

Лабораторная работа 1

Сетевые технологии

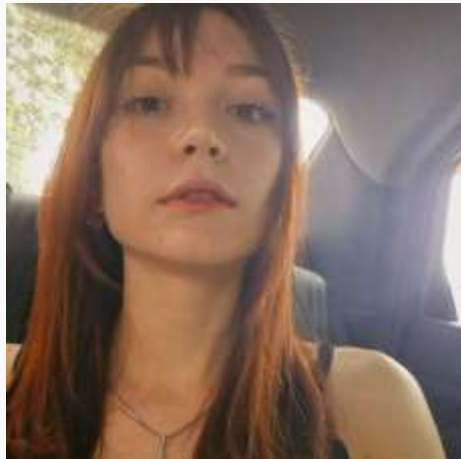
Чигладзе М.В.

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Российский университет дружбы народов, Москва, Россия

Информация

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Вводная часть

Целью данной работы является приобретение практических навыков по установке и конфигурированию DHCP-сервера.

DHCP - автоматизация IP-конфигурации устройств в сети, упрощение администрирования, предотвращение конфликтов адресов.

Методы:

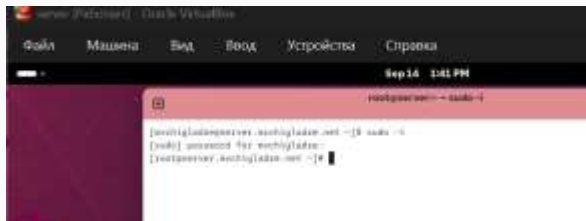
- Установка DHCP-сервера.
- Редактирование конфигурации (диапазон IP, маска, шлюз, DNS).
- Настройка опций (время аренды, суффикс, NTP).
- Статические назначения (резервирование по MAC).
- Тестирование (получение IP клиентами).
- Анализ логов.

Материалы:

- Компьютер с ОС (Linux/Windows).
- ПО DHCP-сервера (isc-dhcp-server, Windows DHCP Server).
- Текстовый редактор.
- Клиентские устройства.
- Сетевые кабели.
- Документация по DHCP.

Выполнение лабораторной работы

Установка DHCP-сервера



```
Running scriptlet: kea-2.6.3-1.el10_0.x86_64
Installing      : kea-2.6.3-1.el10_0.x86_64
Running scriptlet: kea-2.6.3-1.el10_0.x86_64
```

Installed:

```
kea-2.6.3-1.el10_0.x86_64      kea-
mariadb-connector-c-3.4.4-1.el10.x86_64 mariadb
```

Complete!

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

Рис. 1. Переход в режим суперпользователя и установка dhcp.

Конфигурирование DHCP-сервера



```
root@server:~# sudo -i
[mvchigladze@server:mvchigladze.net ~]$ sudo -i
[sudo] password for mvchigladze:
[root@server:mvchigladze.net ~]# cp /etc/kea/kea-dhcp4.conf /etc/kea/
/kea-dhcp4.conf__$(date +%I)
[root@server:mvchigladze.net ~]#
```

Рис. 3. Копирование файла примера конфигурации DHCP и изменение его названия.



```
root@server:~# cat /etc/kea/kea-dhcp4.conf
// don't need to remember the code names. However, some people like
// to use numerical values. For example, option 'domain-name' uses
// option code 15, so you can reference it by either by
// "name": "domain-name" or "code": 15.
{
    "code": 15,
    "data": "mvchigladze.net"
},

// Domain search is also a popular option. It tells the client to
// attempt to resolve names within those specified domains. For
// example, name "foo" would be attempted to be resolved as
// foo.mydomain.example.com and if it fails, then as foo.example.com
{
    "name": "domain-search",
    "data": "mvchigladze.net"
},

// String options that have a comma in their values need to have
// it escaped (i.e. each comma is preceded by two backslashes),
// That's because commas are reserved for separating fields to
```

Рис. 4. Открытие файла /etc/dhcp/dhcpd.conf на редактирование.

Конфигурирование DHCP-сервера

```
"Dhcp4": {  
  "interfaces-config": {  
    "interfaces": [eth1 ]  
  },  
  
  // "control-socket": {
```

```
[root@server ~]# systemctl restart dhcpd  
2025-09-15 16:33:22.287 INFO [kea-dhcp4.hosts/9509.140220438514368] HOSTS_BACKENDS_REGISTERED  
0 the following host backend types are available: mysql postgresql  
2025-09-15 16:33:22.287 WARN [kea-dhcp4.dhcpv4/9509.140220438514368] DHCPV4_MT_DISABLED_QU  
ERY_CONTROL disabling dhcp-query control when multi-threading is enabled.  
2025-09-15 16:33:22.287 WARN [kea-dhcp4.dhcp4/9509.140220438514368] DHCP4_RESERVATIONS_LOOKU  
P_FIRST_ENABLED Multi-threading is enabled and host reservations lookup is always performed f  
irst.  
2025-09-15 16:33:22.287 INFO [kea-dhcp4.dhcpv4/9509.140220438514368] DHCPV4_CFMGR_NEW_SUB  
NET4 a new subnet has been added to configuration: 10.168.1.0/24 with params: valid-lifetime  
<7200  
2025-09-15 16:33:22.287 INFO [kea-dhcp4.dhcpv4/9509.140220438514368] DHCPV4_CFMGR_SOCKET_  
TYPE_SELECT using socket type raw  
2025-09-15 16:33:22.287 INFO [kea-dhcp4.dhcpv4/9509.140220438514368] DHCPV4_CFMGR_ADD_IFA  
CE listening on interface eth1  
2025-09-15 16:33:22.287 INFO [kea-dhcp4.dhcpv4/9509.140220438514368] DHCPV4_CFMGR_SOCKET_  
TYPE_DEFAULT "dhcp-socket-type" not specified - using default socket type raw  
[root@server ~]# systemctl restart dhcpd
```

Рис. 5. Настройка привязки

Рис. 6. Проверяем правильность

Конфигурирование ДНСР-сервера

```
[root@server1 wechigladon:/root] # systemctl --systemd daemon-reload
systemctl enable k8s-dbp4.service
Created symlink '/etc/systemd/system/multi-user.target.wants/k8s-dbp4.service' → '/usr/lib/s
ystemd/system/k8s-dbp4.service'
[root@server1 wechigladon:/root] #
```

Рис. 7. Перезагрузка конфигурации

```

$ cat /usr/share/doc/battle-ftp/wechigladns.conf
#
# IN SOA 0 server.wechigladns.net. (
#
#                2827698000      ; serial
#                1D              ; refresh
#                1W              ; retry
#                1W              ; expire
#                1M              ; minimum
#
# NS             0
# A              192.168.1.1
# $ORIGIN        wechigladns.net.
server          A       192.168.1.1
ns              A       192.168.1.1
dbcp            A       192.168.1.1

```

Рис 8. Добавление записи для
DHCP-сервера в конце файла
прямой DNS-зоны

Конфигурирование DHCP-сервера

```
[root@server.mvchigladze.net ~]# systemctl restart named
[root@server.mvchigladze.net ~]#
```

```
[root@server.mvchigladze.net ~]# ping dhcp.mvchigladze.net
ping: dhcp.mvchigladze.net: Name or service not known
[root@server.mvchigladze.net ~]# vi /etc/resolv.conf
[root@server.mvchigladze.net ~]# systemctl connection modify eth1 ip=4.dns "117.0.0.1"
[root@server.mvchigladze.net ~]# systemctl connection up eth1
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/4)
[root@server.mvchigladze.net ~]# vi /etc/resolv.conf
[root@server.mvchigladze.net ~]# ping dhcp.mvchigladze.net
PING dhcp.mvchigladze.net (192.168.1.1) 56(84) bytes of data:
64 bytes from dhcp.mvchigladze.net: icmp_seq=1 ttl=64 time=0.014 ms
64 bytes from dhcp.mvchigladze.net: icmp_seq=2 ttl=64 time=0.014 ms
64 bytes from dhcp.mvchigladze.net: icmp_seq=3 ttl=64 time=0.014 ms
^C

```

Рис. 9 Перезапускаем

Рис. 10 Проверяем

Конфигурирование ДНСР-сервера



Рис. 11. Внесение изменений в настройки межсетевого экрана узла server, разрешив работу с DHCP.

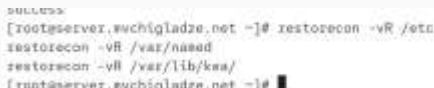


Рис. 12. Восстановление контекста безопасности в SELinux.

Конфигурирование ДНСР-сервера

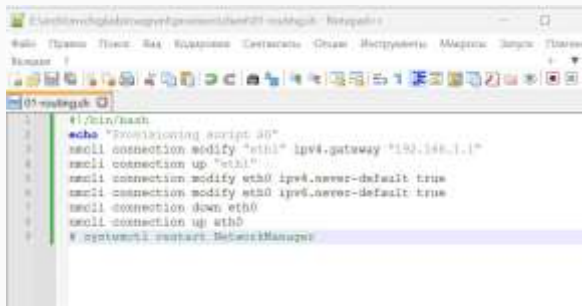


Рис. 13. Запуск в дополнительном терминале мониторинга происходящих в системе процессов в реальном времени.



Рис. 14. Запуск в основном рабочем терминале ДНСР-сервера.

Анализ работы DHCP-сервера



```
1 #!/bin/bash
2 echo "Executing script 30"
3 nmcli connection modify "eth1" ipv4.gateway "192.168.1.1"
4 nmcli connection up "eth1"
5 nmcli connection modify eth0 ipv4.never-default true
6 nmcli connection modify eth0 ipv4.never-default true
7 nmcli connection down eth0
8 nmcli connection up eth0
9 # systemctl restart NetworkManager
```

Рис. 15. Создаем файл



```
1 #!/bin/bash
2 echo "Executing script 30"
3 nmcli connection modify "eth1" ipv4.gateway "192.168.1.1"
4 nmcli connection up "eth1"
5 nmcli connection modify eth0 ipv4.never-default true
6 nmcli connection modify eth0 ipv4.never-default true
7 nmcli connection down eth0
8 nmcli connection up eth0
9 # systemctl restart NetworkManager
```

Рис. 16. Подключаем скрипт

Анализ работы DHCP-сервера

```
Far Manager, version 3.0.6446.0 x64
Copyright © 1996-2000 Eugene Rostislav, Copyright © 2000-2015 Far Group

C:\archi\FAR>cd /vnc/tmp/home/fake/vagrant/provision/client

C:\archi\mchigliadi\home\fake\vagrant\provision\client>touch B1-rooting.sh
"touch" не является внутренним или внешним
командой, исполняемой программой или пакетом fakeos.

C:\archi\mchigliadi\home\fake\vagrant\provision\client>chmod +x B1-rooting.sh
"chmod" не является внутренним или внешним
командой, исполняемой программой или пакетом fakeos.

C:\archi\mchigliadi\home\fake\vagrant>vagrant up client --provision
Bringing machine 'client' up with 'virtualbox' provider...
==> client: Clearing any previously set forwarded ports...
==> client: Fixed port collision for 22 => 2222. Now on port 2200.
==> client: Clearing any previously set network interfaces...
==> client: Preparing network interfaces based on configuration...
    client: Adapter 1: nat
    client: Adapter 2: intranet
==> client: Forwarding ports...
    client: 22 (guest) => 2200 (host) (adapter 1)
==> client: Running 'pre-boot' VM customizations...
==> client: Booting VM...
==> client: Waiting for machine to boot. This may take a few minutes...
    client: SSH address: 127.0.0.1:2200
    client: SSH username: vagrant
    client: SSH auth method: password
```

Рис. 17. Фиксируем внесенные изменения

Анализ работы DHCP-сервера

```
[root@server.mvchigladze.net ~]# cat /var/lib/kea/kea-leases4.csv  
address,hwaddr,client_id,valid_lifetime,expire,subnet_id,fqdn_fwd,fqdn_rev,hostname,state,use  
r_context,pool_id  
192.168.1.100,08:00:27:12:34:56,08:00:27:12:34:56,14400,14400,1,1,1,1,1,1,1
```

Рис. 20. Смотрим список
выданных адресов

Настройка обновления DNS-зоны

```
[root@server.mvchigladze.net ~]# mkdir -p /etc/named/keys
[root@server.mvchigladze.net ~]# tsig-keygen -a HMAC-SHA512 DHCP_UPDATER > /etc/named/keys/dh
cp_updater.key
[root@server.mvchigladze.net ~]# █
```

```
[root@server.mvchigladze.net ~]# cat /etc/named/keys/dhcp_updater.key
key "DHCP_UPDATER" {
    algorithm hmac-sha512;
    secret "uSspgppFcCyFFeV/SdLdKRB++SpeuBz4eZhXJw4hL3xAFh+uXXMh9RCsTJ1WJJRVGY+wjoNzjgRqy
x10HJZyKA==";
};
[root@server.mvchigladze.net ~]# █
```

Рис. 21. Создаем ключ

Рис. 22. Файл апдейтер

Настройка обновления DNS-зоны

```
3 '  
[root@server.mvchigladze.net ~]# chown -R named:named /etc/named/keys  
[root@server.mvchigladze.net ~]#
```

```
5 ,  
  
include "/etc/named.rfc1912.zones";  
include "/etc/named.root.key";  
include "/etc/named/mvchigladze.net";  
include "/etc/named/keys/dhcp_updater.key";
```

Рис. 22. Поправим права доступа

Рис. 23. Подключим ключ в
файле /etc/named.conf

Настройка обновления DNS-зоны

```

# cat /etc/passwd | grep root | sed 's/.*:/:/g' | xargs cp --parents /etc/passwd
// Provided by Red Hat mailing-list@redhat.com
//
// THE RHEL2 named zone configuration for zones recommended by
// RFE 1812 section 4.1 : localhost TLDs and subzone zones
// and https://tools.ietf.org/html/rfc2308
// (c)1997 R R R R R
//
// See /usr/share/doc/named-9.3.4/examples for example named configuration files.
//
// Note: empty zones require no; option is default.
// If private zones should be forwarded, add
// directed-allow-zone "..." (etc options)
//
zone "localhost.localnet" IN {
    type master;
    file "master/localhost.localnet";
    update-policy 1;
    grant DHCP_UPDATE allowed "localhost.localnet & DC1C";
};

zone "1.168.100.in-addr.arpa" IN {
    type master;
    file "master/rr/168.100.1";
    update-policy 1;
    grant DHCP_UPDATE allowed "1.168.100.in-addr.arpa PTR DC1C";
};

```

Рис. 23. Поправим права доступа

```
root@server.mychigladze.net ~]# named-checkconf
root@server.mychigladze.net ~]#
```

Рис. 24. Подключим ключ в файле /etc/named.conf

Настройка обновления DNS-зоны

```
[root@server.mvchigladze.net ~]# systemctl restart named  
[root@server.mvchigladze.net ~]# touch /etc/kea/tsig-keys.json
```

```
[root@server.mvchigladze.net ~]# named-checkconf  
[root@server.mvchigladze.net ~]# systemctl restart named  
[root@server.mvchigladze.net ~]#
```

Рис. 22. Сделаем проверку
конфигурационного файла:
named-checkconf

Рис. 23. Перезапустите DNS-
сервер:
systemctl restart named

Настройка обновления DNS-зоны



Рис. 24. Сформируем ключ для
Kea. Файл ключа назовём
/etc/kea/tsig-keys.json:
touch /etc/kea/tsig-keys.json

Рис. 25. Перенесём ключ на
сервер Kea DHCP и перепишем
его в формате json

Настройка обновления DNS-зоны

```
[root@server.mvchigladze.net ~]# chown kea:kea /etc/kea/tsig-keys.json  
[root@server.mvchigladze.net ~]# chmod 640 /etc/kea/tsig-keys.json  
[root@server.mvchigladze.net ~]#
```

Рис. 25. Сменим владельца:
`chown kea:kea /etc/kea/tsig-keys.json`

Рис. 26. Поправим права доступа:
`chmod 640 /etc/kea/tsig-keys.json`

Настройка обновления DNS-зоны

```
[root@server.mvchigladze.net ~]# chown kea:kea /etc/kea/kea-dhcp-ddns.conf
[root@server.mvchigladze.net ~]# kea-dhcp-ddns -t /etc/kea/kea-dhcp-ddns.conf
2025-09-15 17:42:00.780 INFO [kea-dhcp-ddns.dctl/18611.129000301003296] DCTL_CONFIG_CHECK_CO
MPLETE server has completed configuration check: listening on 127.0.0.1, port 53401, using x0
F, result: success(0), text=Configuration check successful.
[root@server.mvchigladze.net ~]# systemctl enable --now kea-dhcp-ddns.service
Created symlink /etc/systemd/system/multi-user.target.wants/kea-dhcp-ddns.service → /usr/l
ib/systemd/system/kea-dhcp-ddns.service.
[root@server.mvchigladze.net ~]# systemctl status kea-dhcp-ddns.service
● kea-dhcp-ddns.service - Kea DHCP-DDNS Server
   Loaded: loaded (/usr/lib/systemd/system/kea-dhcp-ddns.service; enabled; preset: disabled)
   Active: active (running) since Mon 2025-09-15 17:42:42 UTC; 18s ago
  Invocation: c993846d067445209596c090210f045
    Docs: man:kea-dhcp-ddns(8)
   Main PID: 18825 (kea-dhcp-ddns)
      Tasks: 5 (limit: 10309)
     Memory: 1.0M (peak: 5.0M)
        CPU: 28ms
   CGroup: /system.slice/kea-dhcp-ddns.service
           └─18825 /usr/sbin/kea-dhcp-ddns -c /etc/kea/kea-dhcp-ddns.conf

Sep 15 17:42:42 server.mvchigladze.net systemd[1]: Started kea-dhcp-ddns.service - Kea DHCP-
Sep 15 17:42:42 server.mvchigladze.net kea-dhcp-ddns[18825]: 2025-09-15 17:42:42.680 INFO [
Sep 15 17:42:42 server.mvchigladze.net kea-dhcp-ddns[18825]: INFO COMMAND_ACCEPTOR_START Go
Sep 15 17:42:42 server.mvchigladze.net kea-dhcp-ddns[18825]: INFO DCTL_CONFIG_COMPLETE serv
Sep 15 17:42:42 server.mvchigladze.net kea-dhcp-ddns[18825]: INFO DHCP_DDNS_STARTED Kea DHCP-

[4]~ Stopped                                systemctl status kea-dhcp-ddns.service
[root@server.mvchigladze.net ~]#
```

Рис. 27. Настройка происходит в файле /etc/kea/kea-dhcp-ddns.conf

Рис. 28. Изменим владельца файла:
chown kea:kea /etc/kea/kea-dhcp-ddns.conf

Настройка обновления DNS-зоны

```
[root@server.mschigladze.net ~]# chown kea:kea /etc/kea/kea-dhcp-ddns.conf
[root@server.mschigladze.net ~]# kea-dhcp-ddns -t /etc/kea/kea-dhcp-ddns.conf
2025-09-15 17:42:00.780 INFO [kea-dhcp-ddns.dctl/18011-129000201063296] DCTL_CONFIG_CHECK_CO
MPLETE server has completed configuration check: listening on 127.0.0.1, port 51001, using 10
7. result: success(0), text:Configuration check successful.
[root@server.mschigladze.net ~]# systemctl enable --now kea-dhcp-ddns.service
Created symlink '/etc/systemd/system/multi-user.target.wants/kea-dhcp-ddns.service' → '/usr/l
ib/systemd/system/kea-dhcp-ddns.service'.
[root@server.mschigladze.net ~]# systemctl status kea-dhcp-ddns.service
● kea-dhcp-ddns.service - Kea DHCP-DDNS Server
   Loaded: loaded (/usr/lib/systemd/system/kea-dhcp-ddns.service; enabled; preset: disabled)
   Active: active (running) since Mon 2025-09-15 17:42:42 UTC; 18s ago
     Invocation: c997a440e06744505095620e50210f040
       CGroup: main:kea-dhcp-ddns(8)
    Main PID: 10825 (kea-dhcp-ddns)
       Tasks: 5 (limit 10000)
      Memory: 1.0M (peak: 5.0M)
         CPU: 20ms
    CGroup: /system.slice/kea-dhcp-ddns.service
            └─10825 /usr/sbin/kea-dhcp-ddns -c /etc/kea/kea-dhcp-ddns.conf

Sep 15 17:42:42 server.mschigladze.net systemd[1]: Started kea-dhcp-ddns.service - kea DHCP-
Sep 15 17:42:42 server.mschigladze.net kea-dhcp-ddns[10825]: 2025-09-15 17:42:42.680 INFO [
Sep 15 17:42:42 server.mschigladze.net kea-dhcp-ddns[10825]: INFO COMMAND_ACCEPTOR_START Se
Sep 15 17:42:42 server.mschigladze.net kea-dhcp-ddns[10825]: INFO DCTL_CONFIG_COMPLETE suc
Sep 15 17:42:42 server.mschigladze.net kea-dhcp-ddns[10825]: INFO DHCP_DDNS_STARTED Kea DHC

[4]+  Stopped                  systemctl status kea-dhcp-ddns.service
[root@server.mschigladze.net ~]#
```

Рис. 29. Проверим файл на наличие возможных синтаксических ошибок: kea-dhcp-ddns -t /etc/kea/kea-dhcp-ddns.conf

Рис. 30. Запустим службу ddns: systemctl enable --now kea-dhcp-ddns.service

Настройка обновления DNS-зоны

```
[root@server.mvchigladze.net ~]# chown kea:kea /etc/kea/kea-dhcp-ddns.conf
[root@server.mvchigladze.net ~]# kea-dhcp-ddns -t /etc/kea/kea-dhcp-ddns.conf
2025-09-15 17:42:00.780 INFO: [kea-dhcp-ddns.dctl/18011.129000201001296] DCTL_CONFIG_CHECK_CO
MPLETE: server has completed configuration check: listening on 127.0.0.1, port 53001, using 50
#. result: success(0), text=Configuration check successful
[root@server.mvchigladze.net ~]# systemctl enable --now kea-dhcp-ddns.service
Created symlink /etc/systemd/system/multi-user.target.wants/kea-dhcp-ddns.service → /usr/l
ib/systemd/system/kea-dhcp-ddns.service
[root@server.mvchigladze.net ~]# systemctl status kea-dhcp-ddns.service
● kea-dhcp-ddns.service - Kea DHCP-DDNS Server
   Loaded: loaded (/usr/lib/systemd/system/kea-dhcp-ddns.service; enabled; preset: disabled)
   Active: active (running) since Mon 2025-09-15 17:42:42 UTC; 10s ago
 Invocation: c9f3a4a6d0f4d5d0999663c50218f045
    Cols: var-kea-dhcp-ddns(8)
   Main PID: 18025 (kea-dhcp-ddns)
      Tasks: 5 (limit: 10000)
     Memory: 1.0M (peak: 5.0M)
        CPU: 20ms
    CGroup: /system.slice/kea-dhcp-ddns.service
            └─18025 /usr/sbin/kea-dhcp-ddns -t /etc/kea/kea-dhcp-ddns.conf

Sep 15 17:42:42 server.mvchigladze.net systemd[1]: Started kea-dhcp-ddns.service - Kea DHCP-
Sep 15 17:42:42 server.mvchigladze.net kea-dhcp-ddns[18025]: 2025-09-15 17:42:42.680 INFO [
Sep 15 17:42:42 server.mvchigladze.net kea-dhcp-ddns[18025]: INFO: COMMAND_ACCEPTOR_START Se
Sep 15 17:42:42 server.mvchigladze.net kea-dhcp-ddns[18025]: INFO: DCTL_CONFIG_COMPLETE serv
Sep 15 17:42:42 server.mvchigladze.net kea-dhcp-ddns[18025]: INFO: DHCP_DDNS_STARTED Kea DHCP
[4]+  Stopped                  systemctl status kea-dhcp-ddns.service
[root@server.mvchigladze.net ~]#
```

Рис. 31. Проверим статус работы службы:
systemctl status kea-dhcp-ddns.service

```
GNU nano - 2.10.1 /etc/kea/kea-dhcp4.conf
[
    "dhcp4": {
        "interfaces-config": {
            "interfaces": ["eth1"]
        },

        "dhcp-ddns": {
            "enable-updates": true
        },
        "ddns-qualifying-suffix": "mvchigladze.net",
        "ddns-override-client-update": true,

        // "control-socket": {
        //     "socket-type": "unix",
        //     "socket-name": "kea4-ctrl-socket"
        // }
    },
]
```

Рис. 32. Внесите изменения в конфигурационный файл /etc/kea/kea-dhcp4.conf,

Настройка обновления DNS-зоны

```
[root@centos7 ~]# cat /etc/keadhcp4.conf
2025-09-15 17:40:35.870 INFO [kea-dhcp4.backends/1001.130951451867988] W0575: BACKENDS/REGISTERED
ED the following host backend types are available: mysql postgresql
2025-09-15 17:40:35.882 WARN [kea-dhcp4.backends/1001.130951451867988] D0CPS0: HT/ENABLED is
HOLD_CONTROL disabling dhcp queue control when multi-threading is enabled
2025-09-15 17:40:35.883 WARN [kea-dhcp4.backends/1001.130951451867988] D0CPS0: RESERVATIONS/LOOK
UP/ENABLED Multi-threading is enabled and host reservations lookup is always performed
first.
2025-09-15 17:40:35.883 INFO [kea-dhcp4.backends/1001.130951451867988] D0CPS0: CONFIG_NEW/DO
NOR?A new subset has been added to configuration: 100.100.1.0/24 with params: valid-lifetime
=7200
2025-09-15 17:40:35.883 INFO [kea-dhcp4.backends/1001.130951451867988] D0CPS0: CONFIG_NEW?
TYPE_SELECT using socket type 0
2025-09-15 17:40:35.884 INFO [kea-dhcp4.backends/1001.130951451867988] D0CPS0: CONFIG_NEW/IF
ACE listening on interface eth0
2025-09-15 17:40:35.884 INFO [kea-dhcp4.backends/1001.130951451867988] D0CPS0: CONFIG_NEW?
TYPE_SELECT? "dhcp socket-type" not specified - using default socket type 0
[root@centos7 ~]# systemctl restart kea-dhcp4.service
[root@centos7 ~]# systemctl status kea-dhcp4.service
● kea-dhcp4.service - kea DHCPv4 server
   Loaded: loaded (/usr/lib/systemd/system/kea-dhcp4.service; enabled; growth: 31.44MB)
   Active: active (running) since Mon 2025-09-15 17:40:47 UTC; 5s ago
   Invocation: 6d727f85b24a78b0b3a5e876a78d4f
   Docs: man-kea-dhcp4(5)
   Main PID: 15342 (kea-dhcp4)
   Tasks: 9 (limit: 9999)
   Memory: 2.49M (peak: 5.9M)
   CPU: 48ms
   CGroup: /system.slice/kea-dhcp4.service
           └─[1534] /usr/sbin/kea-dhcp4 -c /etc/kea/kea-dhcp4.conf

Mon 15 17:40:47 docker-keadhcp4@centos7: kea-dhcp4(1534): W0575:0.15 17:40:47 315 9880: Done
```

Рис. 35. Проверим файл на наличие возможных синтаксических ошибок: `kea-dhcp4 -t /etc/kea/kea-dhcp4.conf`

Рис. 36. Перезапустите DHCP-сервер: `systemctl restart kea-dhcp4.service`

Настройка обновления DNS-зоны

```
[root@centos-misc:~]# systemctl status kea-dhcp4.service
2025-09-15 17:40:38.850 INFO [kea-dhcp4.service/10011.130953451867966] W0575: BACKEND_INITIALIZED: the following boot backend types are available: mysql postgresql
2025-09-15 17:40:38.861 INFO [kea-dhcp4.service/10011.130953451867966] W0639: MT_DISABLED: A MTLE_CONTROL disabling dhcp queue control when multi-threading is enabled
2025-09-15 17:40:38.861 INFO [kea-dhcp4.service/10011.130953451867966] W0694: RESERVATION_LOOKUP_DISABLE: multi-threading is enabled and host reservation lookup is always performed.
2025-09-15 17:40:38.861 INFO [kea-dhcp4.service/10011.130953451867966] W0695: STAMPED_NCP_DISABLED: a new subset has been added to configuration: 10011001.130953451867966 with param: valid-lifetime=7200
2025-09-15 17:40:38.861 INFO [kea-dhcp4.service/10011.130953451867966] W0696: STAMPED_NCP_DISABLED: SELECT using subset type id
2025-09-15 17:40:38.864 INFO [kea-dhcp4.service/10011.130953451867966] W0697: STAMPED_NCP_DISABLED: selecting an active subset
2025-09-15 17:40:38.864 INFO [kea-dhcp4.service/10011.130953451867966] W0698: STAMPED_NCP_DISABLED: 'dhcp-subnet-type' not specified - using default subset type id
[centos-misc:~]# systemctl restart kea-dhcp4.service
[centos-misc:~]# systemctl status kea-dhcp4.service
● kea-dhcp4.service - kea DHCPv4 Server
   Loaded: loaded (/usr/lib/systemd/system/kea-dhcp4.service; enabled); growth: 45.4MB
   Active: active (running) since Mon 2025-09-15 17:40:47 UTC; 5s ago
   Document: /etc/kea/keys2e/10011.130953451867966/
   Exec: kea-kea-dhcp4(5)
   Main PID: 15342 (kea-dhcp4)
   Tasks: 7 (limit: 10737)
   Memory: 2.8M (peak: 5.9M)
   CPU: 46ms
   CGroup: /system.slice/kea-dhcp4.service
           └─15342 /usr/sbin/kea-dhcp4 -c /etc/kea/kea-dhcp4.conf

Sep 15 17:40:47 centos-misc:~]# systemctl status kea-dhcp4.service
● kea-dhcp4.service - kea DHCPv4 Server
   Loaded: loaded (/usr/lib/systemd/system/kea-dhcp4.service; enabled); growth: 45.4MB
   Active: active (running) since Mon 2025-09-15 17:40:47 UTC; 5s ago
   Document: /etc/kea/keys2e/10011.130953451867966/
   Exec: kea-kea-dhcp4(5)
   Main PID: 15342 (kea-dhcp4)
   Tasks: 7 (limit: 10737)
   Memory: 2.8M (peak: 5.9M)
   CPU: 46ms
   CGroup: /system.slice/kea-dhcp4.service
           └─15342 /usr/sbin/kea-dhcp4 -c /etc/kea/kea-dhcp4.conf
```

Рис. 37. Проверим статус: `systemctl status kea-dhcp4.service`

```
[mitch@centos-client ~]$ nmcli connection down eth1
Connection 'eth1' successfully deactivated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/5)
[mitch@centos-client ~]$ nmcli connection up eth1
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/7)
[mitch@centos-client ~]$
```

Рис. 38. На машине client переполучите адрес: `nmcli connection down eth1`
`nmcli connection up eth1`

Анализ работы DHCP-сервера после настройки обновления DNS-зоны

```
root@kali:~# nmap -sV 192.168.1.1
Nmap scan report for 192.168.1.1
Host: 192.168.1.1
OS: Linux 3.10 (Ubuntu 14.04.1 LTS)
Device: VMware Workstation
Interface: vnic1
Type: 10/100/1000 Mbps Ethernet
MAC: 08:00:27:00:00:00
IP: 192.168.1.1
TCP: 443, 80, 22, 21, 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1
UDP: 53, 67, 68, 123, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255
Service Name: http
Version: 1.0
Banner:
  HTTP/1.1 200 OK (text/html)
  Server: Apache/2.4.18 (Ubuntu)
  X-Powered-By: PHP/5.6.35-0ubuntu0.14.04.1
  X-Frame-Options: DENY
  X-XSS-Protection: 1; mode=block
  X-Content-Type-Options: nosniff
  X-Permitted-Cross-Domain-Policies: none
  X-WebKit-CSP: default-src 'self'; script-src 'self' https://www.google.com https://www.gstatic.com https://www.gstatic.com/firebasejs.com https://www.gstatic.com/firebasejs.com; style-src 'self' https://www.gstatic.com https://www.gstatic.com; font-src 'self' https://www.gstatic.com https://www.gstatic.com; image-src 'self' https://www.gstatic.com https://www.gstatic.com;
  X-Debug-Header:
    X-Debug-Header: 1
    X-Debug-Header: 2
    X-Debug-Header: 3
    X-Debug-Header: 4
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    X-Debug-Header: 27
```

Рис. 43. Анализ работы DHCP-сервера после настройки обновления DNS-зоны

Внесение изменений в настройки внутреннего окружения виртуальной машины

```
[root@server.mvchigladze.net fs]# ls
mvchigladze.net
[root@server.mvchigladze.net fs]# cd /vagrant/provision/server
[root@server.mvchigladze.net server]# mkdir -p /vagrant/provision/server/dhcp/etc/kea
[root@server.mvchigladze.net server]# cp -R /etc/kea/* /vagrant/provision/server/dhcp/etc/kea/
[root@server.mvchigladze.net server]#
```

```
[root@server.mvchigladze.net ~]# cp -R /etc/named/* /vagrant/
/provision/server/dns/etc/named/
cp: overwrite '/vagrant/provision/server/dns/etc/named/mvchi
gladze.net'? y
[root@server.mvchigladze.net ~]# y
bash: y: command not found...
[root@server.mvchigladze.net ~]# cd /vagrant/provision/server
[root@server.mvchigladze.net server]# touch dhcp.sh
[root@server.mvchigladze.net server]# chmod +x dhcp.sh
[root@server.mvchigladze.net server]#
```

Рис. 44. На виртуальной машине server перейдите в каталог для внесения изменений

Рис 45. Замените конфигурационные файлы DNS-сервера:

Внесение изменений в настройки внутреннего окружения виртуальной машины

```
[root@server.mvchigladze.net ~]# cp -R /etc/named/* /vagrant
/provision/server/dns/etc/named/
cp: overwrite '/vagrant/provision/server/dns/etc/named/mvchi
gladze.net'? y
[root@server.mvchigladze.net ~]# y
bash: y: command not found...
[root@server.mvchigladze.net ~]# cd /vagrant/provision/server
[root@server.mvchigladze.net server]# touch dhcp.sh
[root@server.mvchigladze.net server]# chmod +x dhcp.sh
[root@server.mvchigladze.net server]#
```

Рис. 46. В каталоге /vagrant/provision/server создайте исполняемый файл dhcp.sh

```
GNU nano 8.1 dhcp.sh
#!/bin/bash
echo "Provisioning script 50"
echo "Install needed packages"
dnf -y install kea
echo "Copy configuration files"
cp -R /vagrant/provision/server/dhcp/etc/kea/* /etc/kea/
echo "Fix permissions"
chown -R kea:kea /etc/kea
chmod 640 /etc/kea/tsig-keys.json
restorecon -vR /etc
restorecon -vR /var/lib/kea
echo "Configure firewall"
firewall-cmd --add-service dhcp
firewall-cmd --add-service dhcp --permanent
echo "Start dhcpd service"
systemctl --system daemon-reload
systemctl enable --now kea-dhcp4.service
systemctl enable --now kea-dhcp-ddns.service
```

Рис 47. Для отработки созданного скрипта во время загрузки виртуальной машины server в конфигурационном файле Vagrantfile

REQUIREMENTS



Рис. 48. После этого виртуальные машины client и server можно выключить.

Результаты

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