

# Лабораторная работа

Номер 6

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# Информация

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

```
C:\Users\denis>cd C:\work_asp\dmmosharov\vagrant

C:\work_asp\dmmosharov\vagrant>vagrant up server
Bringing machine 'server' up with 'virtualbox' provider...
==> server: You assigned a static IP ending in ".1" or ":1" to this machine.
==> server: This is very often used by the router and can cause the
==> server: network to not work properly. If the network doesn't work
==> server: properly, try changing this IP.
==> server: You assigned a static IP ending in ".1" or ":1" to this machine.
==> server: This is very often used by the router and can cause the
==> server: network to not work properly. If the network doesn't work
==> server: properly, try changing this IP.
==> server: Clearing any previously set forwarded ports...
==> server: Clearing any previously set network interfaces...
==> server: Preparing network interfaces based on configuration...
    server: Adapter 1: nat
    server: Adapter 2: intnet
==> server: Forwarding ports...
    server: 22 (guest) => 2222 (host) (adapter 1)
==> server: Running 'pre-boot' VM customizations...
==> server: Booting VM...
==> server: Waiting for machine to boot. This may take a few minutes...
    server: SSH address: 127.0.0.1:2222
    server: SSH username: vagrant
    server: SSH auth method: password
```

**Рис. 1:** Запуск сервера

# Установка пакета

```
root@server:~# sudo -i

[root@server.dnsmosharov.net ~]# dnf -y install mariadb mariadb-server
Last metadata expiration check: 2:50:54 ago on Tue 27 Jan 2026 02:03:08 PM UTC.
Dependencies resolved.
=====
Package                Arch      Version      Repository    Size
=====
Installing:
mariadb                x86_64    3:10.11.15-1.el10_1  appstream    1.6 M
mariadb-server         x86_64    3:10.11.15-1.el10_1  appstream    10 M
Installing dependencies:
mariadb-common         noarch    3:10.11.15-1.el10_1  appstream     35 k
mariadb-errmsg         noarch    3:10.11.15-1.el10_1  appstream    262 k
mysql-selinux         noarch    1.0.14-1.el10_0      appstream     37 k
perl-DBD-MariaDB      x86_64    1.23-10.el10         appstream    154 k
perl-Sys-Hostname     x86_64    1.25-512.2.el10_0    appstream     17 k
Installing weak dependencies:
mariadb-backup         x86_64    3:10.11.15-1.el10_1  appstream     6.5 M
mariadb-client-utils   x86_64    3:10.11.15-1.el10_1  appstream     39 k
mariadb-gssapi-server  x86_64    3:10.11.15-1.el10_1  appstream     17 k
mariadb-server-utils   x86_64    3:10.11.15-1.el10_1  appstream    261 k

Transaction Summary
=====
Install 11 Packages

Total download size: 19 M
Installed size: 124 M
Downloading Packages:
1-3/11: mariadb-10.11.1 0% | 1 --- B/s | 0 B --- ETA
```

Рис. 2: Установка пакета

```
GNU nano 8.1 /etc/my.cnf
#
# This group is read both both by the client and the server
# use it for options that affect everything
#
[client-server]

#
# include all files from the config directory
#
!includedir /etc/my.cnf.d
```

Рис. 3: /etc/my.cnf



```
GNU nano 8.1 auth_gssapi.cnf
[mariadb]
#plugin-load-add=auth_gssapi.so
```

**Рис. 4:** auth\_gssapi.cnf



```
GNU nano 2.1 mariadb-server.cnf
#
# These groups are read by MariaDB server.
# Use it for options that only the server (but not clients) should see
#
# See the examples of server my.cnf files in /usr/share/mysql/
#

# this is read by the standalone daemon and embedded servers
[server]

# this is only for the mysqld standalone daemon
# Settings user and group are ignored when systemd is used.
# If you need to run mysqld under a different user or group,
# customize your systemd unit file for mysqld/mariadb according to the
# instructions in http://fedoraproject.org/wiki/Systemd

[mysqld]
datadir=/var/lib/mysql
socket=/var/lib/mysql/mysql.sock
log-error=/var/log/mariadb/mariadb.log
pid-file=/run/mariadb/mariadb.pid


#
# * Galera-related settings
#
[galera]
# Mandatory settings
wsrep_on=ON
wsrep_provider=
wsrep_cluster_address=
binlog_format=row
default_storage_engine=InnoDB
innodb_autoinc_lock_mode=2
#
# Allow server to accept connections on all interfaces.
#
#bind-address=0.0.0.0
#
# Optional setting
wsrep_slave_threads=1
innodb_flush_log_at_trx_commit=0

# this is only for embedded server
```

**Рис. 5:** mariadb-server.cnf

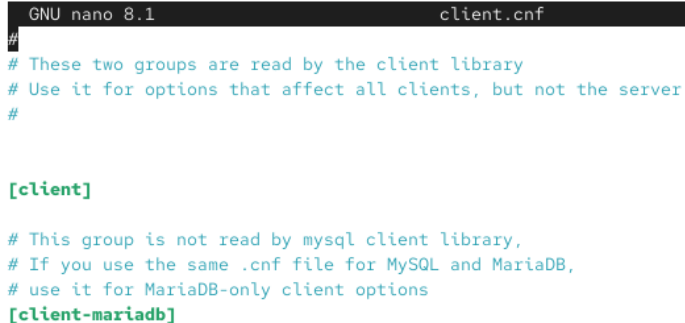
```
GNU nano 8.1 provider_lz4.cnf
[server]
plugin_load_add=provider_lz4
provider_lz4=force_plus_permanent
```

**Рис. 6:** provider\_lz4.cnf

A screenshot of a terminal window showing the GNU nano 8.1 text editor editing the spider.cnf file. The editor's title bar is black with white text. The content of the file is as follows:

```
GNU nano 8.1 spider.cnf
[mariadb]
#
# Uncomment line to enable
#
#plugin-load-add = ha_spider
# Read more at https://mariadb.com/kb/en/spider/
```

**Рис. 7:** spider.cnf



```
GNU nano 8.1 client.cnf
#
# These two groups are read by the client library
# Use it for options that affect all clients, but not the server
#

[client]

# This group is not read by mysql client library,
# If you use the same .cnf file for MySQL and MariaDB,
# use it for MariaDB-only client options
[client-mariadb]
```

**Рис. 8:** client.cnf

```
GNU nano 8.1          mysql-clients.cnf
#
# These groups are read by MariaDB command-line tools
# Use it for options that affect only one utility
#

[mysql]

[mysql_upgrade]

[mysqladmin]

[mysqlbinlog]

[mysqlcheck]

[mysqldump]

[mysqlimport]

[mysqlshow]

[mysqlslap]
```

**Рис. 9:** mysql-clients.cnf

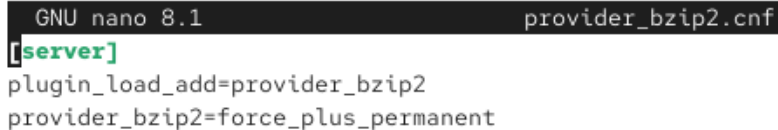
```
GNU nano 8.1 provider_lzo.cnf
[server]
plugin_load_add=provider_lzo
provider_lzo=force_plus_permanent
```

**Рис. 10:** provider\_lzo.cnf

# enable\_encryption.preset

```
GNU nano 8.1      enable_encryption.preset
#
# !include this file into your my.cnf (or any of *.cnf files in /etc/my.cnf.d)
# and it will enable data at rest encryption. This is a simple way to
# ensure that everything that can be encrypted will be and your
# data will not leak unencrypted.
#
# DO NOT EDIT THIS FILE! On MariaDB upgrades it might be replaced with a
# newer version and your edits will be lost. Instead, add your edits
# to the .cnf file after the !include directive.
#
# NOTE that you also need to install an encryption plugin for the encryption
# to work. See https://mariadb.com/kb/en/mariadb/data-at-rest-encryption/#encryption-key
#
[mariadb]
aria-encrypt-tables
encrypt-binlog
encrypt-tmp-disk-tables
encrypt-tmp-files
loose-innodb-encrypt-log
loose-innodb-encrypt-tables
```

**Рис. 11:** enable\_encryption.preset

A screenshot of a terminal window showing the GNU nano 8.1 text editor editing the file provider\_bzip2.cnf. The editor's status bar at the top shows "GNU nano 8.1" on the left and "provider\_bzip2.cnf" on the right. The main text area contains the following configuration: a section header "[server]" in green, followed by two lines of configuration: "plugin\_load\_add=provider\_bzip2" and "provider\_bzip2=force\_plus\_permanent".

```
GNU nano 8.1 provider_bzip2.cnf
[server]
plugin_load_add=provider_bzip2
provider_bzip2=force_plus_permanent
```

**Рис. 12:** provider\_bzip2.cnf



```
GNU nano 8.1 provider_snappy.cnf
[server]
plugin_load_add=provider_snappy
provider_snappy=force_plus_permanent
```

**Рис. 13:** provider\_snappy.cnf

# Запуск mariadb

```
[root@server.dmmosharov.net my.cnf.d]# systemctl start mariadb
[root@server.dmmosharov.net my.cnf.d]# systemctl enable mariadb
Created symlink '/etc/systemd/system/mysql.service' → '/usr/lib/systemd/system/mariadb.service'.
Created symlink '/etc/systemd/system/mysqld.service' → '/usr/lib/systemd/system/mariadb.service'.
Created symlink '/etc/systemd/system/multi-user.target.wants/mariadb.service' → '/usr/lib/systemd/system/mariadb.service'.
[root@server.dmmosharov.net my.cnf.d]# ss -tulpen | grep mysql
[root@server.dmmosharov.net my.cnf.d]# ss -tulpen | grep maria
tcp    LISTEN 0      80                               0.0.0.0:3306              0.0.0.0:*
users:((("mariadb",pid=111716,fd=20))
                                uid:27 ino:1435582 sk:2025 cgroup:/system.slice/mariadb.service <->
tcp    LISTEN 0      80                               [::]:3306                [::]:*
users:((("mariadb",pid=111716,fd=21))
                                uid:27 ino:1435583 sk:202e cgroup:/system.slice/mariadb.service v6only:1 <->
[root@server.dmmosharov.net my.cnf.d]# █
```

**Рис. 14:** Запуск mariadb

```
[root@server.dmosharov.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...

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

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

Switch to unix_socket authentication [Y/n] y
Enabled successfully!
Reloading privilege tables..
... Success!

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

Change the 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!
```

**Рис. 15:** Настройка БД

```
[root@server.dmsosharov.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 13
Server version: 10.11.15-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 ';'
?          (\?) Synonym for 'help'.
charset    (\C) Switch to another charset. Might be needed for processing binlog with mult
i-byte charsets.
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        (\E) 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.
notee      (\t) Don't write into outfile.
nowarning  (\w) Don't show warnings after every statement.
pager      (\P) Set PAGER [to_pager]. Print the query results via PAGER.
print      (\p) Print current command.
prompt     (\R) Change your mysql prompt.
quit       (\q) Quit mysql.
rehash     (\R) Rebuild completion hash.
sandbox    (\-) Disallow commands that access the file system (except \P without an argue
nt and \e).
source     (\.) Execute an SQL script file. Takes a file name as an argument.
status     (\s) Get status information from the server.
system     (\!) 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.
```

**Рис. 16:** Подключение к БД

```
MariaDB [(none)]> SHOW DATABASES;
```

```
+-----+  
| Database          |  
+-----+  
| information_schema |  
| mysql             |  
| performance_schema |  
| sys               |  
+-----+
```

```
4 rows in set (0.000 sec)
```

```
MariaDB [(none)]> exit;
```

```
Bye
```

```
[root@server.dmmosharov.net my.cnf.d]# █
```

**Рис. 17:** Списки БД

```
[root@server.dmosharov.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 14
Server version: 10.11.15-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 10.11.15-MariaDB, for Linux (x86_64) using Editline wrapper

Connection id:          14
Current database:
Current user:            root@localhost
SSL:                    Not in use
Current pager:           stdout
Using outfile:           ''
Using delimiter:         ;
Server:                  MariaDB
Server version:          10.11.15-MariaDB MariaDB Server
Protocol version:        10
Connection:              Localhost via UNIX socket
Server characterset:     latin1
Db characterset:         latin1
Client characterset:     utf8mb3
Conn. characterset:      utf8mb3
UNIX socket:             /var/lib/mysql/mysql.sock
Uptime:                  4 min 57 sec

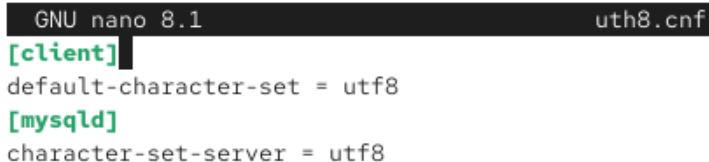
Threads: 1  Questions: 27  Slow queries: 0  Opens: 20  Open tables: 13  Queries per second avg: 0.090
-----

MariaDB [(none)]> exit;
Bye
[root@server.dmosharov.net my.cnf.d]#
```

**Рис. 18:** Статус БД

```
[root@server.dmmosharov.net my.cnf.d]# cd /etc/my.cnf.d  
[root@server.dmmosharov.net my.cnf.d]# touch utf8.cnf  
[root@server.dmmosharov.net my.cnf.d]# nano uth8.cnf  
[root@server.dmmosharov.net my.cnf.d]# █
```

**Рис. 19:** Создание файла конфигурации



```
GNU nano 8.1          uth8.cnf
[client]
default-character-set = utf8
[mysqld]
character-set-server = utf8
```

**Рис. 20:** Содержание файла utf8



# Успешная смена кодировки

```
[root@server.dmosharov.net my.cnf.d]# systemctl restart mariadb
[root@server.dmosharov.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: 10.11.15-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 10.11.15-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:         10.11.15-MariaDB MariaDB Server
Protocol version:       10
Connection:             Localhost via UNIX socket
Server characterset:    utf8mb3
Db characterset:        utf8mb3
Client characterset:    utf8mb3
Conn. characterset:     utf8mb3
UNIX socket:            /var/lib/mysql/mysql.sock
Uptime:                 20 sec

Threads: 1 Questions: 4 Slow queries: 0 Opens: 17 Open tables: 10 Queries per second
avg: 0.200
-----
MariaDB [(none)]> exit;
```

**Рис. 21:** Успешная смена кодировки

# Наполнение таблицы

```
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]> HOW TABLES;
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 'HOW TABLES' at line 1
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 (0.004 sec)

MariaDB [addressbook]> INSERT INTO city(name,city) VALUES ('Иванов','Москва');
Query OK, 1 row affected (0.001 sec)

MariaDB [addressbook]> INSERT INTO city(name,city) VALUES ('Петров','Сочи');
Query OK, 1 row affected (0.001 sec)

MariaDB [addressbook]> INSERT INTO city(name,city) VALUES ('Сидоров','Дубна');
Query OK, 1 row affected (0.001 sec)

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

MariaDB [addressbook]> █
```

Рис. 22: Наполнение таблицы

# Проверка прав доступа для нового пользователя

```
Query OK, 0 rows affected (0.000 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
Bye
[root@server.dmosharov.net my.cnf.d]# mysqlshow -u root -p
Enter password:
+-----+
| Databases |
+-----+
| addressbook |
| information_schema |
| mysql |
| performance_schema |
| sys |
+-----+
[root@server.dmosharov.net my.cnf.d]# mysqlshow -u root -p addressbook
Enter password:
Database: addressbook
+-----+
| Tables |
+-----+
| city |
+-----+
[root@server.dmosharov.net my.cnf.d]# mysqlshow -u user -p addressbook
Enter password:
mysqlshow: Access denied for user 'user'@'localhost' (using password: YES)
[root@server.dmosharov.net my.cnf.d]# mysqlshow -u user -p addressbook
Enter password:
mysqlshow: Access denied for user 'user'@'localhost' (using password: YES)
[root@server.dmosharov.net my.cnf.d]# mysqlshow -u dmosharov -p addressbook
Enter password:
Database: addressbook
+-----+
| Tables |
+-----+
| city |
+-----+
[root@server.dmosharov.net my.cnf.d]#
```

Рис. 23: Проверка прав доступа для нового пользователя

# Бэкапы и сохранение vagrant

```
[root@server.dmmosharov.net my.cnf.d]# mkdir -p /var/backup
[root@server.dmmosharov.net my.cnf.d]# mysqldump -u root -p addressbook > /var/backup/add
ressbook.sql
Enter password:
[root@server.dmmosharov.net my.cnf.d]# mysqldump -u root -p addressbook | gzip > /var/bac
kup/addressbook.sql.gz
Enter password:
[root@server.dmmosharov.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.dmmosharov.net my.cnf.d]# mysql -u root -p addressbook < /var/backup/address
book.sql
Enter password:
[root@server.dmmosharov.net my.cnf.d]# zcat /var/backup/addressbook.sql.gz | mysql -u roo
t -p addressbook
Enter password:
[root@server.dmmosharov.net my.cnf.d]# cd /vagrant/provision/server
[root@server.dmmosharov.net server]# mkdir -p /vagrant/provision/server/mysql/etc/my.cnf.
d
[root@server.dmmosharov.net server]# mkdir -p /vagrant/provision/server/mysql/var/backup
[root@server.dmmosharov.net server]# cp -R /etc/my.cnf.d/utf8.cnf /vagrant/provision/serv
er/mysql/etc/my.cnf.d/
[root@server.dmmosharov.net server]# cp -R /var/backup/* /vagrant/provision/server/mysql/
var/backup/
[root@server.dmmosharov.net server]# cd /vagrant/provision/server
[root@server.dmmosharov.net server]# touch mysql.sh
[root@server.dmmosharov.net server]# chmod +x mysql.sh
[root@server.dmmosharov.net server]# nano mysql.sh
```

**Рис. 24:** Бэкапы и сохранение vagrant

```
GNU nano 8.1 mysql.sh
cd /vagrant/provision/server
touch mysql.sh
chmod +x mysql.sh
Открыть его на редактирование, пропишите в нём следующий скрипт:
#!/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
fi
```

Рис. 25: mysql.sh

```
server.vm.provision "server mysql",  
  type: "shell",  
  preserve_order: true,  
  path: "provision/server/mysql.sh"  
end
```

**Рис. 26:** Vagrantfile

В результате выполнения лабораторной работы были получены навыки по конфигурированию HTTP-сервера Apache и https