

# Лабораторная работа №13

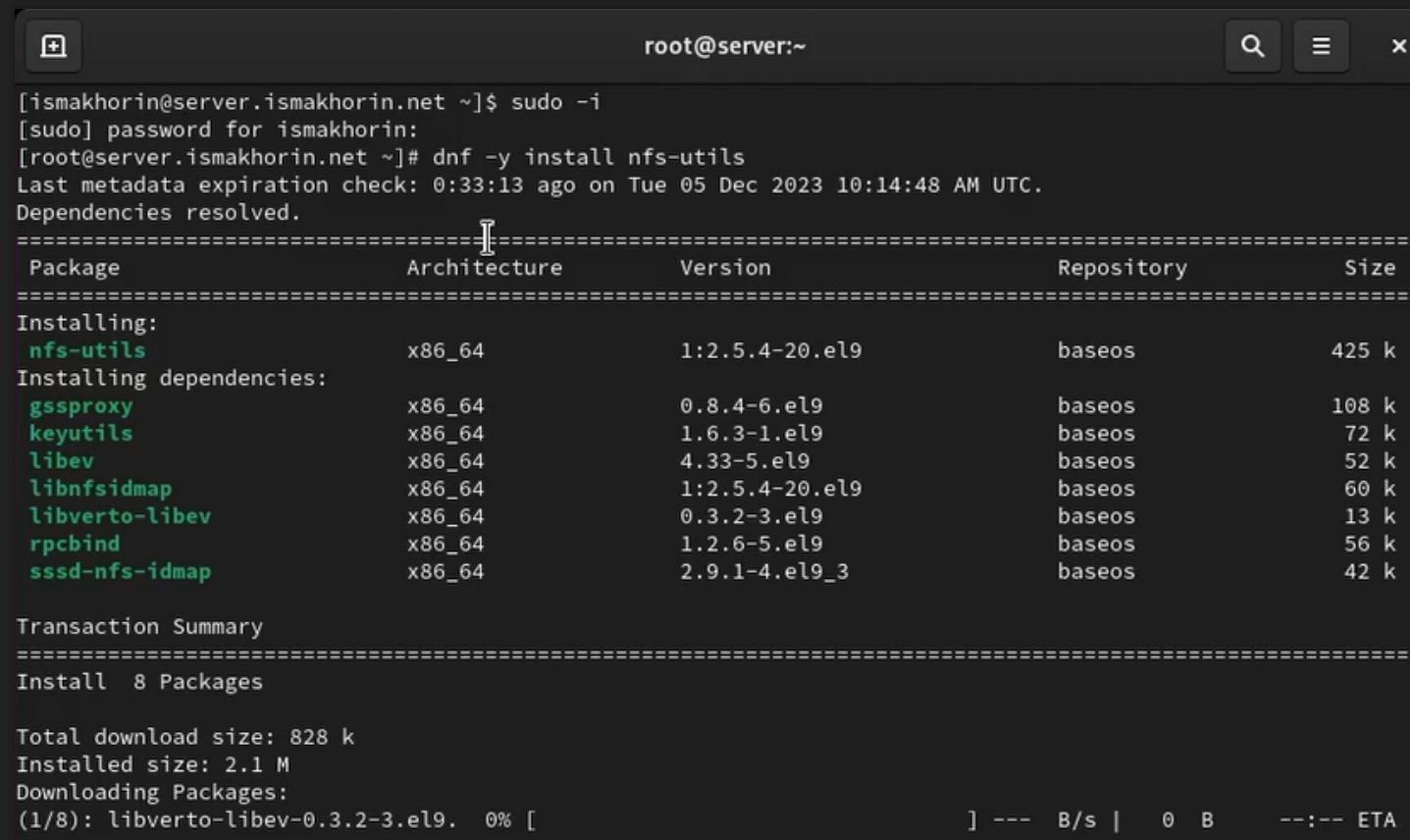
## Настройка NFS

Махорин Иван Сергеевич

1032211221

НПИБд-02-21

# Настройка сервера NFSv4



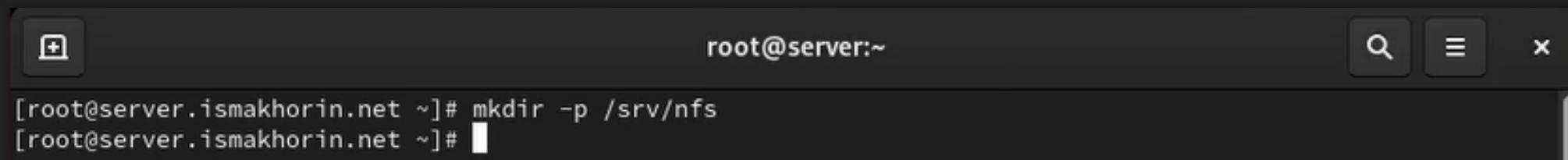
The screenshot shows a terminal window titled "root@server:~". The command entered is "sudo -i" followed by "password for ismakhordin". Then, "dnf -y install nfs-utils" is run. The output shows the package being installed and its dependencies. The transaction summary indicates 8 packages will be installed, with a total download size of 828 k and an installed size of 2.1 M. The download progress for "libverto-libev-0.3.2-3.el9" is shown at 0%.

```
[ismakhordin@server.ismakhordin.net ~]$ sudo -i
[sudo] password for ismakhordin:
[root@server.ismakhordin.net ~]# dnf -y install nfs-utils
Last metadata expiration check: 0:33:13 ago on Tue 05 Dec 2023 10:14:48 AM UTC.
Dependencies resolved.
=====
 Package           Architecture      Version       Repository   Size
 =====
 Installing:
 nfs-utils          x86_64          1:2.5.4-20.el9    baseos     425 k
 Installing dependencies:
 gssproxy           x86_64          0.8.4-6.el9      baseos     108 k
 keyutils            x86_64          1.6.3-1.el9      baseos      72 k
 libbev              x86_64          4.33-5.el9       baseos      52 k
 libnfsidmap         x86_64          1:2.5.4-20.el9    baseos      60 k
 libverto-libev       x86_64          0.3.2-3.el9      baseos      13 k
 rpcbind             x86_64          1.2.6-5.el9      baseos      56 k
 sssd-nfs-idmap      x86_64          2.9.1-4.el9_3    baseos      42 k
 Transaction Summary
 =====
 Install 8 Packages

 Total download size: 828 k
 Installed size: 2.1 M
 Downloading Packages:
 (1/8): libverto-libev-0.3.2-3.el9. 0% [ ] --- B/s | 0 B --:-- ETA
```

Рис. 1.1. Установка на сервере программного обеспечения nfs-utils.

# Настройка сервера NFSv4



The screenshot shows a terminal window with a dark background and light-colored text. At the top, there's a header bar with a search icon, a menu icon, and a close button. The main area of the terminal shows the command `mkdir -p /srv/nfs` being run by a user with root privileges on a server named `server.ismakhorin.net`. The command is completed successfully.

```
root@server:~  
[root@server.ismakhorin.net ~]# mkdir -p /srv/nfs  
[root@server.ismakhorin.net ~]#
```

Рис. 1.2. Создание на сервере каталога, который предполагается сделать доступным всем пользователям сети (корень дерева NFS).

# Настройка сервера NFSv4

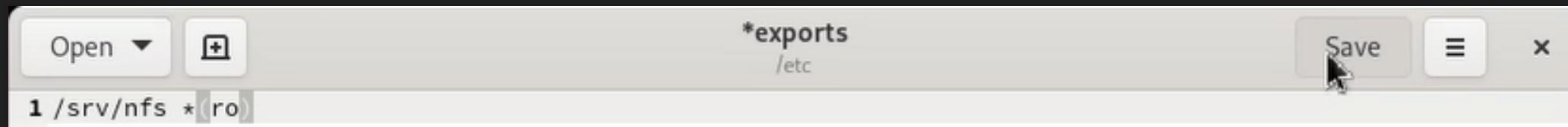
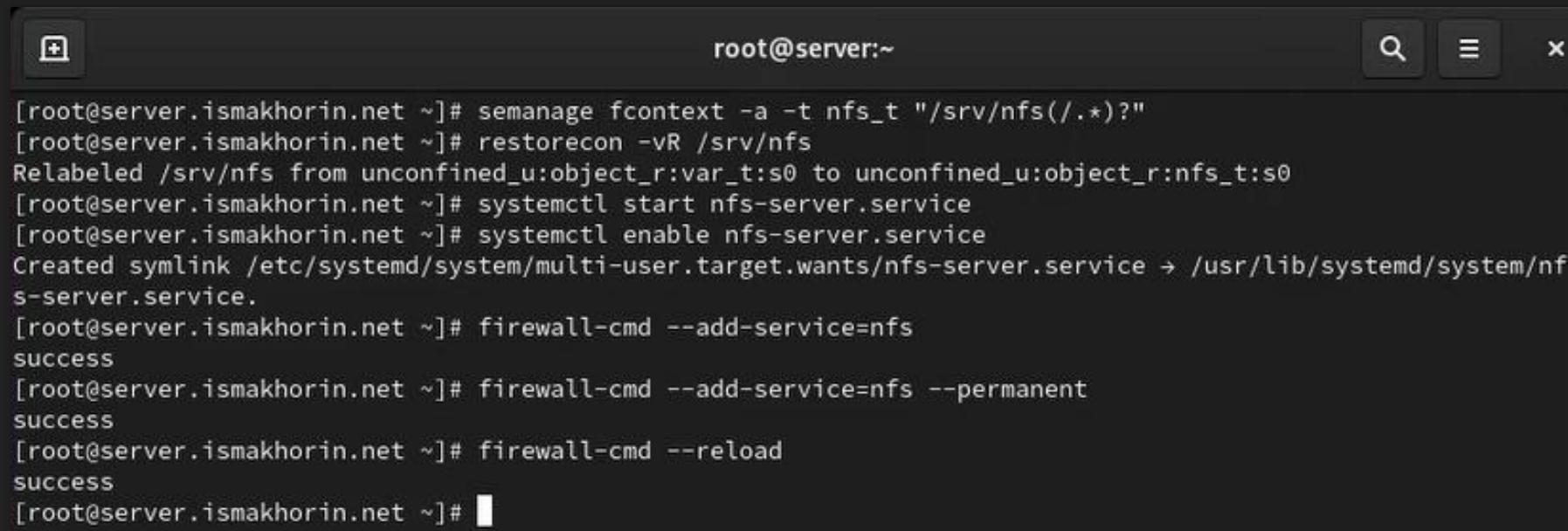


Рис. 1.3. Прописывание в файле /etc/exports подключааемого через NFS общего каталога с доступом только на чтение.

# Настройка сервера NFSv4



The screenshot shows a terminal window with a dark background and light-colored text. The title bar reads "root@server:~". The terminal content is as follows:

```
[root@server.ismakhорин.net ~]# semanage fcontext -a -t nfs_t "/srv/nfs(/.*)?"  
[root@server.ismakhорин.net ~]# restorecon -vR /srv/nfs  
Relabeled /srv/nfs from unconfined_u:object_r:var_t:s0 to unconfined_u:object_r:nfs_t:s0  
[root@server.ismakhорин.net ~]# systemctl start nfs-server.service  
[root@server.ismakhорин.net ~]# systemctl enable nfs-server.service  
Created symlink /etc/systemd/system/multi-user.target.wants/nfs-server.service → /usr/lib/systemd/system/nf  
s-server.service.  
[root@server.ismakhорин.net ~]# firewall-cmd --add-service=nfs  
success  
[root@server.ismakhорин.net ~]# firewall-cmd --add-service=nfs --permanent  
success  
[root@server.ismakhорин.net ~]# firewall-cmd --reload  
success  
[root@server.ismakhорин.net ~]# █
```

**Рис. 1.4.** Настройка для общего каталога контекста безопасности NFS, применение изменённой настройки SELinux к файловой системе, запуск сервера NFS и настройка межсетевого экрана для работы сервера NFS.

# Настройка сервера NFSv4

```
root@client:~
```

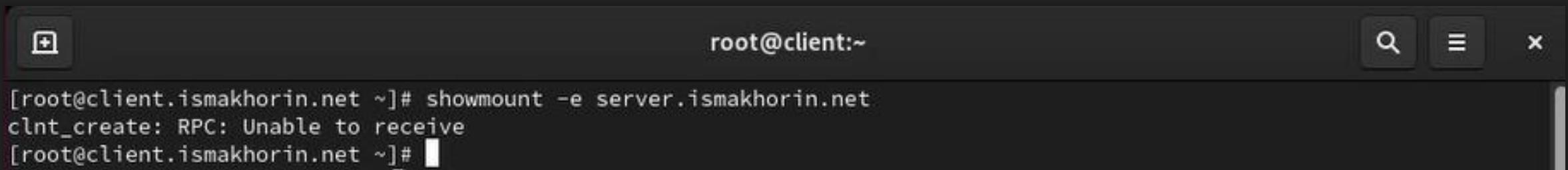
File	Size	Time
(2/8): rpcbind-1.2.6-5.el9.x86_64.rpm	69 kB/s	56 kB 00:00
(3/8): libev-4.33-5.el9.x86_64.rpm	58 kB/s	52 kB 00:00
(4/8): sssd-nfs-idmap-2.9.1-4.el9_3.x86_64.rpm	339 kB/s	42 kB 00:00
(5/8): gssproxy-0.8.4-6.el9.x86_64.rpm	877 kB/s	108 kB 00:00
(6/8): libnfsidmap-2.5.4-20.el9.x86_64.rpm	742 kB/s	60 kB 00:00
(7/8): keyutils-1.6.3-1.el9.x86_64.rpm	808 kB/s	72 kB 00:00
(8/8): nfs-utils-2.5.4-20.el9.x86_64.rpm	2.1 MB/s	425 kB 00:00
Total	413 kB/s	828 kB 00:02

```
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
Preparing : 1/1
Installing : libnfsidmap-1:2.5.4-20.el9.x86_64 1/8
Installing : keyutils-1.6.3-1.el9.x86_64 2/8
Installing : libev-4.33-5.el9.x86_64 3/8
Installing : libverto-libev-0.3.2-3.el9.x86_64 4/8
Installing : gssproxy-0.8.4-6.el9.x86_64 5/8
Running scriptlet: gssproxy-0.8.4-6.el9.x86_64 5/8
Running scriptlet: rpcbind-1.2.6-5.el9.x86_64 6/8
Installing : rpcbind-1.2.6-5.el9.x86_64 6/8
Running scriptlet: rpcbind-1.2.6-5.el9.x86_64 6/8
Created symlink /etc/systemd/system/multi-user.target.wants/rpcbind.service → /usr/lib/systemd/system/rpcbind.service
.
Created symlink /etc/systemd/system/sockets.target.wants/rpcbind.socket → /usr/lib/systemd/system/rpcbind.socket.

Running scriptlet: nfs-utils-1:2.5.4-20.el9.x86_64 7/8
Installing : nfs-utils-1:2.5.4-20.el9.x86_64 7/8
Running scriptlet: nfs-utils-1:2.5.4-20.el9.x86_64 7/8
Installing : sssd-nfs-idmap-2.9.1-4.el9_3.x86_64 8/8
Running scriptlet: sssd-nfs-idmap-2.9.1-4.el9_3.x86_64 8/8
```

Рис. 1.5. Установка на клиенте программного обеспечения для работы NFS.

# Настройка сервера NFSv4



root@client:~

```
[root@client.ismakhорин.net ~]# showmount -e server.ismakhорин.net
clnt_create: RPC: Unable to receive
[root@client.ismakhорин.net ~]#
```

Рис. 1.6. Попытка просмотреть на клиенте имеющихся подмонтированных удалённых ресурсов.

# Настройка сервера NFSv4

```
[root@server.ismakhorin.net ~]# systemctl stop firewalld.service  
[root@server.ismakhorin.net ~]#
```

**Рис. 1.7.** Попытка остановить на сервере сервис межсетевого экрана.

# Настройка сервера NFSv4

```
[root@client.ismakhорин.net ~]# showmount -e server.ismakhорин.net
Export list for server.ismakhорин.net:
/srv/nfs *
```



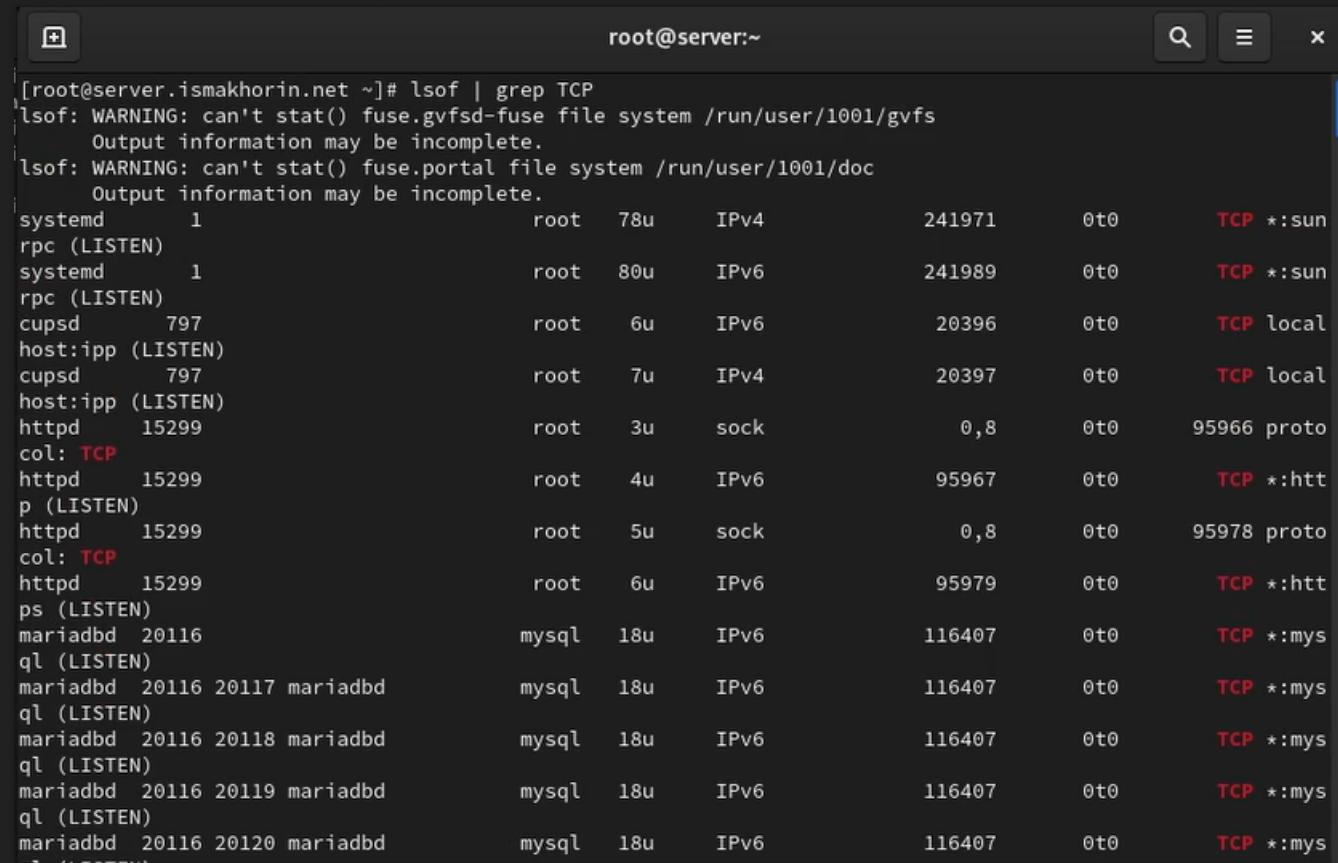
**Рис. 1.8.** Повторная попытка подключения к удалённо смонтированному ресурсу.

# Настройка сервера NFSv4

```
[root@server.ismakhordin.net ~]# systemctl start firewalld  
[root@server.ismakhordin.net ~]# █
```

**Рис. 1.9.** Запуск на сервере сервиса межсетевого экрана.

# Настройка сервера NFSv4



root@server:~# lsof | grep TCP  
lsof: WARNING: can't stat() fuse.gvfsd-fuse file system /run/user/1001/gvfs  
Output information may be incomplete.  
lsof: WARNING: can't stat() fuse.portal file system /run/user/1001/doc  
Output information may be incomplete.  
systemd 1 root 78u IPv4 241971 0t0 TCP \*:sun  
rpc (LISTEN)  
systemd 1 root 80u IPv6 241989 0t0 TCP \*:sun  
rpc (LISTEN)  
cupsd 797 root 6u IPv6 20396 0t0 TCP local  
host:ipp (LISTEN)  
cupsd 797 root 7u IPv4 20397 0t0 TCP local  
host:ipp (LISTEN)  
httpd 15299 root 3u sock 0,8 0t0 95966 proto  
col: TCP  
httpd 15299 root 4u IPv6 95967 0t0 TCP \*:htt  
p (LISTEN)  
httpd 15299 root 5u sock 0,8 0t0 95978 proto  
col: TCP  
httpd 15299 root 6u IPv6 95979 0t0 TCP \*:htt  
ps (LISTEN)  
mariadb 20116 mysql 18u IPv6 116407 0t0 TCP \*:mys  
ql (LISTEN)  
mariadb 20116 20117 mariadb mysql 18u IPv6 116407 0t0 TCP \*:mys  
ql (LISTEN)  
mariadb 20116 20118 mariadb mysql 18u IPv6 116407 0t0 TCP \*:mys  
ql (LISTEN)  
mariadb 20116 20119 mariadb mysql 18u IPv6 116407 0t0 TCP \*:mys  
ql (LISTEN)  
mariadb 20116 20120 mariadb mysql 18u IPv6 116407 0t0 TCP \*:mys

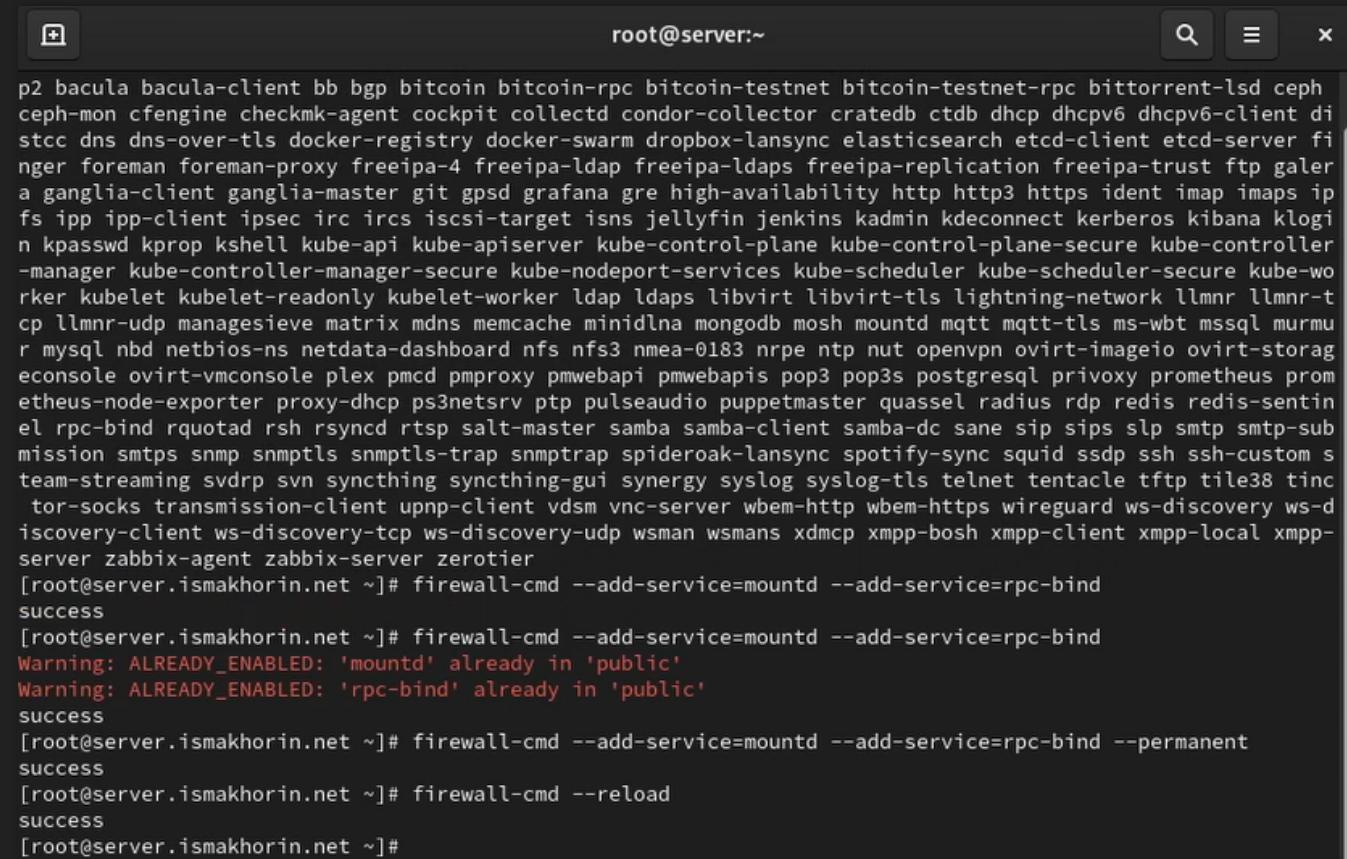
Рис. 1.10. Просмотр на сервере служб, задействованных при удалённом монтировании (TCP).

# Настройка сервера NFSv4

```
[root@server.ismakhорин.net ~]# lsof | grep UDP
lsof: WARNING: can't stat() fuse.gvfsd-fuse file system /run/user/1001/gvfs
      Output information may be incomplete.
lsof: WARNING: can't stat() fuse.portal file system /run/user/1001/doc
      Output information may be incomplete.
systemd    1                      root    79u    IPv4          241980    0t0      UDP *:sun
rpc
systemd    1                      root    81u    IPv6          241998    0t0      UDP *:sun
rpc
avahi-dae 495                    avahi   12u    IPv4          19204    0t0      UDP *:mdn
s
avahi-dae 495                    avahi   13u    IPv6          19205    0t0      UDP *:mdn
s
avahi-dae 495                    avahi   14u    IPv4          19206    0t0      UDP *:600
26
avahi-dae 495                    avahi   15u    IPv6          19207    0t0      UDP *:503
18
NetworkMa 10196                  root    30u    IPv4          247377    0t0      UDP serve
r.ismakhорин.net:bootpc->_gateway:bootps
NetworkMa 10196 10207 gmain
r.ismakhорин.net:bootpc->_gateway:bootps
NetworkMa 10196 10208 gdbus
r.ismakhорин.net:bootpc->_gateway:bootps
dhcpd    12670                  dhcpcd  7u    IPv4          75054    0t0      UDP *:boo
tps
dhcpd    12670                  dhcpcd  20u   IPv4          75040    0t0      UDP *:382
95
dhcpd    12670                  dhcpcd  21u   IPv6          75041    0t0      UDP *:408
32
named   23082                  named   6u    IPv4          247374    0t0      UDP serve
```

Рис. 1.11. Просмотр на сервере служб, задействованных при удалённом монтировании (UDP).

# Настройка сервера NFSv4

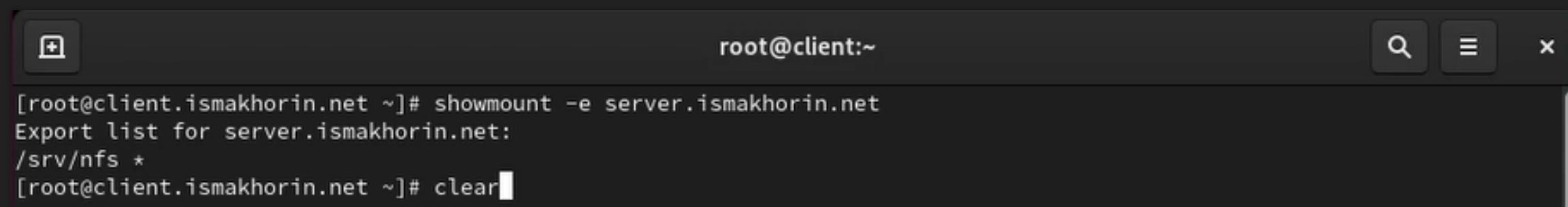


root@server:~

```
p2 bacula bacula-client bb bgp bitcoin bitcoin-rpc bitcoin-testnet bitcoin-testnet-rpc bittorrent-lsd ceph  
ceph-mon cfengine checkmk-agent cockpit collectd condor-collector cratedb ctdb dhcp dhcpcv6 dhcpcv6-client di  
stcc dns dns-over-tls docker-registry docker-swarm dropbox-lansync elasticsearch etcd-client etcd-server fi  
nger foreman foreman-proxy freeipa-4 freeipa-ldap freeipa-ldaps freeipa-replication freeipa-trust ftp galer  
a ganglia-client ganglia-master git gpgsql grafana gre high-availability http http3 https ident imap imaps ip  
fs ipp ipp-client ipsec irc ircs iscsi-target isns jellyfin jenkins kadmin kdeconnect kerberos kibana klogi  
n kpasswd kprop kshell kube-api kube-apiserver kube-control-plane kube-control-secure kube-controller  
-manager kube-controller-manager-secure kube-nodeport-services kube-scheduler kube-scheduler-secure kube-wo  
rker kubelet kubelet-readonly kubelet-worker ldap ldaps libvirt libvirt-tls lightning-network llmnr llmnr-t  
cp llmnr-udp managesieve matrix mdns memcache minidlna mongodb mosh mountd mqtt mqtt-tls ms-wbt mssql murmu  
r mysql nbd netbios-ns netdata dashboard nfs nfs3 nmea-0183 nrpe ntp nut openvpn ovirt-imageio ovirt-storag  
econsole ovirt-vmconsole plex pmcd pmproxy pmwebapi pmwebapis pop3 pop3s postgresql privoxy prometheu  
s prometheus-node-exporter proxy-dhcp ps3netsrv ptp pulseaudio puppetmaster quassel radius rdp redis redis-sentin  
el rpc-bind rquotad rsh rsyncd rtsp salt-master samba samba-client samba-dc sane sip sips slp smtp smtp-sub  
mission smtps snmp snmpd snmptrap snmptrap spideroak-lansync spotify-sync squid ssdp ssh ssh-custom s  
team-streaming svdrp svn syncthing syncthing-gui synergy syslog syslog-tls telnet tentacle tftp tile38 tinc  
tor-socks transmission-client upnp-client vdsm vnc-server wbem-http wbem-https wireguard ws-discovery ws-d  
iscovery-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.ismakhorin.net ~]# firewall-cmd --add-service=mountd --add-service=rpc-bind  
success  
[root@server.ismakhorin.net ~]# firewall-cmd --add-service=mountd --add-service=rpc-bind  
Warning: ALREADY_ENABLED: 'mountd' already in 'public'  
Warning: ALREADY_ENABLED: 'rpc-bind' already in 'public'  
success  
[root@server.ismakhorin.net ~]# firewall-cmd --add-service=mountd --add-service=rpc-bind --permanent  
success  
[root@server.ismakhorin.net ~]# firewall-cmd --reload  
success  
[root@server.ismakhorin.net ~]#
```

Рис. 1.12. Добавление службы rpc-bind и mountd в настройки межсетевого экрана на сервере.

# Настройка сервера NFSv4

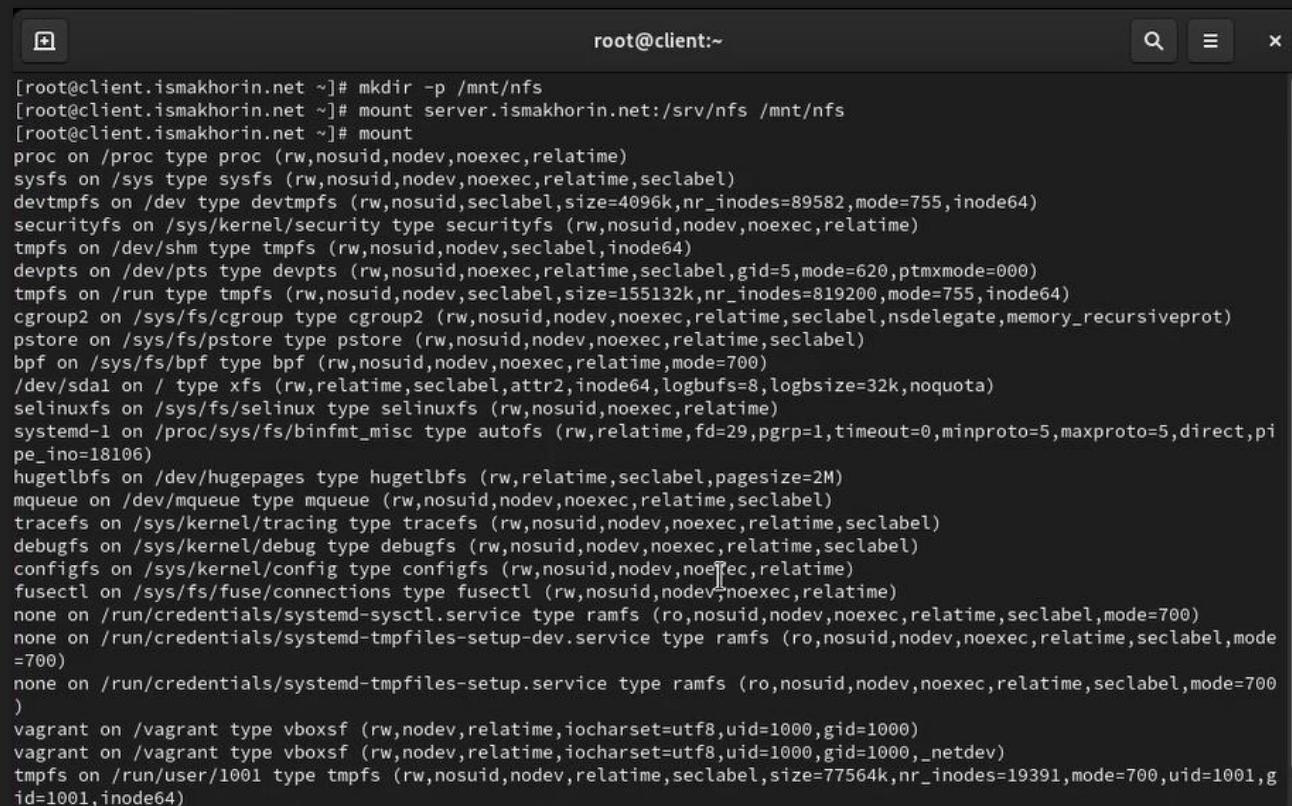


The screenshot shows a terminal window with a dark background and light-colored text. The title bar indicates the session is run as root ('root') on a client machine ('client'). The command entered is 'showmount -e server.ismakhordin.net', which lists exports from the server. The output shows a single export entry: '/srv/nfs \*'. After the command, the user types 'clear' to clear the screen.

```
root@client:~# showmount -e server.ismakhordin.net
Export list for server.ismakhordin.net:
/srv/nfs *
[root@client:~]# clear
```

Рис. 1.13. Проверка на клиенте подключения удалённого ресурса.

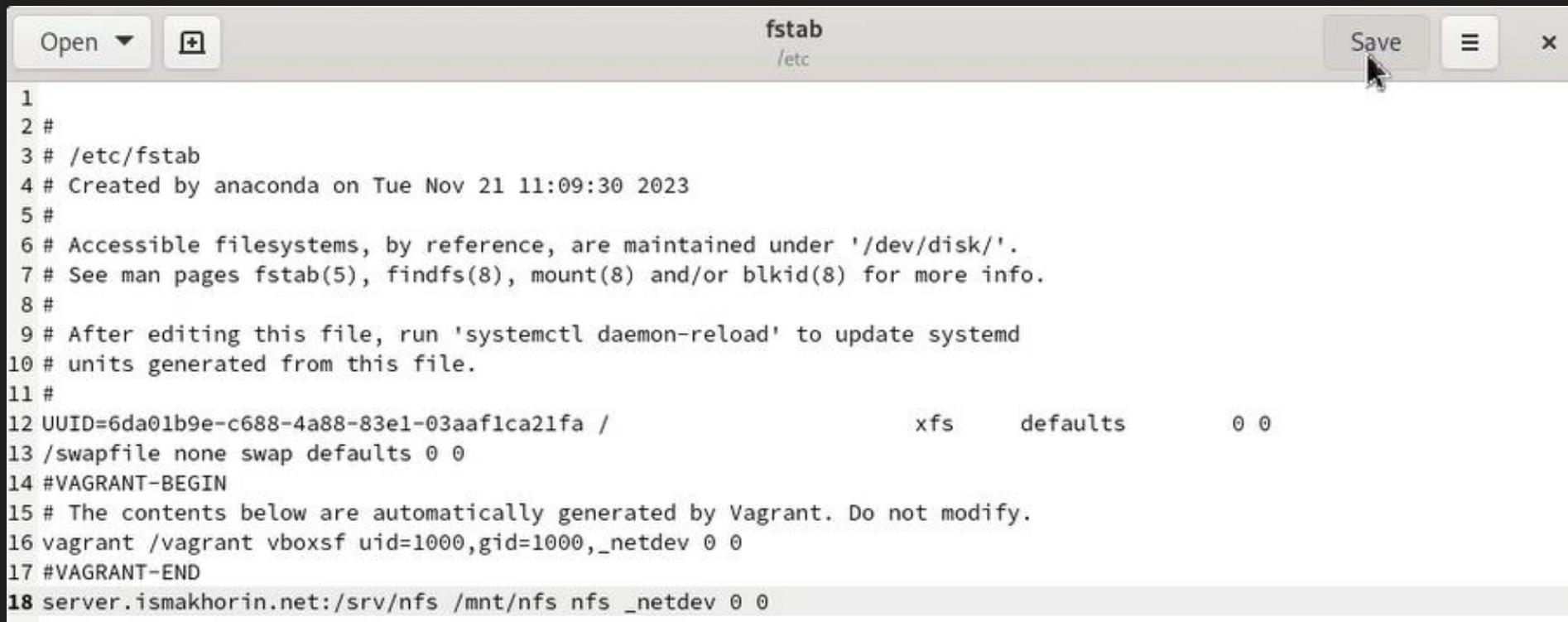
# Мониторинг NFS на клиенте



```
[root@client.ismakhorin.net ~]# mkdir -p /mnt/nfs
[root@client.ismakhorin.net ~]# mount server.ismakhorin.net:/srv/nfs /mnt/nfs
[root@client.ismakhorin.net ~]# mount
proc on /proc type proc (rw,nosuid,nodev,noexec,relatime)
sysfs on /sys type sysfs (rw,nosuid,nodev,noexec,relatime,seclabel)
devtmpfs on /dev type devtmpfs (rw,nosuid,seclabel,size=4096k,nr_inodes=89582,mode=755,inode64)
securityfs on /sys/kernel/security type securityfs (rw,nosuid,nodev,noexec,relatime)
tmpfs on /dev/shm type tmpfs (rw,nosuid,nodev,seclabel,inode64)
devpts on /dev/pts type devpts (rw,nosuid,noexec,relatime,seclabel,gid=5,mode=620,ptmxmode=000)
tmpfs on /run type tmpfs (rw,nosuid,nodev,seclabel,size=155132k,nr_inodes=819200,mode=755,inode64)
cgroup2 on /sys/fs/cgroup type cgroup2 (rw,nosuid,nodev,noexec,relatime,seclabel,nsdelegate,memory_recursiveprot)
pstore on /sys/fs/pstore type pstore (rw,nosuid,nodev,noexec,relatime,seclabel)
bpf on /sys/fs/bpf type bpf (rw,nosuid,nodev,noexec,relatime,mode=700)
/dev/sdal on / type xfs (rw,relatime,seclabel,attr2,inode64,logbufs=8,logbsize=32k,noquota)
selinuxfs on /sys/fs/selinux type selinuxfs (rw,nosuid,noexec,relatime)
systemd-1 on /proc/sys/fs/binfmt_misc type autofs (rw,relatime,fd=29,pgrp=1,timeout=0,minproto=5,maxproto=5,direct,inode=18106)
hugetlbfs on /dev/hugepages type hugetlbfs (rw,relatime,seclabel,pagesize=2M)
mqueue on /dev/mqueue type mqueue (rw,nosuid,nodev,noexec,relatime,seclabel)
tracefs on /sys/kernel/tracing type tracefs (rw,nosuid,nodev,noexec,relatime,seclabel)
debugfs on /sys/kernel/debug type debugfs (rw,nosuid,nodev,noexec,relatime,seclabel)
configfs on /sys/kernel/config type configfs (rw,nosuid,nodev,noexec,relatime)
fusectl on /sys/fs/fuse/connections type fusectl (rw,nosuid,nodev,noexec,relatime)
none on /run/credentials/systemd-sysctl.service type ramfs (ro,nosuid,nodev,noexec,relatime,seclabel,mode=700)
none on /run/credentials/systemd-tmpfiles-setup-dev.service type ramfs (ro,nosuid,nodev,noexec,relatime,seclabel,mode=700)
none on /run/credentials/systemd-tmpfiles-setup.service type ramfs (ro,nosuid,nodev,noexec,relatime,seclabel,mode=700)
)
vagrant on /vagrant type vboxsf (rw,nodev,relatime,iocharset=utf8,uid=1000,gid=1000)
vagrant on /vagrant type vboxsf (rw,nodev,relatime,iocharset=utf8,uid=1000,gid=1000,_netdev)
tmpfs on /run/user/1001 type tmpfs (rw,nosuid,nodev,relatime,seclabel,size=77564k,nr_inodes=19391,mode=700,uid=1001,gid=1001,inode64)
```

**Рис. 2.1.** Создание на клиенте каталога, в который будет монтироваться удалённый ресурс, и монтируется дерево NFS. Проверка, что общий ресурс NFS подключён правильно.

# Мониторинг NFS на клиенте

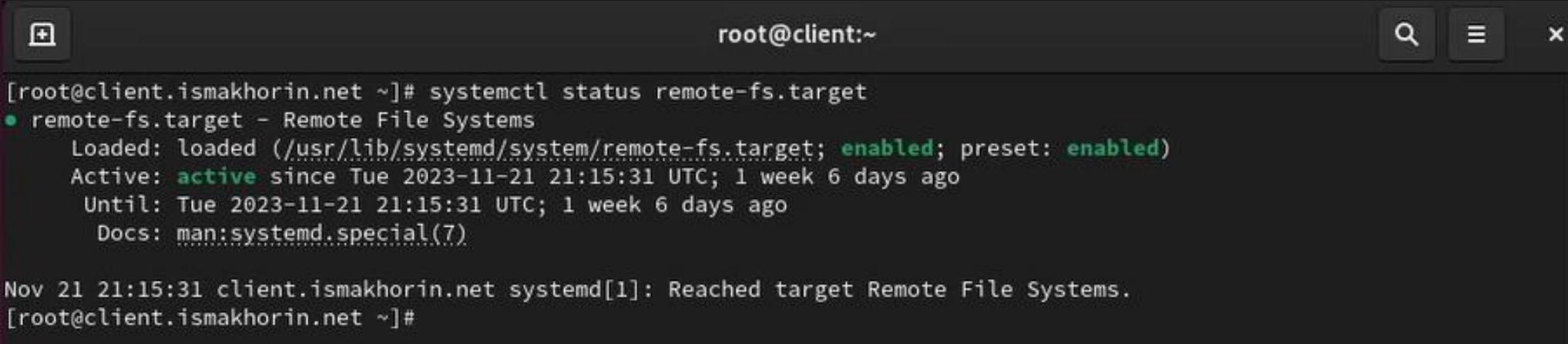


The screenshot shows a file editor window with the title bar "fstab" and the path "/etc". The window includes standard buttons for "Open", "Save", and "x". The main area contains the contents of the /etc/fstab file, which is a configuration file for the Linux system's file system table. The file lists various file systems and their mount points, along with their file systems type and mount options. A new line has been added at the bottom of the file, starting with "18".

```
1
2 #
3 # /etc/fstab
4 # Created by anaconda on Tue Nov 21 11:09:30 2023
5 #
6 # Accessible filesystems, by reference, are maintained under '/dev/disk/'.
7 # See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info.
8 #
9 # After editing this file, run 'systemctl daemon-reload' to update systemd
10 # units generated from this file.
11 #
12 UUID=6da01b9e-c688-4a88-83e1-03aaaf1ca21fa /          xfs      defaults      0 0
13 /swapfile none swap defaults 0 0
14 #VAGRANT-BEGIN
15 # The contents below are automatically generated by Vagrant. Do not modify.
16 vagrant /vagrant vboxsf uid=1000,gid=1000,_netdev 0 0
17 #VAGRANT-END
18 server.ismakhorin.net:/srv/nfs /mnt/nfs nfs _netdev 0 0
```

Рис. 2.2. Добавление на клиенте в конце файла /etc/fstab записи.

# Мониторинг NFS на клиенте



```
root@client:~# systemctl status remote-fs.target
● remote-fs.target - Remote File Systems
  Loaded: loaded (/usr/lib/systemd/system/remote-fs.target; enabled; preset: enabled)
  Active: active since Tue 2023-11-21 21:15:31 UTC; 1 week 6 days ago
    Until: Tue 2023-11-21 21:15:31 UTC; 1 week 6 days ago
   Docs: man:systemd.special(7)

Nov 21 21:15:31 client.ismakhordin.net systemd[1]: Reached target Remote File Systems.
[root@client.ismakhordin.net ~]#
```

**Рис. 2.3.** Проверка на клиенте наличия автоматического мониторинга удалённых ресурсов при запуске операционной системы.

# Подключение каталогов к дереву NFS

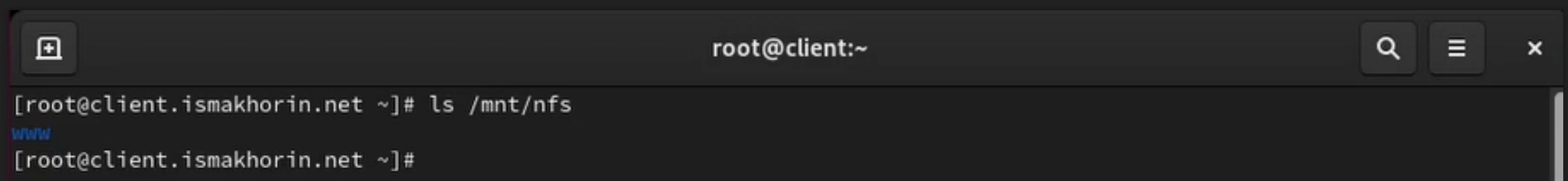


The screenshot shows a terminal window with a dark background and light-colored text. The title bar says "root@server:~". The terminal contains the following command history:

```
[root@server.ismakhорин.net ~]# mkdir -p /srv/nfs/www
[root@server.ismakhорин.net ~]# mount -o bind /var/www/ /srv/nfs/www/
[root@server.ismakhорин.net ~]# ls /srv/nfs
www
[root@server.ismakhорин.net ~]#
```

**Рис. 3.1.** Создание на сервере общего каталога, в который затем будет подмонтирован каталог с контентом веб-сервера. Монтирование каталога web-сервера и проверка, что отображается в каталоге /srv/nfs.

# Подключение каталогов к дереву NFS



```
[root@client.ismakhordin.net ~]# ls /mnt/nfs
www
[root@client.ismakhordin.net ~]#
```

Рис. 3.2. Просмотр на клиенте содержимого каталога /mnt/nfs.

# Подключение каталогов к дереву NFS

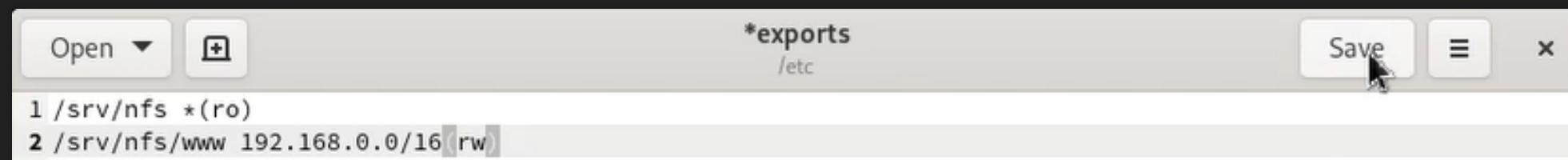
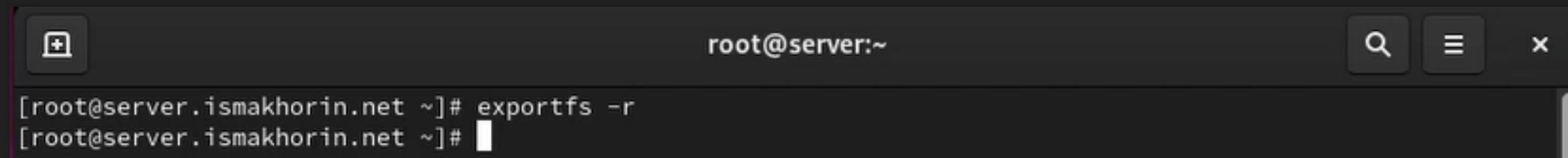


Рис. 3.3. Добавление на сервере в файле /etc/exports экспорта каталога веб-сервера с удалённого ресурса.

# Подключение каталогов к дереву NFS



The screenshot shows a terminal window with a dark theme. The title bar says "root@server:~". The command entered is "exportfs -r", which is used to export all the directories listed in the /etc/exports file. The terminal window has standard Linux-style icons in the top right corner.

```
[root@server.ismakhorin.net ~]# exportfs -r  
[root@server.ismakhorin.net ~]#
```

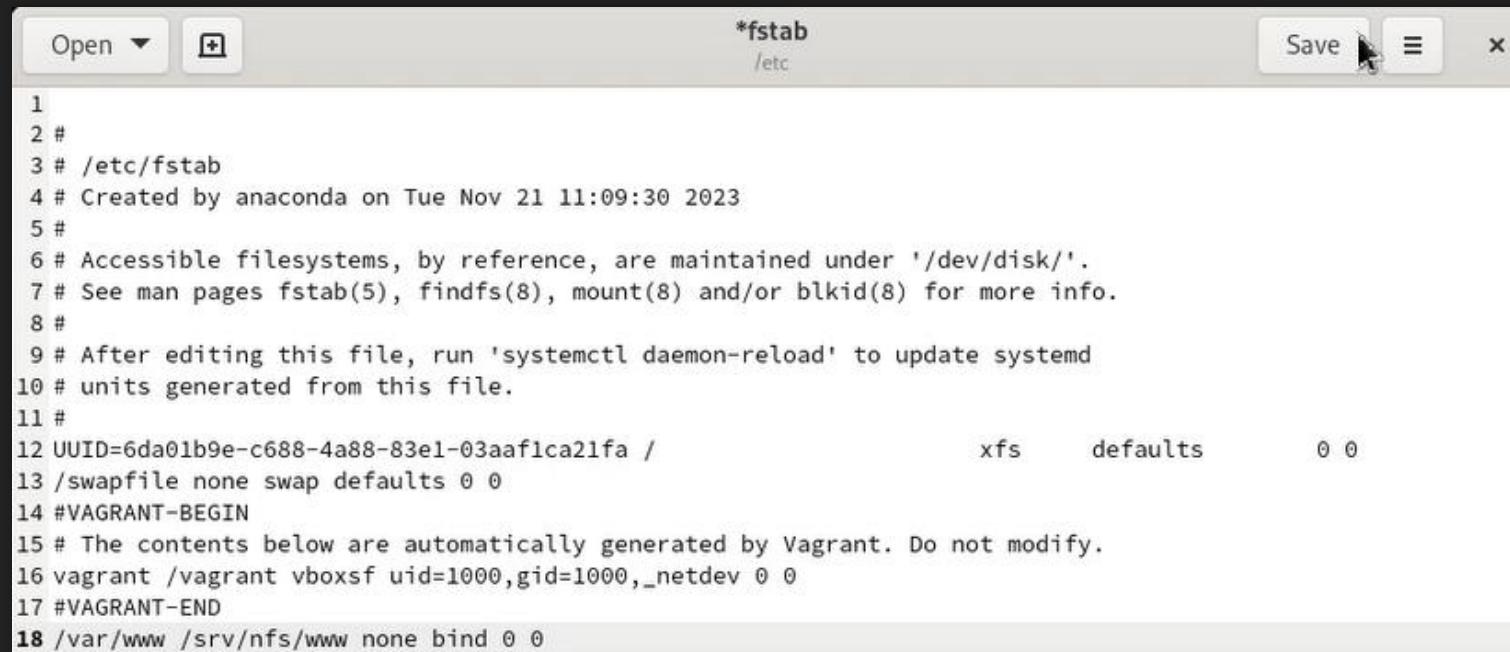
Рис. 3.4. Экспорт всех каталогов, упомянутых в файле /etc/exports.

# Подключение каталогов к дереву NFS

```
[root@client.ismakhорин.net ~]# ls /mnt/nfs  
www  
[root@client.ismakhорин.net ~]# █
```

Рис. 3.5. Проверка на клиенте каталога /mnt/nfs.

# Подключение каталогов к дереву NFS

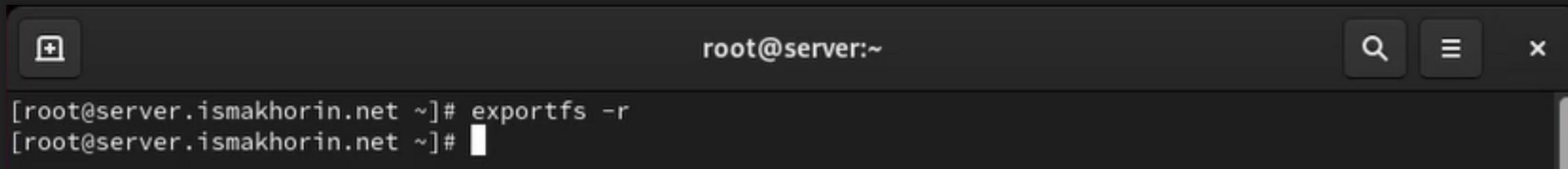


The screenshot shows a terminal window with the title bar "\*fstab /etc". The window contains the contents of the /etc/fstab file. A cursor is visible over the "Save" button in the top right corner. The file content is as follows:

```
1
2 #
3 # /etc/fstab
4 # Created by anaconda on Tue Nov 21 11:09:30 2023
5 #
6 # Accessible filesystems, by reference, are maintained under '/dev/disk/'.
7 # See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info.
8 #
9 # After editing this file, run 'systemctl daemon-reload' to update systemd
10 # units generated from this file.
11 #
12 UUID=6da01b9e-c688-4a88-83e1-03aaaf1ca21fa /          xfs      defaults      0 0
13 /swapfile none swap defaults 0 0
14 #VAGRANT-BEGIN
15 # The contents below are automatically generated by Vagrant. Do not modify.
16 vagrant /vagrant vboxsf uid=1000,gid=1000,_netdev 0 0
17 #VAGRANT-END
18 /var/www /srv/nfs/www none bind 0 0
```

Рис. 3.6. Добавление на сервере в конце файла /etc/fstab записи.

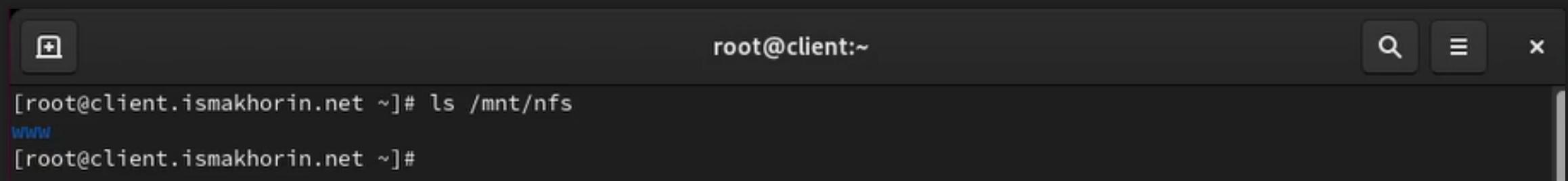
# Подключение каталогов к дереву NFS



The screenshot shows a terminal window with a dark theme. The title bar indicates the session is running as 'root@server:~'. The main area of the terminal displays the command `[root@server.ismakhorin.net ~]# exportfs -r`. The command has been partially typed, with the cursor positioned after the letter 'r'.

**Рис. 3.7.** Повторный экспорт каталогов, указанных в файле /etc/exports.

# Подключение каталогов к дереву NFS

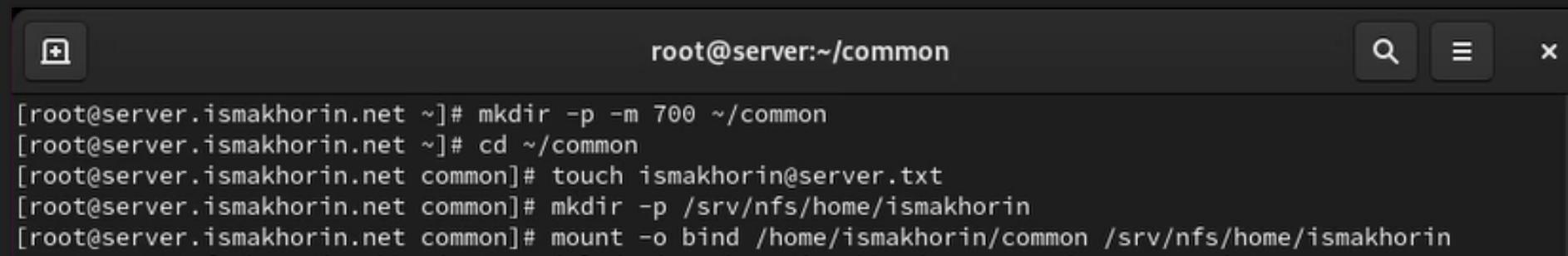


The screenshot shows a terminal window with a dark theme. The title bar indicates the session is running as root ('root') on a client machine ('client'). The command entered is 'ls /mnt/nfs'. The output of the command is displayed below, showing a single entry: 'www'. The terminal window includes standard Linux navigation keys like Esc, F1-F12, Home, End, PgUp, PgDn, and a search bar.

```
root@client:~#
[root@client.ismakhорин.net ~]# ls /mnt/nfs
www
[root@client.ismakhорин.net ~]#
```

Рис. 3.8. Проверка на клиенте каталога /mnt/nfs.

# Подключение каталогов для работы пользователей



```
root@server:~/common
[root@server.ismakhорин.net ~]# mkdir -p -m 700 ~/common
[root@server.ismakhорин.net ~]# cd ~/common
[root@server.ismakhорин.net common]# touch ismakhорин@server.txt
[root@server.ismakhорин.net common]# mkdir -p /srv/nfs/home/ismakhорин
[root@server.ismakhорин.net common]# mount -o bind /home/ismakhорин/common /srv/nfs/home/ismakhорин
```

**Рис. 4.1.** Создание на сервере под пользователем `ismakhорин` в домашнем каталоге каталога `common` с полными правами доступа только для этого пользователя, а в нём файл `ismakhорин@server.txt`. Создание общего каталога для работы пользователя `ismakhорин` по сети и монтирование каталога `common` пользователя `ismakhорин` в NFS.

# Подключение каталогов для работы пользователей

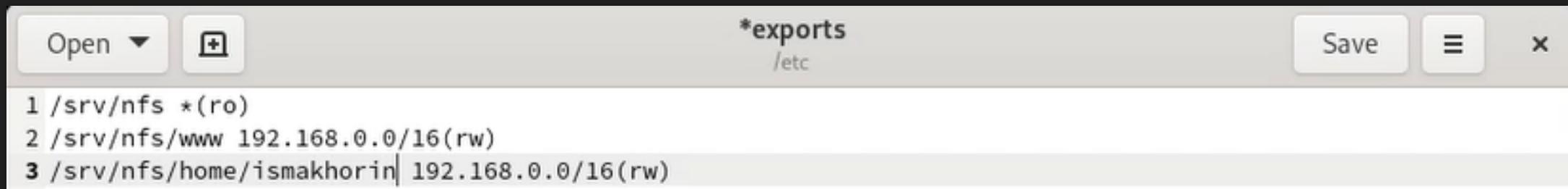
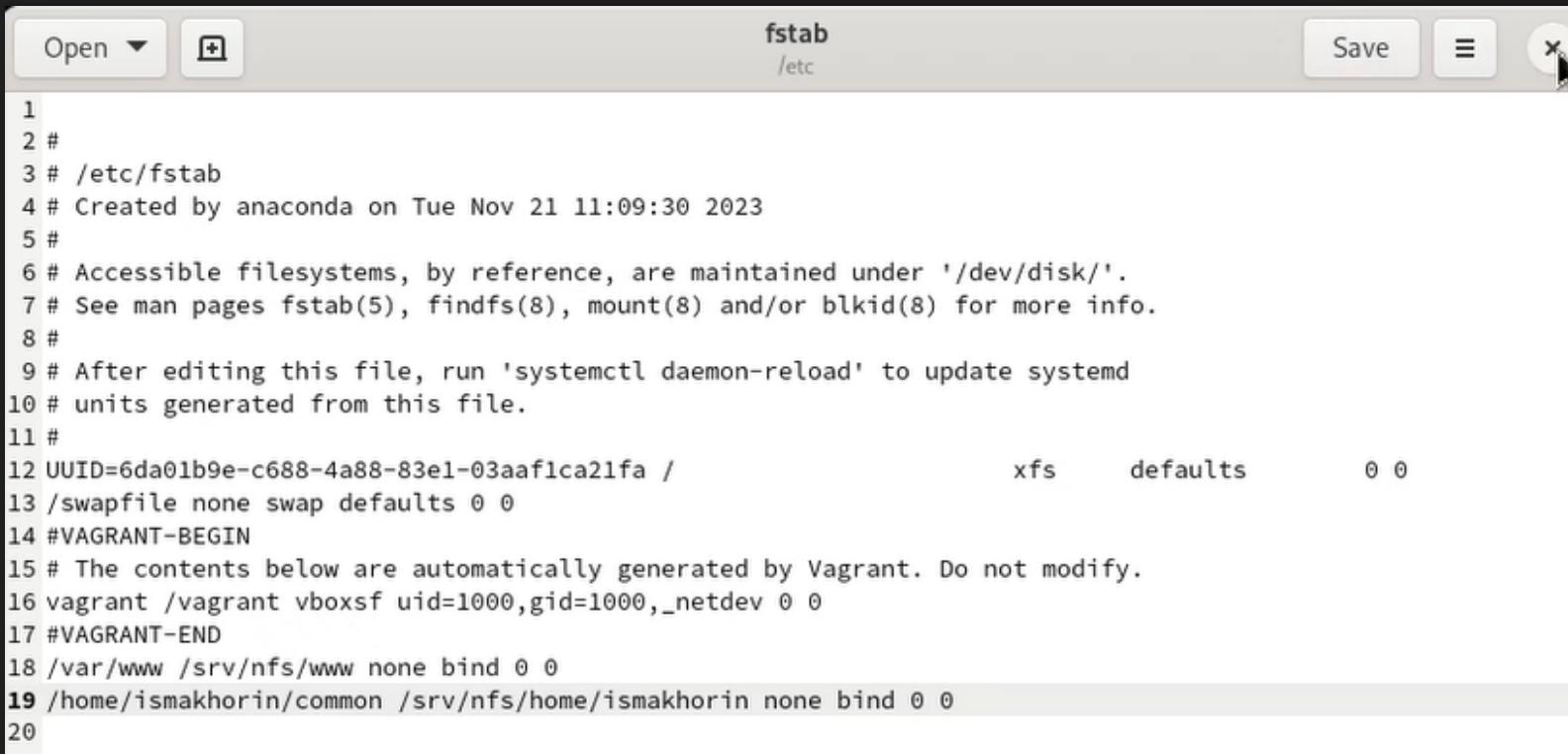


Рис. 4.2. Подключение каталога пользователя в файле /etc/exports.

# Подключение каталогов для работы пользователей

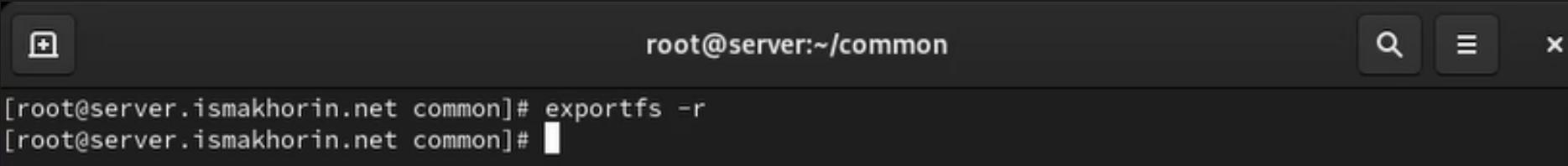


The screenshot shows a file editor window with the title bar "fstab" and the path "/etc". The window includes standard buttons for "Open", "Save", and "X" (close). The file content is a list of file system entries, numbered from 1 to 20. Lines 1 through 11 are comments. Line 12 defines the root file system: "/UUID=6da01b9e-c688-4a88-83e1-03aaaf1ca21fa / xfs defaults 0 0". Line 13 defines a swapfile: "/swapfile none swap defaults 0 0". Line 14 is a Vagrant configuration start marker: "#VAGRANT-BEGIN". Lines 15 and 16 define a Vagrant-mounted disk: "vagrant /vagrant vboxsf uid=1000,gid=1000,\_netdev 0 0". Line 17 is a Vagrant configuration end marker: "#VAGRANT-END". Lines 18 and 19 define NFS mounts: "/var/www /srv/nfs/www none bind 0 0" and "/home/ismakhorin/common /srv/nfs/home/ismakhorin none bind 0 0". Line 20 is a blank line.

```
1
2 #
3 # /etc/fstab
4 # Created by anaconda on Tue Nov 21 11:09:30 2023
5 #
6 # Accessible filesystems, by reference, are maintained under '/dev/disk/'.
7 # See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info.
8 #
9 # After editing this file, run 'systemctl daemon-reload' to update systemd
10 # units generated from this file.
11 #
12 UUID=6da01b9e-c688-4a88-83e1-03aaaf1ca21fa / xfs defaults 0 0
13 /swapfile none swap defaults 0 0
14 #VAGRANT-BEGIN
15 # The contents below are automatically generated by Vagrant. Do not modify.
16 vagrant /vagrant vboxsf uid=1000,gid=1000,_netdev 0 0
17 #VAGRANT-END
18 /var/www /srv/nfs/www none bind 0 0
19 /home/ismakhorin/common /srv/nfs/home/ismakhorin none bind 0 0
20
```

Рис. 4.3. Внесение изменения в файл /etc/fstab.

# Подключение каталогов для работы пользователей

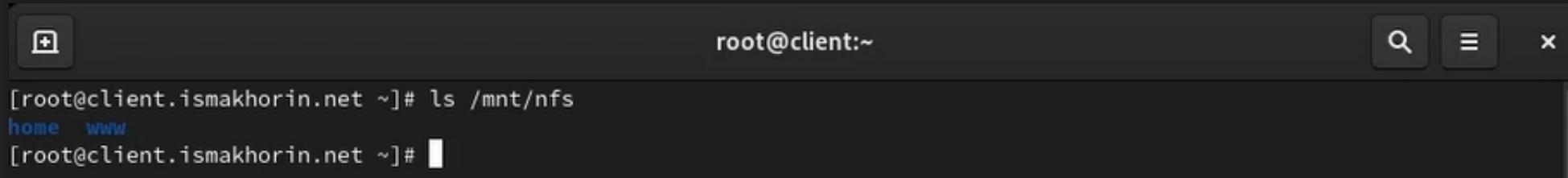


A screenshot of a terminal window with a dark theme. The title bar shows the session is root at server:~/common. The command [root@server.ismakhordin.net common]# exportfs -r is visible in the terminal area. The window has standard Linux terminal icons in the top right corner.

```
[root@server.ismakhordin.net common]# exportfs -r  
[root@server.ismakhordin.net common]#
```

Рис. 4.4. Повторный экспорт каталогов.

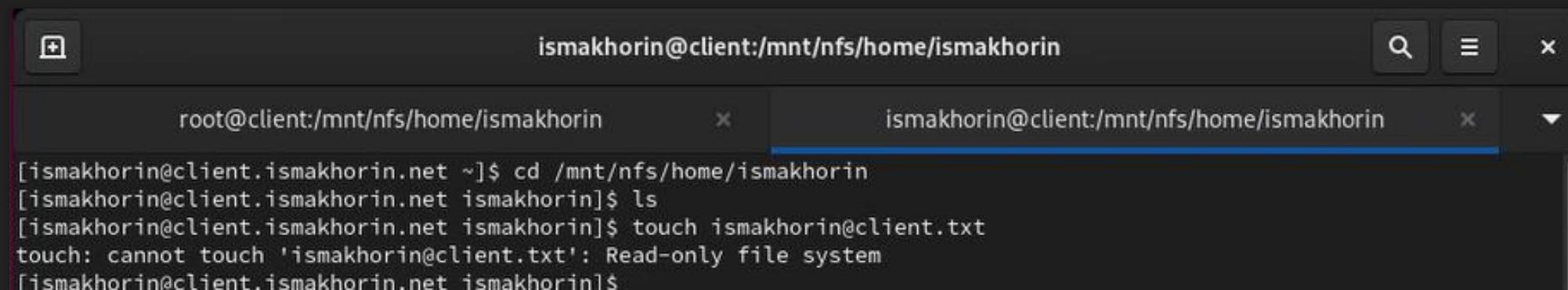
# Подключение каталогов для работы пользователей



```
[root@client.ismakhordin.net ~]# ls /mnt/nfs
home  www
[root@client.ismakhordin.net ~]#
```

Рис. 4.5. Проверка на клиенте каталога /mnt/nfs.

# Подключение каталогов для работы пользователей



```
ismakhorin@client:/mnt/nfs/home/ismakhorin
root@client:/mnt/nfs/home/ismakhorin      ismakhorin@client:/mnt/nfs/home/ismakhorin
[ismakhorin@client.ismakhori...]$ cd /mnt/nfs/home/ismakhorin
[ismakhorin@client.ismakhori...]$ ls
[ismakhorin@client.ismakhori...]$ touch ismakhorin@client.txt
touch: cannot touch 'ismakhorin@client.txt': Read-only file system
[ismakhorin@client.ismakhori...]$
```

**Рис. 4.6.** Переход на клиенте под пользователем `ismakhorin` в каталог `/mnt/nfs/home/ismakhorin` и попытка создать в нём файл `ismakhorin@client.txt`.

# Подключение каталогов для работы пользователей

```
[root@client.ismakhорин.net ~]# cd /mnt/nfs/home/ismakhорин
[root@client.ismakhорин.net ismakhорин]# touch ismakhорин@client.txt
touch: cannot touch 'ismakhорин@client.txt': Read-only file system
[root@client.ismakhорин.net ismakhорин]#
```

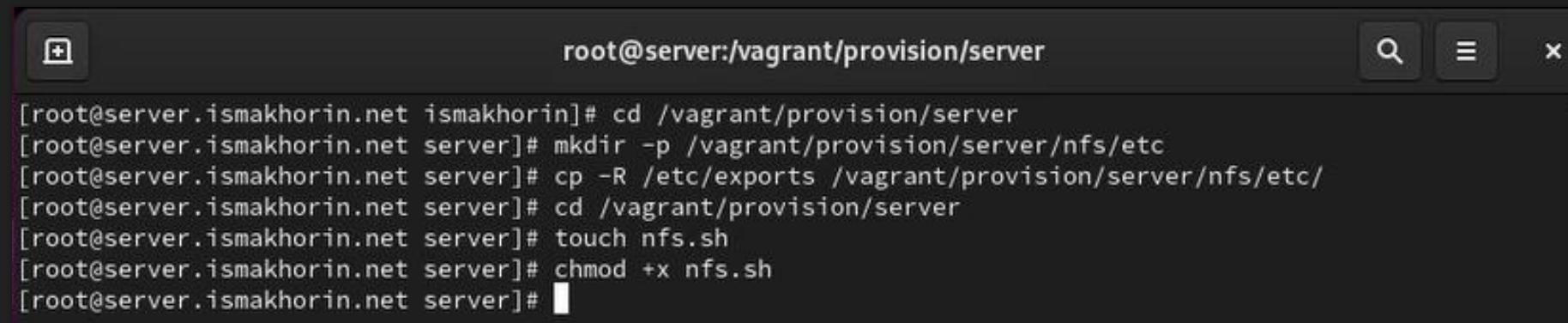
**Рис. 4.7.** Переход на клиенте под пользователем root в каталог /mnt/nfs/home/ismakhорин и попытка создать в нём файл ismakhорин@client.txt.

# Подключение каталогов для работы пользователей

```
[root@server.ismakhori.net common]# ls /home/ismakhori/common  
ls: cannot access '/home/ismakhori/common': No such file or directory  
[root@server.ismakhori.net common]#
```

**Рис. 4.8.** Просмотр наличия изменений на сервере в каталоге пользователя /home/ismakhori/common.

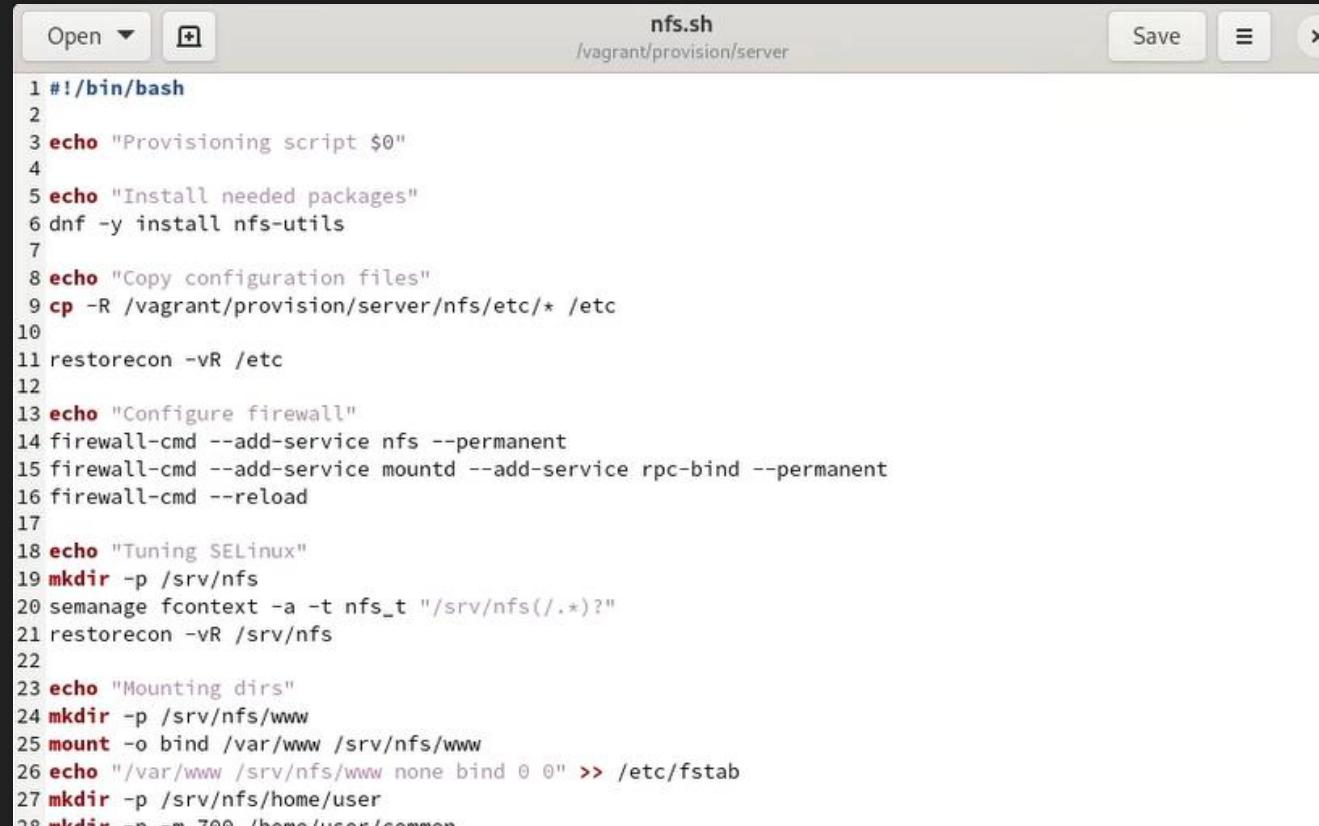
# Внесение изменений в настройки внутреннего окружения виртуальных машин



```
root@server:/vagrant/provision/server
[root@server.ismakhорин.net ismakhорин]# cd /vagrant/provision/server
[root@server.ismakhорин.net server]# mkdir -p /vagrant/provision/server/nfs/etc
[root@server.ismakhорин.net server]# cp -R /etc/exports /vagrant/provision/server/nfs/etc/
[root@server.ismakhорин.net server]# cd /vagrant/provision/server
[root@server.ismakhорин.net server]# touch nfs.sh
[root@server.ismakhорин.net server]# chmod +x nfs.sh
[root@server.ismakhорин.net server]#
```

**Рис. 5.1.** Переход на виртуальной машине server в каталог для внесения изменений в настройки внутреннего окружения /vagrant/provision/server/, создание в нём каталога nfs, в который помещаем в соответствующие подкаталоги конфигурационные файлы. Создание в каталоге /vagrant/provision/server исполняемого файла nfs.sh.

# Внесение изменений в настройки внутреннего окружения виртуальных машин

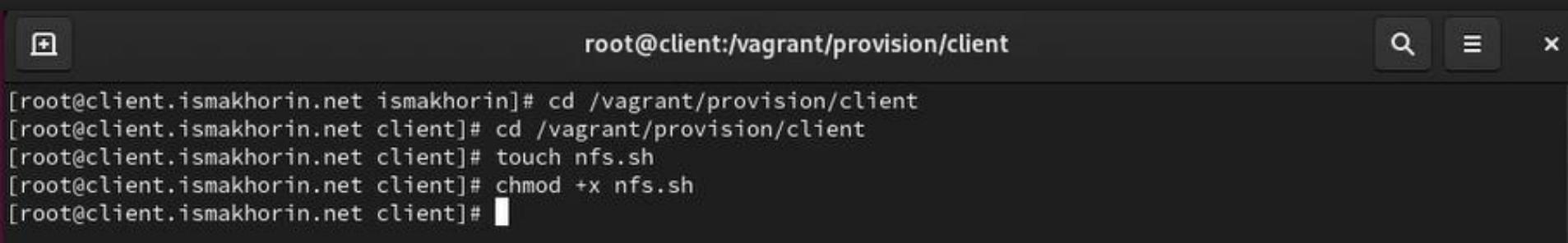


The screenshot shows a terminal window with a light gray header bar. On the left is an 'Open' button with a downward arrow, a small icon, and a plus sign. In the center, the file name 'nfs.sh' is displayed above the path '/vagrant/provision/server'. On the right are 'Save' and 'X' buttons. The main area contains a block of 28 numbered shell commands:

```
1 #!/bin/bash
2
3 echo "Provisioning script $0"
4
5 echo "Install needed packages"
6 dnf -y install nfs-utils
7
8 echo "Copy configuration files"
9 cp -R /vagrant/provision/server/nfs/etc/* /etc
10
11 restorecon -vR /etc
12
13 echo "Configure firewall"
14 firewall-cmd --add-service nfs --permanent
15 firewall-cmd --add-service mountd --add-service rpc-bind --permanent
16 firewall-cmd --reload
17
18 echo "Tuning SELinux"
19 mkdir -p /srv/nfs
20 semanage fcontext -a -t nfs_t "/srv/nfs(/.*)?"
21 restorecon -vR /srv/nfs
22
23 echo "Mounting dirs"
24 mkdir -p /srv/nfs/www
25 mount -o bind /var/www /srv/nfs/www
26 echo "/var/www /srv/nfs/www none bind 0 0" >> /etc/fstab
27 mkdir -p /srv/nfs/home/user
28 mkdir -p -m 700 /home/user/common
```

Рис. 5.2. Открытие файла на редактирование и добавление скрипта.

# Внесение изменений в настройки внутреннего окружения виртуальных машин



```
root@client:~/vagrant/provision/client
[root@client.ismakhorin.net ismakhorin]# cd /vagrant/provision/client
[root@client.ismakhorin.net client]# cd /vagrant/provision/client
[root@client.ismakhorin.net client]# touch nfs.sh
[root@client.ismakhorin.net client]# chmod +x nfs.sh
[root@client.ismakhorin.net client]#
```

**Рис. 5.3.** Переход на виртуальной машине `client` в каталог для внесения изменений в настройки внутреннего окружения `/vagrant/provision/client/`. Создание в каталоге `/vagrant/provision/client` исполняемого файла `nfs.sh`.

# Внесение изменений в настройки внутреннего окружения виртуальных машин



The screenshot shows a terminal window with the following details:

- File name: nfs.sh
- Path: /vagrant/provision/client
- Buttons: Open, Save, and a menu icon.

```
1 #!/bin/bash
2
3 echo "Provisioning script $0"
4
5 echo "Install needed packages"
6 dnf -y install nfs-utils
7
8 echo "Mounting dirs"
9 mkdir -p /mnt/nfs
10 mount server.user.net:/srv/nfs /mnt/nfs
11 echo "server.user.net:/srv/nfs /mnt/nfs nfs _netdev 0 0" >> /etc/fstab
12 restorecon -vR /etc
```

Рис. 5.4. Открытие файла на редактирование и добавление скрипта.

# Внесение изменений в настройки внутреннего окружения виртуальных машин

```
82
83   server.vm.provision "server nfs",
84     type: "shell",
85     preserve_order: true,
86     path: "provision/server/nfs.sh"
87
```

Рис. 5.5. Добавление записи в конфигурационном файле Vagrantfile для сервера.

# Внесение изменений в настройки внутреннего окружения виртуальных машин

```
140
141   client.vm.provision "client nfs",
142     type: "shell",
143     preserve_order: true,
144     path: "provision/client/nfs.sh"
145
```

Рис. 5.6. Добавление записи в конфигурационном файле Vagrantfile для клиента.

# ВЫВОД

- В ходе выполнения лабораторной работы были приобретены навыки настройки сервера NFS для удалённого доступа к ресурсам.



Спасибо за внимание!