

Лабораторная работа № 8

Настройка SMTP-сервера

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Приобретение практических навыков по установке и конфигурированию SMTP-сервера.

1. Установить на виртуальной машине server SMTP-сервер postfix.
2. Сделать первоначальную настройку postfix при помощи утилиты postconf, задав отправку писем не на локальный хост, а на сервер в домене.
3. Проверить отправку почты с сервера и клиента.
4. Сконфигурировать Postfix для работы в домене. Проверить отправку почты с сервера и клиента.
5. Написать скрипт для Vagrant, фиксирующий действия по установке и настройке Postfix во внутреннем окружении виртуальной машины server. Соответствующим образом внесите изменения в Vagrantfile.

Выполнение лабораторной работы

```
[dmbelicheva@server.dmbelicheva.net ~]$ sudo -i
[sudo] password for dmbelicheva:
[root@server.dmbelicheva.net ~]# dnf -y install postfix
Rocky Linux 9 - BaseOS                684 B/s | 4.1 kB    00:06
Rocky Linux 9 - AppStream             8.0 kB/s | 4.5 kB    00:00
Rocky Linux 9 - Extras                10 kB/s | 2.9 kB    00:00
Dependencies resolved.
=====
Package                Architecture  Version              Repository           Size
=====
Installing:
postfix                x86_64       2:3.5.9-24.el9      appstream            1.4 M
Transaction Summary
=====
Install 1 Package

Total download size: 1.4 M
Installed size: 4.4 M
Downloading Packages:
postfix-3.5.9-24.el9.x86_64.rpm      4.9 MB/s | 1.4 MB    00:00
-----
Total                                2.8 MB/s | 1.4 MB    00:00
Running transaction check
```

Рис. 1: Установка пакетов

```
[root@server.dmbelicheva.net ~]# firewall-cmd --add-service=smtp
Warning: ALREADY_ENABLED: 'smtp' already in 'public'
success
[root@server.dmbelicheva.net ~]# firewall-cmd --add-service=smtp --permanent
Warning: ALREADY_ENABLED: smtp
success
[root@server.dmbelicheva.net ~]# firewall-cmd --list-services
cockpit dhcp dhcpv6-client dns http https smtp ssh
[root@server.dmbelicheva.net ~]# restorecon -vR /etc
[root@server.dmbelicheva.net ~]# systemctl enable postfix
Created symlink /etc/systemd/system/multi-user.target.wants/postfix.service → /usr/lib/systemd/system/postfix.service.
[root@server.dmbelicheva.net ~]# systemctl start postfix
[root@server.dmbelicheva.net ~]#
```

Рис. 2: Запуск Postfix

Изменение параметров Postfix с помощью postconf

```
[root@server.dmbelicheva.net ~]# postconf
2bounce_notice_recipient = postmaster
access_map_defer_code = 450
access_map_reject_code = 554
address_verify_cache_cleanup_interval = 12h
address_verify_default_transport = $default_transport
address_verify_local_transport = $local_transport
address_verify_map = btree:$data_directory/verify_cache
address_verify_negative_cache = yes
address_verify_negative_expire_time = 3d
address_verify_negative_refresh_time = 3h
address_verify_pending_request_limit = 5000
address_verify_poll_count = ${stress?(1):(3)}
address_verify_poll_delay = 3s
address_verify_positive_expire_time = 31d
address_verify_positive_refresh_time = 7d
address_verify_relay_transport = $relay_transport
address_verify_relayhost = $relayhost
address_verify_sender = $double_bounce_sender
address_verify_sender_dependent_default_transport_maps = $sender_dependent_default_transport_maps
address_verify_sender_dependent_relayhost_maps = $sender_dependent_relayhost_maps
address_verify_sender_ttl = 0s
```

Рис. 3: postconf

Изменение параметров Postfix с помощью postconf

```
[root@server.dmbelicheva.net ~]# postconf myorigin
myorigin = $myhostname
[root@server.dmbelicheva.net ~]# postconf mydomain
mydomain = dmbelicheva.net
[root@server.dmbelicheva.net ~]# postconf -e 'myorigin = $mydomain'
postconf: fatal: missing '=' after attribute name: "??myorigin"
[root@server.dmbelicheva.net ~]# postconf -e 'myorigin == $mydomain'
postconf: fatal: missing '=' after attribute name: "??myorigin"
[root@server.dmbelicheva.net ~]# postconf -e 'myorigin = $mydomain'
[root@server.dmbelicheva.net ~]# postconf myorigin
myorigin = $mydomain
[root@server.dmbelicheva.net ~]#
```

Рис. 4: Изменение параметров Postfix

Изменение параметров Postfix с помощью postconf

```
root@server.dmbelicheva.net ~]# postfix check
root@server.dmbelicheva.net ~]# systemctl reload postfix
root@server.dmbelicheva.net ~]# postconf -n
alias_database = hash:/etc/aliases
alias_maps = hash:/etc/aliases
command_directory = /usr/sbin
compatibility_level = 2
daemon_directory = /usr/libexec/postfix
data_directory = /var/lib/postfix
debug_peer_level = 2
debugger_command = PATH=/bin:/usr/bin:/usr/local/bin:/usr/X11R6/bin ddd $daemon_directory/$process_name $process_id & sleep 5
html_directory = no
inet_interfaces = localhost
inet_protocols = all
mail_owner = postfix
mailq_path = /usr/bin/mailq.postfix
manpage_directory = /usr/share/man
meta_directory = /etc/postfix
```

Рис. 5: Изменение параметров Postfix

Изменение параметров Postfix с помощью postconf

```
[root@server.dmbelicheva.net ~]# postconf -e 'mydomain = dmbelicheva.net'
[root@server.dmbelicheva.net ~]# postconf inet_protocols
inet_protocols = all
[root@server.dmbelicheva.net ~]# postconf -e 'inet_protocols = ipv4'
[root@server.dmbelicheva.net ~]# postfix check
[root@server.dmbelicheva.net ~]# systemctl reload postfix
[root@server.dmbelicheva.net ~]#
```

Рис. 6: Изменение параметров Postfix

```
[dmbelicheva@server.dmbelicheva.net ~]$ sudo -i
[sudo] password for dmbelicheva:
\root@server.dmbelicheva.net ~]#tail -f /var/log/maillog
Dec 2 19:51:03 server postfix/cleanup[13071]: EF6FE1867D1C: message-id=<20231202195102.EF6FE1867D1C@server.dmbelicheva.net>
Dec 2 19:51:03 server postfix/qmgr[12944]: EF6FE1867D1C: from=<dmbelicheva@dmbelicheva.net>, size=352, nrcpt=1 (queue active)
Dec 2 19:51:03 server postfix/local[13077]: EF6FE1867D1C: to=<dmbelicheva@server.dmbelicheva.net>, relay=local, delay=0.1, delays=0.07/0.02/0/0.01, dsn=2.0.0, status=sent (delivered to mailbox)
Dec 2 19:51:03 server postfix/qmgr[12944]: EF6FE1867D1C: removed
Dec 2 19:51:31 server postfix/postsuper[13089]: Deleted: 0 messages
Dec 2 19:51:39 server postfix/pickup[12943]: 8B31E1867D1C: uid=1001 from=<dmbelicheva>
Dec 2 19:51:39 server postfix/cleanup[13071]: 8B31E1867D1C: message-id=<20231202195139.8B31E1867D1C@server.dmbelicheva.net>
Dec 2 19:51:39 server postfix/qmgr[12944]: 8B31E1867D1C: from=<dmbelicheva@dmbelicheva.net>, size=352, nrcpt=1 (queue active)
Dec 2 19:51:39 server postfix/local[13077]: 8B31E1867D1C: to=<dmbelicheva@server.dmbelicheva.net>, relay=local, delay=0.06, delays=0.05/0/0/0.01, dsn=2.0.0, status=sent (delivered to mailbox)
Dec 2 19:51:39 server postfix/qmgr[12944]: 8B31E1867D1C: removed
```

Рис. 7: мониторинг работы почтовой службы

```
38 From dmbelicheva@dmbelicheva.net Sat Dec 2 19:51:39 2023
39 Return-Path: <dmbelicheva@dmbelicheva.net>
40 X-Original-To: dmbelicheva@server.dmbelicheva.net
41 Delivered-To: dmbelicheva@server.dmbelicheva.net
42 Received: by server.dmbelicheva.net (Postfix, from userid 1001)
43         id 8B31E1867D1C; Sat, 2 Dec 2023 19:51:39 +0000 (UTC)
44 Date: Sat, 02 Dec 2023 19:51:39 +0000
45 To: dmbelicheva@server.dmbelicheva.net
46 Subject: test1
47 User-Agent: s-nail v14.9.22
48 Message-Id: <20231202195139.8B31E1867D1C@server.dmbelicheva.net>
49 From: dmbelicheva@dmbelicheva.net
50
51 .
52
```

Рис. 8: Отправленное письмо

На виртуальной машине client войдем под вашим пользователем и откроем терминал.

Перейдем в режим суперпользователя: *sudo -i*

На клиенте установим необходимые для работы пакеты: *dnf -y install postfix*

dnf -y install s-nail

Проверка работы Postfix

```
Total download size: 621 k
Installed size: 1.1 M
Downloading Packages:
s-nail-14.9.22-6.el9.x86_64.rpm                1.7 MB/s | 621 kB    00:00
-----
Total                                         327 kB/s | 621 kB    00:01
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing                : 1/1
  Running scriptlet: s-nail-14.9.22-6.el9.x86_64 : 1/1
  Installing        : s-nail-14.9.22-6.el9.x86_64 : 1/1
  Running scriptlet: s-nail-14.9.22-6.el9.x86_64 : 1/1
  Verifying         : s-nail-14.9.22-6.el9.x86_64 : 1/1

Installed:
s-nail-14.9.22-6.el9.x86_64

Complete!
[root@client.dmbelicheva.net ~]# dnf -y install s-nail
Last metadata expiration check: 0:01:00 ago on Sat 02 Dec 2023 05:34:35 PM UTC.
Package s-nail-14.9.22-6.el9.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[root@client.dmbelicheva.net ~]# postconf inet_protocols
inet_protocols = all
[root@client.dmbelicheva.net ~]# postconf -e 'inet_protocols = ipv4'
[root@client.dmbelicheva.net ~]# systemctl enable postfix
Created symlink /etc/systemd/system/multi-user.target.wants/postfix.service → /usr/lib/systemd/system/postfix.service.

[root@client.dmbelicheva.net ~]#
[root@client.dmbelicheva.net ~]# systemctl start postfix
```

Рис. 9: Отправленное письмо

```
[dmbelicheva@server.dmbelicheva.net ~]$ sudo -i
[sudo] password for dmbelicheva:
\[root@server.dmbelicheva.net ~]#tail -f /var/log/maillog
Dec 2 19:51:03 server postfix/cleanup[13071]: EF6FE1867D1C: message-id=<20231202195102.EF6FE1867D1C@server.dmbelicheva.net>
Dec 2 19:51:03 server postfix/qmgr[12944]: EF6FE1867D1C: from=<dmbelicheva@dmbelicheva.net>, size=352, nrcpt=1 (queue active)
Dec 2 19:51:03 server postfix/local[13077]: EF6FE1867D1C: to=<dmbelicheva@server.dmbelicheva.net>, relay=local, delay=0.1, delays=0.07/0.02/0/0.01, dsn=2.0.0, status=sent (delivered to mailbox)
Dec 2 19:51:03 server postfix/qmgr[12944]: EF6FE1867D1C: removed
Dec 2 19:51:31 server postfix/postsuper[13089]: Deleted: 0 messages
Dec 2 19:51:39 server postfix/pickup[12943]: 8B31E1867D1C: uid=1001 from=<dmbelicheva>
Dec 2 19:51:39 server postfix/cleanup[13071]: 8B31E1867D1C: message-id=<20231202195139.8B31E1867D1C@server.dmbelicheva.net>
Dec 2 19:51:39 server postfix/qmgr[12944]: 8B31E1867D1C: from=<dmbelicheva@dmbelicheva.net>, size=352, nrcpt=1 (queue active)
Dec 2 19:51:39 server postfix/local[13077]: 8B31E1867D1C: to=<dmbelicheva@server.dmbelicheva.net>, relay=local, delay=0.06, delays=0.05/0/0/0.01, dsn=2.0.0, status=sent (delivered to mailbox)
Dec 2 19:51:39 server postfix/qmgr[12944]: 8B31E1867D1C: removed
```

Рис. 10: мониторинг работы почтовой службы

```
[root@server.dmbelicheva.net ~]# postconf inet_interfaces
inet_interfaces = localhost
[root@server.dmbelicheva.net ~]# postconf mynetworks
mynetworks = 127.0.0.1/32
[root@server.dmbelicheva.net ~]# postconf -e 'inet_interfaces = all'
[root@server.dmbelicheva.net ~]# postconf -e 'mynetworks = 127.0.0.0/8, 192.168.0.0/16'
[root@server.dmbelicheva.net ~]# postfix check
[root@server.dmbelicheva.net ~]# systemctl reload postfix
[root@server.dmbelicheva.net ~]# systemctl stop postfix
[root@server.dmbelicheva.net ~]# systemctl start postfix
[root@server.dmbelicheva.net ~]#
```

Рис. 11: Изменение конфигураций Postfix

Проверка работы Postfix

```
Dec 2 17:18:42 server postfix/qmgr[9069]: B21031867D22: removed
Dec 2 17:43:38 server postfix/postfix-script[9805]: refreshing the Postfix mail system
Dec 2 17:43:38 server postfix/master[8746]: reload -- version 3.5.9, configuration /etc/postfix
Dec 2 17:43:38 server postfix/master[8746]: warning: ignoring inet_protocols parameter value change
Dec 2 17:43:38 server postfix/master[8746]: warning: old value: "all", new value: "ipv4"
Dec 2 17:43:38 server postfix/master[8746]: warning: to change inet_protocols, stop and start Postfix
Dec 2 17:43:38 server postfix/master[8746]: warning: service smtp: ignoring inet_interfaces change
Dec 2 17:43:38 server postfix/master[8746]: warning: to change inet_interfaces, stop and start Postfix
Dec 2 17:43:46 server postfix/postfix-script[9821]: stopping the Postfix mail system
Dec 2 17:43:46 server postfix/master[8746]: terminating on signal 15
Dec 2 17:43:59 server postfix/postfix-script[9900]: starting the Postfix mail system
Dec 2 17:43:59 server postfix/master[9902]: daemon started -- version 3.5.9, configuration /etc/postfix
Dec 2 17:44:09 server postfix/smtpd[9905]: connect from client.dmbelicheva.net[192.168.1.30]
Dec 2 17:44:09 server postfix/smtpd[9905]: 1935F1867D1C: client=client.dmbelicheva.net[192.168.1.30]
Dec 2 17:44:09 server postfix/cleanup[9909]: 1935F1867D1C: message-id=<20231202174408.D71409BAD4C@client.dmbelicheva.net>
Dec 2 17:44:09 server postfix/qmgr[9904]: 1935F1867D1C: from=<root@client.dmbelicheva.net>, size=581, nrcpt=1 (queue active)
Dec 2 17:44:09 server postfix/smtpd[9905]: disconnect from client.dmbelicheva.net[192.168.1.30] ehlo=2 starttls=1 mail=1 rcpt=1 data=1 quit=1 commands=7
Dec 2 17:44:09 server postfix/local[9910]: 1935F1867D1C: to=<dmbelicheva@server.dmbelicheva.net>, relay=local, delay=0.07, delays=0.03/0.02/0/0.02, dsn=2.0.0, status=sent (delivered to mailbox)
Dec 2 17:44:09 server postfix/qmgr[9904]: 1935F1867D1C: removed
Dec 2 17:47:24 server postfix/smtpd[9949]: connect from client.dmbelicheva.net[192.168.1.30]
Dec 2 17:47:24 server postfix/smtpd[9949]: 359031867D1C: client=client.dmbelicheva.net[192.168.1.30]
Dec 2 17:47:24 server postfix/cleanup[9952]: 359031867D1C: message-id=<20231202174029.2A8869BAD4B@client.dmbelicheva.net>
Dec 2 17:47:24 server postfix/qmgr[9904]: 359031867D1C: from=<root@client.dmbelicheva.net>, size=581, nrcpt=1 (queue active)
Dec 2 17:47:24 server postfix/smtpd[9949]: disconnect from client.dmbelicheva.net[192.168.1.30] ehlo=2 starttls=1 mail=1 rcpt=1 data=1 quit=1 commands=7
Dec 2 17:47:24 server postfix/local[9953]: 359031867D1C: to=<dmbelicheva@server.dmbelicheva.net>, relay=local, delay=0.04, delays=0.02/0.01/0/0.02, dsn=2.0.0, status=sent (delivered to mailbox)
Dec 2 17:47:24 server postfix/qmgr[9904]: 359031867D1C: removed
```

Рис. 12: Изменение конфигураций Postfix

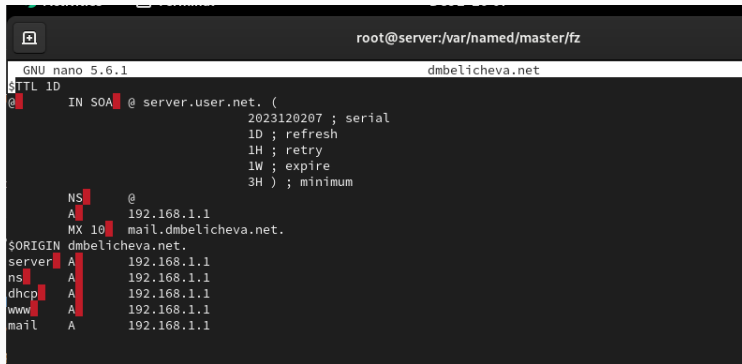
С клиента отправим письмо на свой доменный адрес:

```
echo ./ mail -s test2 dmbelicheva@dmbelicheva.net
```

Конфигурация Postfix для домена

```
Dec 2 20:03:54 client postfix/qmgr[42863]: 7AF219BAD41: removed
Dec 2 20:03:54 client postfix/pickup[44316]: 0DBFF910F96: uid=1001 from=<dmbelicheva>
Dec 2 20:03:54 client postfix/cleanup[45302]: 0DBFF910F96: message-id=<20231202200354.0DBFF910F96@client.dmbelicheva.net>
Dec 2 20:03:54 client postfix/qmgr[42863]: 0DBFF910F96: from=<dmbelicheva@client.dmbelicheva.net>, size=350, nrcpt=1 (queue active)
Dec 2 20:03:54 client postfix/smtp[45308]: 0DBFF910F96: to=<dmbelicheva@dmbelicheva.net>, relay=none, delay=0.06, delays=0.04/0/0.01/0, dsn=5.4.4, status=bounced (Host or domain name not found. Name service error for name=dmbelicheva.net type=A: Host not found)
Dec 2 20:03:54 client postfix/cleanup[45302]: 175BD9BAD41: message-id=<20231202200354.175BD9BAD41@client.dmbelicheva.net>
Dec 2 20:03:54 client postfix/bounce[45309]: 0DBFF910F96: sender non-delivery notification: 175BD9BAD41
Dec 2 20:03:54 client postfix/qmgr[42863]: 0DBFF910F96: removed
Dec 2 20:03:54 client postfix/qmgr[42863]: 175BD9BAD41: from=<>, size=2515, nrcpt=1 (queue active)
Dec 2 20:03:54 client postfix/local[45311]: 175BD9BAD41: to=<dmbelicheva@client.dmbelicheva.net>, relay=local, delay=0.03, delays=0.01/0/0/0.02, dsn=2.0.0, status=sent (delivered to mailbox)
Dec 2 20:03:54 client postfix/qmgr[42863]: 175BD9BAD41: removed
```

Рис. 13: мониторинг работы почтовой службы



```
root@server:/var/named/master/fz
GNU nano 5.6.1 dmbelicheva.net
$TTL 1D
@ IN SOA @ server.user.net. (
                                2023120207 ; serial
                                1D ; refresh
                                1H ; retry
                                1W ; expire
                                3H ) ; minimum
    NS      @
    A       192.168.1.1
    MX 10   mail.dmbelicheva.net.
$ORIGIN dmbelicheva.net.
server A   192.168.1.1
ns      A   192.168.1.1
dhcp    A   192.168.1.1
www     A   192.168.1.1
mail    A   192.168.1.1
```

Рис. 14: Добавление MX записи в файл прямой DNS-зоны

Конфигурация Postfix для домена

```
root@server:/var/named/master/rz
GNU nano 5.6.1 192.168.1
$TTL 1D
@      IN SOA @ server.dmbelicheva.net. (
                                2023120210 ; serial
                                1D      ; refresh
                                1H      ; retry
                                1W      ; expire
                                3H )    ; minimum

      NS      @
      A      192.168.1.1
      PTR     server.dmbelicheva.net.
      MX 10   mail.dmbelicheva.net.
$ORIGIN 1.168.192.in-addr.arpa.
1      PTR     server.dmbelicheva.net.
1      PTR     ns.dmbelicheva.net.
1      PTR     dhcp.dmbelicheva.net.
1      PTR     www.dmbelicheva.net.
1      PTR     mail.dmbelicheva.net.
```

Рис. 15: Добавление MX записи в файл прямой DNS-зоны

```
[root@server.dmbelicheva.net ~]# postconf -e 'mydestination = $myhostname, localhost.$mydomain,localhost, $mydomain'
[root@server.dmbelicheva.net ~]# postfix check
[root@server.dmbelicheva.net ~]# systemctl reload postfix
[root@server.dmbelicheva.net ~]# restorecon -vR /etc
[root@server.dmbelicheva.net ~]# restorecon -vR /var/named
[root@server.dmbelicheva.net ~]# systemctl restart named
[root@server.dmbelicheva.net ~]#
```

Рис. 16: Команды

Конфигурация Postfix для домена

```
2 20:11:09 client postfix/pickup[44316]: 8AC7D910F96: uid=1001 from=<dmbelicheva>
2 20:11:09 client postfix/cleanup[45465]: 8AC7D910F96: message-id=<20231202201109.8AC7D910F96@client.dmbelicheva.net>
2 20:11:09 client postfix/qmgr[42863]: 8AC7D910F96: from=<dmbelicheva@client.dmbelicheva.net>, size=350, nrcpt=1 (queue active)
2 20:11:09 client postfix/smtp[45471]: 8AC7D910F96: to=<dmbelicheva@dmbelicheva.net>, relay=none, delay=0.12, dsn=5.4.4, status=bounced (Host or domain name not found. Name service error for name=dmbelicheva.net type=A: Host not found)
2 20:11:09 client postfix/cleanup[45465]: A3EFD9BAD41: message-id=<20231202201109.A3EFD9BAD41@client.dmbelicheva.net>
2 20:11:09 client postfix/bounce[45472]: 8AC7D910F96: sender non-delivery notification: A3EFD9BAD41
2 20:11:09 client postfix/qmgr[42863]: A3EFD9BAD41: from=<>, size=2515, nrcpt=1 (queue active)
2 20:11:09 client postfix/qmgr[42863]: 8AC7D910F96: removed
2 20:11:09 client postfix/local[45474]: A3EFD9BAD41: to=<dmbelicheva@client.dmbelicheva.net>, relay=local, delay=0.01, delays=0.01/0.01/0/0.02, dsn=2.0.0, status=sent (delivered to mailbox)
2 20:11:09 client postfix/qmgr[42863]: A3EFD9BAD41: removed
```

Рис. 17: мониторинг работы почтовой службы

```
cd /vagrant/provision/server/dns/var/named  
cp -R /var/named/* /vagrant/provision/server/dns/var/named
```

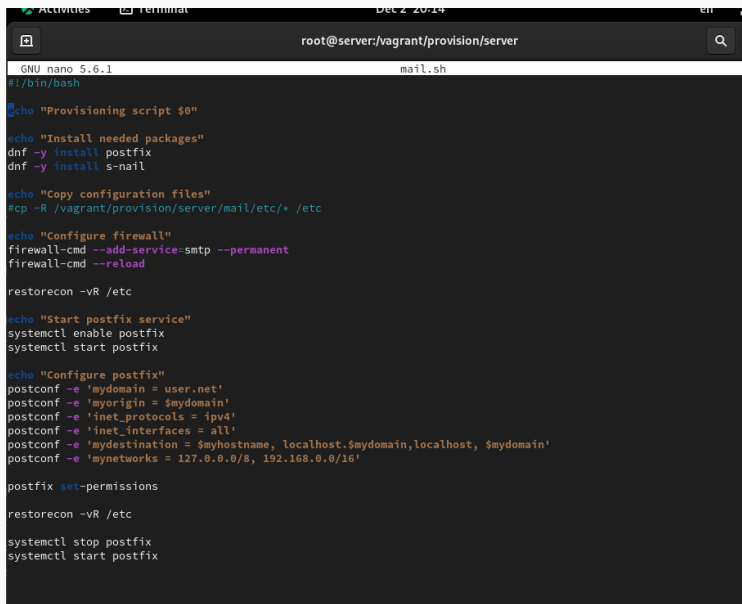

В каталоге `/vagrant/provision/server` создадим исполняемый файл `mail.sh`:

```
cd /vagrant/provision/server
```

```
touch mail.sh
```

```
chmod +x mail.sh
```

Внесение изменений в настройки внутреннего окружения виртуальной машины



The screenshot shows a terminal window with a dark theme. The title bar at the top indicates the window is titled 'root@server:/vagrant/provision/server' and shows system icons on the left and right. The terminal content displays a shell script being edited in nano. The script includes commands for installing postfix and s-nail, copying configuration files, configuring the firewall, and managing the postfix service. The script is saved as 'mail.sh'.

```
GNU nano 5.6.1 mail.sh
#!/bin/bash

echo "Provisioning script $0"

echo "Install needed packages"
dnf -y install postfix
dnf -y install s-nail

echo "Copy configuration files"
#cp -R /vagrant/provision/server/mail/etc/* /etc

echo "Configure firewall"
firewall-cmd --add-service-smtp --permanent
firewall-cmd --reload

restorecon -vR /etc

echo "Start postfix service"
systemctl enable postfix
systemctl start postfix

echo "Configure postfix"
postconf -e 'mydomain = user.net'
postconf -e 'myorigin = $mydomain'
postconf -e 'inet_protocols = ipv4'
postconf -e 'inet_interfaces = all'
postconf -e 'mydestination = $myhostname, localhost.$mydomain, localhost, $mydomain'
postconf -e 'mynetworks = 127.0.0.0/8, 192.168.0.0/16'

postfix set-permissions

restorecon -vR /etc

systemctl stop postfix
systemctl start postfix
```

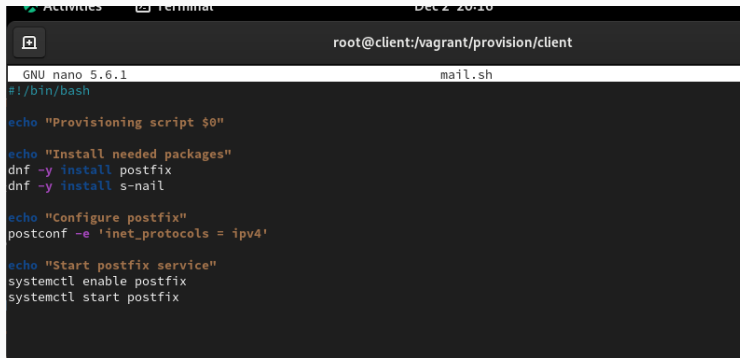
На виртуальной машине `client` перейдем в каталог для внесения изменений в настройки внутреннего окружения `/vagrant/provision/client/`: `cd /vagrant/provision/client`

В каталоге `/vagrant/provision/client` создайте исполняемый файл `mail.sh`:

```
touch mail.sh
```

```
chmod +x mail.sh
```

Внесение изменений в настройки внутреннего окружения виртуальной машины



```
root@client:/vagrant/provision/client
GNU nano 5.6.1 mail.sh
#!/bin/bash

echo "Provisioning script $0"

echo "Install needed packages"
dnf -y install postfix
dnf -y install s-nail

echo "Configure postfix"
postconf -e 'inet_protocols = ipv4'

echo "Start postfix service"
systemctl enable postfix
systemctl start postfix
```

Рис. 19: Редактирование файла

Для отработки созданного скрипта во время загрузки виртуальной машины `server` в конфигурационном файле `Vagrantfile` необходимо добавить в разделе конфигурации для сервера:

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

Для отработки созданного скрипта во время загрузки виртуальной машины client в конфигурационном файле Vagrantfile необходимо добавить в разделе конфигурации для клиента:

```
client.vm.provision "client mail",  
type: "shell",  
preserve_order: true,  
path: "provision/client/mail.sh"
```

В процессе выполнения данной лабораторной работы я приобрела практические навыки по установке и конфигурированию SMTP-сервера.