

Презентация по лабораторной работе №3

Настройка DHCP-сервера

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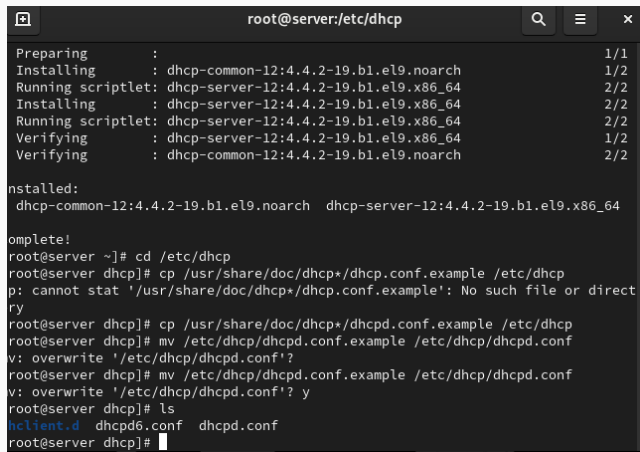
Приобретение практических навыков по установке и конфигурированию DHCP-сервера.

Установка DHCP-сервера

```
dnf -y install dhcp-server
```

Конфигурирование DHCP-сервера

Выполнение лабораторной работы



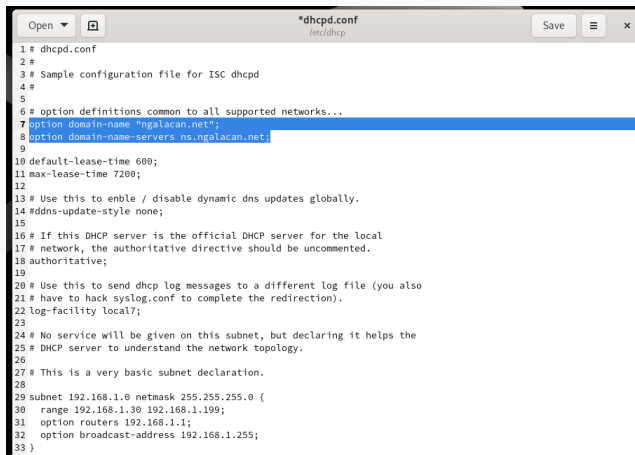
```
root@server:/etc/dhcp
Preparing      :                               1/1
Installing     : dhcp-common-12:4.4.2-19.b1.el9.noarch 1/2
Running scriptlet: dhcp-server-12:4.4.2-19.b1.el9.x86_64 2/2
Installing     : dhcp-server-12:4.4.2-19.b1.el9.x86_64 2/2
Running scriptlet: dhcp-server-12:4.4.2-19.b1.el9.x86_64 2/2
Verifying      : dhcp-server-12:4.4.2-19.b1.el9.x86_64 1/2
Verifying      : dhcp-common-12:4.4.2-19.b1.el9.noarch 2/2

Installed:
  dhcp-common-12:4.4.2-19.b1.el9.noarch  dhcp-server-12:4.4.2-19.b1.el9.x86_64

Complete!
root@server ~]# cd /etc/dhcp
root@server dhcp]# cp /usr/share/doc/dhcp*/dhcp.conf.example /etc/dhcp
cp: cannot stat '/usr/share/doc/dhcp*/dhcp.conf.example': No such file or directory
root@server dhcp]# cp /usr/share/doc/dhcp*/dhcpd.conf.example /etc/dhcp
root@server dhcp]# mv /etc/dhcp/dhcpd.conf.example /etc/dhcp/dhcpd.conf
mv: overwrite '/etc/dhcp/dhcpd.conf'?
root@server dhcp]# mv /etc/dhcp/dhcpd.conf.example /etc/dhcp/dhcpd.conf
mv: overwrite '/etc/dhcp/dhcpd.conf'? y
root@server dhcp]# ls
dhclient.d  dhcpd6.conf  dhcpd.conf
root@server dhcp]#
```

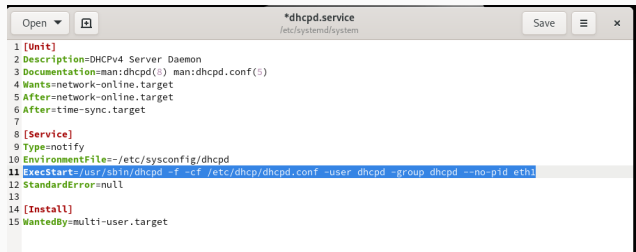
Рис. 1: Копирование файла примера конфигурации и переименование

Выполнение лабораторной работы



```
1 # dhcpd.conf
2 #
3 # Sample configuration file for ISC dhcpd
4 #
5
6 # option definitions common to all supported networks...
7 option domain-name "ngalacan.net";
8 option domain-name-servers ns.ngalacan.net;
9
10 default-lease-time 600;
11 max-lease-time 7200;
12
13 # Use this to enable / disable dynamic dns updates globally.
14 #ddns-update-style none;
15
16 # If this DHCP server is the official DHCP server for the local
17 # network, the authoritative directive should be uncommented.
18 authoritative;
19
20 # Use this to send dhcp log messages to a different log file (you also
21 # have to hack syslog.conf to complete the redirection).
22 log-facility local7;
23
24 # No service will be given on this subnet, but declaring it helps the
25 # DHCP server to understand the network topology.
26
27 # This is a very basic subnet declaration.
28
29 subnet 192.168.1.0 netmask 255.255.255.0 {
30   range 192.168.1.30 192.168.1.199;
31   option routers 192.168.1.1;
32   option broadcast-address 192.168.1.255;
33 }
```

Рис. 2: Редактирование файла `/etc/dhcp/dhcpd.conf`

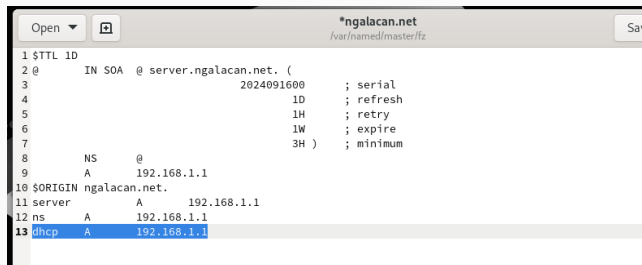


```
1 [Unit]
2 Description=DHCPv4 Server Daemon
3 Documentation=man:dhcpd(8) man:dhcpd.conf(5)
4 Wants=network-online.target
5 After=network-online.target
6 After=time-sync.target
7
8 [Service]
9 Type=notify
10 EnvironmentFile=/etc/sysconfig/dhcpd
11 ExecStart=/usr/sbin/dhcpd -f -cf /etc/dhcp/dhcpd.conf -user dhcpd -group dhcpd --no-pid eth1
12 StandardError=null
13
14 [Install]
15 WantedBy=multi-user.target
```

Рис. 3: Редактирование файла `/etc/systemd/system/dhcpd.service`

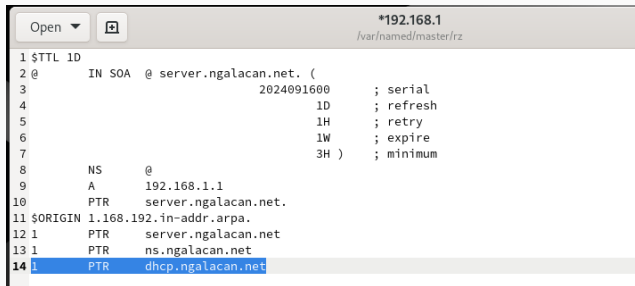
```
Failed to execute child process 'dbus-launch' (No such file or directory)
[root@server dhcp]# systemctl --system daemon-reload
[root@server dhcp]# systemctl enable dhcpd
Created symlink /etc/systemd/system/multi-user.target.wants/dhcpd.service → /etc/systemd/system/dhcpd.service.
[root@server dhcp]#
```

Рис. 4: Перезагрузка конфигурации и автозагрузка DHCP-сервера



```
1 $TTL 1D
2 @      IN SOA  @ server.ngalacan.net. (
3                               2024091600    ; serial
4                               1D      ; refresh
5                               1H      ; retry
6                               1W      ; expire
7                               3H )   ; minimum
8      NS      @
9      A      192.168.1.1
10 $ORIGIN ngalacan.net.
11 server     A      192.168.1.1
12 ns         A      192.168.1.1
13 dhcp       A      192.168.1.1
```

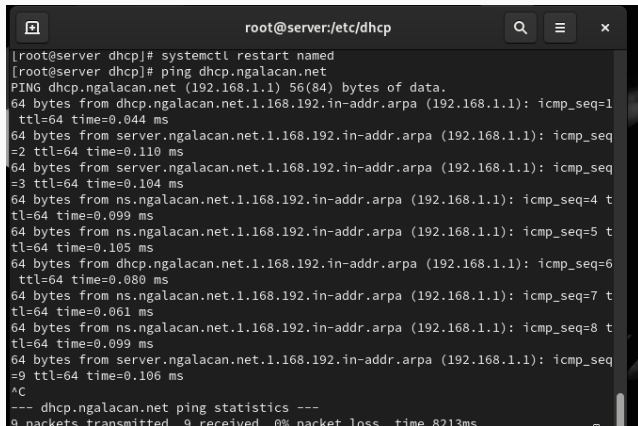
Рис. 5: Редактирование файла прямой DNS-зоны



```
Open [icon] *192.168.1
/var/named/master/rz

1 $TTL 1D
2 @      IN SOA  @ server.ngalacan.net. (
3                               2024091600      ; serial
4                               1D              ; refresh
5                               1H              ; retry
6                               1W              ; expire
7                               3H )            ; minimum
8      NS      @
9      A      192.168.1.1
10     PTR     server.ngalacan.net.
11 $ORIGIN 1.168.192.in-addr.arpa.
12 1      PTR     server.ngalacan.net
13 1      PTR     ns.ngalacan.net
14 1      PTR     dhcp.ngalacan.net
```

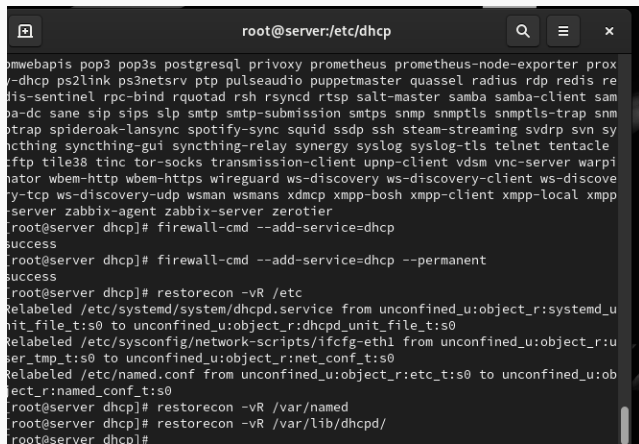
Рис. 6: Редактирование файла обратной DNS-зоны



```
root@server:/etc/dhcp
[root@server dhcp]# systemctl restart named
[root@server dhcp]# ping dhcp.ngalacan.net
PING dhcp.ngalacan.net (192.168.1.1) 56(84) bytes of data.
64 bytes from dhcp.ngalacan.net.1.168.192.in-addr.arpa (192.168.1.1): icmp_seq=1
ttl=64 time=0.044 ms
64 bytes from server.ngalacan.net.1.168.192.in-addr.arpa (192.168.1.1): icmp_seq=
=2 ttl=64 time=0.110 ms
64 bytes from server.ngalacan.net.1.168.192.in-addr.arpa (192.168.1.1): icmp_seq
=3 ttl=64 time=0.104 ms
64 bytes from ns.ngalacan.net.1.168.192.in-addr.arpa (192.168.1.1): icmp_seq=4 t
tl=64 time=0.099 ms
64 bytes from ns.ngalacan.net.1.168.192.in-addr.arpa (192.168.1.1): icmp_seq=5 t
tl=64 time=0.105 ms
64 bytes from dhcp.ngalacan.net.1.168.192.in-addr.arpa (192.168.1.1): icmp_seq=6
ttl=64 time=0.080 ms
64 bytes from ns.ngalacan.net.1.168.192.in-addr.arpa (192.168.1.1): icmp_seq=7 t
tl=64 time=0.061 ms
64 bytes from ns.ngalacan.net.1.168.192.in-addr.arpa (192.168.1.1): icmp_seq=8 t
tl=64 time=0.099 ms
64 bytes from server.ngalacan.net.1.168.192.in-addr.arpa (192.168.1.1): icmp_seq
=9 ttl=64 time=0.106 ms
^C
--- dhcp.ngalacan.net ping statistics ---
9 packets transmitted, 9 received, 0% packet loss, time 8213ms
```

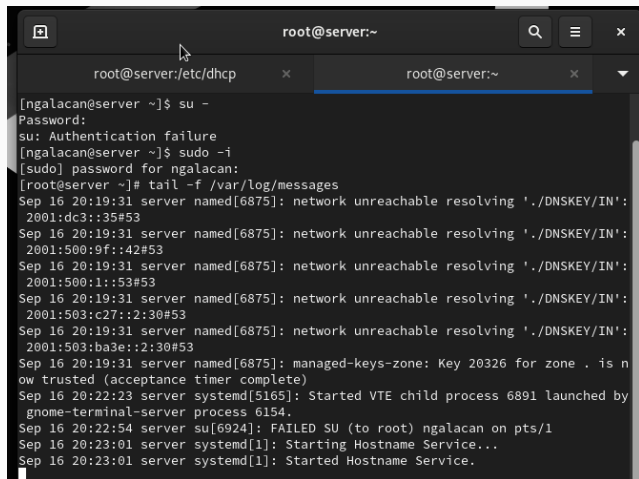
Рис. 7: Перезагрузка DNS-сервера и пинг DHCP-сервера

Выполнение лабораторной работы



```
root@server:/etc/dhcp
omwebapis pop3 pop3s postgresql privoxy prometheus prometheus-node-exporter prox
y-dhcp ps2link ps3netsrv ptp pulseaudio puppetmaster quassel radius rdp redis re
dis-sentinel rpc-bind rquotad rsh rsyncd rtsp salt-master samba samba-client sam
ba-dc sane sip sips slp smtp smtp-submission smtps snmp snmptls snmptls-trap snm
ptrap spideroak-lansync spotify-sync squid ssdp ssh steam-streaming svdrp svn sy
ncthing syncthing-gui syncthing-relay synergy syslog syslog-tls telnet tentacle
cftp tile38 tinc tor-socks transmission-client upnp-client vdsu vnc-server warpi
nator wbem-http wbem-https wireguard ws-discovery ws-discovery-client ws-discove
ry-tcp ws-discovery-udp wsman wsmans xdmcp xmpp-bosh xmpp-client xmpp-local xmpp
-server zabbix-agent zabbix-server zerotier
[root@server dhcp]# firewall-cmd --add-service=dhcp
success
[root@server dhcp]# firewall-cmd --add-service=dhcp --permanent
success
[root@server dhcp]# restorecon -vR /etc
Relabeled /etc/systemd/system/dhcpd.service from unconfined_u:object_r:systemd_u
nit_file_t:s0 to unconfined_u:object_r:dhcpd_unit_file_t:s0
Relabeled /etc/sysconfig/network-scripts/ifcfg-eth1 from unconfined_u:object_r:u
ser_tmp_t:s0 to unconfined_u:object_r:net_conf_t:s0
Relabeled /etc/named.conf from unconfined_u:object_r:etc_t:s0 to unconfined_u:ob
ject_r:named_conf_t:s0
[root@server dhcp]# restorecon -vR /var/named
[root@server dhcp]# restorecon -vR /var/lib/dhcpd/
[root@server dhcp]#
```

Рис. 8: Внесение изменений в настройки межсетевого экрана, восстановление контекста безопасности

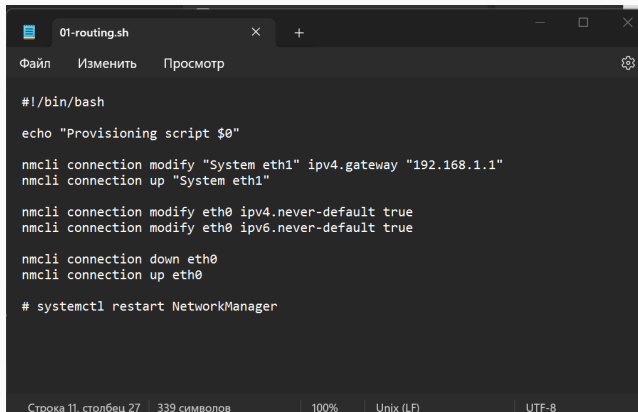


The screenshot shows a terminal window with a dark theme. The title bar at the top reads 'root@server:~'. Below the title bar, there are two tabs: 'root@server:/etc/dhcp' and 'root@server:~'. The main content of the terminal is a series of commands and their outputs. The user 'ngalacan' is initially at the prompt. They attempt to switch to root using 'su -', which fails due to an authentication error. Then, they use 'sudo -i', which succeeds after providing the password. The prompt changes to '#', indicating root access. The user then runs 'tail -f /var/log/messages', which displays a stream of system logs. The logs show several 'network unreachable' messages from the 'named' service, followed by a message from 'systemd' about a 'managed-keys-zone' being trusted, and finally, a message about the 'VTE child process' being launched by 'gnome-terminal-server'. The terminal window also features a search icon, a menu icon, and a close icon in the top right corner.

```
root@server:~  
[ngalacan@server ~]$ su -  
Password:  
su: Authentication failure  
[ngalacan@server ~]$ sudo -i  
[sudo] password for ngalacan:  
[root@server ~]# tail -f /var/log/messages  
Sep 16 20:19:31 server named[6875]: network unreachable resolving './DNSKEY/IN':  
2001:dc3::35#53  
Sep 16 20:19:31 server named[6875]: network unreachable resolving './DNSKEY/IN':  
2001:500:9f::42#53  
Sep 16 20:19:31 server named[6875]: network unreachable resolving './DNSKEY/IN':  
2001:500:1::53#53  
Sep 16 20:19:31 server named[6875]: network unreachable resolving './DNSKEY/IN':  
2001:503:c27::2:30#53  
Sep 16 20:19:31 server named[6875]: network unreachable resolving './DNSKEY/IN':  
2001:503:ba3e::2:30#53  
Sep 16 20:19:31 server named[6875]: managed-keys-zone: Key 20326 for zone . is n  
ow trusted (acceptance timer complete)  
Sep 16 20:22:23 server systemd[5165]: Started VTE child process 6891 launched by  
gnome-terminal-server process 6154.  
Sep 16 20:22:54 server su[6924]: FAILED SU (to root) ngalacan on pts/1  
Sep 16 20:23:01 server systemd[1]: Starting Hostname Service...  
Sep 16 20:23:01 server systemd[1]: Started Hostname Service.
```

Рис. 9: Мониторинг происходящих в системе процессов

Анализ работы DHCP-сервера



The image shows a terminal window with a dark background. The title bar at the top indicates the file is '01-routing.sh'. Below the title bar, there are menu options: 'Файл', 'Изменить', and 'Просмотр'. The main area of the terminal displays the following script content:

```
#!/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

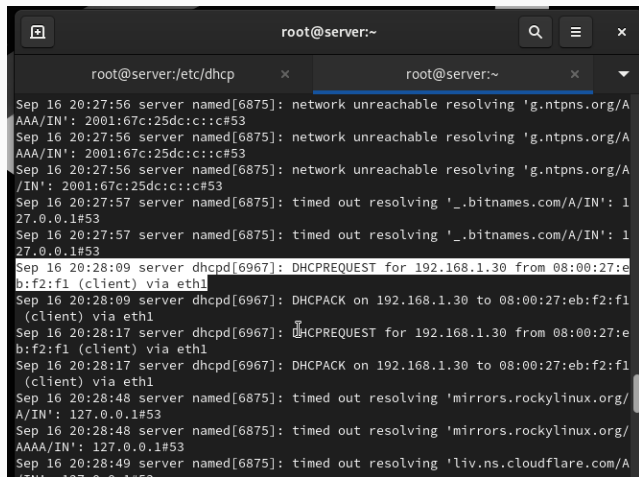
nmcli connection down eth0
nmcli connection up eth0

# systemctl restart NetworkManager
```

At the bottom of the terminal window, a status bar shows: 'Строка 11, столбец 27', '339 символов', '100%', 'Unix (LF)', and 'UTF-8'.

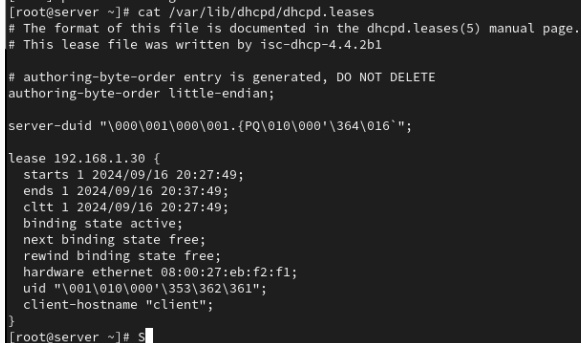
Рис. 10: 01-routing.sh

Выполнение лабораторной работы



```
root@server:~
root@server:/etc/dhcp x root@server:~ x
Sep 16 20:27:56 server named[6875]: network unreachable resolving 'g.ntpns.org/A
AAA/IN': 2001:67c:25dc:c::c#53
Sep 16 20:27:56 server named[6875]: network unreachable resolving 'g.ntpns.org/A
AAA/IN': 2001:67c:25dc:c::c#53
Sep 16 20:27:56 server named[6875]: network unreachable resolving 'g.ntpns.org/A
/IN': 2001:67c:25dc:c::c#53
Sep 16 20:27:57 server named[6875]: timed out resolving '_.bitnames.com/A/IN': 1
27.0.0.1#53
Sep 16 20:27:57 server named[6875]: timed out resolving '_.bitnames.com/A/IN': 1
27.0.0.1#53
Sep 16 20:28:09 server dhcpd[6967]: DHCPREQUEST for 192.168.1.30 from 08:00:27:eb:f2:f1 (client) via eth1
Sep 16 20:28:09 server dhcpd[6967]: DHCPACK on 192.168.1.30 to 08:00:27:eb:f2:f1
(client) via eth1
Sep 16 20:28:17 server dhcpd[6967]: DHCPREQUEST for 192.168.1.30 from 08:00:27:eb:f2:f1 (client) via eth1
Sep 16 20:28:17 server dhcpd[6967]: DHCPACK on 192.168.1.30 to 08:00:27:eb:f2:f1
(client) via eth1
Sep 16 20:28:48 server named[6875]: timed out resolving 'mirrors.rockylinux.org/
A/IN': 127.0.0.1#53
Sep 16 20:28:48 server named[6875]: timed out resolving 'mirrors.rockylinux.org/
AAAA/IN': 127.0.0.1#53
Sep 16 20:28:49 server named[6875]: timed out resolving 'liv.ns.cloudflare.com/A
/IN': 127.0.0.1#53
```

Рис. 11: Запись о подключении к ВМ узла `client` и выдачи ему IP-адреса

A terminal window with a dark background and light-colored text. The text shows the output of the 'cat' command for the file /var/lib/dhcpd/dhcpd.leases. It includes comments about the file format and a DHCP lease entry for IP 192.168.1.30.

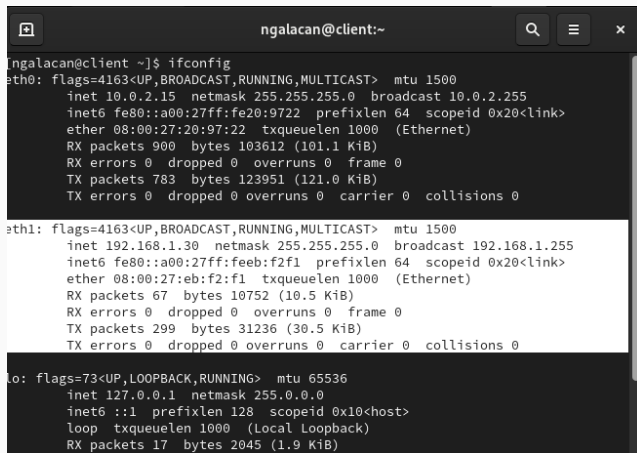
```
[root@server ~]# cat /var/lib/dhcpd/dhcpd.leases
# The format of this file is documented in the dhcpd.leases(5) manual page.
# This lease file was written by isc-dhcp-4.4.2b1

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

server-uid "\000\001\000\001.{PQ\010\000'\364\016`";

lease 192.168.1.30 {
    starts 1 2024/09/16 20:27:49;
    ends 1 2024/09/16 20:37:49;
    cltt 1 2024/09/16 20:27:49;
    binding state active;
    next binding state free;
    rewind binding state free;
    hardware ethernet 08:00:27:eb:f2:f1;
    uid "\001\010\000'\353\362\361";
    client-hostname "client";
}
[root@server ~]# S
```

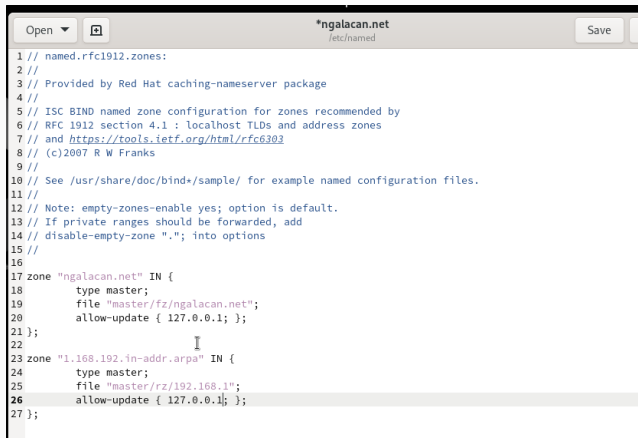
Рис. 12: Просмотр файла /var/lib/dhcpd/dhcpd.leases



```
ngalacan@client:~  
ngalacan@client ~]$ 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:fe20:9722  prefixlen 64  scopeid 0x20<link>  
    ether 08:00:27:20:97:22  txqueuelen 1000  (Ethernet)  
    RX packets 900  bytes 103612 (101.1 KiB)  
    RX errors 0  dropped 0  overruns 0  frame 0  
    TX packets 783  bytes 123951 (121.0 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:feeb:f2f1  prefixlen 64  scopeid 0x20<link>  
    ether 08:00:27:eb:f2:f1  txqueuelen 1000  (Ethernet)  
    RX packets 67  bytes 10752 (10.5 KiB)  
    RX errors 0  dropped 0  overruns 0  frame 0  
    TX packets 299  bytes 31236 (30.5 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)
```

Рис. 13: ifconfig на BM client

Выполнение лабораторной работы



```
1 // named.rfc1912.zones:
2 //
3 // Provided by Red Hat caching-nameserver package
4 //
5 // ISC BIND named zone configuration for zones recommended by
6 // RFC 1912 section 4.1 : localhost TLDs and address zones
7 // and https://tools.ietf.org/html/rfc6303
8 // (c)2007 R W Franks
9 //
10 // See /usr/share/doc/bind*/sample/ for example named configuration files.
11 //
12 // Note: empty-zones-enable yes; option is default.
13 // If private ranges should be forwarded, add
14 // disable-empty-zone "."; into options
15 //
16
17 zone "ngalacan.net" IN {
18     type master;
19     file "master/fz/ngalacan.net";
20     allow-update { 127.0.0.1; };
21 };
22
23 zone "1.168.192.in-addr.arpa" IN {
24     type master;
25     file "master/rz/192.168.1";
26     allow-update { 127.0.0.1; };
27 };
```


Рис. 14: Редактирование файла /etc/named/ngalacan.net

Выполнение лабораторной работы



```
1 # dhcpd.conf
2 #
3 # Sample configuration file for ISC dhcpd
4 #
5
6 # option definitions common to all supported networks...
7 option domain-name "ngalacan.net";
8 option domain-name-servers ns.ngalacan.net;
9
10 default-lease-time 600;
11 max-lease-time 7200;
12
13 # Use this to enable / disable dynamic dns updates globally.
14 #ddns-update-style none;
15
16 ddns-updates on;
17 ddns-update-style interim;
18 ddns-domainname "ngalacan.net.";
19 ddns-rev-domainname "in-addr.arpa.";
20
21 zone ngalacan.net. {
22     primary 127.0.0.1;
23 }
24
25 zone 1.168.192.in-addr.arpa. {
26     primary 127.0.0.1;
27 }
28
29 # If this DHCP server is the official DHCP server for the local
30 # network, the authoritative directive should be uncommented.
31 authoritative;
```

Рис. 15: Редактирование файла `/etc/dhcp/dhcpd.conf`

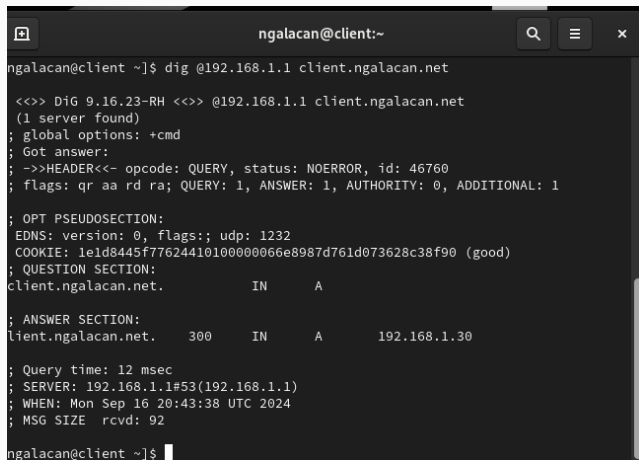


```
[root@server fz]# ls
ngalacan.net  ngalacan.net.jnl
[root@server fz]#
```

A terminal window with a dark background. The prompt is [root@server fz]#. The user enters 'ls' and the output is 'ngalacan.net' and 'ngalacan.net.jnl'. The prompt returns to [root@server fz]#.

Рис. 16: Успешный перезапуск DHCP-сервера

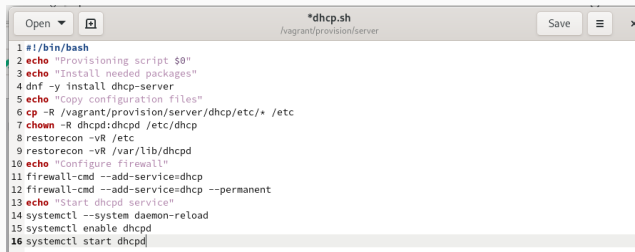
Анализ работы DHCP-сервера после настройки обновления DNS-зоны



```
ngalacan@client:~  
ngalacan@client ~]$ dig @192.168.1.1 client.ngalacan.net  
  
    <<>> DiG 9.16.23-RH <<>> @192.168.1.1 client.ngalacan.net  
    (1 server found)  
; global options: +cmd  
; Got answer:  
; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 46760  
; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1  
  
; OPT PSEUDOSECTION:  
EDNS: version: 0, flags:; udp: 1232  
COOKIE: 1e1d8445f77624410100000066e8987d761d073628c38f90 (good)  
; QUESTION SECTION:  
client.ngalacan.net.          IN      A  
  
; ANSWER SECTION:  
client.ngalacan.net.    300     IN      A      192.168.1.30  
  
; Query time: 12 msec  
; SERVER: 192.168.1.1#53(192.168.1.1)  
; WHEN: Mon Sep 16 20:43:38 UTC 2024  
; MSG SIZE rcvd: 92  
ngalacan@client ~]$
```

Рис. 17: Проверка DNS-записи о клиенте в прямой DNS-зоне

Внесение изменений в настройки
внутреннего окружения
виртуальной машины



The image shows a terminal window titled `*dhcp.sh` with the path `/vagrant/provision/server`. The window contains a shell script with 16 lines of code. The script starts with a shebang `#!/bin/bash` and includes several `echo` statements for logging. It uses `dnf` to install `dhcp-server`, `cp` to copy configuration files from `/vagrant/provision/server/dhcp/etc/*` to `/etc`, and `chown` to set permissions on `/etc/dhcp`. It then uses `restorecon` to restore SELinux context on `/etc` and `/var/lib/dhcpd`. Finally, it configures the firewall to allow DHCP, enables the `dhcpd` service, and starts it.

```
1 #!/bin/bash
2 echo "Provisioning script $0"
3 echo "Install needed packages"
4 dnf -y install dhcp-server
5 echo "Copy configuration files"
6 cp -R /vagrant/provision/server/dhcp/etc/* /etc
7 chown -R dhcpd:dhcpd /etc/dhcp
8 restorecon -vR /etc
9 restorecon -vR /var/lib/dhcpd
10 echo "Configure firewall"
11 firewall-cmd --add-service=dhcp
12 firewall-cmd --add-service=dhcp --permanent
13 echo "Start dhcpd service"
14 systemctl --system daemon-reload
15 systemctl enable dhcpd
16 systemctl start dhcpd
```

Рис. 18: Создание скрипта `dhcp.sh`

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