

Лабораторная работа №3

Администрирование сетевых подсистем

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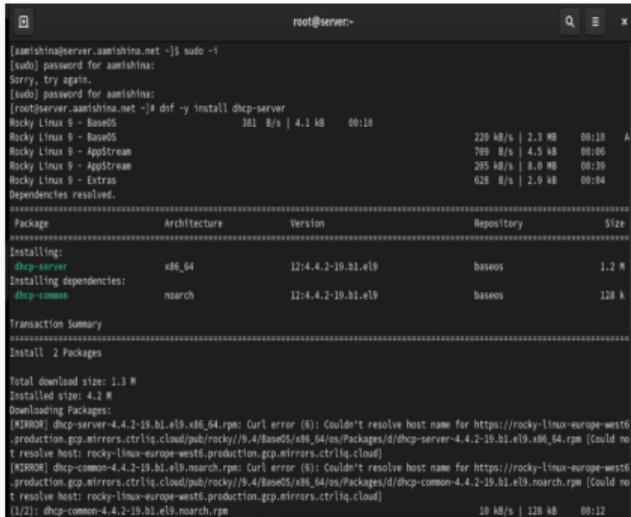
Цели и задачи

- Приобретение практических навыков по установке и конфигурированию DHCP-сервера.

Выполнение лабораторной работы

Установка DHCP-сервера

Dhcp



```
[amishina@server.amishina.net ~]$ sudo -i
[sudo] password for amishina:
Sorry, try again.
[sudo] password for amishina:
[root@server.amishina.net ~]# df -y install dhcp-server
Rocky Linux 9 - BaseOS           381 B/s | 4.1 kB   00:10
Rocky Linux 9 - BaseOS          220 kB/s | 2.3 MB   00:10  A
Rocky Linux 9 - AppStream        709 B/s | 4.5 kB   00:06
Rocky Linux 9 - AppStream       205 kB/s | 8.0 MB   00:39
Rocky Linux 9 - Extras          628 B/s | 2.9 kB   00:04
Dependencies resolved.

---- Package           Architecture      Version       Repository      Size ----
Installing:
  dhcp-server          x86_64          1:4.4.2-19.b1.el9      baseos     1.2 M
Installing dependencies:
  dhcp-common          noarch          1:4.4.2-19.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] (1) dhcp-server-4.4.2-19.b1.el9.x86_64.rpm: Curl error (6): Couldn't resolve host name for https://rocky-linux-europe-west6-production.gcp.mirrors.ctrlq.cloud/pub/rocky/9.4/BaseOS/x86_64/os/Packages/dhcp-server-4.4.2-19.b1.el9.x86_64.rpm [Could not resolve host: rocky-linux-europe-west6-production.gcp.mirrors.ctrlq.cloud]
[2/2] (2) dhcp-common-4.4.2-19.b1.el9.noarch.rpm: Curl error (6): Couldn't resolve host name for https://rocky-linux-europe-west6-production.gcp.mirrors.ctrlq.cloud/pub/rocky/9.4/BaseOS/x86_64/os/Packages/dhcp-common-4.4.2-19.b1.el9.noarch.rpm [Could not resolve host: rocky-linux-europe-west6-production.gcp.mirrors.ctrlq.cloud]
(1/2) (1) dhcp-common-4.4.2-19.b1.el9.noarch.rpm          10 kB/s | 128 kB   00:12
```

Рис. 1: Переход в режим суперпользователя и установка dhcp

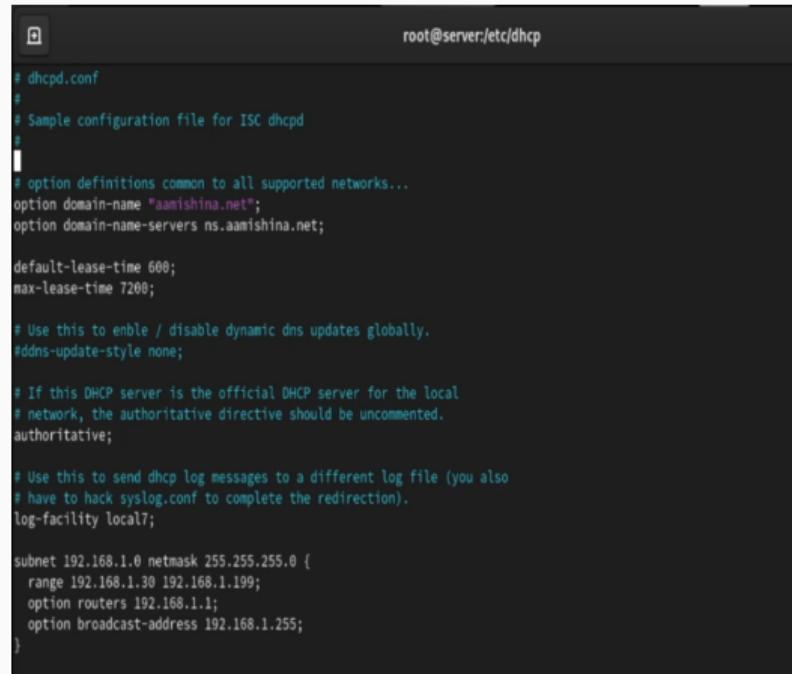
Конфигурирование DHCP-сервера

Файл dhcpcd.conf

```
[root@server.aamishina.net ~]# cd /etc/dhcp
[root@server.aamishina.net dhcp]# cp /usr/share/doc/dhcp*/dhcpcd.conf.example /etc/dhcp
[root@server.aamishina.net dhcp]# mv /etc/dhcp/dhcpcd.conf.example /etc/dhcp/dhcpcd.conf
mv: overwrite '/etc/dhcp/dhcpcd.conf'? y
```

Рис. 2: Копирование файла примера конфигурации и переименование

Файл /etc/dhcp/dhcpd.conf



The screenshot shows a terminal window with the title "root@server:/etc/dhcp". The window displays the configuration file /etc/dhcp/dhcpd.conf. The file contains several sections of comments and configuration options. It includes definitions for domain names, lease times, dynamic DNS updates, authoritative status, log facilities, and a subnet definition for the range 192.168.1.30 to 192.168.1.199.

```
# dhcpd.conf
#
# Sample configuration file for ISC dhcpcd
#
#
# option definitions common to all supported networks...
option domain-name "aamishina.net";
option domain-name-servers ns.aamishina.net;

default-lease-time 600;
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;

# Use this to send dhcp log messages to a different log file (you also
# have to hack syslog.conf to complete the redirection).
log-facility local7;

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;
}
```

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

Привязка dhcpcd к интерфейсу eth1

```
root@server:/etc/dhcp

[Unit]
Description=DHCPv4 Server Daemon
Documentation=man:dhcpcd(8) man:dhcpcd.conf(5)
Wants=network-online.target
After=network-online.target
After=time-sync.target

[Service]
Type=notify
EnvironmentFile=-/etc/sysconfig/dhcpcd
ExecStart=/usr/sbin/dhcpcd -f -cf /etc/dhcp/dhcpcd.conf -user dhcpcd -group dhcpcd --no-pid eth1 $DHCPDARGS
StandardError=null

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

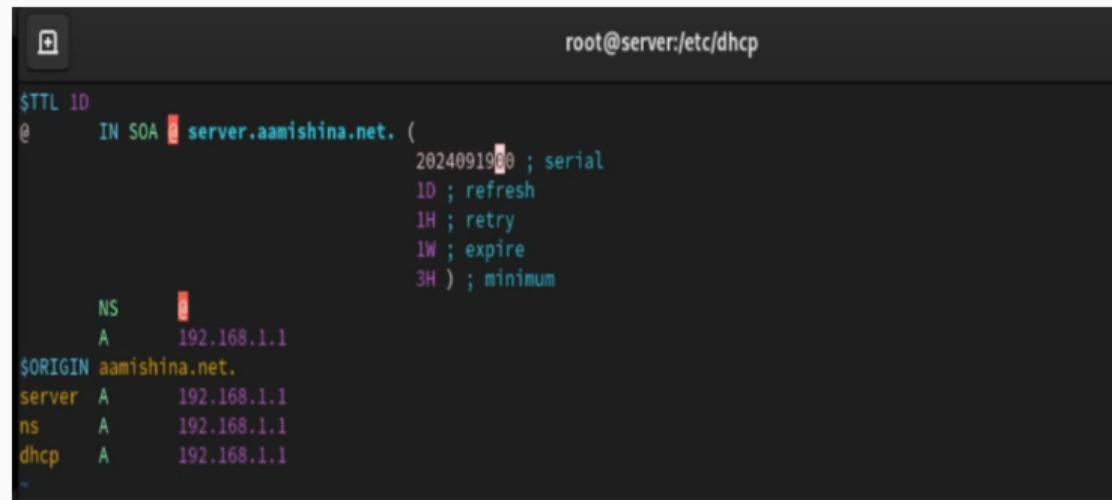
Рис. 4: Редактирование файла /etc/systemd/system/dhcpcd.service

Автозагрузка

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

Рис. 5: Перезагрузка конфигурации и автозагрузка DHCP-сервера

Прямая зона



The screenshot shows a terminal window titled "root@server:/etc/dhcp". The content of the terminal is a DNS zone configuration file:

```
$TTL 1D
@ IN SOA server.aamishina.net. (
                                2024091900 ; serial
                                1D ; refresh
                                1H ; retry
                                1W ; expire
                                3H ) ; minimum
        NS      server.aamishina.net.
        A       192.168.1.1
$ORIGIN aamishina.net.
server A    192.168.1.1
ns      A    192.168.1.1
dhcp   A    192.168.1.1
"
```

Рис. 6: Редактирование файла прямой DNS-зоны

Обратная зона

```
root@server:/etc/dhcp

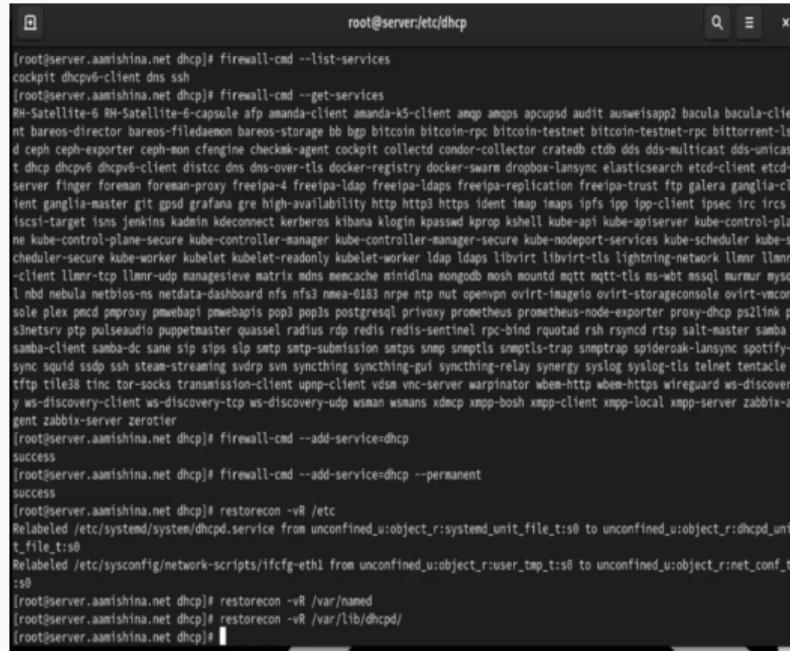
$TTL 1D
@ IN SOA server.aamishina.net. (
    2024091900 ; serial
    1D ; refresh
    1H ; retry
    1W ; expire
    3H ) ; minimum
    NS   .
    A    192.168.1.1
    PTR  server.aamishina.net.
$ORIGIN 1.168.192.in-addr.arpa.
    PTR  server.aamishina.net.
    PTR  ns.aamishina.net.
    PTR  dhcp.aamishina.net.
    "
```

Рис. 7: Редактирование файла обратной DNS-зоны

```
[root@server.aamishina.net dhcp]# systemctl restart named
[root@server.aamishina.net dhcp]# ping dhcp.aamishina.net
PING dhcp.aamishina.net (192.168.1.1) 56(84) bytes of data.
64 bytes from dhcp.aamishina.net (192.168.1.1): icmp_seq=1 ttl=64 time=0.035 ms
64 bytes from ns.aamishina.net (192.168.1.1): icmp_seq=2 ttl=64 time=0.099 ms
64 bytes from ns.aamishina.net (192.168.1.1): icmp_seq=3 ttl=64 time=0.070 ms
64 bytes from server.aamishina.net (192.168.1.1): icmp_seq=4 ttl=64 time=0.079 ms
64 bytes from dhcp.aamishina.net (192.168.1.1): icmp_seq=5 ttl=64 time=0.076 ms
64 bytes from server.aamishina.net (192.168.1.1): icmp_seq=6 ttl=64 time=0.103 ms
64 bytes from ns.aamishina.net (192.168.1.1): icmp_seq=7 ttl=64 time=0.066 ms
```

Рис. 8: Перезагрузка DNS-сервера и пинг DHCP-сервера

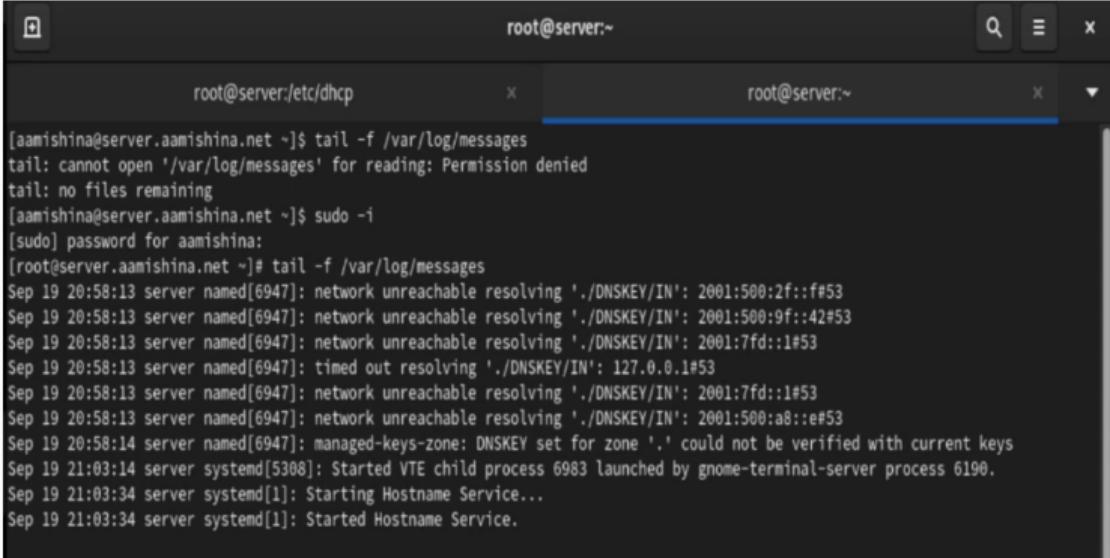
Межсетевой экран и SELinux



root@server:aamishina.net dhcp]# firewall-cmd --list-services
cockpit dhcpv6-client dns ssh
[root@server:aamishina.net dhcp]# firewall-cmd --get-services
RH-Satellite-6 RH-Satellite-6-capsule afp amanda-client amanda-k5-client ampg ampgs apcupsd audit ausweisapp2 bacula bacula-clie nt bareos-director bareos-filedaemon bareos-storage bb bgp bitcoin bitcoin-rpc bitcoin-testnet bitcoin-testnet-rpc bittorrent-ls d ceph ceph-exporter ceph-mon cfengine checkmk-agent cockpit collectd condor-collector cratedb ctdb dds dds-multicast dds-unicast dhcp dhcpv6 dhcpv6-client distcc dns dns-over-tls docker-docker registry docker-swarm dropbox-lansync elasticsearch etcd-client etcd-server finger foreman-proxy freeipa-4 freeipa-ldap freeipa-ldaps freeipa-replication freeipa-trust ftp galera ganglia-cl ient ganglia-master git gns3 grafana gre high-availability http https https ident imap imaps ipfs ipp ipp-client ipsec ircs iscsi-target isns jenkins kadmin kdeconnect kerberos kibana klogind kpasswd kprop kshell kube-api kube-apiserver kube-control-pla ne kube-control-plane-secure kube-controller-manager kube-controller-manager-secure kube-nodeport-services kube-scheduler kube-s cheduler-secure kube-worker kubelet worker ldap ldaps libvirt libvirt-tls lightning-network llmnr llmnr -client llmnr-tcp llmnr-udp managesieve matrix mdns memcache minidlna mongodb mosquitto mqtt mqtt-tls ms-wbt mssql murmur mysq l nbd nebula netbios-ns netdata-dashbaord nfs nfs3 nmea-0183 nrpe ntp ntpd openvpn ovirt-imageio ovirt-storageconsole ovirt-vmcon sole plex pmed pmedproxy pmwebapi pmwebapis pop3 pop3s postgresql privoxy prometheus prometheus-node-exporter proxy-dhcp ps2link p s3netrsvr ptp pulseaudio puppetmaster quassel radius rdp redis redis-sentinel rpc-bind rquotad rsync rtsp salt-master samba samba-client samba-dc sane sip sip sip smtp smtp-submission smtps smp smptls smptls-trap smpttrap spiderOak-lansync spotify-sync squid ssdp ssh steam-streaming svdrp svn syncthing syncthing-gui syncthing-relay synergy syslog syslog-tls telnet tentacle tftp title38 tinc tor-socks transmission-client vnc vnc-server warpinator wbem-http wbem-https wireguard ws-discover y ws-discovery-client ws-discovery-tcp ws-discovery-udp wsmans xdmc xmpp-bosh xmpp-client xmpp-local xmpp-server zabbix-a gent zabbix-server zerotier
[root@server:aamishina.net dhcp]# firewall-cmd --add-service=dhcp
success
[root@server:aamishina.net dhcp]# firewall-cmd --add-service=dhcp --permanent
success
[root@server:aamishina.net dhcp]# restorecon -vR /etc
Relabeled '/etc/systemd/system/dhcpd.service' from unconfined_u:object_r:systemd_unit_file_t:s0 to unconfined_u:object_r:dhcpd_uni t_file_t:s0
Relabeled '/etc/sysconfig/network-scripts/ifcfg-eth1' from unconfined_u:object_r:user_tmp_t:s0 to unconfined_u:object_r:net_conf_t :s0
[root@server:aamishina.net dhcp]# restorecon -vR /var/named
[root@server:aamishina.net dhcp]# restorecon -vR /var/lib/dhcpd/
[root@server:aamishina.net dhcp]#

Рис. 9: Внесение изменений в настройки межсетевого экрана, восстановление контекста безопасности

Мониторинг процессов



The screenshot shows a terminal window titled 'root@server:~'. It contains two tabs: 'root@server:/etc/dhcp' and 'root@server:~'. The current tab is 'root@server:~'. The terminal displays the following command and its output:

```
[aamishina@server.aamishina.net ~]$ tail -f /var/log/messages
tail: cannot open '/var/log/messages' for reading: Permission denied
tail: no files remaining
[aamishina@server.aamishina.net ~]$ sudo -i
[sudo] password for aamishina:
[root@server.aamishina.net ~]# tail -f /var/log/messages
Sep 19 20:58:13 server named[6947]: network unreachable resolving './DNSKEY/IN': 2001:500:2f::f#53
Sep 19 20:58:13 server named[6947]: network unreachable resolving './DNSKEY/IN': 2001:500:9f::42#53
Sep 19 20:58:13 server named[6947]: network unreachable resolving './DNSKEY/IN': 2001:7fd::1#53
Sep 19 20:58:13 server named[6947]: timed out resolving './DNSKEY/IN': 127.0.0.1#53
Sep 19 20:58:13 server named[6947]: network unreachable resolving './DNSKEY/IN': 2001:7fd::1#53
Sep 19 20:58:13 server named[6947]: network unreachable resolving './DNSKEY/IN': 2001:500:a8::e#53
Sep 19 20:58:14 server named[6947]: managed-keys-zone: DNSKEY set for zone '.' could not be verified with current keys
Sep 19 21:03:14 server systemd[5308]: Started VTE child process 6983 launched by gnome-terminal-server process 6190.
Sep 19 21:03:34 server systemd[1]: Starting Hostname Service...
Sep 19 21:03:34 server systemd[1]: Started Hostname Service.
```

Рис. 10: Мониторинг происходящих в системе процессов

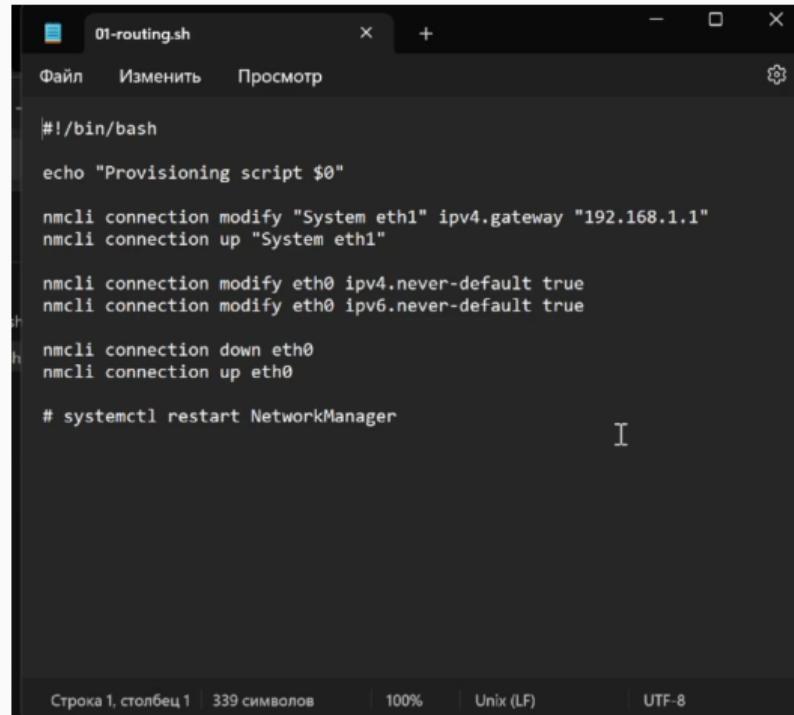
Запуск

```
[root@server.aamishina.net dhcp]# systemctl start dhcpcd  
[root@server.aamishina.net dhcp]#
```

Рис. 11: Запуск DHCP-сервера

Анализ работы DHCP-сервера

01-routing.sh



```
01-routing.sh
Файл Изменить Просмотр
#!/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
```

Строка 1, столбец 1 | 339 символов | 100% | Unix (LF) | UTF-8

Рис. 12: Файл 01-routing.sh

```
Sep 19 21:12:44 server dhcpcd[7050]: DHCPDISCOVER from 08:00:27:14:50:27 via eth1
Sep 19 21:12:45 server dhcpcd[7050]: DHCPOFFER on 192.168.1.30 to 08:00:27:14:50:27 (client) via eth1
Sep 19 21:12:45 server dhcpcd[7050]: DHCPREQUEST for 192.168.1.30 (192.168.1.1) from 08:00:27:14:50:27 (client) via eth1
Sep 19 21:12:45 server dhcpcd[7050]: DHCPACK on 192.168.1.30 to 08:00:27:14:50:27 (client) via eth1
10.97.0.621 okmorf: Success
```

Рис. 13: Запись о подключении к ВМ узла client и выдачи ему IP-адреса

dhcpd.leases

```
[root@server.aamishina.net dhcp]# cat /var/lib/dhcpd/dhcpd.leases
# The format of this file is documented in the dhcpcd.leases(5) manual page.
# This lease file was written by isc-dhcp-4.4.2b1

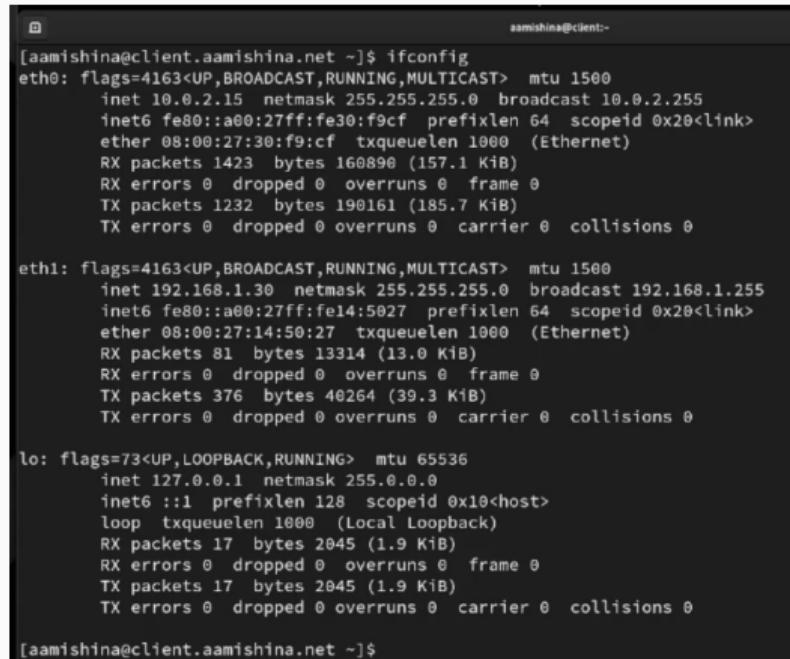
# authoring-byte-order entry is generated, DO NOT DELETE
authoring-byte-order little-endian;

server-duid "\000\001\000\001.\177N:\010\000"\337\264m";

lease 192.168.1.30 {
    starts 4 2024/09/19 21:12:45;
    ends 4 2024/09/19 21:22:45;
    cltt 4 2024/09/19 21:12:45;
    binding state active;
    next binding state free;
    rewind binding state free;
    hardware ethernet 08:00:27:14:50:27;
    uid "\001\010\000"\024P";
    client-hostname "client";
}
[root@server.aamishina.net dhcp]#
```

Рис. 14: Просмотр файла /var/lib/dhcpd/dhcpd.leases

Имеющиеся интерфейсы



The image shows a terminal window with a dark background and light-colored text. At the top right, it says "aamishina@client:~". The command "ifconfig" is run, and the output shows three network interfaces: eth0, eth1, and lo. The eth0 interface has an IP of 10.0.2.15 and is connected to a local loopback interface (lo) with an IP of 127.0.0.1. The eth1 interface has an IP of 192.168.1.30.

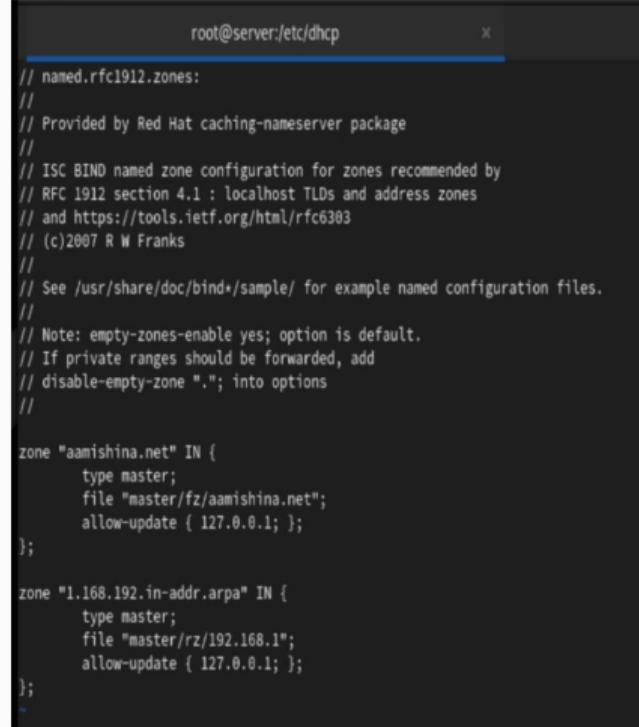
```
aamishina@client.aamishina.net ~]$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
        inet6 fe80::a600:27ff:fe30:f9cf prefixlen 64 scopeid 0x20<link>
            ether 08:00:27:30:f9:cf txqueuelen 1000 (Ethernet)
            RX packets 1423 bytes 160890 (157.1 Kib)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 1232 bytes 190161 (185.7 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::a600:27ff:fe14:5027 prefixlen 64 scopeid 0x20<link>
            ether 08:00:27:14:50:27 txqueuelen 1000 (Ethernet)
            RX packets 81 bytes 13314 (13.0 Kib)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 376 bytes 40264 (39.3 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

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

Рис. 15: ifconfig на BM client



The screenshot shows a terminal window titled "root@server:/etc/dhcp". The content of the terminal is the configuration file for the named daemon. It includes comments about RFC 1912 zones and specific configurations for the "aamishina.net" zone and the "1.168.192.in-addr.arpa" zone.

```
// 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 TLDs and address zones
// and https://tools.ietf.org/html/rfc6303
// (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 "aamishina.net" IN {
    type master;
    file "master/fz/aamishina.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; };
};
```

Рис. 16: Редактирование файла /etc/named/aamishina.net

Перезапуск и редактирование

```
# dhcpcd.conf
#
# Sample configuration file for ISC dhcpcd
#
# option definitions common to all supported networks...
option domain-name "aamishina.net";
option domain-name-servers ns.aamishina.net;

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

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

ddns-updates on;
ddns-update-style interim;
ddns-domainname "aamishina.net.";
ddns-rev-domainname "in-addr.arpa.';

zone aamishina.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.
authoritative;

:wg
```

Рис. 17: Редактирование файла /etc/dhcp/dhcpcd.conf

Перезапуск

```
[root@server.aamishina.net dhcp]# systemctl restart dhcpcd  
[root@server.aamishina.net dhcp]# ls /var/named/master/fz  
aamishina.net aamishina.net.jnl  
[root@server.aamishina.net dhcp]# █
```

Рис. 18: Успешный перезапуск DHCP-сервера

Анализ работы DHCP-сервера после настройки обновления DNS-зоны

BM client

```
[aamishina@client.aamishina.net ~]$ dig @192.168.1.1 client.aamishina.net

; <>> DiG 9.16.23-RH <>> @192.168.1.1 client.aamishina.net
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 49632
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: 184352da5b86a3bc0100000066ec96fcb0d9ade1b6c3a7eb (good)
;; QUESTION SECTION:
;client.aamishina.net.      IN      A

;; ANSWER SECTION:
client.aamishina.net.    300      IN      A      192.168.1.30

;; Query time: 1 msec
;; SERVER: 192.168.1.1#53(192.168.1.1)
;; WHEN: Thu Sep 19 21:26:16 UTC 2024
;; MSG SIZE  rcvd: 93

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

Рис. 19: Проверка DNS-записи о клиенте в прямой DNS-зоне

Внесение изменений в настройки внутреннего окружения виртуальной машины

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

Рис. 20: Изменения в настройках внутреннего окружения, создание каталога dhcp, замена конфигурационных файлов DNS-сервера

Скрипт dhcp.sh

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

echo "Provisioning script $0"

echo "Install needed packages"
dnf -y install dhcp-server

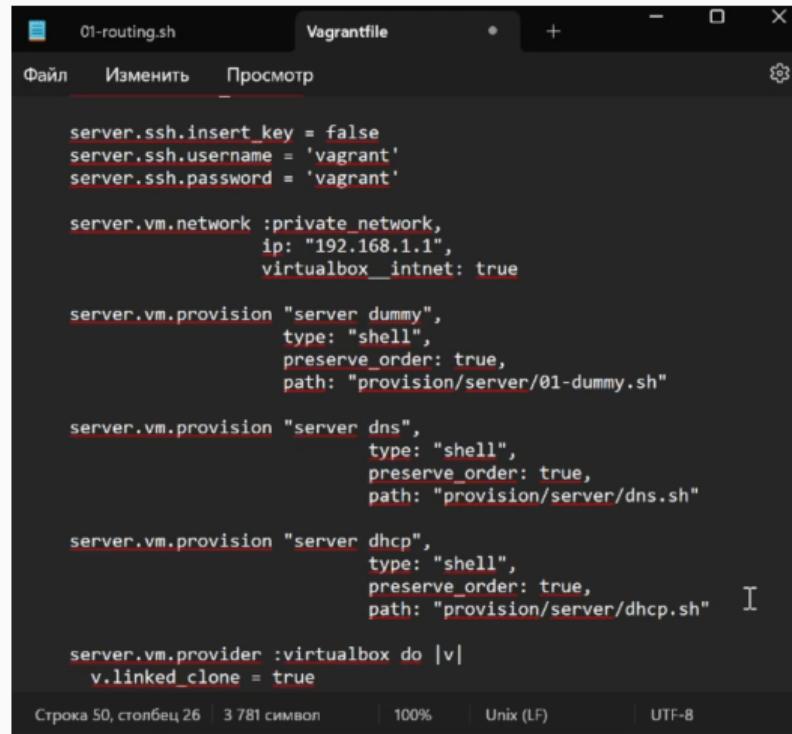
echo "Copy configuration files"
cp -R /vagrant/provision/server/dhcp/etc/* /etc
chown -R dhcpcd:dhcpcd /etc/dhcp
restorecon -vR /etc
restorecon -vR /var/lib/dhcpcd

echo "Configure firewall"
firewall-cmd --add-service=dhcp
firewall-cmd --add-service=dhcp --permanent

echo "Start dhcpcd service"
systemctl --system daemon-reload
systemctl enable dhcpcd
systemctl start dhcpcd
```

Рис. 21: Создание скрипта dhcp.sh

Отработка скрипта во время запуска



The screenshot shows a code editor window with two tabs: "01-routing.sh" and "Vagrantfile". The "Vagrantfile" tab is active, displaying the following configuration code:

```
server.ssh.insert_key = false
server.ssh.username = 'vagrant'
server.ssh.password = 'vagrant'

server.vm.network :private_network,
  ip: "192.168.1.1",
  virtualbox_intnet: 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" | I

server.vm.provider :virtualbox do |v|
  v.linked_clone = true
```

The status bar at the bottom of the editor indicates:

- Строка 50, столбец 26
- 3 781 символ
- 100%
- Unix (LF)
- UTF-8

Рис. 22: Изменения в Vagrantfile

Вывод

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