

# Лабораторная работа №6

Установка и настройка системы управления базами данных MariaDB

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## Вводная часть

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Приобретение практических навыков по установке и конфигурированию системы управления базами данных на примере программного обеспечения MariaDB.

1. Установите необходимые для работы MariaDB пакеты.
2. Настройте в качестве кодировки символов по умолчанию utf8 в базах данных.
3. В базе данных MariaDB создайте тестовую базу addressbook, содержащую таблицу city с полями name и city, т.е., например, для некоторого сотрудника указан город, в котором он работает.
4. Создайте резервную копию базы данных addressbook и восстановите из неё данные.
5. Напишите скрипт для Vagrant, фиксирующий действия по установке и настройке базы данных MariaDB во внутреннем окружении виртуальной машины server.  
Соответствующим образом внести изменения в Vagrantfile.

## Выполнение лабораторной работы

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```
root@server:~  
[eademidova@server.eademidova.net ~]$ sudo -i  
[sudo] password for eademidova:  
[root@server.eademidova.net ~]# dnf -y install mariadb mariadb-server  
Rocky Linux 9 - BaseOS                2.4 kB/s | 4.1 kB  00:01  
Rocky Linux 9 - AppStream             12 kB/s | 4.5 kB  00:00  
Rocky Linux 9 - Extras                 7.6 kB/s | 2.9 kB  00:00  
Dependencies resolved.  
=====
```

Package	Arch	Version	Repository	Size
Installing:				
mariadb	x86_64	3:10.5.22-1.el9_2	appstream	1.6 M
mariadb-server	x86_64	3:10.5.22-1.el9_2	appstream	9.6 M
Installing dependencies:				
mariadb-common	x86_64	3:10.5.22-1.el9_2	appstream	27 k
mariadb-connector-c	x86_64	3.2.6-1.el9_0	appstream	195 k
mariadb-connector-c-config	noarch	3.2.6-1.el9_0	appstream	9.8 k
mariadb-errmsg	x86_64	3:10.5.22-1.el9_2	appstream	211 k
mysql-selinux	noarch	1.0.5-1.el9_0	appstream	35 k
perl-DBD-MariaDB	x86_64	1.21-16.el9_0	appstream	151 k
perl-Sys-Hostname	x86_64	1.23-480.el9	appstream	17 k
Installing weak dependencies:				
mariadb-backup	x86_64	3:10.5.22-1.el9_2	appstream	6.4 M
mariadb-gssapi-server	x86_64	3:10.5.22-1.el9_2	appstream	15 k
mariadb-server-utils	x86_64	3:10.5.22-1.el9_2	appstream	210 k

```
Transaction Summary  
=====
```

Transaction Summary	
Install	12 Packages
Total download size: 18 M	
Installed size: 109 M	

Рис. 1: Установка пакетов для MariaDB

Для запуска и включения программного обеспечения mariadb используем:

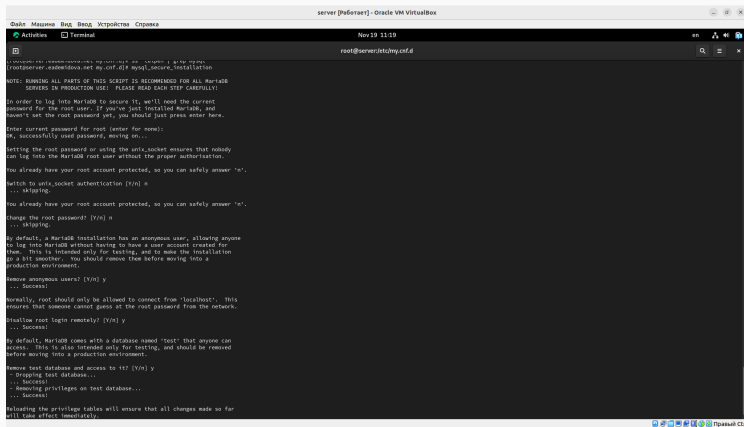
```
systemctl start mariadb  
systemctl enable mariadb
```

Убедимся, что mariadb прослушивает порт:

```
>
[root@server.eademidova.net my.cnf.d]# ss -tulpen | grep mariadb
tcp    LISTEN 0      80          *:3306      *:*        users:((("mariadb",pid=10251,fd=15
)) uid:27 ino:51074 sk:15 cgroup:/system.slice/mariadb.service v6only:0 <->
```

Рис. 2: Проверка прослушивания порта 3306





```
server [Ru60raet] - Oracle VM VirtualBox
Файл Настройка Вид Выход Устройства Справка
Activities Terminal Nov 19 11:19
root@server:~# mysql_secure_installation

[WARNING] The root user has an empty password, which is not recommended.
[WARNING] rootserver.nadentdova.net my.cnf.d# 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
haven't set the root password yet, you should just press enter here.

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

Letting the root password or using the unix_socket ensures that nobody
can log into the MariaDB root user without the proper authorization.

You already have your root account protected, so you can safely answer 'n'.

Switch to unix_socket authentication [Y/n] n
... skipping.

You already have your root account protected, so you can safely answer 'n'.

Change the root password? [Y/n] n
... skipping.

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.

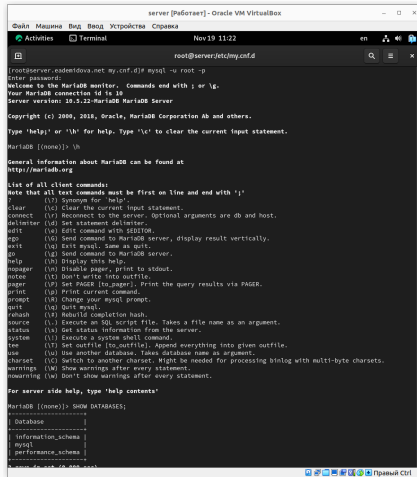
Disallow root login remotely? [Y/n] y
... Success!

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.
```

Рис. 3: Конфигурация безопасности mariadb



```
server [Работает] - Oracle VM VirtualBox
Файл  Машина  Вид  Ввод  Устройства  Справка
Terminal Nov 19 11:22 en
root@server/etc/my.cnf.d

[root@server.eadendova.net my.cnf.d]# mysql -u root -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 10
Server version: 10.5.22-MariaDB MariaDB Server

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

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

MariaDB [(none)]> \h

General information about MariaDB can be found at
http://mariadb.org

List of all client commands:
Note that all text commands must be first on line and end with '\n'.
?      (?) Synonym for 'help'.
clear  (c) Clear the current input statement.
connect (r) Reconnect to the server. Optional arguments are db and host.
delimiter (d) Set statement delimiter.
edit    (e) Edit command with $EDITOR.
ego     (G) Send command to MariaDB server, display result vertically.
exit    (q) Exit mysql. Same as quit.
go      (g) Send command to MariaDB server.
help    (h) Display this help.
nopager (N) Disable pager, print to stdout.
note    (t) Don't write into outfile.
pager   (P) Set PAGER [to_pager]. Print the query results via PAGER.
print   (p) Print current command.
prompt  (P) Change your mysql prompt.
quit    (q) Quit mysql.
rehash  (r) Rebuild completion hash.
source  (s) Execute an SQL script file. Takes a file name as an argument.
status  (s) Get status information from the server.
system  (s) Execute a system shell command.
tee     (T) Set outfile [to_outfile]. Append everything into given outfile.
use     (u) Use another database. Takes database name as argument.
charset (C) Switch to another charset. Might be needed for processing binlog with multi-byte charsets.
warnings (W) Show warnings after every statement.
nowarning (w) Don't show warnings after every statement.

For server side help, type 'help contents'

MariaDB [(none)]> SHOW DATABASES;
+-----+
| Database |
+-----+
| information_schema |
| mysql      |
| performance_schema |
+-----+
```

Рис. 4: Списки команд MySQL и баз данных

# Конфигурация кодировки символов

```
bye
[root@server.eademidova.net my.cnf.d]# mysql -u root -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 11
Server version: 10.5.22-MariaDB MariaDB Server

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

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

MariaDB [(none)]> status
-----
mysql Ver 15.1 Distrib 10.5.22-MariaDB, for Linux (x86_64) using EditLine wrapper

Connection id:          11
Current database:
Current user:            root@localhost
SSL:                     Not in use
Current pager:           stdout
Using outfile:           ''
Using delimiter:         ;
Server:                  MariaDB
Server version:          10.5.22-MariaDB MariaDB Server
Protocol version:        10
Connection:              Localhost via UNIX socket
Server characterset:     latin1
Db      characterset:     latin1
Client characterset:     utf8
Conn.  characterset:     utf8
UNIX socket:              /var/lib/mysql/mysql.sock
Uptime:                  1 hour 40 min 54 sec

Threads: 1  Questions: 21  Slow queries: 0  Opens: 20  Open tables: 13  Queries per second avg: 0.003
-----
MariaDB [(none)]>
```

Рис. 5: Статус MariaDB

## Конфигурация кодировки символов

В каталоге `/etc/my.cnf.d` создадим файл `utf8.cnf`:

```
cd /etc/my.cnf.d  
touch utf8.cnf
```

Откроем его на редактирование и укажем в нём следующую конфигурацию:

```
[client]  
default-character-set = utf8  
[mysqld]  
character-set-server = utf8
```

Перезапустим MariaDB:

```
systemctl restart mariadb
```

# Конфигурация кодировки символов

```
[root@server.leademidova.net my.cnf.d]# systemctl restart mariadb
[root@server.leademidova.net my.cnf.d]# mysql -u root -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 3
Server version: 10.5.22-MariaDB MariaDB Server

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

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

MariaDB [(none)]> status
-----
mysql Ver 15.1 Distrib 10.5.22-MariaDB, for Linux (x86_64) using EditLine wrapper

Connection id:          3
Current database:
Current user:           root@localhost
SSL:                    Not in use
Current pager:          stdout
Using outfile:          ''
Using delimiter:        ;
Server:                 MariaDB
Server version:         10.5.22-MariaDB MariaDB Server
Protocol version:       10
Connection:             Localhost via UNIX socket
Server characterset:    utf8
Db characterset:        utf8
Client characterset:    utf8
Conn. characterset:     utf8
UNIX socket:            /var/lib/mysql/mysql.sock
Uptime:                 14 sec

Threads: 1  Questions: 4  Slow queries: 0  Opens: 17  Open tables: 10  Queries per second avg: 0.285
-----
MariaDB [(none)]>
```

Рис. 6: Статус MariaDB после добавления конфигураций

```

-- version for the right syntax to use near '000-addressbook' at line 1
MariaDB [(none)]> CREATE DATABASE addressbook CHARACTER SET utf8 COLLATE utf8_general_ci;
Query OK, 1 row affected (0.000 sec)

MariaDB [(none)]> USE addressbook;
Database changed
MariaDB [addressbook]> SHOW TABLES;
Empty set (0.000 sec)

MariaDB [addressbook]> CREATE TABLE city(name VARCHAR(40), city VARCHAR(40));
Query OK, 0 rows affected (0.010 sec)

MariaDB [addressbook]> INSERT INTO city(name,city) VALUES ('Иванов','Москва');
Query OK, 1 row affected (0.008 sec)

MariaDB [addressbook]> INSERT INTO city(name,city) VALUES ('Петров','Сочи');
Query OK, 1 row affected (0.009 sec)

MariaDB [addressbook]> INSERT INTO city(name,city) VALUES ('Сидоров','Дубна');
Query OK, 1 row affected (0.008 sec)

MariaDB [addressbook]> SELECT * FROM city;
+-----+-----+
| name      | city      |
+-----+-----+
| Иванов    | Москва    |
| Петров    | Сочи      |
| Сидоров   | Дубна     |
+-----+-----+
3 rows in set (0.000 sec)

MariaDB [addressbook]> 
```

Рис. 7: Содержимое таблицы city в базе данных addressbook

```
MariaDB [addressbook]> CREATE USER eademidova@%' IDENTIFIED BY '123456';
Query OK, 0 rows affected (0.010 sec)

MariaDB [addressbook]> GRANT SELECT,INSERT,UPDATE,DELETE ON addressbook.* TO eademidova@'%';
Query OK, 0 rows affected (0.009 sec)

MariaDB [addressbook]> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.001 sec)

MariaDB [addressbook]> DESCRIBE city;
+-----+-----+-----+-----+-----+-----+
| Field | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| name  | varchar(40)   | YES  |     | NULL    |       |
| city  | varchar(40)   | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
2 rows in set (0.001 sec)

MariaDB [addressbook]> quit
```

Рис. 8: Создание пользователя и предоставление ему прав для работы с addressbook

```
Bye
[root@server.eademidova.net my.cnf.d]# mysqlshow -u root -p
Enter password:
+-----+
| Databases |
+-----+
| addressbook |
| information_schema |
| mysql |
| performance_schema |
+-----+
[root@server.eademidova.net my.cnf.d]# mysqlshow -u root -p addressbook
Enter password:
Database: addressbook
+-----+
| Tables |
+-----+
| city |
+-----+
[root@server.eademidova.net my.cnf.d]#
```

Рис. 9: Просмотр списка баз данных и таблиц базы данных addressbook



```
-----+
root@server.eademidova.net my.cnf.d]# mkdir -p /var/backup
root@server.eademidova.net my.cnf.d]# mysqldump -u root -p addressbook > /var/backup/addressbook.sql
Enter password:
root@server.eademidova.net my.cnf.d]# mysqldump -u root -p addressbook | gzip > /var/backup/addressbook.sql.gz
Enter password:
root@server.eademidova.net my.cnf.d]# mysqldump -u root -p addressbook | gzip > $(date+var/backup/addressbook.%
Y%m%d.%H%M%S.sql.gz)↵
bash: date+var/backup/addressbook.%Y%m%d.%H%M%S.sql.gz: No such file or directory
Enter password:
root@server.eademidova.net my.cnf.d]# mysqldump -u root -p addressbook | gzip > $(date+var/backup/addressbook.%
Y%m%d.%H%M%S.sql.gz)
bash: date+var/backup/addressbook.%Y%m%d.%H%M%S.sql.gz: No such file or directory
bash: $(date+var/backup/addressbook.%Y%m%d.%H%M%S.sql.gz): ambiguous redirect
Enter password:
mysqldump: Got errno 32 on write
root@server.eademidova.net my.cnf.d]# mysqldump -u root -p addressbook | gzip > $(date+ /var/backup/addressbook.
Y%m%d.%H%M%S.sql.gz)
Enter password: bash: date+: command not found...
similar command is: 'date'
bash: $(date+ /var/backup/addressbook.%Y%m%d.%H%M%S.sql.gz): ambiguous redirect

mysqldump: Got errno 32 on write
root@server.eademidova.net my.cnf.d]# mysqldump -u root -p addressbook | gzip > $(date+var/backup/addressbook.%
Y%m%d.%H%M%S.sql.gz)
bash: date+var/backup/addressbook.%Y%m%d.%H%M%S.sql.gz: No such file or directory
bash: $(date+var/backup/addressbook.%Y%m%d.%H%M%S.sql.gz): ambiguous redirect
Enter password:
mysqldump: Got errno 32 on write
root@server.eademidova.net my.cnf.d]# mysqldump -u root -p addressbook | gzip > $(date+var/backup/addressbook.
Y%m%d.%H%M%S.sql.gz)
Enter password:
root@server.eademidova.net my.cnf.d]# mysql -u root -p addressbook < /var/backup/addressbook.sql
Enter password:
root@server.eademidova.net my.cnf.d]# zcat /var/backup/addressbook.sql.gz | mysql -u root -p addressbook
Enter password:
root@server.eademidova.net my.cnf.d]#
```

# Внесение изменений в настройки внутреннего окружения виртуальной машины

```
Enter password:
[root@server.eademidova.net my.cnf.d]# cd /vagrant/provision/server
[root@server.eademidova.net server]# mkdir -p /vagrant/provision/server/mysql/etc/my.cnf.d
[root@server.eademidova.net server]# mkdir -p /vagrant/provision/server/mysql/var/backup
[root@server.eademidova.net server]# cp -R /etc/my.cnf.d/utf8.cnf /vagrant/provision/server/mysql/etc/my.cnf.d/
[root@server.eademidova.net server]# cp -R /var/backup/* /vagrant/provision/server/mysql/var/backup/
[root@server.eademidova.net server]# touch mysql.sh
[root@server.eademidova.net server]# chmod +x mysql.sh
[root@server.eademidova.net server]#
```

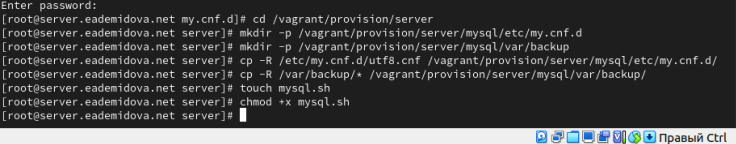
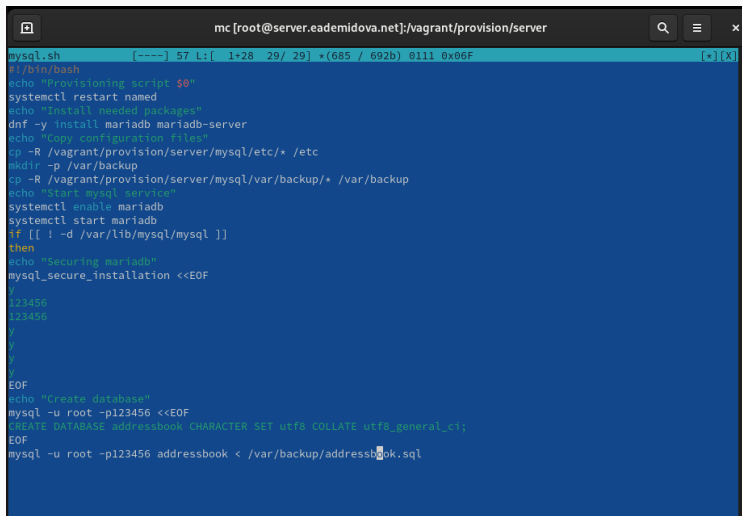


Рис. 11: Создание окружения для внесения изменений в настройки окружающей среды

# Внесение изменений в настройки внутреннего окружения виртуальной машины



```
mysql.sh [----] 57 L: [ 1+28 29/ 29] *(685 / 692b) 0111 0x06F [*][X]
#!/bin/bash
echo "Provisioning script $0"
systemctl restart named
echo "Install needed packages"
dnf -y install mariadb mariadb-server
echo "Copy configuration files"
cp -R /vagrant/provision/server/mysql/etc/* /etc
mkdir -p /var/backup
cp -R /vagrant/provision/server/mysql/var/backup/* /var/backup
echo "Start mysql service"
systemctl enable mariadb
systemctl start mariadb
if [[ ! -d /var/lib/mysql/mysql ]]
then
echo "Securing mariadb"
mysql_secure_installation <<EOF
Y
123456
123456
Y
Y
Y
Y
EOF
echo "Create database"
mysql -u root -p123456 <<EOF
CREATE DATABASE addressbook CHARACTER SET utf8 COLLATE utf8_general_ci;
EOF
mysql -u root -p123456 addressbook < /var/backup/addressbook.sql
```

Рис. 12: Содержание mysql.sh

```
70     path: "provision/server/http.sh"
71   server.vm.provision "server mysql",
72     type: "shell",
73     preserve_order: true,
74     path: "provision/server/mysql.sh"
75   end
76 end
77
```

Рис. 13: Изменение файла Vagrantfile

## Заключение

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В результате выполнения данной работы были приобретены практические навыки по установке и конфигурированию системы управления базами данных на примере программного обеспечения MariaDB.