop’

```
192.168.30.126 - Putty
```

```
root@Moxa:/mnt/ramdisk/mysql-server-5.1.23# /etc/init.d/mysql.server start
Starting MySQL. SUCCESS!
root@Moxa:/mnt/ramdisk/mysql-server-5.1.23#
```

3.1.3. Start MySQL Automatically

Below commands demonstrate how to make MySQL server automatically starts at boot time.

```
192.168.30.126 - Putty
root@Moxa: # ln -s /etc/init.d/mysql.server /etc/rc.d/rc3.d/S99mysql.server
root@Moxa: #
```

3.1.4. Uninstall MySQL Server

Same as install MySQL server, just choose the uninstall function to remove MySQL server. It will remove all databases, too.

On UC-7400-LX Plus, we support to uninstall MySQL server from embedded flash or CF card.

```
192.168.30.126 - Putty
root@Moxa:/mnt/ramdisk/mysql-server-5.1.23#./install.sh
Press the number:
1. Install MySQL server into flash.
2. Install MySQL server into CF card.
3. Uninstall MySQL server from flash.
4. Uninstall MySQL server from CF card.
5. Exit.
3

MySQL server uninstall success

root@Moxa:/mnt/ramdisk/mysql-server-5.1.23#
```

On IA-24X-LX / W325-LX / UC-7112-LX Plus, we support to uninstall MySQL server from SD card.

```
192.168.30.126 - Putty
root@Moxa:/mnt/ramdisk/mysql-server-5.1.23#./install.sh
1. Install MySQL server into SD card.
2. Uninstall MySQL server from SD card.
3. Exit.
2

MySQL server uninstall success

root@Moxa:/mnt/ramdisk/mysql-server-5.1.23#
```

3.1.5. Note

1. MySQL server will consume about 6.2 MB initially and the database may use more storage when you running the MySQL server. Make sure you will not run out of storage if you install MySQL server on embedded flash.
2. MySQL server initially only allow connections from localhost, if you need to connect from remote machine, please install MySQL client and run ‘mysql’ to modify the privilege.

3.2. MySQL Client

3.2.1. Install MySQL Client

If you wan to run MySQL client on UC, please follow the statements bellow.

1. Using command 'upramdisk' to mount a ram disk at '/mnt/ramdisk' and then copy 'mysql-client-5.1.23.tgz' to '/mnt/ramdisk'
2. After that, untar 'mysql-client-5.1.23.tgz' and enter 'mysql-server' directory and run 'install.sh' script.
3. You will see three functions after running install script.
   i. Function 1 will install MySQL client into embedded flash.
   ii. Function 2 will uninstall MySQL client from embedded flash.
   iii. Function 3 will leave the install script immediately.

Choosing function 1 to install MySQL client, after seeing "MySQL client install success", you have MySQL client on UC-7400 PLUS series box. MySQL client will occupy about 500KB embedded flash space.

```
192.168.30.126 - Putty
root@Moxa:/mnt/ramdisk/mysql-client-5.1.23# ./install.sh
Press the number:
1. Install MySQL client and MySQL client library.
2. Uninstall MySQL client and MySQL client library.
3. Exit.
1
MySQL install success!

root@Moxa:/mnt/ramdisk/mysql-client-5.1.23#
```

3.2.2. Test MySQL Client

1. If you have a running MySQL server at localhost, you can simply type 'mysql' to connect to localhost MySQL server and make some SQL query.

```
192.168.30.126 - Putty
mysql> use mysql
Database changed
mysql> select user,host from user;
+------+-----------+
| user | host      |
+------+-----------+
| root | 127.0.0.1 |
|      | Moxa      |
| root | Moxa      |
|      | localhost |
| root | localhost |
+------+-----------+
5 rows in set (0.00 sec)

mysql>
```

2. If you have a remote MySQL server, make sure you have privilege to connect to remote MySQL server, and then use this command to connect 'mysql –h remote_server_ip –u user -p'

```
192.168.30.126 - Putty
root@Moxa# mysql -h localhost -u root
```

```
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 3
Server version: 5.1.23-rc-log Source distribution

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

mysql> use mysql
Database changed
mysql> select user,host from user;
+------+-----------+
| user | host      |
+------+-----------+
| root | 127.0.0.1 |
|      | Moxa      |
| root | Moxa      |
|      | localhost |
| root | localhost |
+------+-----------+
5 rows in set (0.00 sec)

mysql>
```

3.2.3. Uninstall MySQL Client

Same as Install MySQL client, just select function 2 to uninstall MySQL client.

```
          192.168.30.126 - Putty
root@Moxa:/mnt/ramdisk/mysql-client-5.1.23# ./install.sh
Press the number:
1. Install MySQL client and MySQL client library.
2. Uninstall MySQL client and MySQL client library.
3. Exit.
2
MySQL uninstall success!

root@Moxa:/mnt/ramdisk/mysql-client-5.1.23#
```

3.3. MySQL Utilities: mysql-5.1.23-rc-linux-xscale.tar.gz

If you want more utilities to manage MySQL, there are many utilities compiled from MySQL source code and some test procedures and bench-mark program in this package.

3.3.1. Installing MySQL utilities

MySQL utilities is too large to install into UC box, so just untar ‘mysql-5.1.23-rc-linux-xscale.tar.gz’ at your computer and copy the utilities you want to UC-7400 PLUS series box.

3.4. MySQL Development environment

3.4.1. Install MySQL Development Environment

1. Untar ‘mysql-dev-5.1.23.tgz’ on your development machine and entering directory ‘mysql-dev’.
2. Run install script ‘install.sh’ and choose function 1 to install MySQL develop environment.

```
          192.168.30.126 - Putty
debian:# cd /tmp
debian:/tmp#
```

```
debian:/tmp#
debian:/tmp# tar –zxf ./mysql-dev.tgz
debian:/tmp# cd mysql-dev
debian:/tmp/mysql-dev# ls
examples    include    lib
```

3.4.2. Compile and Test Examples

1. Entering directory ‘mysql-dev/examples’ and type ‘make’ to compile examples. These examples are default connect to localhost as root without password, it will work on new installed MySQL server, if you want to change these settings, please modify these examples’ source code.

```
          192.168.30.126 - Putty
debian:/tmp/mysql-dev# cd example
debian:/tmp/mysql-dev/examples#
debian:/tmp/mysql-dev/examples# make
[root@jaredRH90 examples]# make
xscale_be-gcc -c get_server_info.c -I../include/mysql/
xscale_be-gcc get_server_info.o -o get_server_info -L../lib/mysql/ -lmysqlclient
xscale_be-gcc -c get_client_info.c -I../include/mysql/
xscale_be-gcc get_client_info.o -o get_client_info -L../lib/mysql/ -lmysqlclient
xscale_be-gcc -c create_db.c -I../include/mysql/
xscale_be-gcc create_db.o -o create_db -L../lib/mysql/ -lmysqlclient
xscale_be-gcc -c delete_db.c -I../include/mysql/
xscale_be-gcc delete_db.o -o delete_db -L../lib/mysql/ -lmysqlclient
xscale_be-gcc -c create_table.c -I../include/mysql/
xscale_be-gcc create_table.o -o create_table -L../lib/mysql/ -lmysqlclient
xscale_be-gcc -c alter_table.c -I../include/mysql/
xscale_be-gcc alter_table.o -o alter_table -L../lib/mysql/ -lmysqlclient
xscale_be-gcc -c delete_table.c -I../include/mysql/
xscale_be-gcc delete_table.o -o delete_table -L../lib/mysql/ -lmysqlclient
xscale_be-gcc -c insert.c -I../include/mysql/
xscale_be-gcc insert.o -o insert -L../lib/mysql/ -lmysqlclient
xscale_be-gcc -c select.c -I../include/mysql/
xscale_be-gcc select.o -o select -L../lib/mysql/ -lmysqlclient
xscale_be-gcc -c update.c -I../include/mysql/
xscale_be-gcc update.o -o update -L../lib/mysql/ -lmysqlclient
[root@jaredRH90 examples]#
```

2. Copying these examples to UC box and run it.

```
          192.168.30.126 - Putty
[root@jaredRH90 examples]# ftp 192.168.30.126
Connected to 192.168.30.126 (192.168.30.126).
220 Moxa FTP server (Version wu-2.6.1(15) Wed Jun 7 11:17:28 CST 2006) ready.
Name (192.168.30.126:root): root
331 Password required for root.
Password:
230 User root logged in.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> cd /mnt/ramdisk
```

```
250 CWD command successful.
ftp> mput alter_table create_db create_table delete_db delete_table get_client_info
get_server_info insert select update
mput alter_table? u
227 Entering Passive Mode (192,168,30,126,31,64)
150 Opening BINARY mode data connection for alter_table.
226 Transfer complete.
9858 bytes sent in 0.00105 secs (9.2e+03 Kbytes/sec)
mput create_db? y
227 Entering Passive Mode (192,168,30,126,120,229)
150 Opening BINARY mode data connection for create_db.
226 Transfer complete.
9598 bytes sent in 0.00241 secs (3.9e+03 Kbytes/sec)
mput create_table? y
227 Entering Passive Mode (192,168,30,126,120,229)
150 Opening BINARY mode data connection for create_table.
226 Transfer complete.
9891 bytes sent in 0.000399 secs (2.4e+04 Kbytes/sec)
mput delete_db? y
227 Entering Passive Mode (192,168,30,126,211,190)
150 Opening BINARY mode data connection for delete_db.
226 Transfer complete.
9590 bytes sent in 0.000354 secs (2.6e+04 Kbytes/sec)
mput delete_table? y
227 Entering Passive Mode (192,168,30,126,211,190)
150 Opening BINARY mode data connection for delete_table.
226 Transfer complete.
9835 bytes sent in 0.000337 secs (2.8e+04 Kbytes/sec)
mput get_client_info? y
227 Entering Passive Mode (192,168,30,126,175,204)
150 Opening BINARY mode data connection for get_client_info.
226 Transfer complete.
8482 bytes sent in 0.000455 secs (1.8e+04 Kbytes/sec)
mput get_server_info? y
227 Entering Passive Mode (192,168,30,126,14,113)
150 Opening BINARY mode data connection for get_server_info.
226 Transfer complete.
8933 bytes sent in 0.000475 secs (1.8e+04 Kbytes/sec)
mput insert? y
227 Entering Passive Mode (192,168,30,126,232,97)
150 Opening BINARY mode data connection for insert.
226 Transfer complete.
9845 bytes sent in 0.000354 secs (2.7e+04 Kbytes/sec)
mput select? y
227 Entering Passive Mode (192,168,30,126,232,97)
150 Opening BINARY mode data connection for select.
226 Transfer complete.
9896 bytes sent in 0.000632 secs (1.5e+04 Kbytes/sec)
mput update? y
227 Entering Passive Mode (192,168,30,126,197,88)
150 Opening BINARY mode data connection for update.
226 Transfer complete.
9861 bytes sent in 0.000544 secs (1.8e+04 Kbytes/sec)
ftp> y
```

Test the uploaded files on target

```
192.168.30.126 – Putty
root@Moxa:/mnt/ramdisk# chmod a+x ./alter_table ./create_db ./create_table
./delete_db ./delete_table ./get_client_info ./get_server_info ./insert ./select ./update
root@Moxa:/mnt/ramdisk# ./get_server_info
MySQL Server Version is 5.1.23-rc-log
root@Moxa:/mnt/ramdisk# ./get_client_info
MySQL Client Version is 5.1.23-rc
root@Moxa:/mnt/ramdisk# ./create_db
Database Created
root@Moxa:/mnt/ramdisk# ./create_table
Database selected
Table Created
root@Moxa:/mnt/ramdisk# ./select
root@Moxa:/mnt/ramdisk# ./insert
Database selected
Record added
root@Moxa:/mnt/ramdisk# ./select
1 MOXA
root@Moxa:/mnt/ramdisk# ./update
Database selected
Record added
root@Moxa:/mnt/ramdisk# ./select
404 MOXA
root@Moxa:/mnt/ramdisk# ./alter_table
Database Selected
Table altered
root@Moxa:/mnt/ramdisk# ./select
404 MOXA
root@Moxa:/mnt/ramdisk# ./delete_table
Database selected
Table deleted
root@Moxa:/mnt/ramdisk# ./delete_db
Database Deleted
root@Moxa:/mnt/ramdisk#
```

4. Reference

1. MySQL 4.1 Reference Manual - http://dev.mysql.com/doc/refman/5.1/en/index.html
2. MySQL C API - http://dev.mysql.com/doc/refman/5.1/en/c.html