

# 实验 1 DBMS 的安装和使用

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## 实验目的

1. 通过安装某个数据库管理系统,初步了解 DBMS 的运行环境。
2. 了解 DBMS 交互界面、图形界面和系统管理工具的使用。
3. 搭建实验平台。

## 实验平台

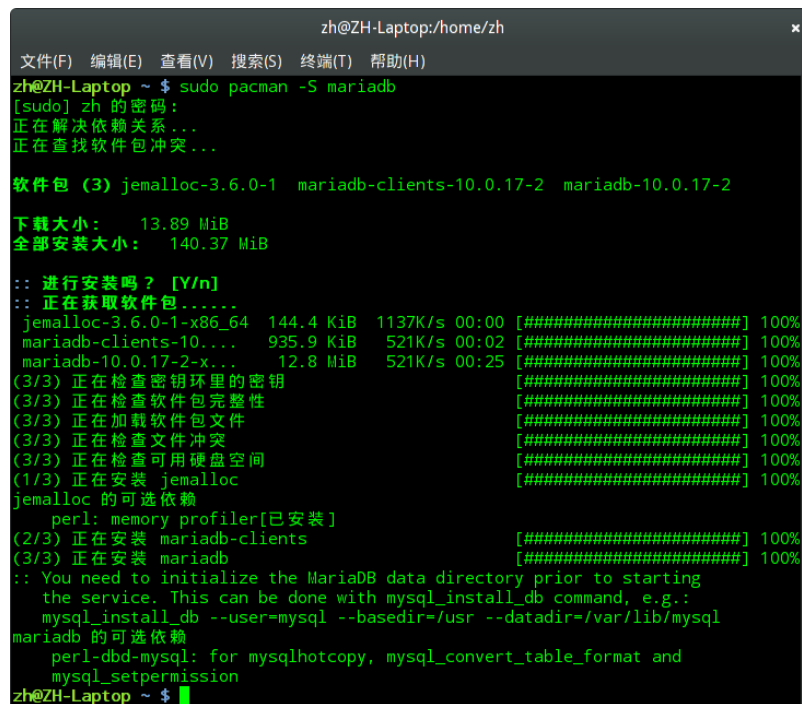
1. 操作系统: Arch Linux
2. 数据库管理系统: MariaDB 10.0.17

## 实验内容和要求

1. 根据某个 DBMS 的安装说明等文档,安装 DBMS。

1. 查阅 [MySQL - Arch Wiki](#)。
2. 安装 mariadb 软件包。

```
sudo pacman -S mariadb
```



```
zh@ZH-Laptop: /home/zh
文件(F) 编辑(E) 查看(V) 搜索(S) 终端(T) 帮助(H)
zh@ZH-Laptop ~ $ sudo pacman -S mariadb
[sudo] zh 的密码:
正在解决依赖关系...
正在查找软件包冲突...

软件包 (3) jemalloc-3.6.0-1 mariadb-clients-10.0.17-2 mariadb-10.0.17-2

下载大小: 13.89 MiB
全部安装大小: 140.37 MiB

:: 进行安装吗? [Y/n]
:: 正在获取软件包...
jemalloc-3.6.0-1-x86_64 144.4 KiB 1137K/s 00:00 [#####] 100%
mariadb-clients-10.0.17-2-x86_64 935.9 KiB 521K/s 00:02 [#####] 100%
mariadb-10.0.17-2-x86_64 12.8 MiB 521K/s 00:25 [#####] 100%
(3/3) 正在检查密钥环里的密钥 [#####] 100%
(3/3) 正在检查软件包完整性 [#####] 100%
(3/3) 正在加载软件包文件 [#####] 100%
(3/3) 正在检查文件冲突 [#####] 100%
(3/3) 正在检查可用硬盘空间 [#####] 100%
(1/3) 正在安装 jemalloc [#####] 100%
jemalloc 的可选依赖
perl: memory profiler[已安装]
(2/3) 正在安装 mariadb-clients [#####] 100%
(3/3) 正在安装 mariadb [#####] 100%
:: You need to initialize the MariaDB data directory prior to starting
the service. This can be done with mysql_install_db command, e.g.:
mysql_install_db --user=mysql --basedir=/usr --datadir=/var/lib/mysql
mariadb 的可选依赖
perl: dbd-mysql: for mysqlhotcopy, mysql_convert_table_format and
mysql_setpermission
zh@ZH-Laptop ~ $
```

pacman

3. 安装 mariadb。

```
mysql_install_db --user=mysql --basedir=/usr --datadir=/var/lib/mysql
```

```
zh@ZH-Laptop:/home/zh
文件(F) 编辑(E) 查看(V) 搜索(S) 终端(T) 帮助(H)
zh@ZH-Laptop ~$ mysql_install_db --user=mysql --basedir=/usr --datadir=/var/lib/mysql
chown: 正在更改"/var/lib/mysql"的所有者: 不允许的操作
Cannot change ownership of the database directories to the 'mysql' user. Check that you have the necessary permissions and try again.
zh@ZH-Laptop ~:( $ sudo mysql_install_db --user=mysql --basedir=/usr --datadir=/var/lib/mysql
Installing MariaDB/MySQL system tables in '/var/lib/mysql' ...
150317 12:22:17 [Note] InnoDB: Using mutexes to ref count buffer pool pages
150317 12:22:17 [Note] InnoDB: The InnoDB memory heap is disabled
150317 12:22:17 [Note] InnoDB: Mutexes and rw_locks use GCC atomic builtins
150317 12:22:17 [Note] InnoDB: Memory barrier is not used
150317 12:22:17 [Note] InnoDB: Compressed tables use zlib 1.2.8
150317 12:22:17 [Note] InnoDB: Using Linux native AIO
150317 12:22:17 [Note] InnoDB: Using CPU crc32 instructions
150317 12:22:17 [Note] InnoDB: Initializing buffer pool, size = 128.0M
150317 12:22:17 [Note] InnoDB: Completed initialization of buffer pool
150317 12:22:17 [Note] InnoDB: The first specified data file ./ibdata1 did not exist: a new database to be created!
150317 12:22:17 [Note] InnoDB: Setting file ./ibdata1 size to 12 MB
150317 12:22:17 [Note] InnoDB: Database physically writes the file full: wait...
150317 12:22:18 [Note] InnoDB: Setting log file ./ib_logfile101 size to 48 MB
150317 12:22:19 [Note] InnoDB: Setting log file ./ib_logfile1 size to 48 MB
150317 12:22:20 [Note] InnoDB: Renaming log file ./ib_logfile101 to ./ib_logfile0
150317 12:22:20 [Warning] InnoDB: New log files created, LSN=45781
150317 12:22:20 [Note] InnoDB: Doublewrite buffer not found: creating new
150317 12:22:20 [Note] InnoDB: Doublewrite buffer created
150317 12:22:20 [Note] InnoDB: 128 rollback segment(s) are active.
150317 12:22:20 [Warning] InnoDB: Creating foreign key constraint system tables.
150317 12:22:20 [Note] InnoDB: Foreign key constraint system tables created
150317 12:22:20 [Note] InnoDB: Creating tablespace and datafile system tables.
150317 12:22:20 [Note] InnoDB: Tablespace and datafile system tables created.
150317 12:22:20 [Note] InnoDB: Waiting for purge to start
150317 12:22:20 [Note] InnoDB: Percona XtraDB (http://www.percona.com) 5.6.22-72.0 started; log sequence number 0
150317 12:22:21 [Warning] Failed to load slave replication state from table mysql.gtid_slave_pos: 1146: Table 'mysql.gtid_slave_pos' doesn't exist
150317 12:22:25 [Note] InnoDB: FTS optimize thread exiting.
150317 12:22:25 [Note] InnoDB: Starting shutdown...
150317 12:22:27 [Note] InnoDB: Shutdown completed; log sequence number 1616697
OK
Filling help tables...
150317 12:22:27 [Note] InnoDB: Using mutexes to ref count buffer pool pages
150317 12:22:27 [Note] InnoDB: The InnoDB memory heap is disabled
150317 12:22:27 [Note] InnoDB: Mutexes and rw_locks use GCC atomic builtins
150317 12:22:27 [Note] InnoDB: Memory barrier is not used
150317 12:22:27 [Note] InnoDB: Compressed tables use zlib 1.2.8
150317 12:22:27 [Note] InnoDB: Using Linux native AIO
150317 12:22:27 [Note] InnoDB: Using CPU crc32 instructions
```

mysql\_install\_db\_0

```
zh@ZH-Laptop:/home/zh
文件(F) 编辑(E) 查看(V) 搜索(S) 终端(T) 帮助(H)
150317 12:22:27 [Note] InnoDB: Using Linux native AIO
150317 12:22:27 [Note] InnoDB: Using CPU crc32 instructions
150317 12:22:27 [Note] InnoDB: Initializing buffer pool, size = 128.0M
150317 12:22:27 [Note] InnoDB: Completed initialization of buffer pool
150317 12:22:27 [Note] InnoDB: Highest supported file format is Barracuda.
150317 12:22:27 [Note] InnoDB: 128 rollback segment(s) are active.
150317 12:22:27 [Note] InnoDB: Waiting for purge to start
150317 12:22:27 [Note] InnoDB: Percona XtraDB (http://www.percona.com) 5.6.22-7
2.0 started; log sequence number 1616697
150317 12:22:28 [Note] InnoDB: FTS optimize thread exiting.
150317 12:22:28 [Note] InnoDB: Starting shutdown...
150317 12:22:30 [Note] InnoDB: Shutdown completed; log sequence number 1616707
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 MariaDB root USER !
To do so, start the server, then issue the following commands:

'/usr/bin/mysqladmin' -u root password 'new-password'
'/usr/bin/mysqladmin' -u root -h ZH-Laptop password 'new-password'

Alternatively you can run:
'/usr/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 MariaDB Knowledgebase at http://mariadb.com/kb or the
MySQL manual for more instructions.

You can start the MariaDB daemon with:
cd '/usr' ; /usr/bin/mysqld_safe --datadir='/var/lib/mysql'

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

Please report any problems at http://mariadb.org/jira

The latest information about MariaDB is available at http://mariadb.org/.
You can find additional information about the MySQL part at:
http://dev.mysql.com
Support MariaDB development by buying support/new features from MariaDB
Corporation Ab. You can contact us about this at sales@mariadb.com.
Alternatively consider joining our community based development effort:
http://mariadb.com/kb/en/contributing-to-the-mariadb-project/

zh@ZH-Laptop ~ $
```

mysql\_install\_db\_1

## 2. 了解 DBMS 的用户管理。

### 1. 启动 mysqld，进行安全设置，设置 root 账户密码。

```
sudo systemctl start mysqld
mysql_secure_installation
```

```
zh@ZH-Laptop:/home/zh
文件(F) 编辑(E) 查看(V) 搜索(S) 终端(T) 帮助(H)
zh@ZH-Laptop ~ $ systemctl start mysqld
zh@ZH-Laptop ~ $ sudo mysql_secure_installation

NOTE: RUNNING ALL PARTS OF THIS SCRIPT IS RECOMMENDED FOR ALL MariaDB
SERVERS IN PRODUCTION USE! PLEASE READ EACH STEP CAREFULLY!

In order to log into MariaDB to secure it, we'll need the current
password for the root user. If you've just installed MariaDB, and
you haven't set the root password yet, the password will be blank,
so you should just press enter here.

Enter current password for root (enter for none):
OK, successfully used password, moving on...

Setting the root password ensures that nobody can log into the MariaDB
root user without the proper authorisation.

Set root password? [Y/n] y
New password:
Re-enter new password:
Password updated successfully!
Reloading privilege tables..
... Success!

By default, a MariaDB installation has an anonymous user, allowing anyone
to log into MariaDB without having to have a user account created for
them. This is intended only for testing, and to make the installation
go a bit smoother. You should remove them before moving into a
production environment.

Remove anonymous users? [Y/n] y
... Success!

Normally, root should only be allowed to connect from 'localhost'. This
ensures that someone cannot guess at the root password from the network.

Disallow root login remotely? [Y/n] y
... Success!

By default, MariaDB comes with a database named 'test' that anyone can
access. This is also intended only for testing, and should be removed
before moving into a production environment.

Remove test database and access to it? [Y/n] y
- Dropping test database...
... Success!
- Removing privileges on test database...
... Success!
```

mysql\_secure\_installation\_0

```
zh@ZH-Laptop:/home/zh
文件(F) 编辑(E) 查看(V) 搜索(S) 终端(T) 帮助(H)

Setting the root password ensures that nobody can log into the MariaDB
root user without the proper authorisation.

Set root password? [Y/n] y
New password:
Re-enter new password:
Password updated successfully!
Reloading privilege tables..
... Success!

By default, a MariaDB installation has an anonymous user, allowing anyone
to log into MariaDB without having to have a user account created for
them. This is intended only for testing, and to make the installation
go a bit smoother. You should remove them before moving into a
production environment.

Remove anonymous users? [Y/n] y
... Success!

Normally, root should only be allowed to connect from 'localhost'. This
ensures that someone cannot guess at the root password from the network.

Disallow root login remotely? [Y/n] y
... Success!

By default, MariaDB comes with a database named 'test' that anyone can
access. This is also intended only for testing, and should be removed
before moving into a production environment.

Remove test database and access to it? [Y/n] y
- Dropping test database...
... Success!
- Removing privileges on test database...
... Success!

Reloading the privilege tables will ensure that all changes made so far
will take effect immediately.

Reload privilege tables now? [Y/n] y
... Success!

Cleaning up...

All done! If you've completed all of the above steps, your MariaDB
installation should now be secure.

Thanks for using MariaDB!
zh@ZH-Laptop ~ $
```

mysql\_secure\_installation\_1

2. 编辑 my.cnf，设置自动补全，UTF-8，tmpfs 临时文件目录，时区。

```
zh@ZH-Laptop:/etc/mysql
文件(F) 编辑(E) 查看(V) 搜索(S) 终端(T) 帮助(H)

Reload privilege tables now? [Y/n] y
... Success!

Cleaning up...

All done! If you've completed all of the above steps, your MariaDB
installation should now be secure.

Thanks for using MariaDB!
zh@ZH-Laptop ~ $ sudo emacs /etc/mysql/my.cnf
emacsclient: can't find socket; have you started the server?
To start the server in Emacs, type "M-x server-start".

Warning: due to a long standing Gtk+ bug
http://bugzilla.gnome.org/show_bug.cgi?id=85715
Emacs might crash when run in daemon mode and the X11 connection is unexpectedly
lost.
Using an Emacs configured with --with-x-toolkit=luclid does not have this problem
.
Starting Emacs daemon.
Emacs daemon should have started, trying to connect again
zh@ZH-Laptop ~ $ cd /etc/myqsc/
bash: cd: /etc/myqsc/: 没有那个文件或目录
zh@ZH-Laptop ~ :( $ cd /etc/mysql/
zh@ZH-Laptop /etc/mysql $ ll
总用量 8
-rw-r--r-- 1 root root 4916 3月  7 21:55 my.cnf
zh@ZH-Laptop /etc/mysql $ sudo emacs my.cnf
zh@ZH-Laptop /etc/mysql $ ll
总用量 16
-rw-r--r-- 1 root root 4916 3月  7 21:55 my.cnf~
-rw-r--r-- 1 root root 4913 3月 17 12:32 my.cnf
zh@ZH-Laptop /etc/mysql $ sudo mv my.cnf~ my.cnf.zhbak
zh@ZH-Laptop /etc/mysql $ sudo emacs my.cnf
zh@ZH-Laptop /etc/mysql $ mkdir -pv /var/lib/mysql/tmp
mkdir: 无法创建目录"/var/lib/mysql": 权限不够
zh@ZH-Laptop /etc/mysql :( $ sudo mkdir -pv /var/lib/mysql/tmp
[sudo] zh 的密码:
对不起, 请重试。
[sudo] zh 的密码:
mkdir: 已创建目录 "/var/lib/mysql/tmp"
zh@ZH-Laptop /etc/mysql $ sudo chown mysql:mysql /var/lib/myqsc/tmp
chown: 无法访问"/var/lib/myqsc/tmp": 没有那个文件或目录
zh@ZH-Laptop /etc/mysql :( $ sudo chown mysql:mysql /var/lib/mysql/tmp
zh@ZH-Laptop /etc/mysql $ id mysql
uid=89(mysql) gid=89(mysql) 组=89(mysql)
zh@ZH-Laptop /etc/mysql $ sudo emacs /etc/fstab
zh@ZH-Laptop /etc/mysql $ sudo mv /etc/fstab~ /etc/fstab.zhbak
zh@ZH-Laptop /etc/mysql $ sudo emacs /etc/mysql/my.cnf
```

my\_cnf

### 3. 创建非 root 用户。

```
zh@ZH-Laptop:/home/zh
文件(F) 编辑(E) 查看(V) 搜索(S) 终端(T) 帮助(H)

zh@ZH-Laptop ~ $ mysql -u root -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 4
Server version: 10.0.17-MariaDB-log MariaDB Server

Copyright (c) 2000, 2015, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> CREATE USER 'zh'@'localhost' IDENTIFIED BY ' ';
Query OK, 0 rows affected (0.00 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON *.* TO 'zh'@'localhost'
-> WITH GRANT OPTION;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that
corresponds to your MariaDB server version for the right syntax to use near 'PRI
VILEGES ON *.* TO 'zh'@'localhost'
WITH GRANT OPTION' at line 1
MariaDB [(none)]> GRANT ALL PRIVILEGES ON *.* TO 'zh'@'localhost' WITH GRANT OP
TION;
Query OK, 0 rows affected (0.00 sec)

MariaDB [(none)]> quit
```

create\_user

### 3. 熟悉交互界面的基本交互命令。

创建测试数据库、表、数据。

```
zh@ZH-Laptop:/home/zh
文件(F) 编辑(E) 查看(V) 搜索(S) 终端(T) 帮助(H)
zh@ZH-Laptop ~ $ mysql -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 6
Server version: 10.0.17-MariaDB-log MariaDB Server

Copyright (c) 2000, 2015, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> CREATE DATABASE test;
Query OK, 1 row affected (0.00 sec)

MariaDB [(none)]> USE test;
Database changed
MariaDB [test]> CREATE TABLE test (key VARCHAR(20), value VARCHAR(20));
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that
corresponds to your MariaDB server version for the right syntax to use near 'VAR
CHAR(20), value VARCHAR(20))' at line 1
MariaDB [test]> CREATE TABLE test (name VARCHAR(20), value VARCHAR(20));
Query OK, 0 rows affected (0.33 sec)

MariaDB [test]> INSERT INTO test VALUES ('zh', 'zhanghai');
Query OK, 1 row affected (0.06 sec)

MariaDB [test]> SELECT * FROM test WHERE name LIKE '%z%';
+-----+-----+
| name | value |
+-----+-----+
| zh   | zhanghai |
+-----+-----+
1 row in set (0.05 sec)

MariaDB [test]> exit;
Bye
zh@ZH-Laptop ~ $
```

create\_table

4. 熟悉图形界面的功能和操作。

1. 安装 mysql-workbench 软件包。

```
sudo pacman -S mysql-workbench
```

```

zh@ZH-Laptop:/home/zh
文件(F) 编辑(E) 查看(V) 搜索(S) 终端(T) 帮助(H)
zh@ZH-Laptop ~ : ( $ sudo pacman -S mysql-workbench
正在解决依赖关系...
正在查找软件包冲突...

软件包 (21) cfitsio-3.370-3 ctemplate-2.3-2 gdal-1.11.2-2 geos-3.4.2-2
hdf5-1.8.14-1 libantlr3c-3.4-1 libfreexl-1.0.0g-2
libgeotiff-1.4.1-2 libiodbc-3.52.9-2 libspatialite-4.2.0-2
libzip-0.11.2-1 mysql-connector-c++-1.1.5-3
mysql-python-1.2.5-1 netcdf-4.3.3.1-1 proj-4.9.1-1
python2-ecdsa-0.13-1 python2-paramiko-1.15.2-1
python2-pexpect-3.3-1 tinymce-2.6.2-3 vsqlite++-0.3.13-3
mysql-workbench-6.2.5-1

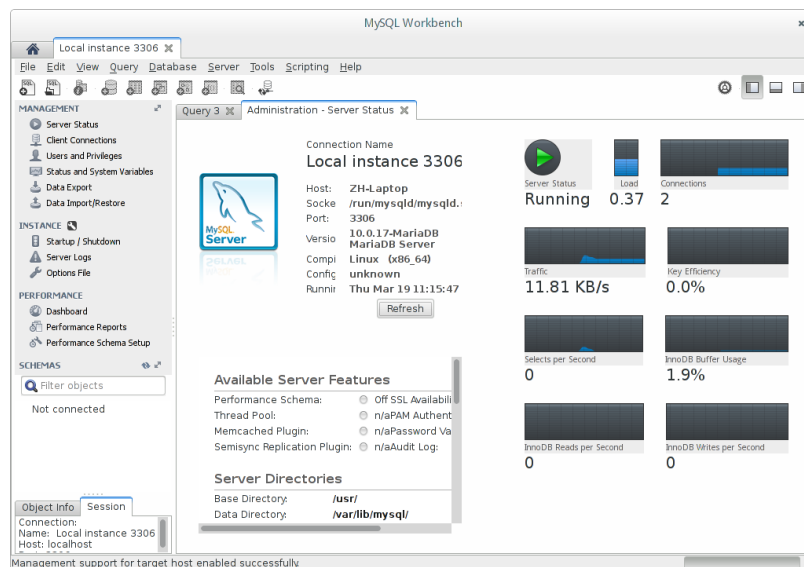
下载大小: 15.79 MiB
全部安装大小: 153.70 MiB

:: 进行安装吗? [Y/n]
:: 正在获取软件包.....
libspatialite-4.2.0... 1002.2 KiB 155K/s 00:06 [#####] 100%
gdal-1.11.2-2-x86_64 4.5 MiB 152K/s 00:30 [#####] 100%
tinymce-2.6.2-3-x86_64 49.7 KiB 325K/s 00:00 [#####] 100%
libiodbc-3.52.9-2-x... 157.0 KiB 138K/s 00:01 [#####] 100%
mysql-connector-c+... 304.6 KiB 175K/s 00:02 [#####] 100%
vsqlite++-0.3.13-... 48.7 KiB 333K/s 00:00 [#####] 100%
libantlr3c-3.4-1-x86_64 86.2 KiB 231K/s 00:00 [#####] 100%
mysql-workbench-6.2... 9.7 MiB 122K/s 01:21 [#####] 100%
(21/21) 正在检查密钥环里的密钥 [#####] 100%
(21/21) 正在检查软件包完整性 [#####] 100%
(21/21) 正在加载软件包文件 [#####] 100%
(21/21) 正在检查文件冲突 [#####] 100%
(21/21) 正在检查可用硬盘空间 [#####] 100%
( 1/21) 正在安装 libzip [#####] 100%
( 2/21) 正在安装 ctemplate [#####] 100%
( 3/21) 正在安装 python2-ecdsa [#####] 100%
( 4/21) 正在安装 python2-paramiko [#####] 100%
( 5/21) 正在安装 python2-pexpect [#####] 100%
( 6/21) 正在安装 geos [#####] 100%

```

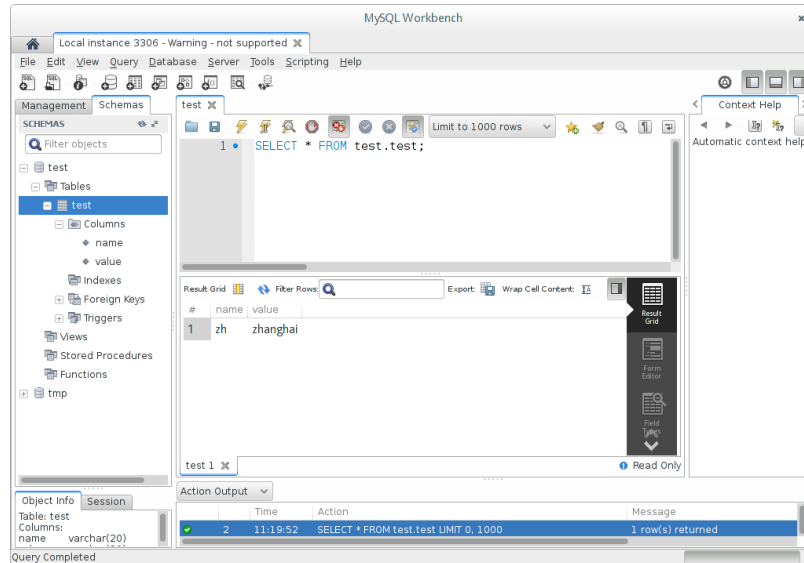
pacman\_mysql\_workbench

## 2. 使用图形界面



workbench\_status

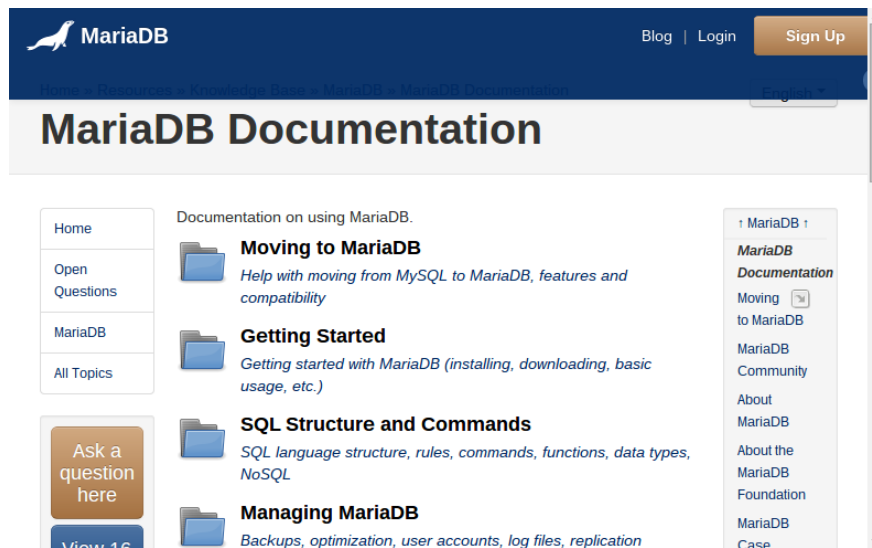




workbench\_schema

5. 了解基本的 DBMS 管理功能和操作。

阅读 [MariaDB Documentation - MariaDB Knowledge Base](#) 及 [MySQL :: MySQL 5.7 Reference Manual](#)。



MariaDB Documentation - MariaDB Knowledge Base

6. 熟悉在线帮助系统的使用。

熟悉 [MariaDB Documentation - MariaDB Knowledge Base](#) 及 [MySQL :: MySQL 5.7 Reference Manual](#)。

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## MySQL 5.7 Reference Manual

Preface and Legal Notices »

### MySQL 5.7 Reference Manual

**Abstract**

This is the MySQL™ Reference Manual. It documents MySQL 5.7 through 5.7.8.

MySQL Cluster is currently not supported in MySQL 5.7. For information about MySQL Cluster, please see [MySQL Cluster NDB 7.3](#) and [MySQL Cluster NDB 7.4](#).

**MySQL 5.7 features.** This manual describes features that are not included in every edition of MySQL 5.7; such features may not be included in the edition of MySQL 5.7 licensed to you. If you have any questions about the features included in your edition of MySQL 5.7, refer to your MySQL 5.7

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  - 4 MySQL Programs
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  - 7 Backup and Recovery
  - 8 Optimization
  - 9 Language Structure
  - 10 Globalization
  - 11 Data Types
  - 12 Functions and Operators

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MySQL :: MySQL 5.7 Reference Manual