

# Администрирование сетевых подсистем

Настройка DNS-сервера (Лабораторная работа №2)

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Заур Мустафаев

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Российский университет дружбы народов, Москва, Россия

## Цели и задачи работы

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## Цель лабораторной работы

Получение практических навыков установки и настройки DNS-сервера на базе BIND.

## Выполнение лабораторной работы

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## Проверка работы сервера

```
root@server:~ – sudo -i
[root@server.zmustafaev.net ~]# dig www.yandex.ru

; <>> DiG 9.18.33 <>> www.yandex.ru
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 10018
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 512
;; QUESTION SECTION:
;www.yandex.ru.           IN      A

;; ANSWER SECTION:
www.yandex.ru.        331      IN      A      77.88.44.55
www.yandex.ru.        331      IN      A      77.88.55.88
www.yandex.ru.        331      IN      A      5.255.255.77

;; Query time: 20 msec
;; SERVER: 10.0.2.3#53(10.0.2.3) (UDP)
;; WHEN: Mon Sep 08 09:20:47 UTC 2025
;; MSG SIZE  rcvd: 90

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

## Настройка системных параметров

```
; <>> DiG 9.18.33 <>> @127.0.0.1 www.yandex.ru
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 9829
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: 60058798dc672a250100000068bea0578f8c1747001fb9c2 (good)
;; QUESTION SECTION:
;www.yandex.ru.          IN      A

;; ANSWER SECTION:
www.YANDEX.ru.        579     IN      A      5.255.255.77
www.YANDEX.ru.        579     IN      A      77.88.44.55
www.YANDEX.ru.        579     IN      A      77.88.55.88

;; Query time: 1 msec
;; SERVER: 127.0.0.1#53(127.0.0.1) (UDP)
;; WHEN: Mon Sep 08 09:22:31 UTC 2025
;; MSG SIZE  rcvd: 131
```

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

## Конфигурация сетевого подключения

```
[root@server.zmustafaev.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, et
h, 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' (e292e83a-7750-4087-b4e1-a998fc55c0ea) successfully updated.
nmcli> quit
[root@server.zmustafaev.net ~]#
```

Рис. 3: Настройка подключения через nmcli

## Изменения в named.conf

The screenshot shows a terminal window with the command `root@server:~ - sudo -i` at the top. Below it is a vi editor window displaying the `/etc/named.conf` file. The file contains configuration options for a DNS server, including port settings, directory paths, and access control. A cursor is visible near the bottom of the configuration block. At the bottom of the screen, there is a menu bar with numbered options from 1 to 10.

```
root@server:~ - sudo -i
+
named.conf      [---] 53 L:[ 1+18 19/ 60] *(662 /1743b) 0125 0x07D [*][X]
// 
// 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.
1Help 2Save 3Mark 4Replac 5Copy 6Move 7Search 8Delete 9PullDn 10Quit
```

## Проверка работы DNS

Output information may be incomplete.							
lsof: WARNING: can't stat() fuse.portal file system /run/user/1001/doc							
Output information may be incomplete.							
avahi-dae	887	avahi	12u	IPv4	8033	0t0	<b>UDP</b> *:mdns
avahi-dae	887	avahi	13u	IPv6	8034	0t0	<b>UDP</b> *:mdns
chronyd	964	chrony	5u	IPv4	8146	0t0	<b>UDP</b> localho
st:323							
chronyd	964	chrony	6u	IPv6	8147	0t0	<b>UDP</b> localho
st:323							
named	26885	named	25u	IPv4	62978	0t0	<b>UDP</b> localho
st:domain							
named	26885	named	26u	IPv4	62979	0t0	<b>UDP</b> localho
st:domain							
named	26885	named	31u	IPv6	62982	0t0	<b>UDP</b> localho
st:domain							
named	26885	named	32u	IPv6	62983	0t0	<b>UDP</b> localho
st:domain							
named	26885 26886 isc-net-0	named	25u	IPv4	62978	0t0	<b>UDP</b> localho
st:domain							
named	26885 26886 isc-net-0	named	26u	IPv4	62979	0t0	<b>UDP</b> localho
st:domain							
named	26885 26886 isc-net-0	named	31u	IPv6	62982	0t0	<b>UDP</b> localho
st:domain							
named	26885 26886 isc-net-0	named	32u	IPv6	62983	0t0	<b>UDP</b> localho
st:domain							
named	26885 26887 isc-net-0	named	25u	IPv4	62978	0t0	<b>UDP</b> localho
st:domain							
named	26885 26887 isc-net-0	named	26u	IPv4	62979	0t0	<b>UDP</b> localho
st:domain							
named	26885 26887 isc-net-0	named	31u	IPv6	62982	0t0	<b>UDP</b> localho

Рис. 5: Проверка работы DNS через lsوف

# Создание зоны zmustafaev.net

```
root@server:/etc/named – sudo -i
[named.conf] 36 L:[ 32+27 59/ 60] *(1778/1779b) 0010 0x00A
[*][X]
-----dnssec-validation yes;
-----managed-keys-directory "/var/named/dynamic";
-----geoip-directory "/usr/share/GeoIP";
-----pid-file "/run/named/named.pid";
-----session-keyfile "/run/named/session.key";
-----/* https://fedoraproject.org/wiki/Changes/CryptoPolicy */
-----include '/etc/crypto-policies/back-ends/bind.config';
};

logging {
    channel default_debug {
        file "data/named.run";
        severity dynamic;
    };
};

zone "." IN {
    type hint;
    file "named.ca";
};

include "/etc/named.rfc1912.zones";
include "/etc/named.root.key";
include '/etc/named/zmustafaev.net';

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

## Прямая зона

```
zmustafaev.net      [----] 1 L:[ 1+ 9 10/ 14] *(162 / 224b) 0079 0x04F
$TTL 1D
@<---->IN SOA<>@ server.zmustafaev.net. (
<----><----><----><----><---->2025090800<---->; serial
<----><----><----><----><---->1D<---->; refresh
<----><----><----><----><---->1H<---->; retry
<----><----><----><----><---->1W<---->; expire
<----><----><----><----><---->3H )<--->; minimum
<---->NS<---->@
<---->A<---->192.168.1.1
$ORIGIN zmustafaev.net.
server<>A<---->192.168.1.1
ns<---->A<---->192.168.1.1
```

Рис. 7: Файл прямой зоны zmustafaev.net

## Обратная зона

```
root@server:/var/named/master/rz - sudo -i

192.168.1      [-M--]  0 L:[ 1+13 14/ 15] *(275 / 276b) 0010 0x00A
$TTL 1D
@<---->IN SOA<>@ server.zmustafaev.net. (
<----><----><----><----><---->2025090800<---->; serial
<----><----><----><----><---->1D<---->; refresh
<----><----><----><----><---->1H<---->; retry
<----><----><----><----><---->1W<---->; expire
<----><----><----><----><---->3H )<---->; minimum
<---->NS<---->@
<---->A<---->192.168.1.1
<---->PTR<---->server.zmustafaev.net.
$ORIGIN 1.168.192.in-addr.arpa.
1<---->PTR<---->server.zmustafaev.net.
1<---->PTR<---->ns.zmustafaev.net.
```

Рис. 8: Файл обратной зоны 192.168.1

## SELinux и права доступа

```
[root@server.zmustafaev.net rz]# chown -R named:named /etc/named
[root@server.zmustafaev.net rz]# chown -R named:named /var/named
[root@server.zmustafaev.net rz]# restorecon -vR /etc
Relabeled /etc/lvm/devices/system.devices from system_u:object_r:lvm_metadata_t:s0 to system_u:object_r:lvm_e
tc_t:s0
Relabeled /etc/lvm/devices/backup/system.devices-20250908.091354.0005 from system_u:object_r:lvm_metadata_t:s
0 to system_u:object_r:lvm/etc_t:s0
Relabeled /etc/NetworkManager/system-connections/eth1.nmconnection from unconfined_u:object_r:user_tmp_t:s0 t
o unconfined_u:object_r:NetworkManager_etc_rw_t:s0
[root@server.zmustafaev.net rz]# restorecon -vR /var/named/
[root@server.zmustafaev.net rz]# getsebool -a | grep named
named_tcp_bind_http_port --> off
named_write_master_zones --> on
[root@server.zmustafaev.net rz]#
```

Рис. 9: Настройка прав и SELinux

# Конфигурация зон

The screenshot shows a terminal window titled "root@server:/var/named/master/rz - sudo -i". The window has two tabs: "root@server:/var/named/master/rz - sudo -i" and "root@server:~ - sudo -i". The main pane displays the configuration file for the "zmustafaev.net" zone. The configuration includes comments about BIND version 9, RFC 1912 section 4.1, and copyright information. It specifies two zones: "zmustafaev.net" and "1.168.192.in-addr.arpa". Both zones are defined as master zones with files located at "/master/fz/zmustafaev.net" and "/master/rz/192.168.1" respectively, and no allow-update options.

```
zmustafaev.net      [-M--] 38 L:[ 4+15 19/ 29] *(565 / 704b) 0034 0x022 [*][X]
// 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 "zmustafaev.net" IN {
    type master;
    file "master/fz/zmustafaev.net";
    allow-update { none; };
};

zone "1.168.192.in-addr.arpa" IN {
    type master;
    file "master/rz/192.168.1";
    allow-update { none; };
};

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

## Проверка работы зоны через dig

```
[root@server.zmustafaev.net rz]#  
[root@server.zmustafaev.net rz]# dig ns.zmustafaev.net  
  
; <>> DiG 9.18.33 <>> ns.zmustafaev.net  
;; global options: +cmd  
;; Got answer:  
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 4043  
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1  
  
;; OPT PSEUDOSECTION:  
; EDNS: version: 0, flags:; udp: 1232  
; COOKIE: 04308167320029a00100000068beac5269320040a95f6434 (good)  
;; QUESTION SECTION:  
;ns.zmustafaev.net.      IN      A  
  
;; ANSWER SECTION:  
ns.zmustafaev.net.    86400   IN      A      192.168.1.1  
  
;; Query time: 0 msec  
;; SERVER: 127.0.0.1#53(127.0.0.1) (UDP)  
;; WHEN: Mon Sep 08 10:13:38 UTC 2025  
;; MSG SIZE  rcvd: 90  
  
[root@server.zmustafaev.net rz]#
```

Рис. 11: Проверка зоны через dig

## Проверка работы зоны через host

```
[root@server.zmustafaev.net rz]# host -l zmustafaev.net
zmustafaev.net name server zmustafaev.net.
zmustafaev.net has address 192.168.1.1
ns.zmustafaev.net has address 192.168.1.1
server.zmustafaev.net has address 192.168.1.1
[root@server.zmustafaev.net rz]# host -a zmustafaev.net
Trying "zmustafaev.net"
;; -->HEADER<<- opcode: QUERY, status: NOERROR, id: 35593
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;zmustafaev.net.           IN      ANY

;; ANSWER SECTION:
zmustafaev.net.      86400   IN      SOA     zmustafaev.net. server.zmustafaev.net. 2025090800 86400 3600
604800 10800
zmustafaev.net.      86400   IN      NS      zmustafaev.net.
zmustafaev.net.      86400   IN      A       192.168.1.1

Received 105 bytes from 127.0.0.1#53 in 0 ms
[root@server.zmustafaev.net rz]# host -t A zmustafaev.net
zmustafaev.net has address 192.168.1.1
[root@server.zmustafaev.net rz]# host -t PTR 192.168.1.1
1.1.168.192.in-addr.arpa domain name pointer ns.zmustafaev.net.
1.1.168.192.in-addr.arpa domain name pointer server.zmustafaev.net.
[root@server.zmustafaev.net rz]#
```

Рис. 12: Проверка зоны через host

## Выводы по проделанной работе

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## Вывод

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В ходе лабораторной работы был установлен и настроен DNS-сервер на основе BIND. Реализованы прямая и обратная зоны, проведена проверка их работы через `dig` и `host`. Настроен кэширующий сервер и автоматизация конфигурации с помощью Vagrant.