Отчёт по лабораторной работе №6

Установка и настройка СУБД MariaDB

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3 января 2026

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Цели и задачи работы

Цель лабораторной работы

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

Выполнение работы

Установка пакетов MariaDB

На виртуальной машине `server` выполнена установка серверной и клиентской части MariaDB.

```
Installed:
  mariadb-3:10.11.11-1.el10.x86_64                        mariadb-backup-3:10.11.11-1.el10.x86_64
  mariadb-client-utils-3:10.11.11-1.el10.x86_64           mariadb-common-3:10.11.11-1.el10.noarch
  mariadb-errmsg-3:10.11.11-1.el10.noarch                 mariadb-gssapi-server-3:10.11.11-1.el10.x86_64
  mariadb-server-3:10.11.11-1.el10.x86_64                 mariadb-server-utils-3:10.11.11-1.el10.x86_64
  mysql-selinux-1.0.14-1.el10_0.noarch                    perl-DBD-MariaDB-1.23-10.el10.x86_64
  perl-Sys-Hostname-1.25-512.2.el10_0.x86_64

Complete!
[root@server.elsaiedadel.net www.elsaiedadel.net]#
[root@server.elsaiedadel.net www.elsaiedadel.net]# cat /etc/my.cnf.d/
cat: /etc/my.cnf.d/: Is a directory
[root@server.elsaiedadel.net www.elsaiedadel.net]# ls /etc/my.cnf.d/
auth_gssapi.cnf  enable_encryption.preset  mysql-clients.cnf   provider_lz4.cnf  provider_snappy.cnf
client.cnf       mariadb-server.cnf        provider_bzip2.cnf  provider_lzo.cnf  spider.cnf
[root@server.elsaiedadel.net www.elsaiedadel.net]# cat /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

[root@server.elsaiedadel.net www.elsaiedadel.net]#
```

Рис. 1: Установка пакетов MariaDB

Запуск и автозагрузка службы

Служба MariaDB запущена и включена в автозагрузку:

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

```
[root@server.elsaiedadel.net www.elsaiedadel.net]#
[root@server.elsaiedadel.net www.elsaiedadel.net]# systemctl start mariadb
[root@server.elsaiedadel.net www.elsaiedadel.net]# 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.elsaiedadel.net www.elsaiedadel.net]# ss -tulpen | grep 3306
tcp   LISTEN 0      80                                   0.0.0.0:3306       0.0.0.0:*    users:(("mariadbd",pid=24689,fd=18))
                                                                                          uid:27 ino:244314 sk:1a cgroup:/system.slic

e/mariadb.service <->
tcp   LISTEN 0      80                                      [::]:3306          [::]:*    users:(("mariadbd",pid=24689,fd=19))
                                                                                          uid:27 ino:244315 sk:27 cgroup:/system.slic

e/mariadb.service v6only:1 <->
[root@server.elsaiedadel.net www.elsaiedadel.net]#
```

Рис. 2: Запуск и enable mariadb

Проверка прослушивания порта 3306

Проверено, что процесс `mariadbd` слушает порт `3306`:

- `ss -tulpen | grep 3306`

```
[root@server.elsaiedadel.net www.elsaiedadel.net]#
[root@server.elsaiedadel.net www.elsaiedadel.net]# systemctl start mariadb
[root@server.elsaiedadel.net www.elsaiedadel.net]# 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.elsaiedadel.net www.elsaiedadel.net]# ss -tulpen | grep 3306
tcp   LISTEN 0      80                                   0.0.0.0:3306       0.0.0.0:*    users:(("mariadbd",pid=24689,fd=18))
                                                                                          uid:27 ino:244314 sk:1a cgroup:/system.slic
e/mariadb.service <->
tcp   LISTEN 0      80                                      [::]:3306          [::]:*    users:(("mariadbd",pid=24689,fd=19))
                                                                                          uid:27 ino:244315 sk:27 cgroup:/system.slic
e/mariadb.service v6only:1 <->
[root@server.elsaiedadel.net www.elsaiedadel.net]#
```

Рис. 3: Проверка порта 3306

mysql_secure_installation

Выполнено: - настройка root-доступа (в т.ч. unix_socket) - установка пароля root MariaDB - применение обновлений таблиц привилегий

```
[root@server.elsaiedadel.net www.elsaiedadel.net]# 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]
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]
```

Проверка окружения MariaDB

В интерактивной оболочке проверены: - справка: `\h` - системные базы: `SHOW DATABASES;`

```
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 multi-byte charset
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.
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    (\#) Rebuild completion hash.
sandbox   (\-) Disallow commands that access the file system (except \P without an argument 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.
warnings  (\W) Show warnings after every statement.

For server side help, type 'help contents'

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

Статус до изменения кодировки

Команда `status` показала, что серверная кодировка по умолчанию была `latin1`.

```
MariaDB [(none)]>
MariaDB [(none)]> status
--------------
mysql  Ver 15.1 Distrib 10.11.11-MariaDB, for Linux (x86_64) using  EditLine wrapper

Connection id:          13
Current database:
Current user:           root@localhost
SSL:                    Not in use
Current pager:          stdout
Using outfile:          ''
Using delimiter:        ;
Server:                 MariaDB
Server version:         10.11.11-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:                 2 min 24 sec

Threads: 1  Questions: 25  Slow queries: 0  Opens: 20  Open tables: 13  Queries per second avg: 0.173
--------------

MariaDB [(none)]>
```

Рис. 6: status до настройки UTF-8

Настройка UTF-8 через utf8.cnf

Создан файл `/etc/my.cnf.d/utf8.cnf`:

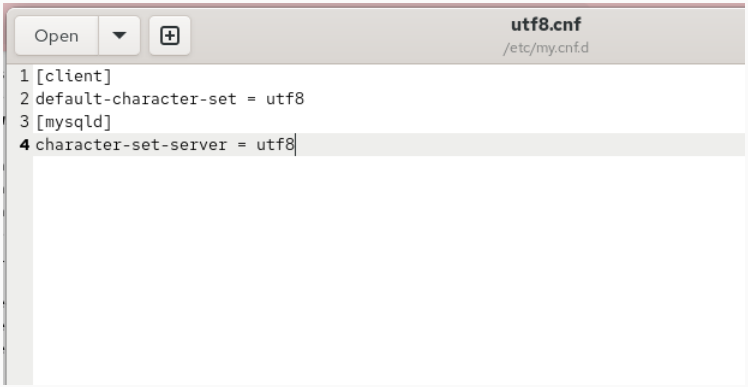

Рис. 7: Файл utf8.cnf

Статус после перезапуска MariaDB

Изменения: - `Server characterset`: `latin1` → `utf8mb3` - `Db characterset`: `latin1` → `utf8mb3`

```
[root@server.elsaiedadel.net my.cnf.d]#
[root@server.elsaiedadel.net my.cnf.d]# systemctl restart mariadb
[root@server.elsaiedadel.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: 10.11.11-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 10.11.11-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:         10.11.11-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:                 12 sec
```

Создание базы и таблицы

```
MariaDB [(none)]>
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 (0.004 sec)

MariaDB [addressbook]> INSERT INTO city(name, city) VALUES ('Иванов', 'Москва');
Query OK, 1 row affected (0.004 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. 9: SELECT * FROM city

Создание пользователя и выдача прав

```
MariaDB [addressbook]>
MariaDB [addressbook]> CREATE USER elsaiedadel@'%' IDENTIFIED BY '123456';
Query OK, 0 rows affected (0.001 sec)

MariaDB [addressbook]> GRANT SELECT,INSERT,UPDATE,DELETE ON addressbook.* TO elsaiedadel@'%';
Query OK, 0 rows affected (0.001 sec)

MariaDB [addressbook]> FLUSH PRIVILEGES;
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 (0.000 sec)

MariaDB [addressbook]>
```

Рис. 10: Пользователь, GRANT, DESCRIBE

Проверка структуры таблицы и объектов

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

Рис. 11: mysqlshow: базы и таблицы

Резервные копии mysqldump

```
[root@server.elsaiedadel.net my.cnf.d]#
[root@server.elsaiedadel.net my.cnf.d]# mkdir -p /var/backup
[root@server.elsaiedadel.net my.cnf.d]# mysqldump -u root -p addressbook > /var/backup/addressbook.sql
Enter password:
[root@server.elsaiedadel.net my.cnf.d]# mysqldump -u root -p addressbook > gzip > /var/backup/addressbook.sql.gz
Enter password:
[root@server.elsaiedadel.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.elsaiedadel.net my.cnf.d]# ls /var/backup/
addressbook.20260103.100154.sql.gz  addressbook.sql  addressbook.sql.gz
[root@server.elsaiedadel.net my.cnf.d]# mysql -u root -p addressbook < /var/backup/addressbook.sql
Enter password:
[root@server.elsaiedadel.net my.cnf.d]# zcat /var/backup/addressbook.sql.gz | mysql -u root -p addressbook
```

Рис. 12: Backup/Restore addressbook

Подготовка файлов для provisioning

Созданы каталоги в `/vagrant/provision/server`: - `mysql/etc/my.cnf.d` - `mysql/var/backup`

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

Рис. 13: Копирование конфигурации и резервных копий

Скрипт mysql.sh

Создан исполняемый скрипт `mysql.sh`, который повторяет выполненные шаги:

Vagrantfile | dhcp.sh | http.sh | mysql.sh

```
#!/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
```

Выводы

Вывод

В ходе лабораторной работы выполнена установка и настройка MariaDB на виртуальной машине: применены базовые меры безопасности, настроена кодировка UTF-8, создана пользовательская база `addressbook`, реализовано управление доступом и проверены операции резервного копирования/восстановления. Дополнительно подготовлен provisioning-скрипт, автоматизирующий установку и конфигурацию, что повышает воспроизводимость и упрощает развёртывание серверного окружения.