

# Лабораторная работа №2

## Настройка DNS-сервера

**Студент: БАНСИМБА КЛОДЕЛИ ДЬЕГРА**

**Группа: НПИбд 02–22**

**дисциплина: Администрирование сетевых подсистем (Lab 2)**

# Цель работы

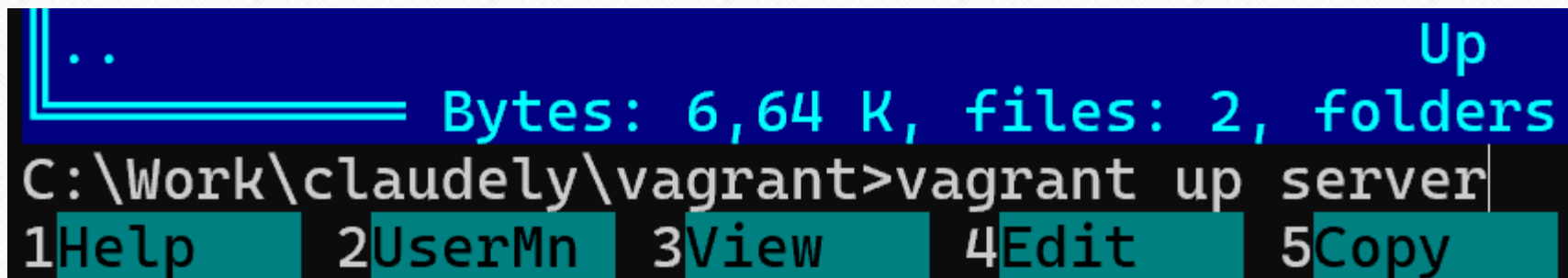
---

Целью данной работы является приобретение практических навыков по установке и конфигурированию DNS-сервера, усвоение принципов работы системы доменных имён.



## Выполнение работы работы

---



```
.. Up
Bytes: 6,64 K, files: 2, folders
C:\Work\claudely\vagrant>vagrant up server
1Help 2UserMn 3View 4Edit 5Copy
```

**Рис. 1.1.** Открытие рабочего каталога с проектом и запуск виртуальной машины server.

# Установка DNS-сервера

```
root@server:~  
[claudely@server.claudely.net ~]$ sudo -i  
[sudo] password for claudely:  
[root@server.claudely.net ~]# dnf -y install bind bind-utils  
Extra Packages for Enterprise Linux 9 - x86_64          38 kB/s | 29 kB    00:00  
Extra Packages for Enterprise Linux 9 - x86_64          8.7 MB/s | 23 MB    00:02  
Rocky Linux 9 - BaseOS                                4.4 kB/s | 4.1 kB    00:00  
Rocky Linux 9 - AppStream                             10 kB/s | 4.5 kB    00:00  
Rocky Linux 9 - AppStream                             6.1 MB/s | 8.0 MB    00:01  
Rocky Linux 9 - Extras                                7.2 kB/s | 2.9 kB    00:00  
Package bind-utils-32:9.16.23-18.el9_4.6.x86_64 is already installed.  
Dependencies resolved.  
=====
```

Package	Architecture	Version	Repository	Size
Installing:				
bind	x86_64	32:9.16.23-18.el9_4.6	appstream	490 k
Installing dependencies:				
bind-dnssec-doc	noarch	32:9.16.23-18.el9_4.6	appstream	45 k
python3-bind	noarch	32:9.16.23-18.el9_4.6	appstream	61 k
python3-ply	noarch	3.11-14.el9.0.1	baseos	103 k
Installing weak dependencies:				
bind-dnssec-utils	x86_64	32:9.16.23-18.el9_4.6	appstream	114 k

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

Transaction Summary			
Install	5 Packages		
Total download size: 813 k			
Installed size: 2.5 M			
Downloading Packages:			
(1/5):	python3-ply-3.11-14.el9.0.1.noarch.rpm	442 kB/s   103 kB	00:00
(2/5):	bind-dnssec-utils-9.16.23-18.el9_4.6.x86_64.rpm	400 kB/s   114 kB	00:00
(3/5):	bind-dnssec-doc-9.16.23-18.el9_4.6.noarch.rpm	1.1 MB/s   45 kB	00:00

Рис. 1.2. Переход в режим суперпользователя и установка bind,bind-utils.

# Установка DNS-сервера

---

```
Complete!
[root@server.claudely.net ~]#
[root@server.claudely.net ~]#
[root@server.claudely.net ~]# dig www.yandex.ru

; <<>> DiG 9.16.23-RH <<>> www.yandex.ru
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 9029
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;www.yandex.ru.                IN      A

;; ANSWER SECTION:
www.yandex.ru.                 3600    IN      A      77.88.55.88
www.yandex.ru.                 3600    IN      A      5.255.255.77
www.yandex.ru.                 3600    IN      A      77.88.44.55

;; Query time: 4 msec
;; SERVER: 10.0.2.3#53(10.0.2.3)
;; WHEN: Fri Sep 13 09:17:53 UTC 2024
;; MSG SIZE rcvd: 79

[root@server.claudely.net ~]#
```

**Рис. 1.3.** Запрос с помощью утилиты dig.



# Конфигурирование кэширующего DNS-сервера

```
Complete!
[root@server.claudely.net ~]#
[root@server.claudely.net ~]#
[root@server.claudely.net ~]# dig www.yandex.ru

; <<>> DiG 9.16.23-RH <<>> www.yandex.ru
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 9029
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;www.yandex.ru.                IN      A

;; ANSWER SECTION:
www.yandex.ru.                3600    IN      A      77.88.55.88
www.yandex.ru.                3600    IN      A      5.255.255.77
www.yandex.ru.                3600    IN      A      77.88.44.55

;; Query time: 4 msec
;; SERVER: 10.0.2.3#53(10.0.2.3)
;; WHEN: Fri Sep 13 09:17:53 UTC 2024
;; MSG SIZE rcvd: 79

[root@server.claudely.net ~]#
```

**Рис. 2.2.** Просмотр содержания файла /etc/named.conf.

# Конфигурирование кэширующего DNS-сервера

```
[root@server.claudely.net ~]#  
[root@server.claudely.net ~]# cat /var/named/named.ca  
  
; <<>> DiG 9.18.20 <<>> -4 +tcp +nored +nostats @d.root-servers.net  
; (1 server found)  
;; global options: +cmd  
;; Got answer:  
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 47286  
;; flags: qr aa; QUERY: 1, ANSWER: 13, AUTHORITY: 0, ADDITIONAL: 27  
  
;; OPT PSEUDOSECTION:  
; EDNS: version: 0, flags:; udp: 1450  
;; QUESTION SECTION:  
;.                               IN      NS  
  
;; ANSWER SECTION:  
.          518400 IN      NS      a.root-servers.net.  
.          518400 IN      NS      b.root-servers.net.  
.          518400 IN      NS      c.root-servers.net.  
.          518400 IN      NS      d.root-servers.net.  
.          518400 IN      NS      e.root-servers.net.  
.          518400 IN      NS      f.root-servers.net.  
.          518400 IN      NS      g.root-servers.net.  
.          518400 IN      NS      h.root-servers.net.  
.          518400 IN      NS      i.root-servers.net.  
.          518400 IN      NS      j.root-servers.net.  
.          518400 IN      NS      k.root-servers.net.  
.          518400 IN      NS      l.root-servers.net.
```

Рис. 2.3. Просмотр содержания файла /var/named/named.ca.

# Конфигурирование кэширующего DNS-сервера

---

```
[root@server.claudely.net ~]#  
[root@server.claudely.net ~]# cat /var/named/named.localhost  
$TTL 1D  
@      IN SOA  @ rname.invalid. (   
                                0      ; serial  
                                1D     ; refresh  
                                1H     ; retry  
                                1W     ; expire  
                                3H )   ; minimum  
  
    NS      @  
    A       127.0.0.1  
    AAAA    ::1  
[root@server.claudely.net ~]#
```

**Рис. 2.4.** Просмотр содержания файла `/var/named/named.localhost`.



# Конфигурирование кэширующего DNS-сервера

```
[root@server.claudely.net ~]#  
[root@server.claudely.net ~]# systemctl start named  
[root@server.claudely.net ~]# systemctl enable named  
Created symlink /etc/systemd/system/multi-user.target.wants/named.service → /usr/lib/systemd/system/named.service.  
[root@server.claudely.net ~]#  
[root@server.claudely.net ~]#  
[root@server.claudely.net ~]#  
[root@server.claudely.net ~]# dig www.yandex.ru  
; <<>> DiG 9.16.23-RH <<>> www.yandex.ru  
;; global options: +cmd  
;; Got answer:  
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 46893  
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 0  
  
;; QUESTION SECTION:  
;www.yandex.ru. IN A  
  
;; ANSWER SECTION:  
www.yandex.ru. 3600 IN A 5.255.255.77  
www.yandex.ru. 3600 IN A 77.88.55.88  
www.yandex.ru. 3600 IN A 77.88.44.55  
  
;; Query time: 51 msec  
;; SERVER: 10.0.2.3#53(10.0.2.3)  
;; WHEN: Fri Sep 13 09:32:16 UTC 2024  
;; MSG SIZE rcvd: 79  
  
[root@server.claudely.net ~]#  
[root@server.claudely.net ~]# dig @127.0.0.1 www.yandex.ru  
  
; <<>> DiG 9.16.23-RH <<>> @127.0.0.1 www.yandex.ru  
; (1 server found)  
;; global options: +cmd  
;; connection timed out; no servers could be reached  
  
[root@server.claudely.net ~]#
```

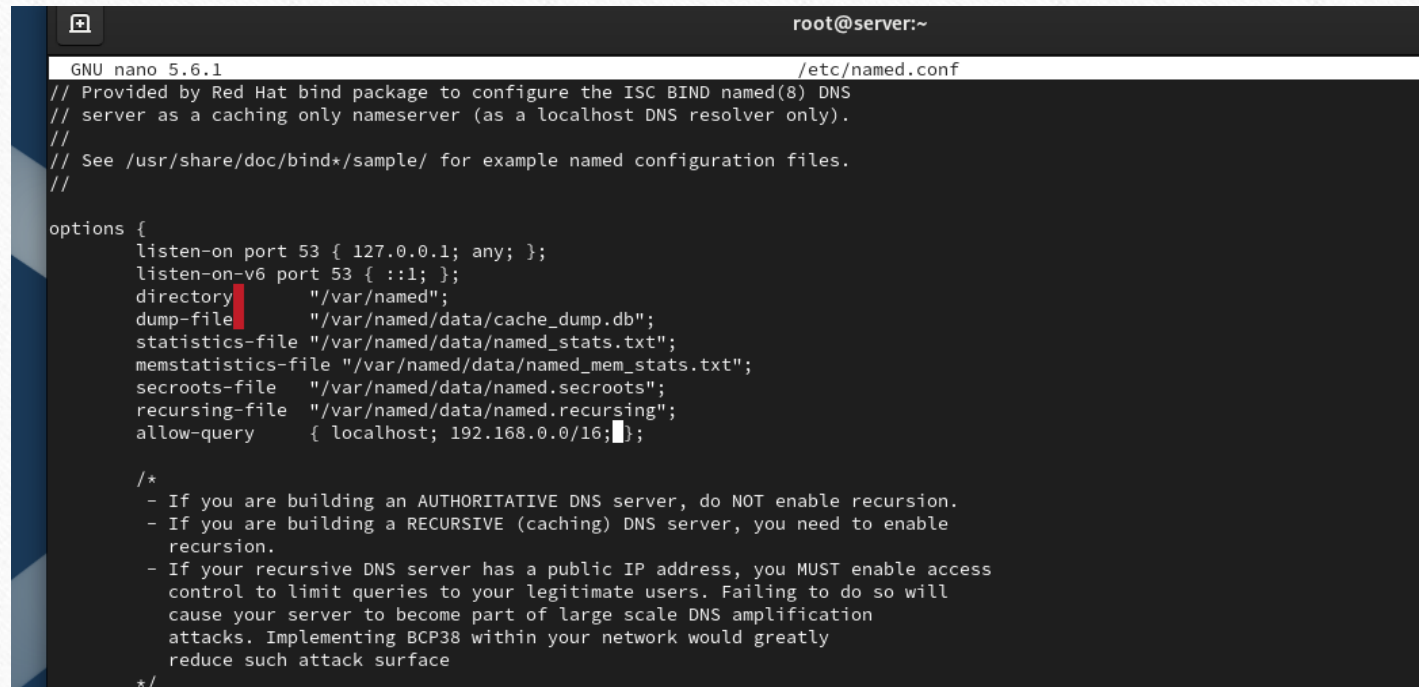
**Рис. 2.6.** Запуск DNS-сервера, включение запуска DNS-сервера в автозапуск при загрузке системы, анализ выведенной на экран информации при выполнении команды `dig www.yandex.ru`.

# Конфигурирование кэширующего DNS-сервера

```
[root@server.claudely.net ~]#  
[root@server.claudely.net ~]# nmcli connection edit eth0  
  
===| nmcli interactive connection editor |===  
  
Editing existing '802-3-ethernet' connection: 'eth0'  
  
Type 'help' or '?' for available commands.  
Type 'print' to show all the connection properties.  
Type 'describe [<setting>.<prop>]' for detailed property description.  
  
You may edit the following settings: connection, 802-3-ethernet (ethernet), 802-1x, dcb, sriov, ethtool, match, ipv4, ipv6, hostname, link, tc, proxy  
nmcli> remove ipv4.dns  
nmcli> set ipv4.ignore-auto-dns yes  
nmcli> set ipv4.dns 127.0.0.1  
nmcli> save  
Connection 'eth0' (1a5d94c3-14f8-4488-b2c9-4f22f18e6c7c) successfully updated.  
nmcli> quit  
[root@server.claudely.net ~]#  
[root@server.claudely.net ~]#  
[root@server.claudely.net ~]#
```

**Рис. 2.9.** Повторяем действия для соединения System eth0.

# Конфигурирование кэширующего DNS-сервера



```
root@server:~  
GNU nano 5.6.1 /etc/named.conf  
// Provided by Red Hat bind package to configure the ISC BIND named(8) DNS  
// server as a caching only nameserver (as a localhost DNS resolver only).  
//  
// See /usr/share/doc/bind*/sample/ for example named configuration files.  
//  
options {  
    listen-on port 53 { 127.0.0.1; any; };  
    listen-on-v6 port 53 { ::1; };  
    directory "/var/named";  
    dump-file "/var/named/data/cache_dump.db";  
    statistics-file "/var/named/data/named_stats.txt";  
    memstatistics-file "/var/named/data/named_mem_stats.txt";  
    secroots-file "/var/named/data/named.secroots";  
    recursing-file "/var/named/data/named.recursing";  
    allow-query { localhost; 192.168.0.0/16; };  
  
    /*  
    - If you are building an AUTHORITATIVE DNS server, do NOT enable recursion.  
    - If you are building a RECURSIVE (caching) DNS server, you need to enable  
    recursion.  
    - If your recursive DNS server has a public IP address, you MUST enable access  
    control to limit queries to your legitimate users. Failing to do so will  
    cause your server to become part of large scale DNS amplification  
    attacks. Implementing BCP38 within your network would greatly  
    reduce such attack surface  
    */  
}
```

**Рис. 2.11.** Настройка направления DNS-запросов от всех узлов внутренней сети, включая запросы от узла server, через узел server.



# Конфигурирование первичного DNS-сервера

[illegible]

**Рис. 4.3.** Открытие файла /etc/named/user.net на редактирование. Прописывание своей прямой зоны, обратной зоны и удаление остальных записей в файле.

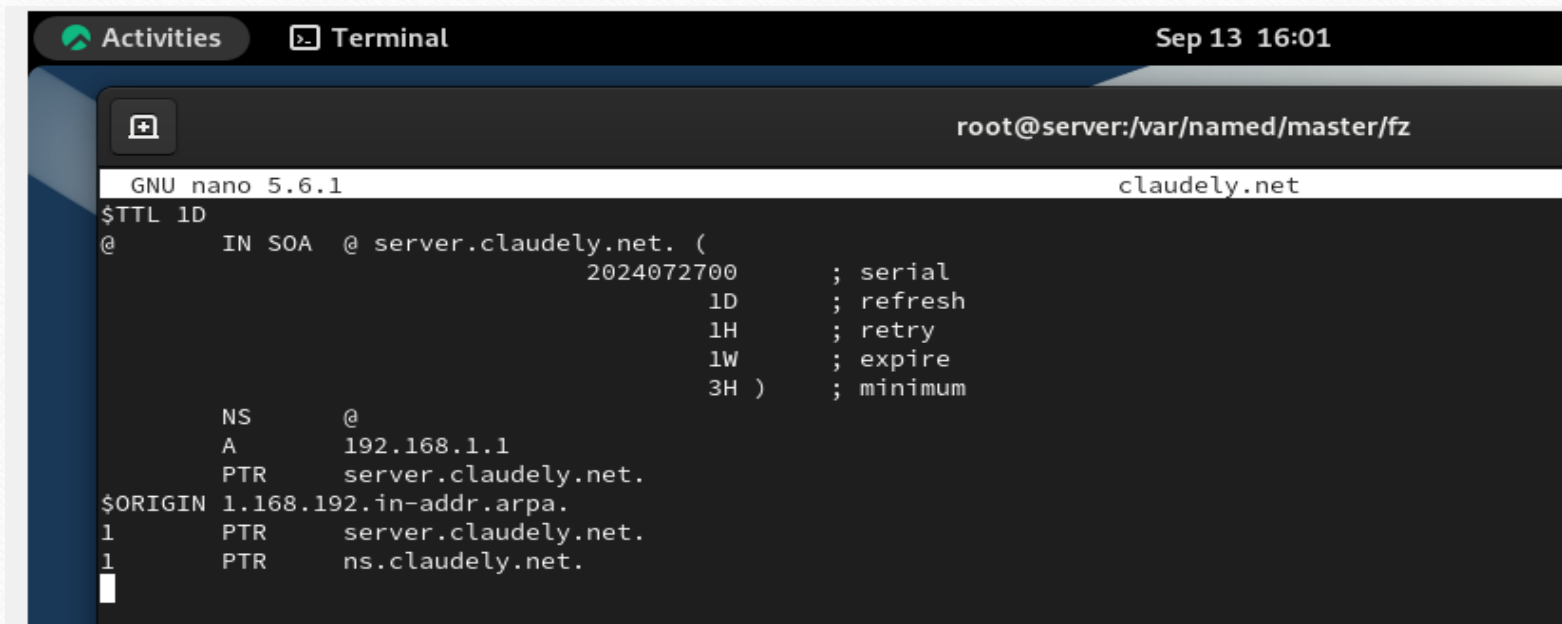
# Конфигурирование первичного DNS-сервера

---

```
[root@server.claudely.net named]# cd /var/named
[root@server.claudely.net named]# mkdir -p /var/named/master/fz
[root@server.claudely.net named]# mkdir -p /var/named/master/rz
[root@server.claudely.net named]# ls
data  dynamic  master  named.ca  named.empty  named.localhost  named.loopback  slaves
```

**Рис. 4.4.** В каталоге `/var/named` создание подкаталогов `master/fz` и `master/rz`.

# Конфигурирование первичного DNS-сервера



The screenshot shows a terminal window with the title bar "Activities Terminal" and the date/time "Sep 13 16:01". The prompt is "root@server:/var/named/master/fz". The editor is GNU nano 5.6.1, editing the file "claudely.net". The content of the file is as follows:

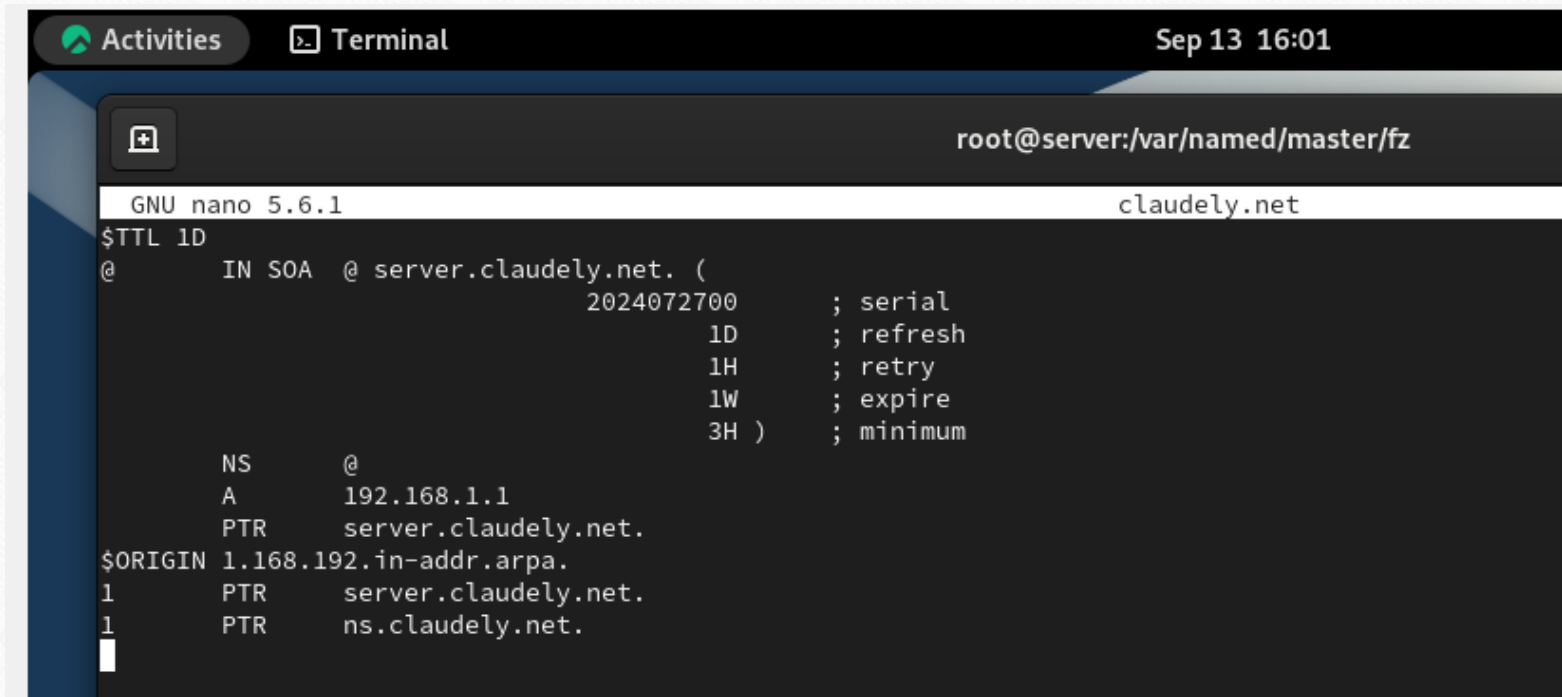
```
$TTL 1D
@      IN SOA  @ server.claudely.net. (
                                2024072700      ; serial
                                1D                ; refresh
                                1H                ; retry
                                1W                ; expire
                                3H )              ; minimum

      NS      @
      A      192.168.1.1
      PTR     server.claudely.net.
$ORIGIN 1.168.192.in-addr.arpa.
1      PTR     server.claudely.net.
1      PTR     ns.claudely.net.
```

**Рис. 4.8.** Изменение файла `/var/named/master/rz/192.168.1`, указав необходимые DNS записи для обратной зоны.



# Анализ работы DNS-сервера



```
GNU nano 5.6.1 claudely.net
$TTL 1D
@      IN SOA  @ server.claudely.net. (
                                2024072700    ; serial
                                1D              ; refresh
                                1H              ; retry
                                1W              ; expire
                                3H )           ; minimum

      NS   @
      A    192.168.1.1
      PTR  server.claudely.net.
$ORIGIN 1.168.192.in-addr.arpa.
1      PTR  server.claudely.net.
1      PTR  ns.claudely.net.
```

Рис. 5.1. Получение описания DNS-зоны с сервера ns.claudely.net.

# Анализ работы DNS-сервера

```
[root@server.claudely.net rz]#  
[root@server.claudely.net rz]# host -l claudely.net  
claudely.net name server claudely.net.  
claudely.net has address 192.168.1.1  
ns.claudely.net has address 192.168.1.1  
server.claudely.net has address 192.168.1.1  
[root@server.claudely.net rz]# host -a claudely.net  
Trying "claudely.net"  
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 65326  
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 1  
  
;; QUESTION SECTION:  
;claudely.net.                IN      ANY  
  
;; ANSWER SECTION:  
claudely.net.                86400   IN      SOA     claudely.net. server.claudely.net. 2024072700  
86400 3600 604800 10800  
claudely.net.                86400   IN      NS      claudely.net.  
claudely.net.                86400   IN      A       192.168.1.1  
  
;; ADDITIONAL SECTION:  
claudely.net.                86400   IN      A       192.168.1.1  
  
Received 119 bytes from 127.0.0.1#53 in 20 ms  
[root@server.claudely.net rz]#  
[root@server.claudely.net rz]# host -t A claudely.net  
claudely.net has address 192.168.1.1  
[root@server.claudely.net rz]# host -t PTR 192.168.1.1  
1.1.168.192.in-addr.arpa domain name pointer server.claudely.net.  
1.1.168.192.in-addr.arpa domain name pointer ns.claudely.net.  
[root@server.claudely.net rz]#
```

Рис. 5.2. Анализ корректности работы DNS-сервера.

# Внесение изменений в настройки внутреннего окружения виртуальной машины

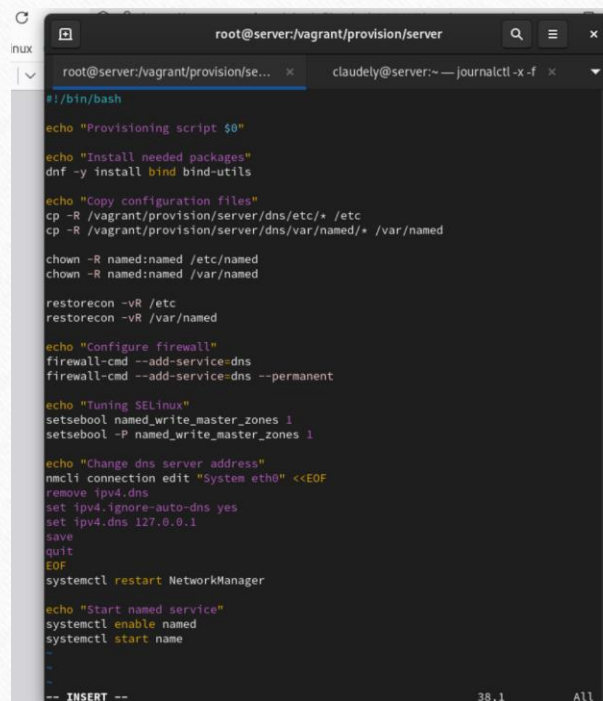
---

```
[root@server.claudely.net vagrant]#  
[root@server.claudely.net vagrant]# cd /vagrant/provision/server/  
[root@server.claudely.net server]# touch dns.sh  
[root@server.claudely.net server]# chmod +x dns.sh  
[root@server.claudely.net server]#
```

**Рис. 6.2.** Создание в каталоге `/vagrant/provision/server` исполняемого файла `dns.sh`.



# Внесение изменений в настройки внутреннего окружения виртуальной машины



```
root@server:~/vagrant/provision/server
root@server:~/vagrant/provision/se... x claudely@server:~ — journalctl -x -f x
#!/bin/bash

echo "Provisioning script $0"

echo "Install needed packages"
dnf -y install bind bind-utils

echo "Copy configuration files"
cp -R /vagrant/provision/server/dns/etc/* /etc
cp -R /vagrant/provision/server/dns/var/named/* /var/named

chown -R named:named /etc/named
chown -R named:named /var/named

restorecon -vR /etc
restorecon -vR /var/named

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

echo "Tuning SELinux"
setsebool named_write_master_zones 1
setsebool -P named_write_master_zones 1

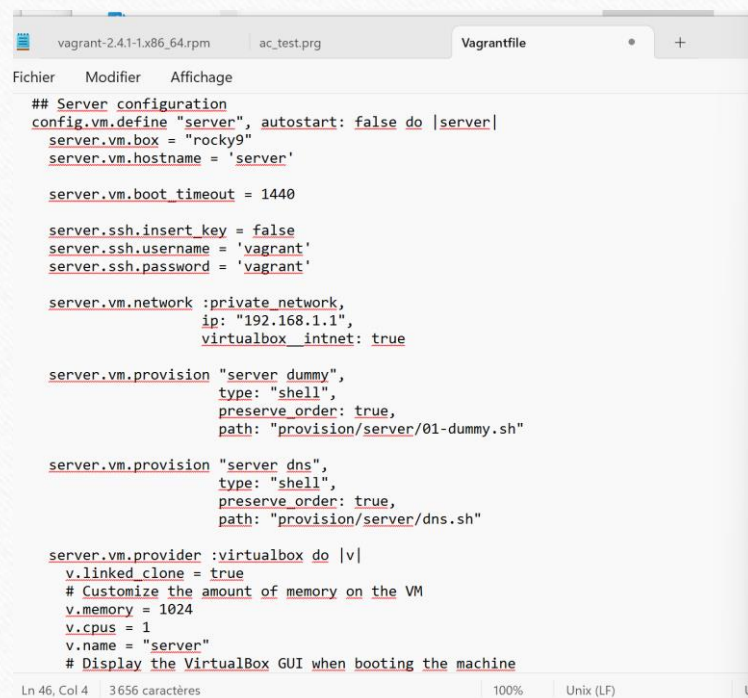
echo "Change dns server address"
nmcli connection edit "System eth0" <<EOF
remove ipv4.dns
set ipv4.ignore-auto-dns yes
set ipv4.dns 127.0.0.1
save
quit
EOF
systemctl restart NetworkManager

echo "Start named service"
systemctl enable named
systemctl start named

-- INSERT --
```

Рис. 6.3. Открытие файла на редактирование и прописывание в нём скрипта.

# Внесение изменений в настройки внутреннего окружения виртуальной машины

A screenshot of a text editor window showing a Vagrantfile configuration. The window has tabs for 'vagrant-2.4.1-1.x86\_64.rpm', 'ac\_test.prg', and 'Vagrantfile'. The 'Vagrantfile' tab is active, displaying a Ruby configuration for a virtual machine named 'server'. The configuration includes settings for the VM box (rocky9), hostname (server), boot timeout (1440), SSH settings (username: vagrant, password: vagrant), network (private network, IP: 192.168.1.1), and two provision scripts: 'server dummy' and 'server dns'. The provider is set to 'virtualbox' with options for linked clone, memory (1024), CPU (1), and name ('server').

```
## Server configuration
config.vm.define "server", autostart: false do |server|
  server.vm.box = "rocky9"
  server.vm.hostname = 'server'

  server.vm.boot_timeout = 1440

  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.provider :virtualbox do |v|
    v.linked_clone = true
    # Customize the amount of memory on the VM
    v.memory = 1024
    v.cpus = 1
    v.name = "server"
    # Display the VirtualBox GUI when booting the machine
```

**Рис. 6.4.** Добавление параметров в конфигурационном файле Vagrantfile в разделе конфигурации для сервера.

## *Вывод*

---

В ходе выполнения лабораторной работы были приобретены практические навыки по установке и конфигурированию DNS-сервера, а также усвоили принципы работы системы доменных имён.



---

*Спасибо за внимание !*