

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

C:\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

C:\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            noarch            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 ~]#  
[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 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 -tulpen | 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.
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)]>
```

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.

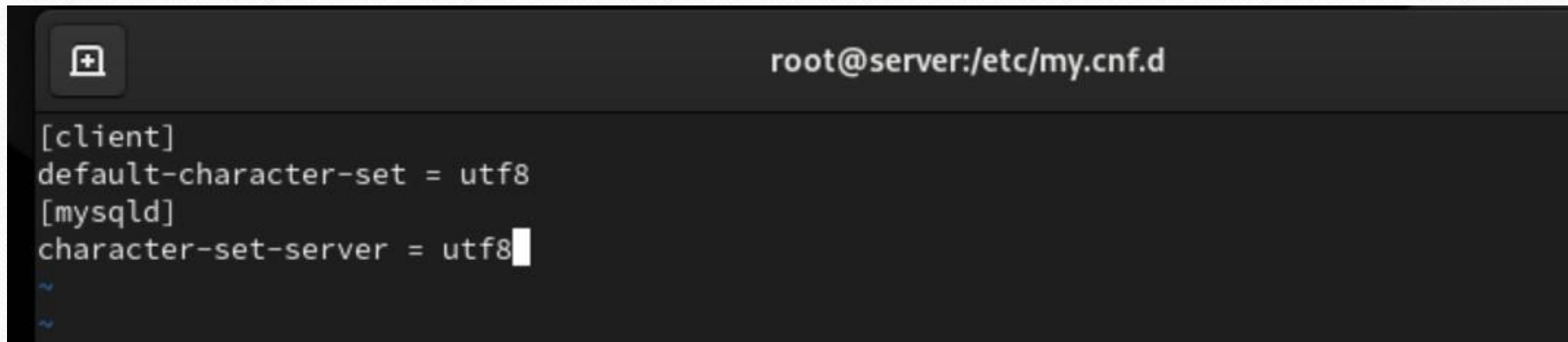
Рис. 2.1. Вход в базу данных с правами администратора, отображение статуса MariaDB.

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

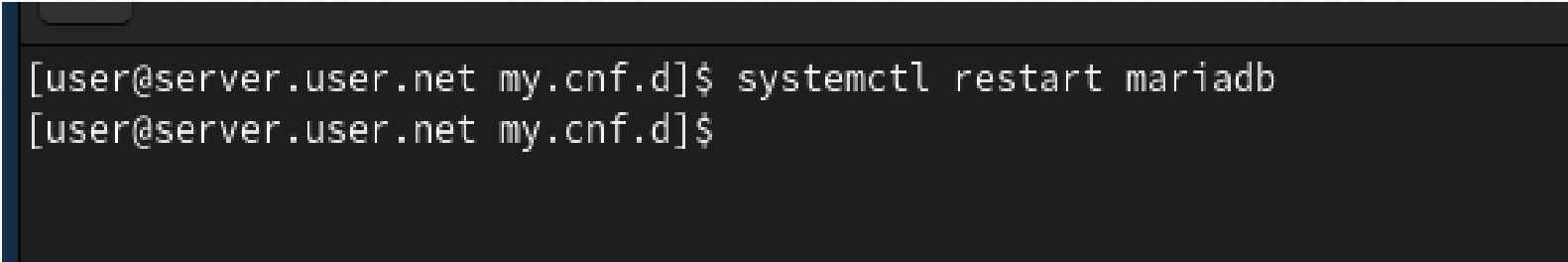
A screenshot of a terminal window with a dark background. The title bar at the top shows a window icon on the left and the text 'root@server:/etc/my.cnf.d' on the right. The terminal content shows the configuration for the MySQL client and server. The '[client]' section has 'default-character-set = utf8'. The '[mysqld]' section has 'character-set-server = utf8' followed by a white cursor. There are two tilde '~' characters at the bottom of the visible text.

```
root@server:/etc/my.cnf.d

[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

A terminal window with a dark background and light-colored text. The prompt is [user@server.user.net my.cnf.d]\$. The command systemctl restart mariadb has been entered and executed. The prompt is now [user@server.user.net my.cnf.d]\$.

```
[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 имеющиеся 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 привилегии базы данных addressbook, просмотр общей информации о таблице city базы данных addressbook и выход из окружения MariaDB.

Создание базы данных

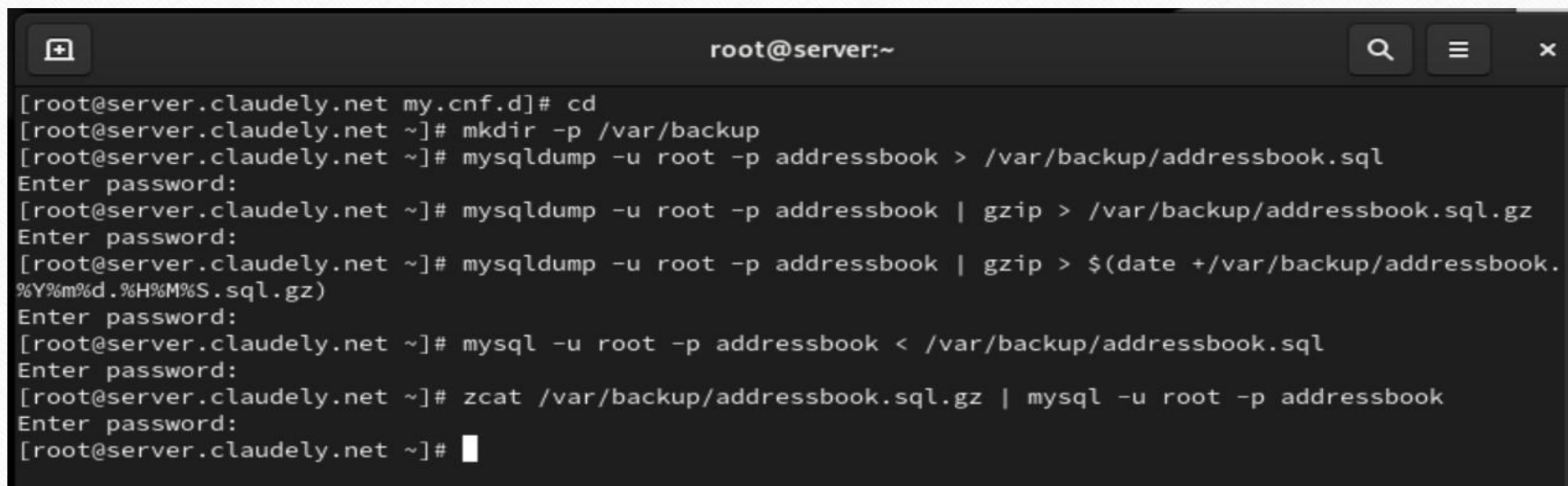
```
MariaDB [addressbook]> quit
Bye
[root@server.claudely.net my.cnf.d]#
[root@server.claudely.net my.cnf.d]# mysqlshow -u root -p
Enter password:
+-----+
| Databases |
+-----+
| addressbook |
| information_schema |
| mysql |
| performance_schema |
+-----+

[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.

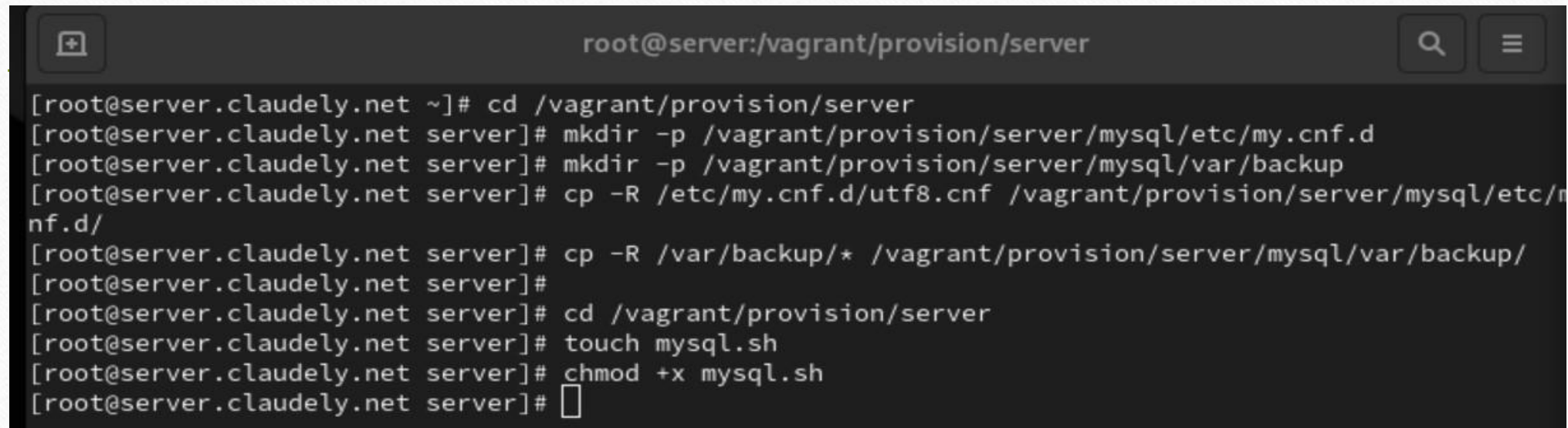
Резервные копии

A terminal window titled 'root@server:~' with search, menu, and close icons in the top right. It displays a series of commands for creating and restoring a MySQL database named 'addressbook'. The commands include creating a backup directory, dumping the database to a file, creating a compressed backup with a timestamp, and restoring the database from both the original file and the compressed backup.

```
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 +%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

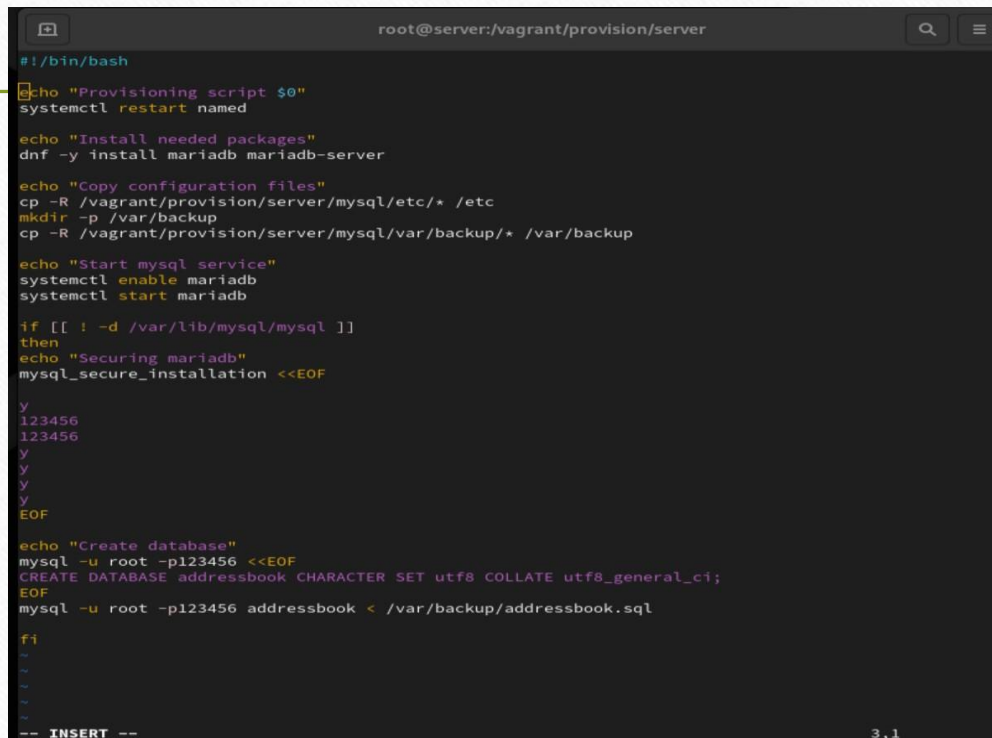


```
root@server:/vagrant/provision/server

[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



```
root@server:/vagrant/provision/server
#!/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

```
virtualbox____innet___. true  
  
server.vm.provision "server dummy",  
  type: "shell",  
  preserve_order: true,  
  path: "provision/server/01-dummy.sh"  
  
server.vm.provision "server dns",  
  type: "shell",  
  preserve_order: true,  
  path: "provision/server/dns.sh"  
  
server.vm.provision "server dhcp",  
  type: "shell",  
  preserve_order: true,  
  path: "provision/server/dhcp.sh"  
  
server.vm.provision "server http",  
  type: "shell",  
  preserve_order: true,  
  path: "provision/server/http.sh"  
server.vm.provision "server mysql",  
  type: "shell",  
  preserve_order: true,  
  path: "provision/server/mysql.sh"
```

Рис. 5.3. Добавление записи в конфигурационном файле Vagrantfile.

Вывод

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!