

Лабораторная работа №3

Настройка DHCP-сервера

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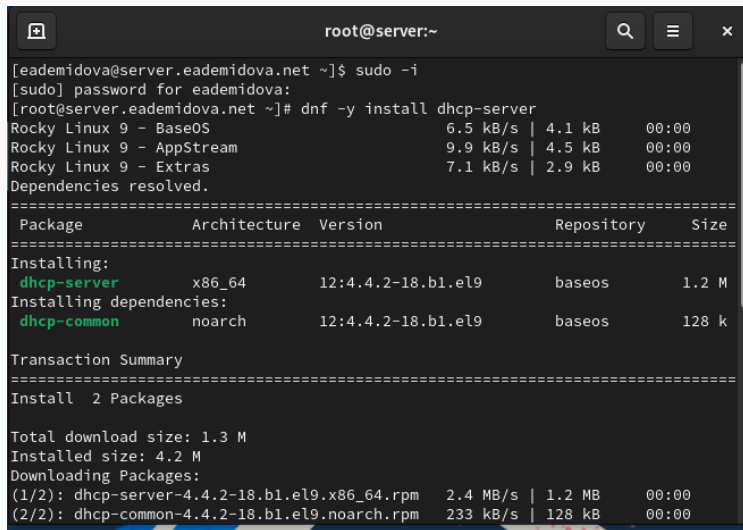
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Вводная часть

Приобретение практических навыков по установке и конфигурированию DHCP-сервера.

1. Установите на виртуальной машине server DHCP-сервер.
2. Настройте виртуальную машину server в качестве DHCP-сервера для виртуальной внутренней сети.
3. Проверьте корректность работы DHCP-сервера в виртуальной внутренней сети путём запуска виртуальной машины client и применения соответствующих утилит диагностики.
4. Настройте обновление DNS-зоны при появлении в виртуальной внутренней сети новых узлов.
5. Проверьте корректность работы DHCP-сервера и обновления DNS-зоны в виртуальной внутренней сети путём запуска виртуальной машины client и применения соответствующих утилит диагностики.
6. Напишите скрипт для Vagrant, фиксирующий действия по установке и настройке DHCP-сервера во внутреннем окружении виртуальной машины server. Соответствующим образом внести изменения в Vagrantfile.

Выполнение лабораторной работы



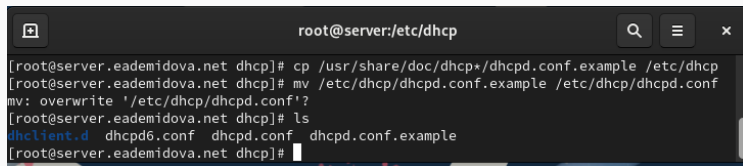
```
root@server:~  
[eademidova@server.eademidova.net ~]$ sudo -i  
[sudo] password for eademidova:  
[root@server.eademidova.net ~]# dnf -y install dhcp-server  
Rocky Linux 9 - BaseOS                6.5 kB/s | 4.1 kB    00:00  
Rocky Linux 9 - AppStream              9.9 kB/s | 4.5 kB    00:00  
Rocky Linux 9 - Extras                 7.1 kB/s | 2.9 kB    00:00  
Dependencies resolved.  
=====
```

Package	Architecture	Version	Repository	Size
Installing:				
dhcp-server	x86_64	12:4.4.2-18.b1.el9	baseos	1.2 M
Installing dependencies:				
dhcp-common	noarch	12:4.4.2-18.b1.el9	baseos	128 k

```
Transaction Summary  
=====
```

Install 2 Packages				
Total download size: 1.3 M				
Installed size: 4.2 M				
Downloading Packages:				
(1/2):	dhcp-server-4.4.2-18.b1.el9.x86_64.rpm	2.4 MB/s 1.2 MB	00:00	
(2/2):	dhcp-common-4.4.2-18.b1.el9.noarch.rpm	233 kB/s 128 kB	00:00	

Рис. 1: Установка dhcp на виртуальной машине server

A terminal window titled 'root@server:/etc/dhcp' with search, menu, and close icons. It shows a sequence of commands to copy and rename a DHCP configuration file. The commands are: 'cp /usr/share/doc/dhcp*/dhcpd.conf.example /etc/dhcp', 'mv /etc/dhcp/dhcpd.conf.example /etc/dhcp/dhcpd.conf', and 'ls'. The output of 'ls' shows 'dhclient.d', 'dhcpd6.conf', 'dhcpd.conf', and 'dhcpd.conf.example'. The prompt is currently at the end of the 'ls' command line.

```
root@server:/etc/dhcp
[root@server.eademidova.net dhcp]# cp /usr/share/doc/dhcp*/dhcpd.conf.example /etc/dhcp
[root@server.eademidova.net dhcp]# mv /etc/dhcp/dhcpd.conf.example /etc/dhcp/dhcpd.conf
mv: overwrite '/etc/dhcp/dhcpd.conf'?
[root@server.eademidova.net dhcp]# ls
dhclient.d  dhcpd6.conf  dhcpd.conf  dhcpd.conf.example
[root@server.eademidova.net dhcp]#
```

Рис. 2: Копирование и переименования файла примера конфигурации DHCP

Конфигурирование DHCP-сервера

```
mc [root@server.eademidova.net]:/etc/dhcp
dhcpd.conf [-M--] 46 L:[ 11+21 32/ 88] *(921 /2704b) 0059 0x03B [*][X]
max-lease-time 7200;

# Use this to enable / disable dynamic dns updates globally.
#ddns-update-style none;

# If this DHCP server is the official DHCP server for the local
# network, the authoritative directive should be uncommented.
authoritative;

# This declaration allows BOOTP clients to get dynamic addresses,
# which we don't really recommend.

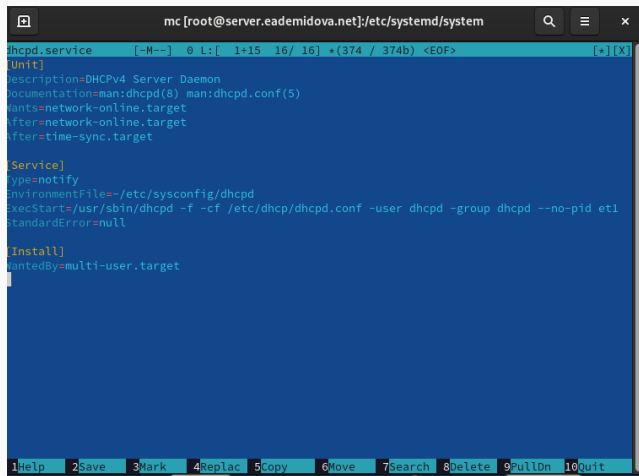
subnet 192.168.1.0 netmask 255.255.255.0 {
    range 192.168.1.30 192.168.1.199;
    option routers 192.168.1.1;
    option broadcast-address 192.168.1.255;
}

# A slightly different configuration for an internal subnet.
subnet 10.5.5.0 netmask 255.255.255.224 {
    range 10.5.5.26 10.5.5.30;
    option domain-name-servers ns.eademidova.net;
    option domain-name "eademidova.net";
    option routers 10.5.5.1;
    option broadcast-address 10.5.5.31;
    default-lease-time 600;
    max-lease-time 7200;
}

1Help 2Save 3Mark 4Replac 5Copy 6Move 7Search 8Delete 9PullDn 10Quit
```

Рис. 3: Редактирование файла /etc/dhcp/dhcpd.conf

Конфигурирование DHCP-сервера



The screenshot shows a terminal window with the nano text editor open at the file `/etc/systemd/system/dhcpd.service`. The editor's title bar indicates the user is root on the server `server.eademidova.net`. The file content is as follows:

```
dhcpd.service [-M--] 0 L:[ 1+15 16/ 16] *(374 / 374b) <EOF> [*][X]
[Unit]
Description=DHCPv4 Server Daemon
Documentation=man:dhcpd(8) man:dhcpd.conf(5)
Wants=network-online.target
After=network-online.target
After=time-sync.target

[Service]
Type=notify
EnvironmentFile=/etc/sysconfig/dhcpd
ExecStart=/usr/sbin/dhcpd -f -cf /etc/dhcp/dhcpd.conf -user dhcpd -group dhcpd --no-pid etl
StandardError=null

[Install]
WantedBy=multi-user.target
```

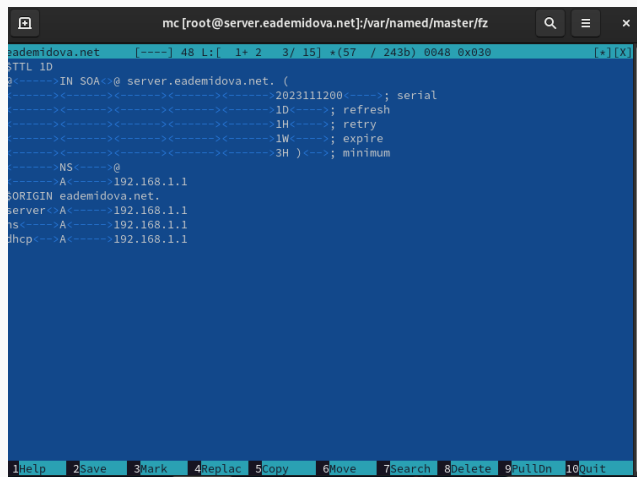
At the bottom of the editor, a status bar shows keyboard shortcuts: 1Help, 2Save, 3Mark, 4Replac, 5Copy, 6Move, 7Search, 8Delete, 9FullDn, 10Quit.

Рис. 4: Изменение файла `/etc/systemd/system/dhcpd.service`

```
[root@server.eademidova.net system]# systemctl --system daemon-reload
[root@server.eademidova.net system]# systemctl enable dhcpd
Created symlink /etc/systemd/system/multi-user.target.wants/dhcpd.service → /etc/systemd/system/dhcpd.service.
[root@server.eademidova.net system]#
```

Рис. 5: Перезагрузка конфигурации dhcpd и разрешение загрузки DHCP-сервера при запуске виртуальной машины server

Конфигурирование DHCP-сервера

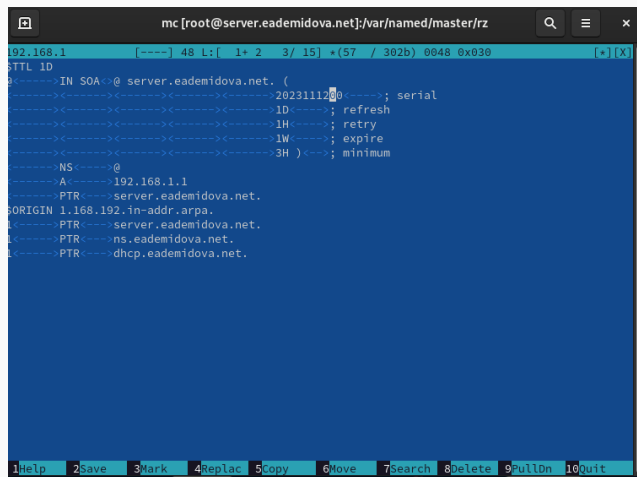


The screenshot shows a terminal window titled "mc [root@server.eademidova.net]:/var/named/master/fz". The terminal displays the configuration of a DHCP server's forward zone file. The configuration includes a header line for the zone "eademidova.net" with a TTL of 1D. The main configuration block is enclosed in curly braces and contains several directives: "IN SOA", "2023111200" for the serial number, "1D" for the refresh interval, "1H" for the retry interval, "1W" for the expire interval, and "3H" for the minimum interval. The "NS" directive is set to "@". The "A" directive is set to "192.168.1.1". The "ORIGIN" is set to "eademidova.net.". The "server" directive is set to "A", and the "ns" and "dhcp" directives are also set to "A". The terminal window has a status bar at the bottom with the following text: "1Help 2Save 3Mark 4Replac 5Copy 6Move 7Search 8Delete 9PullDn 10Quit".

```
mc [root@server.eademidova.net]:/var/named/master/fz
eademidova.net  [----] 48 L:[ 1+ 2 3/ 15] *(57 / 243b) 0048 0x030 [X]
$TTL 1D
;
; IN SOA<-->@ server.eademidova.net. (
;-----><-----><-----><-----><----->2023111200<----->; serial
;-----><-----><-----><-----><----->1D<----->; refresh
;-----><-----><-----><-----><----->1H<----->; retry
;-----><-----><-----><-----><----->1W<----->; expire
;-----><-----><-----><-----><----->3H )<-->; minimum
;----->NS<----->@
;----->A<----->192.168.1.1
;ORIGIN eademidova.net.
server<-->A<----->192.168.1.1
ns<----->A<----->192.168.1.1
dhcp<-->A<----->192.168.1.1
```

Рис. 6: Изменение файла прямой зоны

Конфигурирование DHCP-сервера

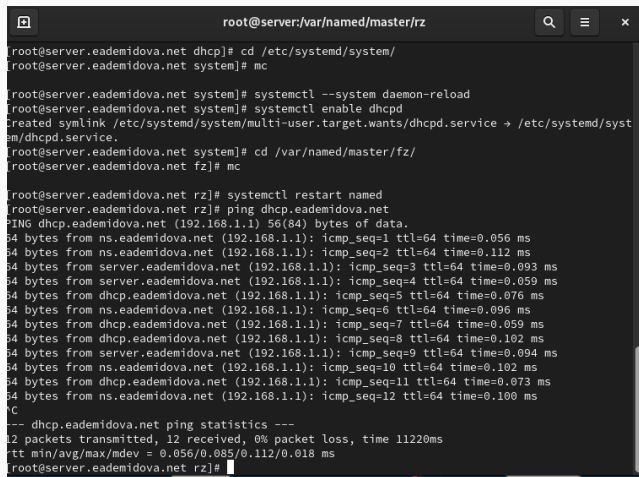


```
mc [root@server.eademidova.net]:/var/named/master/rz
192.168.1.1 [----] 48 L:[ 1+ 2 3/ 15] *(57 / 302b) 0048 0x030 [X]
$TTL 1D
@<----->IN SOA<@ server.eademidova.net. (
<-----><-----><-----><-----><----->2023111200<----->; serial
<-----><-----><-----><-----><----->1D<----->; refresh
<-----><-----><-----><-----><----->1H<----->; retry
<-----><-----><-----><-----><----->1W<----->; expire
<-----><-----><-----><-----><----->3H )<-->; minimum
<----->NS<----->@
<----->A<----->192.168.1.1
<----->PTR<---->server.eademidova.net.
$ORIGIN 1.168.192.in-addr.arpa.
1<----->PTR<---->server.eademidova.net.
1<----->PTR<---->ns.eademidova.net.
1<----->PTR<---->dhcp.eademidova.net.
```

1Help 2Save 3Mark 4Replac 5Copy 6Move 7Search 8Delete 9PullDn 10Quit

Рис. 7: Изменение файла обратной зоны

Конфигурирование DHCP-сервера



```
root@server:/var/named/master/rz

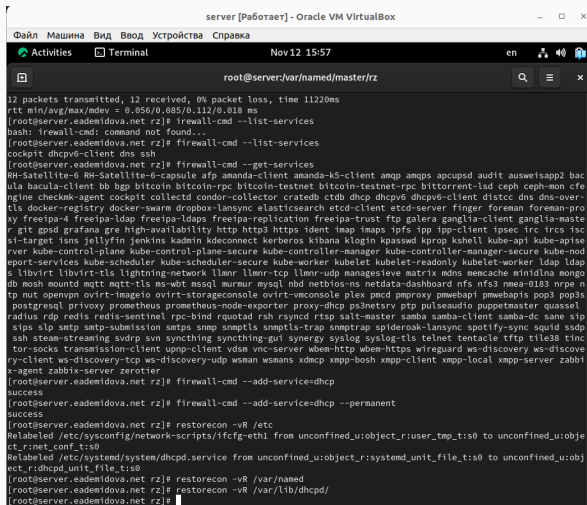
[root@server.eademidova.net dhcp]# cd /etc/systemd/system/
[root@server.eademidova.net system]# mc

[root@server.eademidova.net system]# systemctl --system daemon-reload
[root@server.eademidova.net system]# systemctl enable dhcpd
Created symlink /etc/systemd/system/multi-user.target.wants/dhcpd.service → /etc/systemd/system/dhcpd.service.
[root@server.eademidova.net system]# cd /var/named/master/fz/
[root@server.eademidova.net fz]# mc

[root@server.eademidova.net rz]# systemctl restart named
[root@server.eademidova.net rz]# ping dhcp.eademidova.net
PING dhcp.eademidova.net (192.168.1.1) 56(84) bytes of data:
64 bytes from ns.eademidova.net (192.168.1.1): icmp_seq=1 ttl=64 time=0.056 ms
64 bytes from ns.eademidova.net (192.168.1.1): icmp_seq=2 ttl=64 time=0.112 ms
64 bytes from server.eademidova.net (192.168.1.1): icmp_seq=3 ttl=64 time=0.093 ms
64 bytes from server.eademidova.net (192.168.1.1): icmp_seq=4 ttl=64 time=0.059 ms
64 bytes from dhcp.eademidova.net (192.168.1.1): icmp_seq=5 ttl=64 time=0.076 ms
64 bytes from ns.eademidova.net (192.168.1.1): icmp_seq=6 ttl=64 time=0.096 ms
64 bytes from dhcp.eademidova.net (192.168.1.1): icmp_seq=7 ttl=64 time=0.059 ms
64 bytes from dhcp.eademidova.net (192.168.1.1): icmp_seq=8 ttl=64 time=0.102 ms
64 bytes from server.eademidova.net (192.168.1.1): icmp_seq=9 ttl=64 time=0.094 ms
64 bytes from ns.eademidova.net (192.168.1.1): icmp_seq=10 ttl=64 time=0.102 ms
64 bytes from dhcp.eademidova.net (192.168.1.1): icmp_seq=11 ttl=64 time=0.073 ms
64 bytes from ns.eademidova.net (192.168.1.1): icmp_seq=12 ttl=64 time=0.100 ms
^C
--- dhcp.eademidova.net ping statistics ---
12 packets transmitted, 12 received, 0% packet loss, time 11220ms
rtt min/avg/max/mdev = 0.056/0.085/0.112/0.018 ms
[root@server.eademidova.net rz]#
```

Рис. 8: Обращение к к DHCP-серверу по имени

Конфигурирование DHCP-сервера

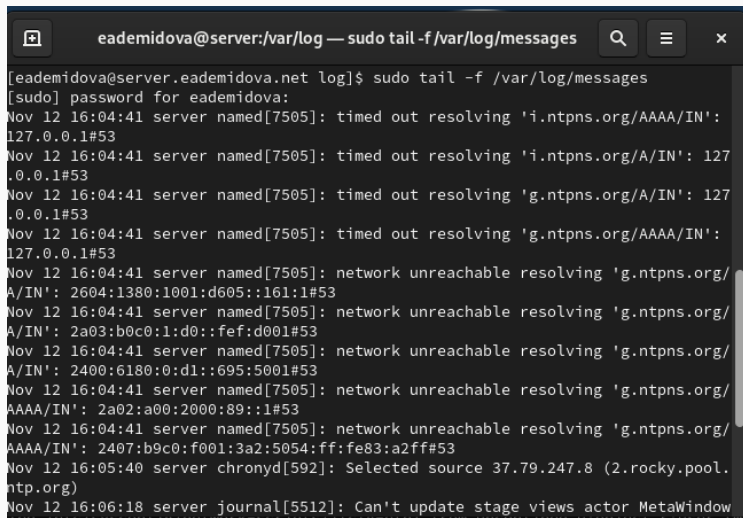


```
server [Работает] - Oracle VM VirtualBox
Файл Машина Вид Ввод Устройства Справка
Activities Terminal Nov 12 15:57
root@server:/var/named/master/rz

12 packets transmitted, 12 received, 0% packet loss, time 11220ms
rtt min/avg/max/mdev = 0.056/0.085/0.112/0.018 ms
[root@server.eademidova.net rz]# firewall-cmd --list-services
bash: firewall-cmd: command not found...
[root@server.eademidova.net rz]# firewall-cmd --list-services
cockpit dhcpv6-client dns ssh
[root@server.eademidova.net rz]# firewall-cmd --get-services
RH-Satellite-6 RH-Satellite-6-capsule afp amanda-client amanda-k5-client amqp amqps apcupsd audit ausweisapp2 bac
ula bacula-client bb bgp bitcoin bitcoin-rpc bitcoin-testnet bitcoin-testnet-rpc bittorrent-lsd ceph ceph-mon cfe
ngine checkmk-agent cockpit collectd condor-collector cratedb ctddb dhcp dhcpv6 dhcpv6-client distcc dns dns-over-
tls docker-registry docker-swarm dropbox-lansync elasticsearch etcd-client etcd-server finger foreman foreman-pro
xy freeipa-4 freeipa-ldap freeipa-ltdaps freeipa-replication freeipa-trust ftp galera ganglia-client ganglia-maste
r git gpsd grafana gre high-availability http http3 https ident imap imaps ipfs ipp ipp-client ipsec irc ircs isc
si-target isns jellyfin jenkins kadmin kdeconnect kerberos kibana klogin kpasswd kproton kshell kube-api kube-apise
rver kube-control-plane kube-control-plane-secure kube-controller-manager kube-controller-manager-secure kube-nod
eport-services kube-scheduler kube-scheduler-secure kube-worker kubelet kubelet-readonly kubelet-worker ldap ldap
s libvirt libvirt-tls lightning-network llmnr llmnr-tcp llmnr-udp managessie matrix mdns memcache minidlna mongo
db mosh moudn mqtt mqtt-tls ms-wbt mssql murmur mysql nbd netbios-ns netdata-dashboard nfs nfs3 nmea-0183 nrpe n
tp nut openvpn ovirt-imageio ovirt-storageconsole ovirt-vmconsole plex pncd pmproxy pmwebapi pmwebapis pop3 pop3s
postgresql privoxy prometheus prometheus-node-exporter proxy-dhcp ps3netsrv ptp pulseaudio puppetmaster quassel
radius rdp redis redis-sentinel rpc-bind rquotad rsh rsyncd rtsp salt-master samba samba-client samba-dc sane sip
sips slp smtp smtp-submission smtps snmp snmptls snmptls-trap snmptrap spideroak-lansync spotify-sync squid sddp
ssh steam-streaming svdrp svn syncthing syncthing-gui synergy syslog syslog-tls telnet tentacle tftp tile38 tinc
tor-socks transmission-client unpn-client vdsim vnc-server wben-http wben-https wireguard ws-discovery ws-discove
ry-client ws-discovery-tcp ws-discovery-udp wsman wsmans xdmcp xmpp-bosh xmpp-client xmpp-local xmpp-server zabbi
x-agent zabbix-server zerotier
[root@server.eademidova.net rz]# firewall-cmd --add-service=dhcp
success
[root@server.eademidova.net rz]# firewall-cmd --add-service=dhcp --permanent
success
[root@server.eademidova.net rz]# restorecon -vR /etc
Relabeled /etc/sysconfig/network-scripts/ifcfg-eth1 from unconfined_u:object_r:user_tmp_t:s0 to unconfined_u:obje
ct_r:net_conf_t:s0
Relabeled /etc/systemd/system/dhcpd.service from unconfined_u:object_r:systemd_unit_file_t:s0 to unconfined_u:obj
ect_r:dhcpd_unit_file_t:s0
[root@server.eademidova.net rz]# restorecon -vR /var/named
[root@server.eademidova.net rz]# restorecon -vR /var/lib/dhcpd/
[root@server.eademidova.net rz]#
```

Рис. 9: Разрешение межсетевому экрану работы с DHCP и восстановление контекста безопасности

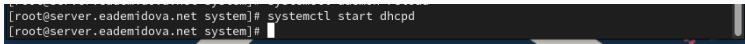
Конфигурирование DHCP-сервера



The image shows a terminal window with the title bar "eademidova@server:/var/log — sudo tail -f /var/log/messages". The terminal displays the output of the command "sudo tail -f /var/log/messages". The output shows several log entries from the system log, including messages about DNS resolution timeouts and network unreachable errors for the server named [7505]. The messages are timestamped with the date and time "Nov 12 16:04:41". The messages are as follows:

```
[eademidova@server.eademidova.net log]$ sudo tail -f /var/log/messages
[sudo] password for eademidova:
Nov 12 16:04:41 server named[7505]: timed out resolving 'i.ntpns.org/AAAA/IN': 127.0.0.1#53
Nov 12 16:04:41 server named[7505]: timed out resolving 'i.ntpns.org/A/IN': 127.0.0.1#53
Nov 12 16:04:41 server named[7505]: timed out resolving 'g.ntpns.org/A/IN': 127.0.0.1#53
Nov 12 16:04:41 server named[7505]: timed out resolving 'g.ntpns.org/AAAA/IN': 127.0.0.1#53
Nov 12 16:04:41 server named[7505]: network unreachable resolving 'g.ntpns.org/A/IN': 2604:1380:1001:d605::161:1#53
Nov 12 16:04:41 server named[7505]: network unreachable resolving 'g.ntpns.org/A/IN': 2a03:b0c0:1:d0::fef:d001#53
Nov 12 16:04:41 server named[7505]: network unreachable resolving 'g.ntpns.org/A/IN': 2400:6180:0:d1::695:5001#53
Nov 12 16:04:41 server named[7505]: network unreachable resolving 'g.ntpns.org/AAAA/IN': 2a02:a00:2000:89::1#53
Nov 12 16:04:41 server named[7505]: network unreachable resolving 'g.ntpns.org/AAAA/IN': 2407:b9c0:f001:3a2:5054:ff:fe83:a2ff#53
Nov 12 16:05:40 server chronyd[592]: Selected source 37.79.247.8 (2.rocky.pool.ntp.org)
Nov 12 16:06:18 server journal[5512]: Can't update stage views actor MetaWindow
```

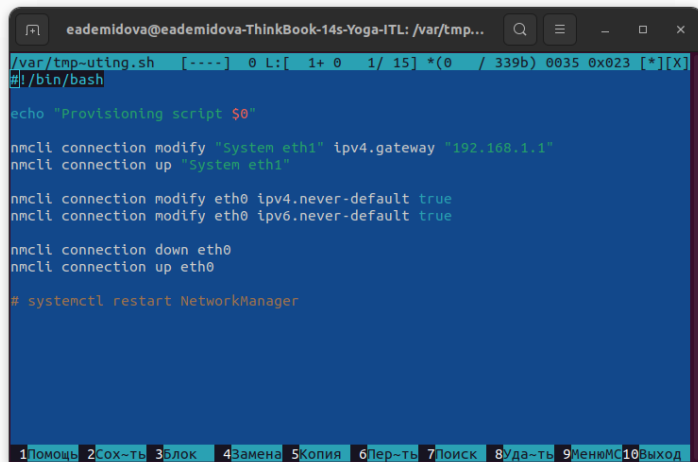
Рис. 10: Запуск мониторинга происходящих в системе процессов



```
[root@server.eademidova.net system]# systemctl start dhcpd  
[root@server.eademidova.net system]#
```

Рис. 11: Запуск DHCP-сервера

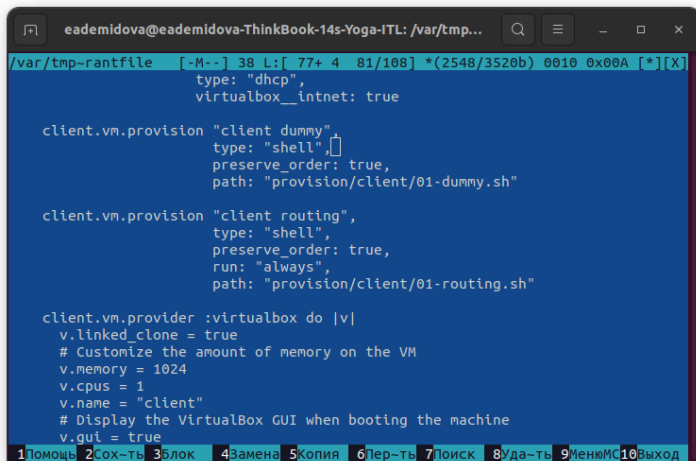

```
cd /var/tmp/user_name/vagrant/provision/client  
touch 01-routing.sh  
chmod +x 01-routing.sh
```



```
eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp...  
/var/tmp~uting.sh [----] 0 L:[ 1+ 0 1/ 15] *(0 / 339b) 0035 0x023 [*][X]  
#!/bin/bash  
  
echo "Provisioning script $0"  
  
nmcli connection modify "System eth1" ipv4.gateway "192.168.1.1"  
nmcli connection up "System eth1"  
  
nmcli connection modify eth0 ipv4.never-default true  
nmcli connection modify eth0 ipv6.never-default true  
  
nmcli connection down eth0  
nmcli connection up eth0  
  
# systemctl restart NetworkManager
```

1Помощь 2Сох-ть 3Блок 4Замена 5Копия 6Пер-ть 7Поиск 8Уда-ть 9МенюМС 10Выход

Рис. 12: Содержимое файла 01-routing.sh



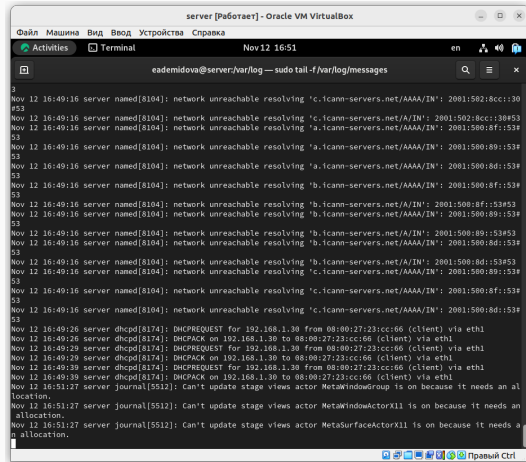
The image shows a terminal window with a dark background and light-colored text. The window title is "eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp...". The terminal content displays a Vagrantfile configuration for a DHCP server. The configuration includes a DHCP type, a shell provision script for a dummy client, a shell provision script for a routing client, and VirtualBox VM settings like memory, CPUs, and GUI. At the bottom of the terminal, there is a navigation bar with buttons labeled "1Помощь", "2Сох-ть", "3Блок", "4Замена", "5Копия", "6Пер-ть", "7Поиск", "8Уда-ть", "9МенюМС", and "10Выход".

```
eademidova@eademidova-ThinkBook-14s-Yoga-ITL: /var/tmp...  
/var/tmp-rantfile [-M--] 38 L:[ 77+ 4 81/108] *(2548/3520b) 0010 0x00A [*][X]  
  type: "dhcp",  
  virtualbox__intnet: true  
  
  client.vm.provision "client dummy"  
    type: "shell",  
    preserve_order: true,  
    path: "provision/client/01-dummy.sh"  
  
  client.vm.provision "client routing",  
    type: "shell",  
    preserve_order: true,  
    run: "always",  
    path: "provision/client/01-routing.sh"  
  
  client.vm.provider :virtualbox do |v|  
    v.linked_clone = true  
    # Customize the amount of memory on the VM  
    v.memory = 1024  
    v.cpus = 1  
    v.name = "client"  
    # Display the VirtualBox GUI when booting the machine  
    v.gui = true
```

Рис. 13: Подключение скрипта в Vagrantfile

```
make client-provision
```

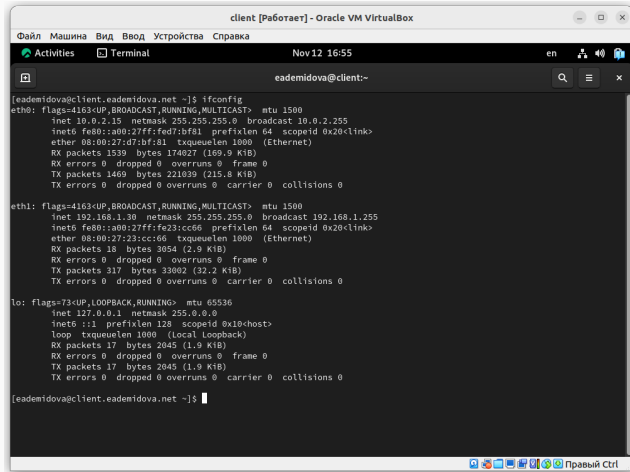
Анализ работы DHCP-сервера



```
server [Работает] - Oracle VM VirtualBox
Файл Машина Вид Ввод Устройства Справка
Activities Terminal Nov 12 16:51 en
eademidova@server:/var/log — sudo tail -f /var/log/messages
Nov 12 16:49:16 server named[8104]: network unreachable resolving 'c.icann-servers.net/AAAA/IN': 2001:502:8cc::30#53
Nov 12 16:49:16 server named[8104]: network unreachable resolving 'c.icann-servers.net/A/IN': 2001:502:8cc::30#53
Nov 12 16:49:16 server named[8104]: network unreachable resolving 'a.icann-servers.net/AAAA/IN': 2001:500:8f::53#53
Nov 12 16:49:16 server named[8104]: network unreachable resolving 'a.icann-servers.net/AAAA/IN': 2001:500:89::53#53
Nov 12 16:49:16 server named[8104]: network unreachable resolving 'a.icann-servers.net/AAAA/IN': 2001:500:8d::53#53
Nov 12 16:49:16 server named[8104]: network unreachable resolving 'b.icann-servers.net/AAAA/IN': 2001:500:8f::53#53
Nov 12 16:49:16 server named[8104]: network unreachable resolving 'b.icann-servers.net/A/IN': 2001:500:8f::53#53
Nov 12 16:49:16 server named[8104]: network unreachable resolving 'b.icann-servers.net/AAAA/IN': 2001:500:89::53#53
Nov 12 16:49:16 server named[8104]: network unreachable resolving 'b.icann-servers.net/A/IN': 2001:500:89::53#53
Nov 12 16:49:16 server named[8104]: network unreachable resolving 'b.icann-servers.net/AAAA/IN': 2001:500:8d::53#53
Nov 12 16:49:16 server named[8104]: network unreachable resolving 'b.icann-servers.net/A/IN': 2001:500:8d::53#53
Nov 12 16:49:16 server named[8104]: network unreachable resolving 'c.icann-servers.net/AAAA/IN': 2001:500:89::53#53
Nov 12 16:49:16 server named[8104]: network unreachable resolving 'c.icann-servers.net/AAAA/IN': 2001:500:8f::53#53
Nov 12 16:49:16 server named[8104]: network unreachable resolving 'c.icann-servers.net/AAAA/IN': 2001:500:8d::53#53
Nov 12 16:49:26 server dhcpd[8174]: DHCPREQUEST for 192.168.1.30 from 08:00:27:23:cc:66 (client) via eth1
Nov 12 16:49:26 server dhcpd[8174]: DHCPACK on 192.168.1.30 to 08:00:27:23:cc:66 (client) via eth1
Nov 12 16:49:29 server dhcpd[8174]: DHCPREQUEST for 192.168.1.30 from 08:00:27:23:cc:66 (client) via eth1
Nov 12 16:49:29 server dhcpd[8174]: DHCPACK on 192.168.1.30 to 08:00:27:23:cc:66 (client) via eth1
Nov 12 16:49:39 server dhcpd[8174]: DHCPREQUEST for 192.168.1.30 from 08:00:27:23:cc:66 (client) via eth1
Nov 12 16:49:39 server dhcpd[8174]: DHCPACK on 192.168.1.30 to 08:00:27:23:cc:66 (client) via eth1
Nov 12 16:51:27 server journal[5512]: Can't update stage views actor MetaWindowGroup is on because it needs an allocation.
Nov 12 16:51:27 server journal[5512]: Can't update stage views actor MetaWindowActorX11 is on because it needs an allocation.
Nov 12 16:51:27 server journal[5512]: Can't update stage views actor MetaSurfaceActorX11 is on because it needs an allocation.
```

Рис. 14: Подключение к виртуальной внутренней сети узла client и выдача ему IP-адреса

Анализ работы DHCP-сервера



The screenshot shows a terminal window titled "client [Работает] - Oracle VM VirtualBox". The window has a menu bar with "Файл", "Машина", "Вид", "Ввод", "Устройства", and "Справка". Below the menu bar is a toolbar with icons for "Activities", "Terminal", and a clock showing "Nov 12 16:55". The terminal prompt is "eademidova@client:~". The command "ifconfig" has been executed, showing the configuration for three network interfaces: eth0, eth1, and lo.

```
[eademidova@client.eademidova.net ~]$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
    inet 10.0.2.15  netmask 255.255.255.0  broadcast 10.0.2.255
    inet6 fe80::a00:27ff:fed7:bf81  prefixlen 64  scopeid 0x20<link>
    ether 08:00:27:d7:bf:81  txqueuelen 1000  (Ethernet)
    RX packets 1539  bytes 174027 (169.9 KiB)
    RX errors 0  dropped 0  overruns 0  frame 0
    TX packets 1469  bytes 221039 (215.8 KiB)
    TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

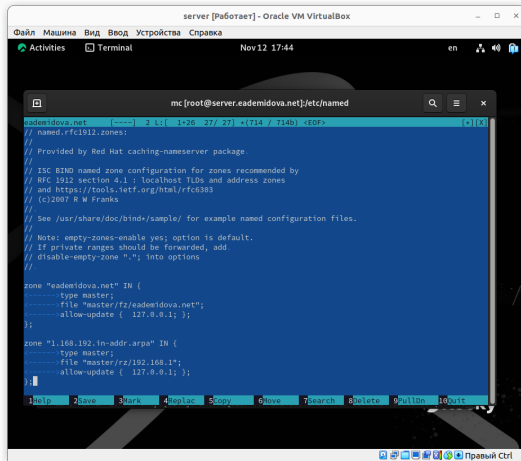
eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
    inet 192.168.1.30  netmask 255.255.255.0  broadcast 192.168.1.255
    inet6 fe80::a00:27ff:fe23:cc66  prefixlen 64  scopeid 0x20<link>
    ether 08:00:27:23:cc:66  txqueuelen 1000  (Ethernet)
    RX packets 18  bytes 3054 (2.9 KiB)
    RX errors 0  dropped 0  overruns 0  frame 0
    TX packets 317  bytes 33002 (32.2 KiB)
    TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
    inet 127.0.0.1  netmask 255.0.0.0
    inet6 ::1  prefixlen 128  scopeid 0x10<host>
    loop txqueuelen 1000  (Local Loopback)
    RX packets 17  bytes 2045 (1.9 KiB)
    RX errors 0  dropped 0  overruns 0  frame 0
    TX packets 17  bytes 2045 (1.9 KiB)
    TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

[eademidova@client.eademidova.net ~]$
```

Рис. 15: Информация об интерфейсах виртуальной машины client

Настройка обновления DNS-зоны



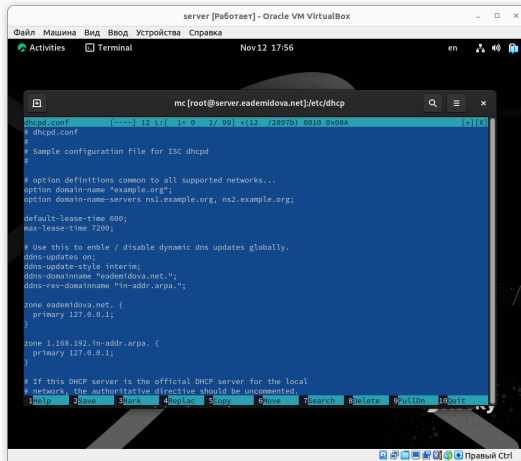
```
server [Работает] - Oracle VM VirtualBox
Файл Машина Вид Ввод Устройства Справка
Activities Terminal Nov 12 17:44 en
mc [root@server.eademidova.net]:/etc/named
eademidova.net [----] 2 L: [ 1+26 27/ 27] *(T14 / T14b) <EOF>
// named.rfc1912.zones:
//
// Provided by Red Hat caching-nameserver package.
//
// ISC BIND named zone configuration for zones recommended by
// RFC 1912 section 4.1 : localhost T1Ds and address zones
// and https://tools.ietf.org/html/rfc6383
// (c)2007 R W Franks
//
// See /usr/share/doc/bind-*/sample/ for example named configuration files.
//
// Note: empty-zones-enable yes; option is default.
// If private ranges should be forwarded, add
// disable-empty-zone "."; into options
//
zone "eademidova.net" IN {
    type master;
    file "master/fz/eademidova.net";
    allow-update { 127.0.0.1; };
};
zone "1.168.192.in-addr.arpa" IN {
    type master;
    file "master/rz/192.168.1.";
    allow-update { 127.0.0.1; };
};
1Help 2Save 3Mark 4Replac 5Copy 6Move 7Search 8Delete 9PullOn 10Quit
Правый Ctrl
```

Рис. 16: Разрешение обновления зоны с локального адреса

Затем перезапустим DNS-сервер командой:

```
systemctl restart named
```


Настройка обновления DNS-зоны



```
server [Работает] - Oracle VM VirtualBox
Файл  Машина  Вид  Ввод  Устройства  Справка
Activities  Terminal  Nov 12 17:56  en  [audio icon]  [network icon]

mc [root@server.eademidova.net]:/etc/dhcp

dhcpd.conf  [----] 12 L: [ 1+ 0 1/ 99] *(12 /2897b) 8010 0x00A [*](X)
# dhcpd.conf
#
# Sample configuration file for ISC dhcpd
#
# option definitions common to all supported networks...
option domain-name "example.org";
option domain-name-servers ns1.example.org, ns2.example.org;

default-lease-time 600;
max-lease-time 7200;

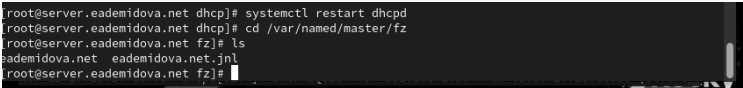
# Use this to enable / disable dynamic dns updates globally.
ddns-update-style interim;
ddns-domainname "eademidova.net.";
ddns-rev-domainname "in-addr.arpa.";

zone eademidova.net. {
    primary 127.0.0.1;
}

zone 1.168.192.in-addr.arpa. {
    primary 127.0.0.1;
}

# If this DHCP server is the official DHCP server for the local
# network, the authoritative directive should be uncommented.
1Help 2Save 3Mark 4Replac 5Copy 6Move 7Search 8Delete 9PullOn 10Quit
```

Рис. 17: Добавление разрешения на динамическое обновление DNS-записей с локального узла прямой и обратной зон

A terminal window with a black background and white text. The text shows a series of commands and their outputs in a root shell on a server named eademidova.net. The commands are: 'systemctl restart dhcpd', 'cd /var/named/master/fz', 'ls', and 'cat eademidova.net eademidova.net.jnl'. The output of 'ls' shows 'eademidova.net' and 'eademidova.net.jnl'. The output of 'cat' shows the contents of 'eademidova.net.jnl'.

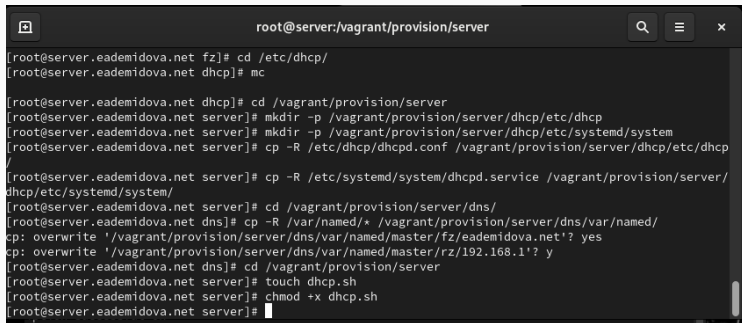
```
[root@server.eademidova.net dhcp]# systemctl restart dhcpd
[root@server.eademidova.net dhcp]# cd /var/named/master/fz
[root@server.eademidova.net fz]# ls
eademidova.net  eademidova.net.jnl
[root@server.eademidova.net fz]#
```

Рис. 18: Перезапуск сервера и отображение файла eademidova.net.jnl

С помощью утилиты dig убедимся в наличии DNS-записи о клиенте в прямой DNS-зоне:

```
dig @192.168.1.1 client.eademidova.net
```

Внесение изменений в настройки внутреннего окружения виртуальной машины



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

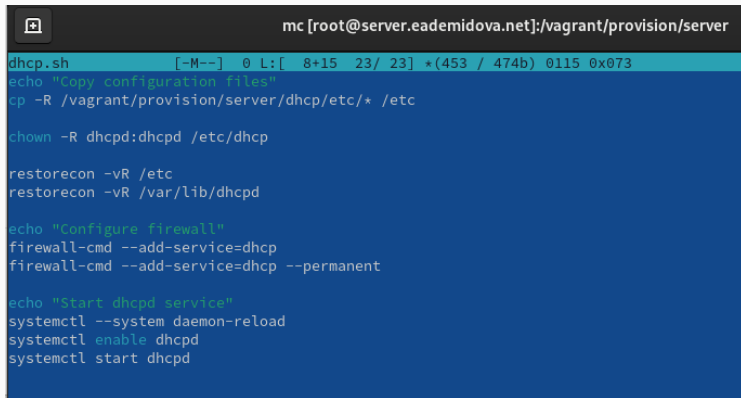
[root@server.eademidova.net fz]# cd /etc/dhcp/
[root@server.eademidova.net dhcp]# mc

[root@server.eademidova.net dhcp]# cd /vagrant/provision/server
[root@server.eademidova.net server]# mkdir -p /vagrant/provision/server/dhcp/etc/dhcp
[root@server.eademidova.net server]# mkdir -p /vagrant/provision/server/dhcp/etc/systemd/system
[root@server.eademidova.net server]# cp -R /etc/dhcp/dhcpd.conf /vagrant/provision/server/dhcp/etc/dhcp/
[root@server.eademidova.net server]# cp -R /etc/systemd/system/dhcpd.service /vagrant/provision/server/dhcp/etc/systemd/system/
[root@server.eademidova.net server]# cd /vagrant/provision/server/dns/
[root@server.eademidova.net dns]# cp -R /var/named/* /vagrant/provision/server/dns/var/named/
cp: overwrite '/vagrant/provision/server/dns/var/named/master/fz/eademidova.net'? yes
cp: overwrite '/vagrant/provision/server/dns/var/named/master/rz/192.168.1'? y
[root@server.eademidova.net dns]# cd /vagrant/provision/server
[root@server.eademidova.net server]# touch dhcp.sh
[root@server.eademidova.net server]# chmod +x dhcp.sh
[root@server.eademidova.net server]#
```

Рис. 19: Создание в каталоге dns /vagrant/provision/server/ конфигурационных файлов

Внесение изменений в настройки внутреннего окружения виртуальной машины

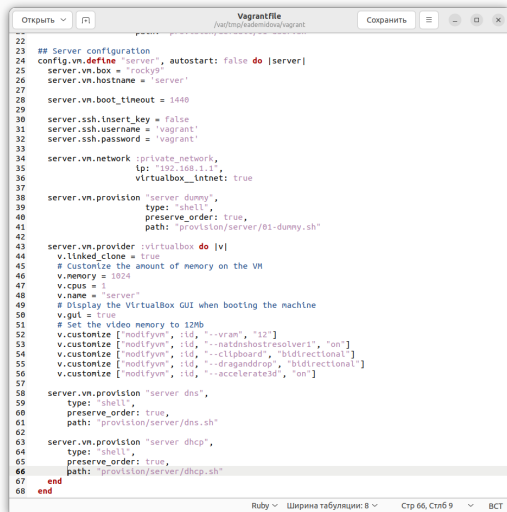
Запишем в dhcp.sh следующий скрипт:



```
mc [root@server.eademidova.net]:/vagrant/provision/server  
dhcp.sh      [-M--]  0 L:[ 8+15 23/ 23] *(453 / 474b) 0115 0x073  
echo "Copy configuration files"  
cp -R /vagrant/provision/server/dhcp/etc/* /etc  
  
chown -R dhcpd:dhcpd /etc/dhcp  
  
restorecon -vR /etc  
restorecon -vR /var/lib/dhcpd  
  
echo "Configure firewall"  
firewall-cmd --add-service=dhcp  
firewall-cmd --add-service=dhcp --permanent  
  
echo "Start dhcpd service"  
systemctl --system daemon-reload  
systemctl enable dhcpd  
systemctl start dhcpd
```

Рис. 20: Изменение файла dhcp.sh

Внесение изменений в настройки внутреннего окружения виртуальной машины



The image shows a code editor window titled 'Vagrantfile' with a file path of '/var/tmp/evadmidova/vagrant'. The editor contains Ruby code for configuring a virtual machine. The code is as follows:

```
22
23 ## Server configuration
24 config.vm.define "server", autostart: false do |server|
25   server.vm.box = "rocky9"
26   server.vm.hostname = "server"
27
28   server.vm.boot_timeout = 1440
29
30   server.ssh.insert_key = false
31   server.ssh.username = "vagrant"
32   server.ssh.password = "vagrant"
33
34   server.vm.network :private_network,
35     ip: "192.168.1.1",
36     virtualbox____ltnet: true
37
38   server.vm.provision "server dunny",
39     type: "shell",
40     preserve_order: true,
41     path: "provision/server/01-dunny.sh"
42
43   server.vm.provider :virtualbox do |v|
44     v.linked_clone = true
45     # Customize the amount of memory on the VM
46     v.memory = 1024
47     v.cpus = 1
48     v.name = "server"
49     # Display the VirtualBox GUI when booting the machine
50     v.gui = true
51     # Set the video memory to 12Mb
52     v.customize ["modifyvm", :id, "--vram", "12"]
53     v.customize ["modifyvm", :id, "--natdnshostresolver1", "on"]
54     v.customize ["modifyvm", :id, "--clipboard", "bidirectional"]
55     v.customize ["modifyvm", :id, "--draganddrop", "bidirectional"]
56     v.customize ["modifyvm", :id, "--accelerate3d", "on"]
57
58   server.vm.provision "server dns",
59     type: "shell",
60     preserve_order: true,
61     path: "provision/server/dns.sh"
62
63   server.vm.provision "server dhcp",
64     type: "shell",
65     preserve_order: true,
66     path: "provision/server/dhcp.sh"
67 end
68 end
```

The editor interface includes a menu bar with 'Открыть' (Open) and 'Сохранить' (Save) options. The status bar at the bottom indicates 'Ruby', 'Ширина табуляции: 8' (Tab width: 8), 'Стр 66, Стлб 9' (Page 66, Column 9), and 'ВСТ'.

Рис. 21: Изменение файла Vagrantfile

Заключение

В результате выполнения данной работы были приобретены практические навыки по установке и конфигурированию DHCP-сервера.