

Лабораторная работа №6

Установка и настройка системы управления
базами данных MariaDB

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Цель работы

Целью данной работы является приобретение практических навыков по установке и конфигурированию системы управления базами данных на примере программного обеспечения MariaDB.

Установка MariaDB

```
=> 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: Machine already provisioned. Run `vagrant provision` or use the `--provision`  
=> server: flag to force provisioning. Provisioners marked to run always will still run.  
=> server: Running provisioner: common hostname (shell)...  
    server: Running: C:/Users/Pacavira/AppData/Local/Temp/vagrant-shell20260131-20284-rc2j1c.sh  
  
::\work\user\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: 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: Machine already provisioned. Run `vagrant provision` or use the `--provision`  
=> server: flag to force provisioning. Provisioners marked to run always will still run.  
=> server: Running provisioner: common hostname (shell)...  
    server: Running: C:/Users/Pacavira/AppData/Local/Temp/vagrant-shell20260131-18364-2lvz5h.sh  
  
:\work\user\vagrant>vagrant up server
```

Рис. 1.1. Открытие рабочего каталога с проектом и запуск виртуальной машины server.

Установка MariaDB

```
[user@server.user.net ~]$ sudo -i  
[sudo] password for user:  
[root@server.user.net ~]# dnf -y install mariadb mariadb-server  
Last metadata expiration check: 0:39:16 ago on Sat 31 Jan 2026 03:00:18 PM UTC.  
Dependencies resolved.  
=====  
 Package           Architecture   Version      Repository    Size  
=====  
Installing:  
 mariadb           x86_64        3:10.5.29-3.el9_7  appstream     1.6 M  
 mariadb-server    x86_64        3:10.5.29-3.el9_7  appstream     9.7 M  
Installing dependencies:  
 mariadb-common    x86_64        3:10.5.29-3.el9_7  appstream     27 k  
 mariadb-connector-c x86_64        3.2.6-1.el9_0   appstream     195 k  
 mariadb-connector-c-config x86_64        3.2.6-1.el9_0   appstream     9.8 k  
 mariadb-errmsg     x86_64        3:10.5.29-3.el9_7  appstream     210 k  
 mysql-selinux     noarch       1.0.14-1.el9_6   appstream     36 k  
 perl-DBD-MariaDB x86_64        1.21-17.el9    appstream     149 k  
 perl-Sys-Hostname x86_64        1.23-481.1.el9_6 appstream     15 k  
Installing weak dependencies:  
 mariadb-backup    x86_64        3:10.5.29-3.el9_7  appstream     6.5 M  
 mariadb-gssapi-server x86_64        3:10.5.29-3.el9_7  appstream     14 k  
 mariadb-server-utils x86_64        3:10.5.29-3.el9_7  appstream     210 k  
  
Transaction Summary  
=====  
Install 12 Packages
```

Рис. 1.2. Переход в режим суперпользователя и установка необходимых для работы с базами данных пакетов.

Установка MariaDB

```
[root@server.user.net ~]# cd /etc/my.cnf.d
[root@server.user.net my.cnf.d]# ls
auth_gssapi.cnf  client.cnf  enable_encryption.preset  mariadb-server.cnf  mysql-clients.cnf  spider.cnf
[root@server.user.net my.cnf.d]#
[root@server.user.net my.cnf.d]# cat /etc/my.cnf
#
# This group is read 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.user.net my.cnf.d]#
```

Рис. 1.3. Просмотр конфигурационных файлов mariadb в каталоге /etc/my.cnf.d и в файле /etc/my.cnf

Установка MariaDB

```
[root@server.user.net ~]# ss -tulpn | grep mysql
[root@server.user.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] 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]
```

Рис. 1.4. Запуск и включение программного обеспечения mariadb, проверка прослушивания порта, запуск скрипта конфигурации безопасности mariadb.

Установка MariaDB

```
[user@server.user.net ~]$ mysql -u root -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 13
Server version: 10.5.29-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 multi-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       (\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.
noteee    (\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)]>
```

Рис. 1.5. Вход в базу данных с правами администратора базы данных и просмотр списка команд MySQL.

Установка MariaDB

```
For server side help, type 'help contents'

MariaDB [(none)]> SHOW DATABASES;
+-----+
| Database      |
+-----+
| information_schema |
| mysql          |
| performance_schema |
+-----+
3 rows in set (0.294 sec)

MariaDB [(none)]>
```

Рис. 1.6. Отображение доступных в настоящее время баз данных и выход из интерфейса интерактивной оболочки MariaDB.

Конфигурация кодировки символов

```
[user@server.user.net ~]$ mysql -u root -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 14
Server version: 10.5.29-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 10.5.29-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:         10.5.29-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:                 9 min 19 sec

Threads: 1  Questions: 27  Slow queries: 0  Opens: 20  Open tables: 13  Queries per second avg: 0.048
-----
MariaDB [(none)]>
```

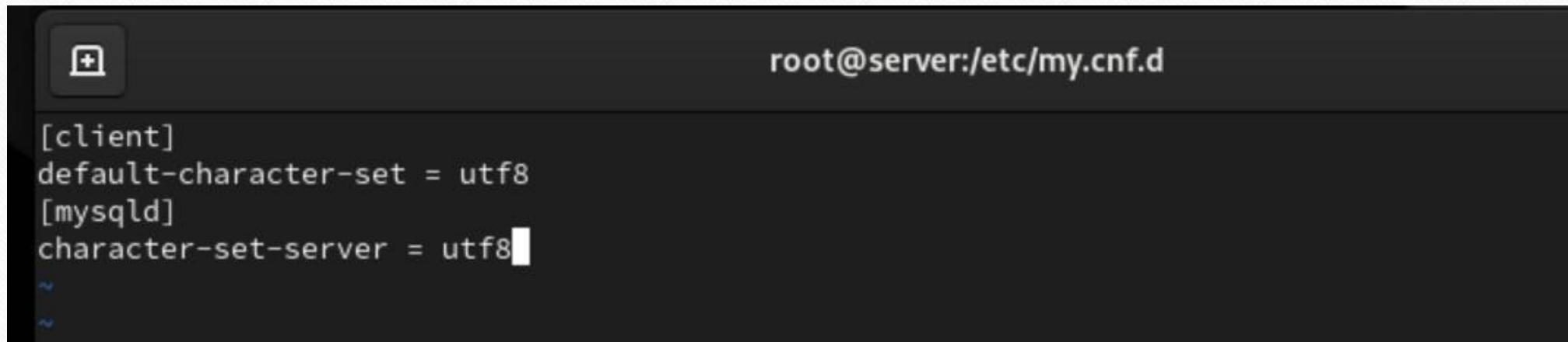
Рис. 2.1. Вход в базу данных с правами администратора, отображение статуса MariaDB.

Конфигурация кодировки символов

```
[user@server.user.net my.cnf.d]$ cd /etc/my.cnf.d
[user@server.user.net my.cnf.d]$ touch utf8.cnf
touch: cannot touch 'utf8.cnf': Permission denied
[user@server.user.net my.cnf.d]$
```

Рис. 2.2. Создание файла utf8.cnf в каталоге /etc/my.cnf.d.

Конфигурация кодировки символов



The screenshot shows a terminal window with a dark background and light-colored text. In the top right corner, it displays the session information: `root@server:/etc/my.cnf.d`. On the left side, there is a small icon of a document with a plus sign. The main area of the terminal contains the following configuration settings:

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

Рис. 2.3. Открытие файла на редактирование и указание в нём конфигурации.

Конфигурация кодировки символов

```
[user@server.user.net my.cnf.d]$ systemctl restart mariadb  
[user@server.user.net my.cnf.d]$
```

Рис. 2.4. Перезапуск MariaDB.

Конфигурация кодировки символов

```
[user@server.user.net my.cnf.d]$ systemctl restart mariadb
[user@server.user.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: 10.5.29-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 10.5.29-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:            10.5.29-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 min 35 sec

Threads: 1  Questions: 4  Slow queries: 0  Opens: 17  Open tables: 10  Queries per second avg: 0.042
-----
```

Рис. 2.5. Вход в базу данных с правами администратора и просмотр статуса MariaDB для проверки изменений.

Создание базы данных

```
[user@server.user.net my.cnf.d]$ systemctl restart mariadb
[user@server.user.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: 10.5.29-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 10.5.29-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:    10.5.29-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 min 35 sec

Threads: 1  Questions: 4  Slow queries: 0  Opens: 17  Open tables: 10  Queries per second avg: 0.042
-----
```

Рис. 3.1. Вход в базу данных с правами администратора, создание базы данных с именем addressbook, открытие базы данных addressbook, отображение имеющейся в базе данных addressbook таблицы. Создание таблицы city с полями name и city и заполнение таблицы некоторыми данными в соответствии с синтаксисом MySQL.

Создание базы данных

```
MariaDB [addressbook]> SELECT * FROM city;
+-----+-----+
| name | city |
+-----+-----+
| Иванов | Москва |
| Петров | Сочи |
| Сидоров | Дубна |
+-----+-----+
3 rows in set (0.003 sec)

MariaDB [addressbook]> CREATE USER claudely@'%' IDENTIFIED BY 'password';
Query OK, 0 rows affected (0.074 sec)

MariaDB [addressbook]> GRANT SELECT,INSERT,UPDATE,DELETE ON addressbook.* TO claudely@'%';
Query OK, 0 rows affected (0.008 sec)

MariaDB [addressbook]> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.011 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 (0.078 sec)
```

Рис. 3.2. MySQL-запрос, создание пользователя для работы с базой данных addressbook, предоставление прав доступа созданному пользователю claudely на действия с базой данных addressbook, обновление привилегий базы данных addressbook, просмотр общей информации о таблице city базы данных addressbook и выход из окружения MariaDB.

Создание базы данных

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

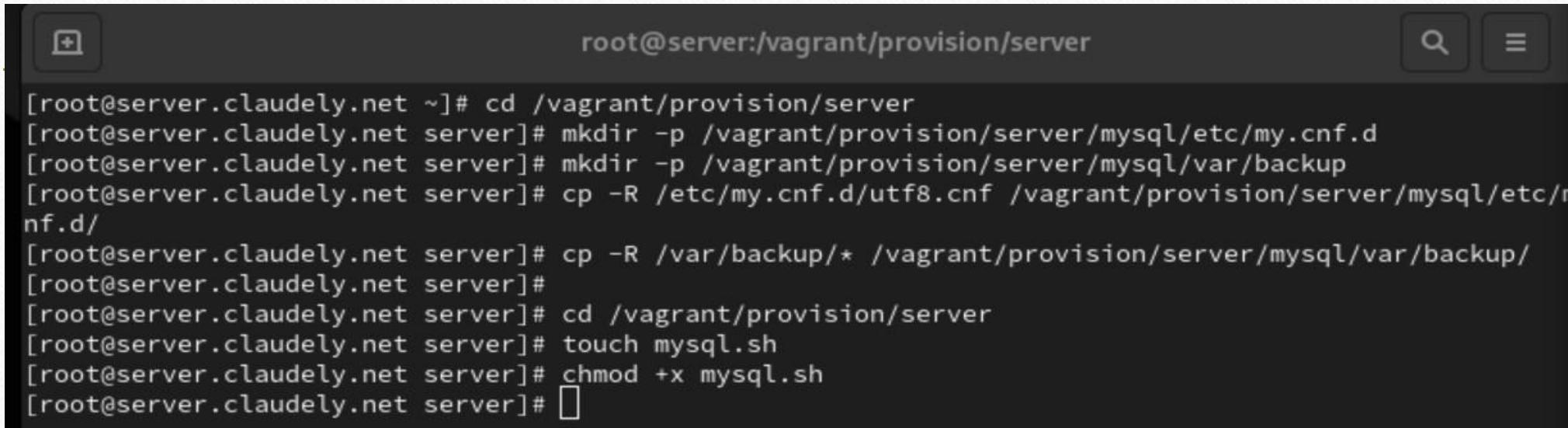
Рис. 3.3. Просмотр списка баз данных и списка таблиц базы данных addressbook.

Резервные копии

```
root@server:~ [root@server.claudely.net my.cnf.d]# cd
[root@server.claudely.net ~]# mkdir -p /var/backup
[root@server.claudely.net ~]# mysqldump -u root -p addressbook > /var/backup/addressbook.sql
Enter password:
[root@server.claudely.net ~]# mysqldump -u root -p addressbook | gzip > /var/backup/addressbook.sql.gz
Enter password:
[root@server.claudely.net ~]# mysqldump -u root -p addressbook | gzip > $(date +/var/backup/addressbook.%Y%m%d.%H%M%S.sql.gz)
Enter password:
[root@server.claudely.net ~]# mysql -u root -p addressbook < /var/backup/addressbook.sql
Enter password:
[root@server.claudely.net ~]# zcat /var/backup/addressbook.sql.gz | mysql -u root -p addressbook
Enter password:
[root@server.claudely.net ~]#
```

Рис. 4. Создание каталога для резервных копий, создание резервной копии базы данных addressbook, создание сжатой резервной копии базы данных addressbook, создание сжатой резервной копии базы данных addressbook с указанием даты создания копии, восстановление базы данных addressbook из резервной копии, восстановление базы данных addressbook из сжатой резервной копии.

Внесение изменений в настройки внутреннего окружения виртуальной машины

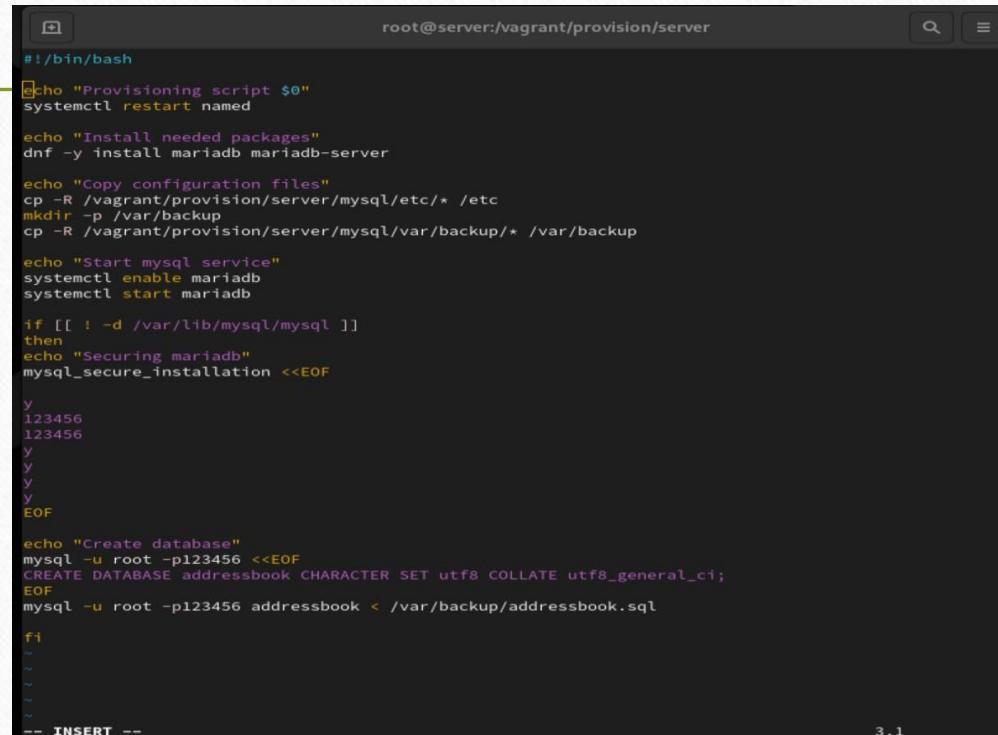


The screenshot shows a terminal window with a dark background and light-colored text. At the top, it says "root@server:vagrant/provision/server". On the left is a small icon, and on the right are search and filter icons. The terminal output is as follows:

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

Рис. 5.1. Открытие каталога для внесения изменений в настройки внутреннего окружения /vagrant/provision/server/, создание в нём каталога mysql, в который помещаем в соответствующие подкаталоги конфигурационные файлы MariaDB и резервную копию базы данных addressbook. Создание в каталоге /vagrant/provision/server исполняемого файла mysql.sh.

Внесение изменений в настройки внутреннего окружения виртуальной машины



The screenshot shows a terminal window titled "root@server:/vagrant/provision/server". The window contains a shell script with various commands for provisioning a MySQL database. The script includes commands for restarting services, installing packages, copying configuration files, starting the MySQL service, securing the installation, creating a database, and importing a backup. The user is prompted for input at several points, indicated by "y" and "123456". The bottom of the terminal shows the command "-- INSERT --". The status bar at the bottom right of the terminal window displays "3,1".

```
#!/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
~
~
~
~
~
-- INSERT --
```

Рис. 5.2. Открытие исполняемого файла на редактирование и прописывание в нём скрипта.

Внесение изменений в настройки внутреннего окружения виртуальной машины

```
vagrant.configure("2.0") do |config|  
    config.vm.provision "server dummy",  
        type: "shell",  
        preserve_order: true,  
        path: "provision/server/01-dummy.sh"  
  
    config.vm.provision "server dns",  
        type: "shell",  
        preserve_order: true,  
        path: "provision/server/dns.sh"  
  
    config.vm.provision "server dhcp",  
        type: "shell",  
        preserve_order: true,  
        path: "provision/server/dhcp.sh"  
  
    config.vm.provision "server http",  
        type: "shell",  
        preserve_order: true,  
        path: "provision/server/http.sh"  
    config.vm.provision "server mysql",  
        type: "shell",  
        preserve_order: true,  
        path: "provision/server/mysql.sh"
```

Рис. 5.3. Добавление записи в конфигурационном файле Vagrantfile.

Выход

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

Спасибо за внимание!