

Лабораторная работа №4

Администрирование сетевых подсистем

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24 сентября 2024

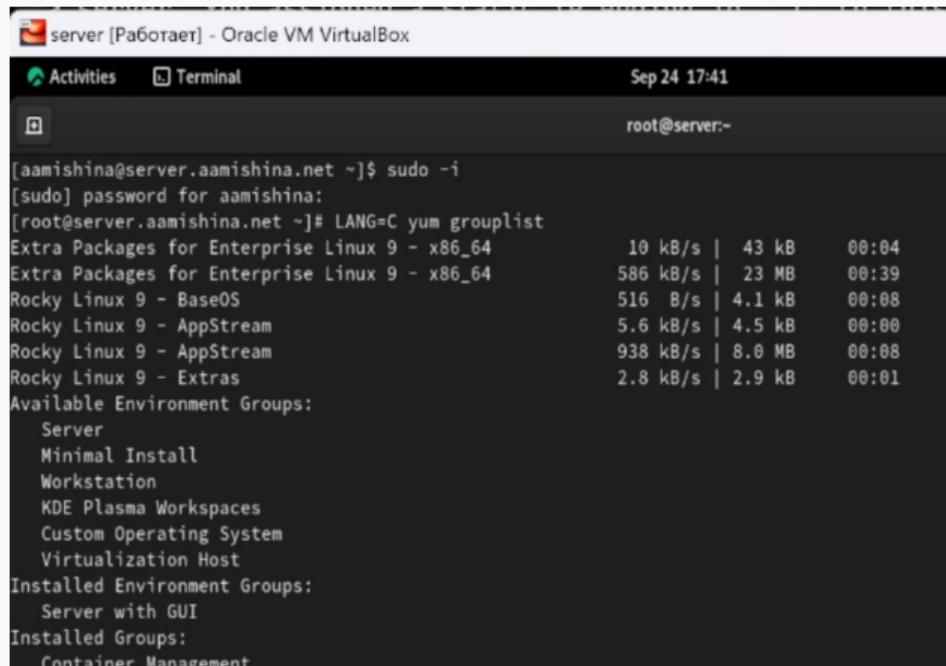
Цели и задачи

- Приобретение практических навыков по установке и базовому конфигурированию HTTP-сервера Apache.

Выполнение лабораторной работы

Установка HTTP-сервера

HTTP-сервер



server [Работает] - Oracle VM VirtualBox

Activities Terminal Sep 24 17:41

[root@server.aamishina.net ~]\$ sudo -i
[sudo] password for aamishina:
[root@server.aamishina.net ~]# LANG=C yum grouplist

Extra Packages for Enterprise Linux 9 - x86_64	10 kB/s 43 kB	00:04
Extra Packages for Enterprise Linux 9 - x86_64	586 kB/s 23 MB	00:39
Rocky Linux 9 - BaseOS	516 B/s 4.1 kB	00:08
Rocky Linux 9 - AppStream	5.6 kB/s 4.5 kB	00:00
Rocky Linux 9 - AppStream	938 kB/s 8.0 MB	00:08
Rocky Linux 9 - Extras	2.8 kB/s 2.9 kB	00:01

Available Environment Groups:

- Server
- Minimal Install
- Workstation
- KDE Plasma Workspaces
- Custom Operating System
- Virtualization Host

Installed Environment Groups:

- Server with GUI

Installed Groups:

- Container Management

Рис. 1: Переход в режим суперпользователя и установка стандартного веб-сервера

Каталоги

```
[root@server.aamishina.net conf]# ls
httpd.conf  magic
[root@server.aamishina.net conf]# vim httpd.conf
[root@server.aamishina.net conf]# vim magic
[root@server.aamishina.net conf]#
[root@server.aamishina.net conf]#
[root@server.aamishina.net conf]#
[root@server.aamishina.net conf]# cat /etc/httpd/conf.d
cat: /etc/httpd/conf.d: Is a directory
[root@server.aamishina.net conf]# cd /etc/httpd/conf.d
[root@server.aamishina.net conf.d]# ls
autoindex.conf  fcgid.conf  manual.conf  README  ssl.conf  userdir.conf  welcome.conf
[root@server.aamishina.net conf.d]# vim autoindex.conf
[root@server.aamishina.net conf.d]# vim fcgid.conf
[root@server.aamishina.net conf.d]# vim manual.conf
[root@server.aamishina.net conf.d]# vim README
[root@server.aamishina.net conf.d]# vim ssl.conf
[root@server.aamishina.net conf.d]# vim userdir.conf
[root@server.aamishina.net conf.d]# vim welcome.conf
[root@server.aamishina.net conf.d]#
```

Рис. 2: Просмотр содержимого каталогов /etc/httpd/conf и /etc/httpd/conf.d

Межсетевой экран узла server

```
[root@server.aamishina.net conf.d]# firewall-cmd --list-services
cockpit dhcp dhcpcv6-client dns ssh
[root@server.aamishina.net conf.d]# firewall-cmd --get-services
RH-Satellite-6 RH-Satellite-6-capsule afp amanda-client amanda-k5-client amqp amqps apcupsd audit ausweisapp2 bacula bacula-client bareos-director bareos-filedaemon bareos-storage bb bgp bitcoin bitcoin-rpc bitcoin-testnet bitcoin-testnet-rpc bittorrent-lsd ceph ceph-exporter ceph-mon cfengine checkmk-agent cockpit collectd condor-collector cratedb ctdb dds dds-multicast dds-unicast dhcp dhcpcv6 dhcpcv6-client distcc dns dns-over-tls docker-registry docker-swarm dropbox-lansync elasticsearch etcd-client etcd-server finger foreman-proxy freeipa-4 freeipa-ldap freeipa-freeipa replication freeipa-trust ftp galera ganglia-client ganglia-master git gpgsql grafana gre high-availability http http3 https ident imap imaps ipfs ipp ipp-client ipp-ec irc ircs iscsi-target isns jenkins kadmin kdeconnect kerberos kibana klogin kpasswd kprop kshell kube-api kube-apiserver kube-control-plane kube-control-plane-secure kube-controller-manager kube-controller-manager-secure kube-nodeport-services kube-scheduler kube-scheduler-secure kube-worker kubelet kubelet-worker ldap ldaps libvirt libvirt-tls lightning-network llmnr llmnr-client llmnr-tcp llmnr-udp managesieve matrix mdns memcache minidlna mongodb mosh mountd mqtt mqtt-tls ms-wbt mssql murmur mysql nbd nebula netbios-ns netdata-dashboard nfs nfs3 nmea-0183 nrpe ntp nut openvpn ovirt-imageio ovirt-storageconsole ovirt-vmconsole plex pmcd pmproxy pmwebapi pmwebapis pop3 pop3s postgresql privoxy prometheus prometheus-node-exporter proxy-dhcp ps2link ps3netsrv ptp pulseaudio puppetmaster quassel radius rdp redis redis-sentinel rpc-bind rquotad rsh rsync cd rtsp salt-master samba samba-client sane sip sips slp smtp smtp-submission smtps snmp snmpTLS snmptrap spiderOak-lansync spotify-sync squid ssdp ssh steam-streaming svdrp svn syncthing syncthing-gui syncthing-relay synergy syslog syslog-tls telnet tentacle tftp tile38 tinc tor-socks transmission-client upnp-client vdsm vnc-server warpinator wbem-wbem-https wireguard ws-discovery ws-discovery-client ws-discovery-tcp ws-discovery-udp wsman wsmans xdmcp xmpp-bosh xmpp-client xmpp-local xmpp-server zabbix-agent zabbix-server zerotier
[root@server.aamishina.net conf.d]# firewall-cmd --add-service=http
success
[root@server.aamishina.net conf.d]# firewall-cmd --add-service=http --permanent
success
[root@server.aamishina.net conf.d]# systemctl enable httpd
Created symlink /etc/systemd/system/multi-user.target.wants/httpd.service → /usr/lib/systemd/system/httpd.service.
[root@server.aamishina.net conf.d]# systemctl start httpd
[root@server.aamishina.net conf.d]# █
```

Рис. 3: Внесение изменений в настройки межсетевого экрана, запуск HTTP-сервера

Проверка запуска сервера

```
Sep 24 17:46:55 server.aamishina.net systemd[1]: Finished One-time temporary TLS key generation for httpd.service.
Subject: A start job for unit httpd-init.service has finished successfully
Defined-By: systemd
Support: https://wiki.rockylinux.org/rocky/support

A start job for unit httpd-init.service has finished successfully.

The job identifier is 3213.
Sep 24 17:46:55 server.aamishina.net systemd[1]: httpd-init.service: Consumed 1.551s CPU time.
Subject: Resources consumed by unit runtime
Defined-By: systemd
Support: https://wiki.rockylinux.org/rocky/support

The unit httpd-init.service completed and consumed the indicated resources.
Sep 24 17:46:55 server.aamishina.net systemd[1]: Starting The Apache HTTP Server...
Subject: A start job for unit httpd.service has begun execution
Defined-By: systemd
Support: https://wiki.rockylinux.org/rocky/support

A start job for unit httpd.service has begun execution.

The job identifier is 3136.
Sep 24 17:46:55 server.aamishina.net systemd[1]: Started The Apache HTTP Server.
Subject: A start job for unit httpd.service has finished successfully
Defined-By: systemd
Support: https://wiki.rockylinux.org/rocky/support

A start job for unit httpd.service has finished successfully.           I

The job identifier is 3136.
Sep 24 17:46:55 server.aamishina.net httpd[18246]: Server configured, listening on: port 443, port 80
```

Рис. 4: Расширенный лог системных сообщений

Анализ работы HTTP-сервера

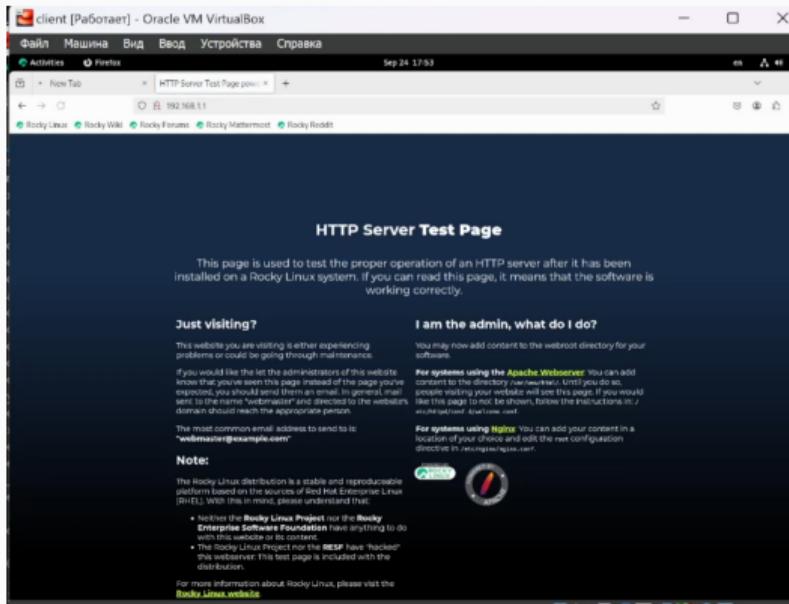


Рис. 5: Тестовая страница HTTP-сервера

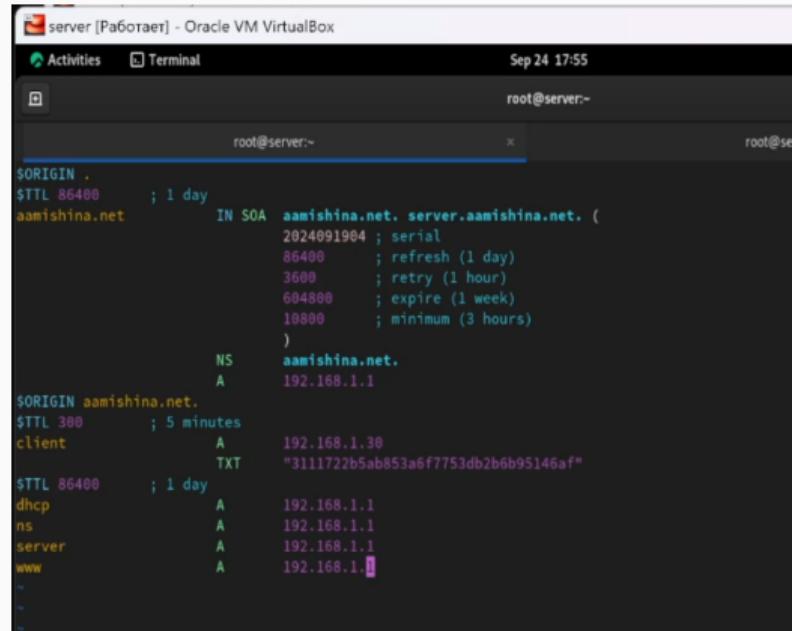
Мониторинг и лог

```
[root@server.aamishina.net conf.d]# tail -f /var/log/httpd/error_log
[Tue Sep 24 17:46:55.704736 2024] [core:notice] [pid 10246:tid 10246] SELinux policy enabled; httpd running as context system_u:system_r:httpd_t:s0
[Tue Sep 24 17:46:55.708540 2024] [suexec:notice] [pid 10246:tid 10246] AH01232: suEXEC mechanism enabled (wrapper: /usr/sbin/suexec)
[Tue Sep 24 17:46:55.730446 2024] [lbbmethod_heartbeat:notice] [pid 10246:tid 10246] AH02282: No slotmem from mod_heartmonitor
[Tue Sep 24 17:46:55.744957 2024] [mpm_event:notice] [pid 10246:tid 10246] AH00489: Apache/2.4.57 (Rocky Linux) OpenSSL/3.0.7
mod_fcgid/2.3.9 configured -- resuming normal operations
[Tue Sep 24 17:46:55.744980 2024] [core:notice] [pid 10246:tid 10246] AH00094: Command line: '/usr/sbin/httpd -D FOREGROUND'
^C
[root@server.aamishina.net conf.d]# tail -f /var/log/httpd/access_log
192.168.1.30 - - [24/Sep/2024:17:53:17 +0000] "GET / HTTP/1.1" 403 7620 "-" "Mozilla/5.0 (X11; Linux x86_64; rv:128.0) Gecko/20100101 Firefox/128.0"
192.168.1.30 - - [24/Sep/2024:17:53:19 +0000] "GET /icons/poweredbypng HTTP/1.1" 200 15443 "http://192.168.1.1/" "Mozilla/5.0
(X11; Linux x86_64; rv:128.0) Gecko/20100101 Firefox/128.0"
192.168.1.30 - - [24/Sep/2024:17:53:19 +0000] "GET /poweredby.png HTTP/1.1" 200 5714 "http://192.168.1.1/" "Mozilla/5.0 (X11;
Linux x86_64; rv:128.0) Gecko/20100101 Firefox/128.0"
192.168.1.30 - - [24/Sep/2024:17:53:19 +0000] "GET /favicon.ico HTTP/1.1" 404 196 "http://192.168.1.1/" "Mozilla/5.0 (X11; Lin
ux x86_64; rv:128.0) Gecko/20100101 Firefox/128.0"
```

Рис. 6: Запись в мониторинге доступа. Запись в логе ошибок

Настройка виртуального хостинга для HTTP-сервера

Прямая зона

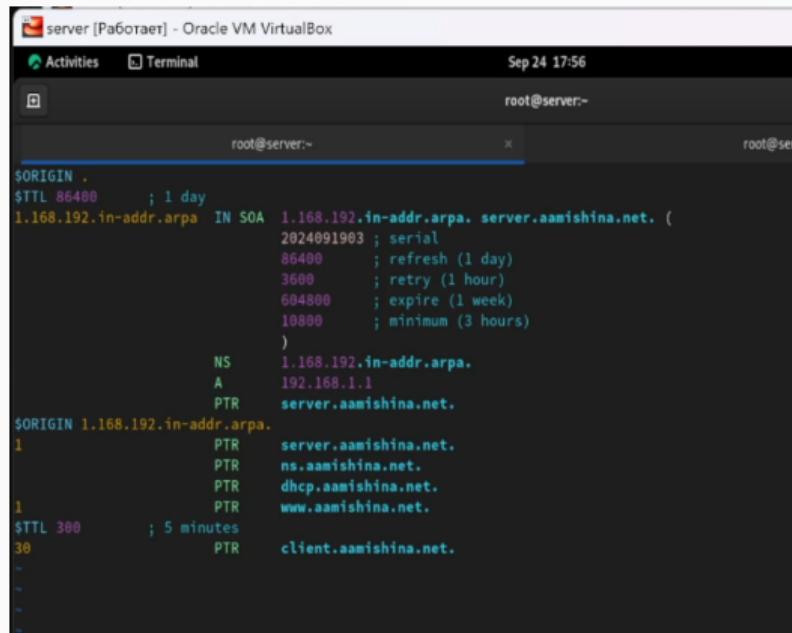


The screenshot shows a terminal window titled "server [Работает] - Oracle VM VirtualBox". The window title bar includes "Activities", "Terminal", and the date "Sep 24 17:55". The terminal prompt is "root@server:~". The content of the terminal is a DNS zone file for "aamishina.net". The file contains the following records:

```
$ORIGIN .
$TTL 86400 ; 1 day
aamishina.net. IN SOA aamishina.net. server.aamishina.net. (
    2024091904 ; serial
    86400 ; refresh (1 day)
    3600 ; retry (1 hour)
    604800 ; expire (1 week)
    10800 ; minimum (3 hours)
)
NS aamishina.net.
A 192.168.1.1
$ORIGIN aamishina.net.
$TTL 300 ; 5 minutes
client A 192.168.1.30
        TXT "3111722b5ab853a6f7753db2b6b95146af"
$TTL 86400 ; 1 day
dhcp A 192.168.1.1
ns A 192.168.1.1
server A 192.168.1.1
www A 192.168.1.1
~
~
```

Рис. 7: Добавление записи в конец файла прямой DNS-зоны

Обратная зона



The screenshot shows a terminal window titled "server [Работает] - Oracle VM VirtualBox". The window is running on a Linux system, indicated by the root prompt "root@server:~". The terminal displays the contents of a DNS zone file, specifically for the reverse zone "1.168.192.in-addr.arpa". The file includes SOA records for the zone, NS records pointing to "1.168.192.in-addr.arpa", A records for "192.168.1.1" and "server.aamishina.net", PTR records for "server.aamishina.net", "ns.aamishina.net", "dhcp.aamishina.net", and "www.aamishina.net", and a final PTR record for "client.aamishina.net". The file concludes with several blank lines.

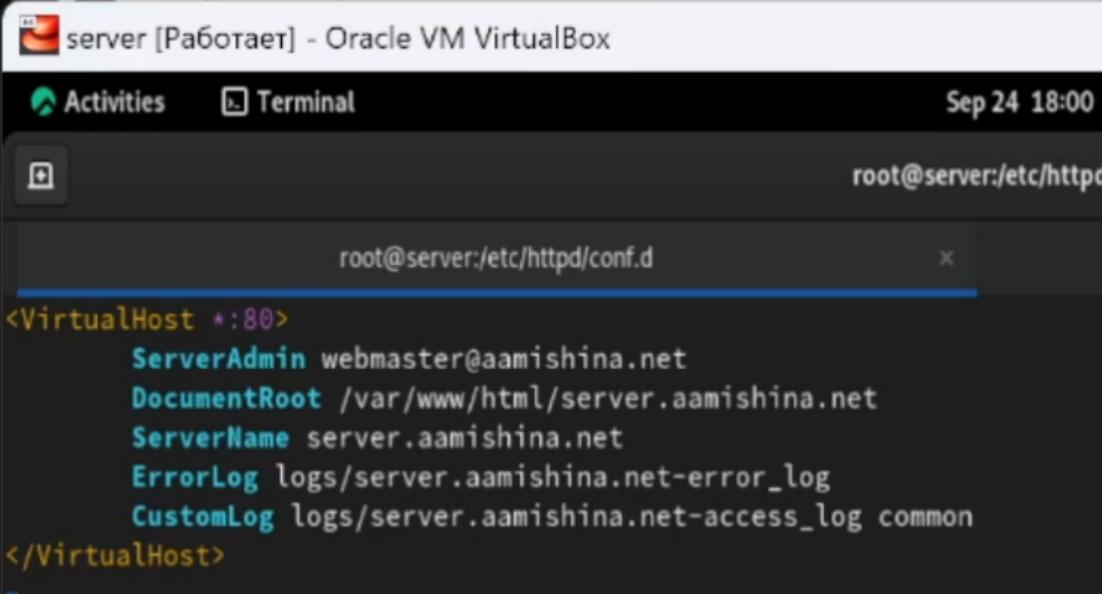
```
$ORIGIN .
$TTL 86400      ; 1 day
1.168.192.in-addr.arpa. IN SOA 1.168.192.in-addr.arpa. server.aamishina.net. (
                                2024091903 ; serial
                                86400    ; refresh (1 day)
                                3600     ; retry (1 hour)
                                604800   ; expire (1 week)
                                10800    ; minimum (3 hours)
)
NS      1.168.192.in-addr.arpa.
A       192.168.1.1
PTR    server.aamishina.net.
$ORIGIN 1.168.192.in-addr.arpa.
1        PTR    server.aamishina.net.
                  PTR    ns.aamishina.net.
                  PTR    dhcp.aamishina.net.
1        PTR    www.aamishina.net.
$TTL 300      ; 5 minutes
30      PTR    client.aamishina.net.
~  
~  
~  
~
```

Рис. 8: Добавление записи в конец файла обратной DNS-зоны

Файлы и перезапуск

```
[root@server.aamishina.net ~]# cd /var/named/master/fz/
[root@server.aamishina.net fz]# ls
aamishina.net  aamishina.net.jnl
[root@server.aamishina.net fz]# rm -r aamishina.net.jnl
rm: remove regular file 'aamishina.net.jnl'? y
[root@server.aamishina.net fz]# ls
aamishina.net
[root@server.aamishina.net fz]# cd /var/named/master/rz
[root@server.aamishina.net rz]# ls
192.168.1  192.168.1.jnl
[root@server.aamishina.net rz]# rm -r 192.168.1.jnl
rm: remove regular file '192.168.1.jnl'? y
[root@server.aamishina.net rz]# ls
192.168.1
[root@server.aamishina.net rz]# systemctl start named
[root@server.aamishina.net rz]# cd /etc/httpd/conf.d
[root@server.aamishina.net conf.d]# touch server.aamishina.net.conf
[root@server.aamishina.net conf.d]# touch www.aamishina.net.conf
[root@server.aamishina.net conf.d]# vim server.aamishina.net.conf
[root@server.aamishina.net conf.d]# vim www.aamishina.net.conf
[root@server.aamishina.net conf.d]# █
```

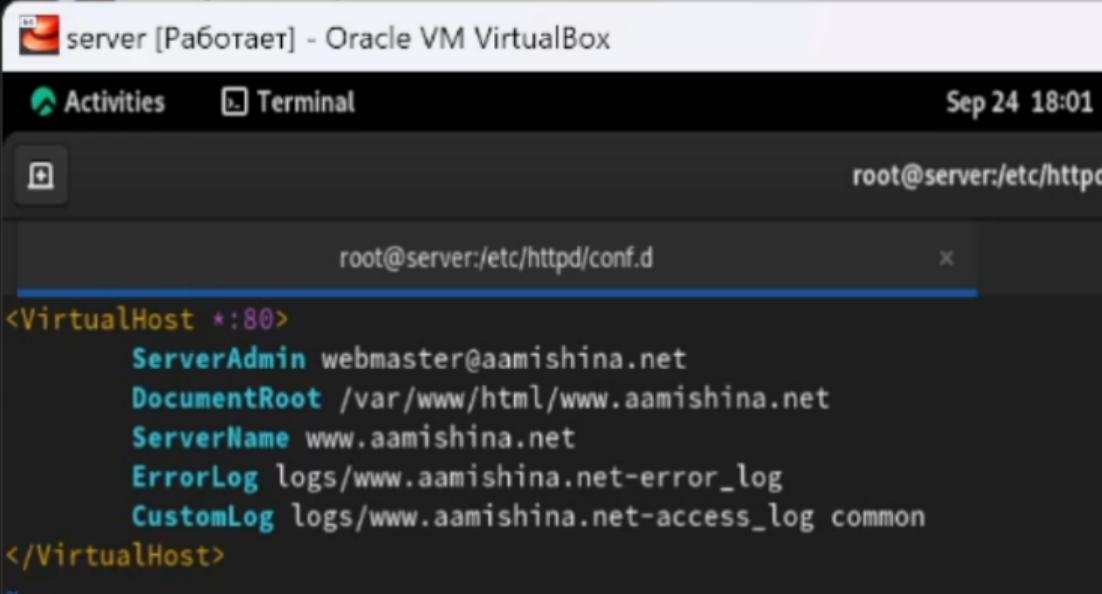
Рис. 9: Удаление файлов журналов DNS, перезапуск DNS-сервера, создание файлов



The screenshot shows a terminal window titled "server [Работает] - Oracle VM VirtualBox". The window title bar includes the server name, the status "Работает", and the application "Oracle VM VirtualBox". The window has a dark theme with light-colored text. The terminal interface includes a header bar with "Activities" and "Terminal" buttons, and a date/time indicator "Sep 24 18:00". The main area of the terminal shows the command line "root@server:/etc/httpd," followed by a tab labeled "root@server:/etc/httpd/conf.d". The user is editing the configuration file, specifically the section for a virtual host on port 80. The configuration parameters shown are:

```
<VirtualHost *:80>
    ServerAdmin webmaster@aamishina.net
    DocumentRoot /var/www/html/server.aamishina.net
    ServerName server.aamishina.net
    ErrorLog logs/server.aamishina.net-error_log
    CustomLog logs/server.aamishina.net-access_log common
</VirtualHost>
```

Рис. 10: Редактирование server.aamishina.net.conf



The screenshot shows a terminal window titled "server [Работает] - Oracle VM VirtualBox". The window has tabs for "Activities" and "Terminal". The status bar shows the date and time: "Sep 24 18:01". The terminal session is for user "root" at the server's root directory: "root@server:/etc/httpd/". A single tab is open, titled "root@server:/etc/httpd/conf.d". The content of the tab is the configuration for a virtual host:

```
<VirtualHost *:80>
    ServerAdmin webmaster@aamishina.net
    DocumentRoot /var/www/html/www.aamishina.net
    ServerName www.aamishina.net
    ErrorLog logs/www.aamishina.net-error_log
    CustomLog logs/www.aamishina.net-access_log common
</VirtualHost>
```

Рис. 11: Редактирование www.aamishina.net.conf

```
[root@server.aamishina.net conf.d]# cd /var/www/html
[root@server.aamishina.net html]# mkdir server.aamishina.net
[root@server.aamishina.net html]# cd /var/www/html/server.aamishina.net
[root@server.aamishina.net server.aamishina.net]# touch index.html
[root@server.aamishina.net server.aamishina.net]# vim index.html
```

Рис. 12: Создание каталога и файла главной страницы

Права доступа и SELinux

```
[root@server.aamishina.net server.aamishina.net]# chown -R apache:apache /var/www
[root@server.aamishina.net server.aamishina.net]# restorecon -vR /etc
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 server.aamishina.net]# restorecon -vR /var/named
[root@server.aamishina.net server.aamishina.net]# restorecon -vR /var/www
[root@server.aamishina.net server.aamishina.net]# systemctl restart httpd
[root@server.aamishina.net server.aamishina.net]#
```

Рис. 13: Корректирование прав доступа, восстановление контекста безопасности, перезагрузка httpd

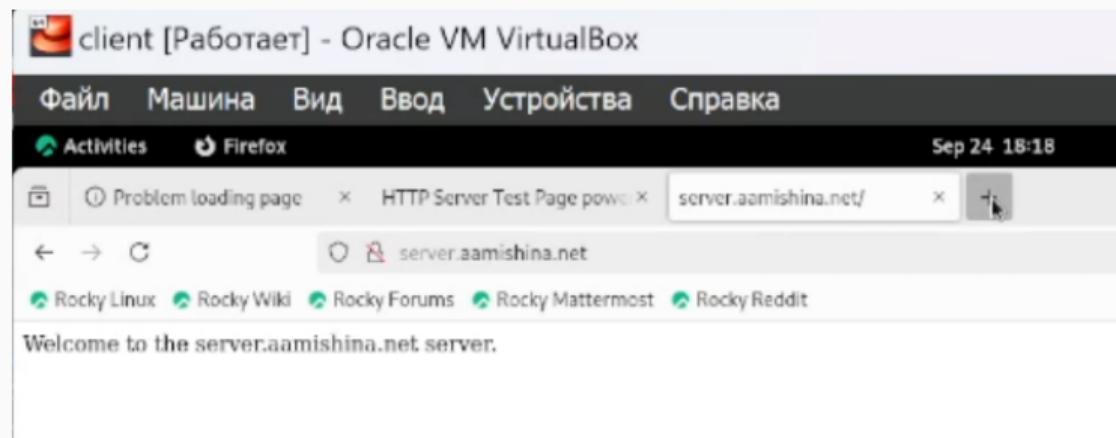


Рис. 14: Доступ к server.aamishina.net

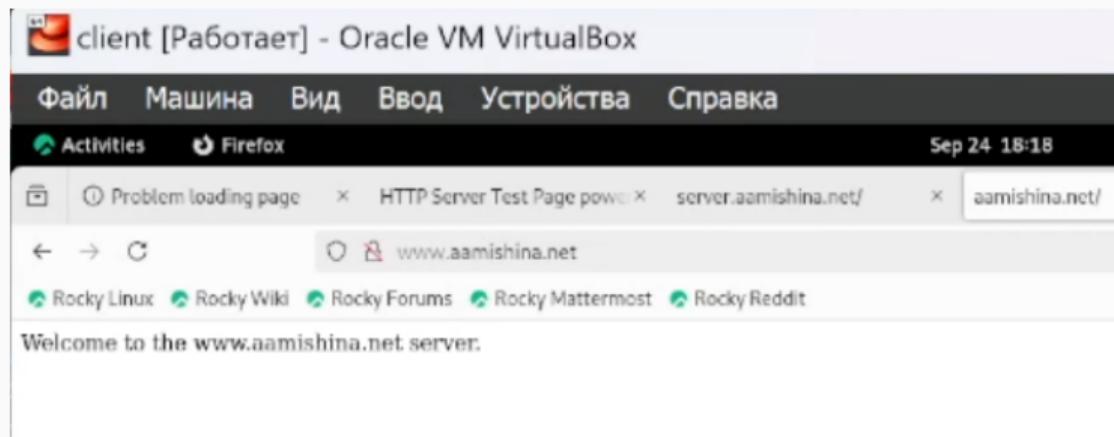


Рис. 15: Доступ к www.aamishina.net

Внесение изменений в настройки внутреннего окружения виртуальной машины

Конфигурационные файлы

```
[root@server.aamishina.net www.aamishina.net]# cd /vagrant/provision/server
[root@server.aamishina.net server]# mkdir -p /vagrant/provision/server/http/etc/httpd/conf.d
[root@server.aamishina.net server]# mkdir -p /vagrant/provision/server/http/var/www/html
[root@server.aamishina.net server]# cp -R /etc/httpd/conf.d/* /vagrant/provision/server/http/etc/httpd/conf.d/
[root@server.aamishina.net server]# cp -R /var/www/html/* /vagrant/provision/server/http/var/www/html
[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/data/named.run'? y
cp: overwrite '/vagrant/provision/server/dns/var/named/dynamic/managed-keys.bind.jnl'? y
cp: overwrite '/vagrant/provision/server/dns/var/named/dynamic/managed-keys.bind'? y
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
cp: overwrite '/vagrant/provision/server/dns/var/named/named.ca'? y
cp: overwrite '/vagrant/provision/server/dns/var/named/named.empty'? y
cp: overwrite '/vagrant/provision/server/dns/var/named/named.localhost'? y
cp: overwrite '/vagrant/provision/server/dns/var/named/named.loopback'? y
[root@server.aamishina.net dns]#
```

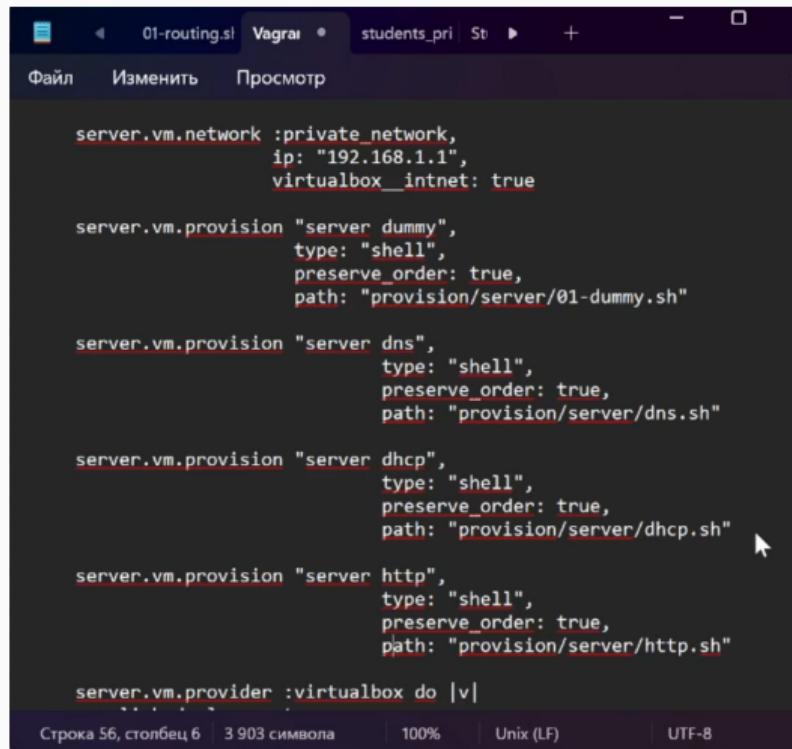
Рис. 16: Создание каталога http, помещение конфигурационных файлов HTTP-сервера, заменя конфигурационных файлов DNS-сервера

Скрипт http.sh

```
[root@server.aamishina.net dns]# cd /vagrant/provision/server  
[root@server.aamishina.net server]# touch http.sh  
[root@server.aamishina.net server]# chmod +x http.sh  
[root@server.aamishina.net server]# vim http.sh █
```

Рис. 17: Создание скрипта http.sh

Vagrantfile



```
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"

server.vm.provision "server http",
  type: "shell",
  preserve_order: true,
  path: "provision/server/http.sh"

server.vm.provider :virtualbox do |v|
```

Строка 56, столбец 6 | 3 903 символа | 100% | Unix (LF) | UTF-8

Рис. 18: Vagrantfile

Вывод

- В результате выполнения работы были приобретены практические навыки по установке и базовому конфигурированию HTTP-сервера Apache.