

# Лабораторная работа №13

Администрирование сетевых подсистем

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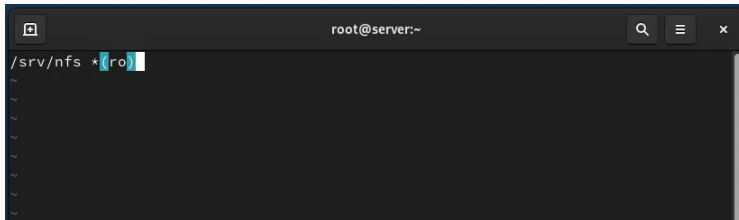
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Приобретение практических навыков настройки сервера NFS для удалённого доступа к ресурсам.

## Выполнение лабораторной работы

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A terminal window with a dark background. The title bar shows 'root@server:~' and standard window controls. The command prompt is '/srv/nfs \*'(ro)' with a cursor at the end. The terminal shows several tilde '~' characters on subsequent lines, likely representing a scrollback buffer.

```
root@server:~  
/srv/nfs *'(ro)  
~  
~  
~  
~  
~  
~  
~
```

Рис. 1: Подключение через NFS каталога только на чтение

```
complete.  
[root@server.ioithenko.net ~]# mkdir -p /srv/nfs  
[root@server.ioithenko.net ~]# vi /etc/exports  
2 files to edit  
[root@server.ioithenko.net ~]# vi /etc/exports  
[root@server.ioithenko.net ~]# semanage fcontext -a -t nfs_t "/srv/nfs(/.*)?"  
[root@server.ioithenko.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.ioithenko.net ~]# systemctl start nfs-server.service  
[root@server.ioithenko.net ~]# systemctl enable nfs-server.service  
Created symlink /etc/systemd/system/multi-user.target.wants/nfs-server.service →  
/usr/lib/systemd/system/nfs-server.service.  
[root@server.ioithenko.net ~]# firewall-cmd --add-service=nfs  
success  
[root@server.ioithenko.net ~]# firewall-cmd --add-service=nfs --permanent  
success  
[root@server.ioithenko.net ~]# firewall-cmd --reload  
success  
[root@server.ioithenko.net ~]#
```

Рис. 2: Запуск NFS-сервера

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

Рис. 3: Просмотр подмонтированных удалённых ресурсов на клиенте

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

Рис. 4: Остановка сервиса межсетевого экрана

```

# net - create mount table to receive
[root@client.ioithenko.net ~]# showmount -e server.ioithenko.net
Export list for server.ioithenko.net:
/srv/nfs *
[root@client.ioithenko.net ~]#
```

Рис. 5: Просмотр подмонтированных удалённых ресурсов на клиенте



```

[root@server.ioithenko.net ~]# systemctl start firewallld
[root@server.ioithenko.net ~]# lsof | grep TCP
lsof: WARNING: can't stat() fuse.gvfsd-fuse file system /run/user/1001/gvfs
Output information may be incomplete.
systemd 1 root 237u IPv4 42320
0t0 TCP *:sunrpc (LISTEN)
systemd 1 root 239u IPv6 42338
0t0 TCP *:sunrpc (LISTEN)
cupsd 754 root 6u IPv6 20724
0t0 TCP localhost:ipp (LISTEN)
cupsd 754 root 7u IPv4 20725
0t0 TCP localhost:ipp (LISTEN)
sshd 776 root 3u IPv4 20821
0t0 TCP *:down (LISTEN)
sshd 776 root 4u IPv6 20832
0t0 TCP *:down (LISTEN)
sshd 776 root 5u IPv4 20834
0t0 TCP *:ssh (LISTEN)
sshd 776 root 6u IPv6 20836
0t0 TCP *:ssh (LISTEN)
named 843 named 22u IPv4 21011
0t0 TCP localhost:domain (LISTEN)
named 843 named 25u IPv6 21017
0t0 TCP localhost:domain (LISTEN)
named 843 named 26u IPv4 21080
0t0 TCP localhost:rndc (LISTEN)
named 843 named 27u IPv6 21083
0t0 TCP localhost:rndc (LISTEN)
named 843 named 28u IPv4 22080
0t0 TCP server.ioithenko.net:domain (LISTEN)
named 843 named 30u IPv4 33207
0t0 TCP dhcp.ioithenko.net:domain (LISTEN)
named 843 named 22u IPv4 21011
0t0 TCP localhost:domain (LISTEN)
named 843 named 25u IPv6 21017
0t0 TCP localhost:domain (LISTEN)
named 843 named 26u IPv4 21080
0t0 TCP localhost:rndc (LISTEN)
named 843 named 27u IPv6 21083
0t0 TCP localhost:rndc (LISTEN)
named 843 named 28u IPv4 22080
0t0 TCP server.ioithenko.net:domain (LISTEN)
named 843 named 30u IPv4 33207
0t0 TCP dhcp.ioithenko.net:domain (LISTEN)
named 843 named 22u IPv4 21011

```

Рис. 6: Просмотр задействованных при удалённом монтировании служб

```
root@server:~  
[root@server.ioithenko.net ~]# lsof | grep UDP  
lsof: WARNING: can't stat() fuse.gvfsd-fuse file system /run/user/1001/gvfs  
Output information may be incomplete.  
systemd      1      UDP *:sunrpc      root    238u    IPv4      42329  
0t0  
systemd      1      UDP *:sunrpc      root    240u    IPv6      42347  
0t0  
avahi-daemon 581    UDP *:mdns       avahi   12u    IPv4      19878  
0t0  
avahi-daemon 581    UDP *:mdns       avahi   13u    IPv6      19879  
0t0  
avahi-daemon 581    UDP *:mdns       avahi   14u    IPv4      19880  
0t0  
avahi-daemon 581    UDP *:37329      avahi   15u    IPv6      19881  
0t0  
chronyd      625    UDP *:42454      chrony   5u    IPv4      19952  
0t0  
chronyd      625    UDP localhost:323 chrony   6u    IPv6      19953  
0t0  
chronyd      625    UDP localhost:323 chrony   7u    IPv4      19954  
0t0  
named        843    UDP *:ntp        named    6u    IPv4      22679  
0t0  
named        843    UDP server.ioithenko.net:domain named    21u    IPv4      21010  
0t0  
named        843    UDP localhost:domain named    24u    IPv6      21016  
0t0  
named        843    UDP localhost:domain named    29u    IPv4      33206  
0t0  
named        843    UDP www.ioithenko.net:domain named    6u    IPv4      22679  
0t0  
named        843    UDP isc-net-0    named    21u    IPv4      21010  
0t0  
named        843    UDP localhost:domain named    24u    IPv6      21016  
0t0  
named        843    UDP localhost:domain named    29u    IPv4      33206  
0t0  
named        843    UDP www.ioithenko.net:domain named    6u    IPv4      22679  
0t0  
named        843    UDP server.ioithenko.net:domain named    21u    IPv4      21010  
0t0  
named        843    UDP localhost:domain named    24u    IPv6      21016  
0t0  
named        843    UDP localhost:domain named    29u    IPv4      33206  
0t0  
named        843    UDP www.ioithenko.net:domain named    6u    IPv4      22679  
0t0  
named        843    UDP isc-timer    named    21u    IPv4      21010  
0t0  
named        843    UDP localhost:domain
```

Рис. 7: Просмотр задействованных при удалённом монтировании служб

```

[root@server.ioithenko.net ~]# firewall-cmd --get-services
RH-Satellite-6 RH-Satellite-6-capsule afp amanda-client amanda-k5-client amqp am
qps apcupsd audit ausweisapp2 bacula bacula-client bareos-director bareos-fileda
emon bareos-storage bb bgp bitcoin bitcoin-rpc bitcoin-testnet bitcoin-testnet-r
pc bittorrent-lsd ceph ceph-exporter ceph-mon cfengine checkmk-agent cockpit col
lectd condor-collector cratedb ctdb dds dds-multicast dds-unicast dhcp dhcpv6 dh
cpv6-client distcc dns dns-over-tls docker-registry docker-swarm dropbox-lansync
elasticsearch etcd-client etcd-server finger foreman foreman-proxy freeipa-4 fr
eeipa-ldap freeipa-ldaps freeipa-replication freeipa-trust ftp galera ganglia-cl
ient ganglia-master git gpsd grafana gre high-availability http http3 https iden
t imap imaps ipfs ipp ipp-client ipsec 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-contro
ller-manager-secure kube-nodeport-services kube-scheduler kube-scheduler-secure
kube-worker kubelet kubelet-readonly kubelet-worker ldap ldaps libvirt libvirt-t
ls lightning-network llmnr llmnr-client llmnr-tcp llmnr-udp managesieve matrix m
dns memcache minidlna mongodb mosh mountd mqtt mqtt-tls ms-wbt mssql murmur mysq
l nbd nebula netbios-ns netdata-dashboard nfs nfs3 nmea-0183 nrpe ntp nut openvp
n ovirt-imageio ovirt-storageconsole ovirt-vmconsole plex pmcd pmproxy pmwebapi
pmwebapis pop3 pop3s postgresql privoxy prometheus prometheus-node-exporter prox
y-dhcp ps2link ps3netsrv ptp pulseaudio puppetmaster quassel radius rdp redis re
dis-sentinel rpc-bind rquotad rsh rsyncd rtsp salt-master samba samba-client sam
ba-dc sane sip sips slp smtp smtp-submission smtps snmp snmptls snmptls-trap snm
ptrap spideroak-lansync spotify-sync squid ssdp ssh ssh-custom steam-streaming s
vdrp svn syncthing syncthing-gui syncthing-relay synergy syslog syslog-tls telne
t tentacle tftp tile38 tinc tor-socks transmission-client upnp-client vdsm vnc-s
erver warpinator wbem-http 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.ioithenko.net ~]# firewall-cmd --add-service=mountd --add-service=r
pc-bind
success
[root@server.ioithenko.net ~]# firewall-cmd --add-service=mountd --add-service=r
pc-bind --permanent
success
[root@server.ioithenko.net ~]# firewall-cmd --reload
success
[root@server.ioithenko.net ~]#

```

Рис. 8: Добавление служб rpc-bind и mountd в настройки межсетевого экрана

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

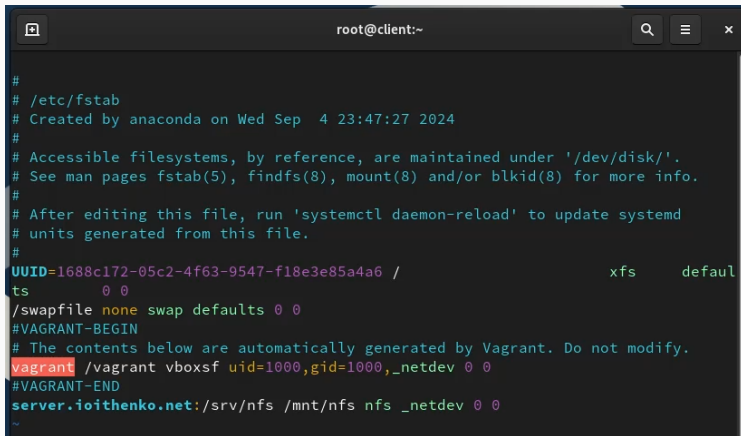
Рис. 9: Проверка подключения удалённого ресурса на клиенте

```
[root@client.ioithenko.net ~]#  
[root@client.ioithenko.net ~]# mkdir -p /mnt/nfs  
[root@client.ioithenko.net ~]# mount server.ioithenko.net:/srv/nfs /mnt/nfs  
[root@client.ioithenko.net ~]# mount  
proc on /proc type proc (rw, nosuid, nodev, noexec, relatime)
```

Рис. 10: Монтирование дерева NFS

```
server.ioithenko.net:/srv/nfs on /mnt/nfs type nfs4 (rw,relatime,vers=4.2,rsz=131072,wsz=131072,namlen=255,hard,proto=tcp,timeo=600,retrans=2,sec=sys,clientaddr=192.168.1.30,local_lock=none,addr=192.168.1.1)  
[root@client.ioithenko.net ~]#
```

Рис. 11: Проверка подключения ресурса



```
root@client:~  
#  
# /etc/fstab  
# Created by anaconda on Wed Sep  4 23:47:27 2024  
#  
# Accessible filesystems, by reference, are maintained under '/dev/disk/'.  
# See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info.  
#  
# After editing this file, run 'systemctl daemon-reload' to update systemd  
# units generated from this file.  
#  
UUID=1688c172-05c2-4f63-9547-f18e3e85a4a6 /          xfs      default  
ts          0 0  
/swapfile none swap defaults 0 0  
#VAGRANT-BEGIN  
# The contents below are automatically generated by Vagrant. Do not modify.  
vagrant /vagrant vboxsf uid=1000,gid=1000,_netdev 0 0  
#VAGRANT-END  
server.ioithenko.net:/srv/nfs /mnt/nfs nfs _netdev 0 0
```

Рис. 12: Добавление записи в файл /etc/fstab на клиенте

```
[root@client.ioithenko.net ~]# systemctl status remote-fs.target
● remote-fs.target - Remote File Systems
   Loaded: loaded (/usr/lib/systemd/system/remote-fs.target; enabled; preset:
   Active: active since Wed 2024-11-27 11:00:50 UTC; 34min ago
   Until: Wed 2024-11-27 11:00:50 UTC; 34min ago
   Docs: man:systemd.special(7)

Nov 27 11:00:50 client.ioithenko.net systemd[1]: Reached target Remote File Sys
lines 1-7/7 (END)
```

Рис. 13: Проверка наличия автоматического монтирования удалённых ресурсов при запуске ОС



```
server.ioithenko.net:/srv/nfs on /mnt/nfs type nfs4 (rw,relatime,vers=4.2,rsize=
131072,wsizе=131072,namlen=255,hard,proto=tcp,timeo=600,retrans=2,sec=sys,client
addr=192.168.1.30,local_lock=none,addr=192.168.1.1,_netdev)
tmpfs on /run/user/1001 type tmpfs (rw,nosuid,nodev,relatime,seclabel,size=78768
k,nr_inodes=19692,mode=700,uid=1001,gid=1001,inode64)
gvfsd-fuse on /run/user/1001/gvfs type fuse.gvfsd-fuse (rw,nosuid,nodev,relatime
,user_id=1001,group_id=1001)
[ioithenko@client.ioithenko.net ~]$
```

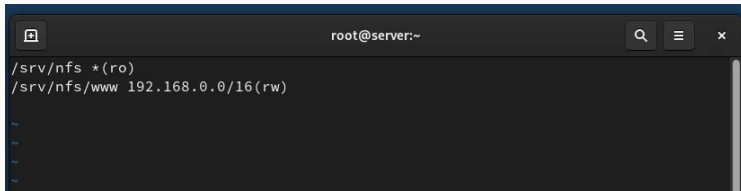
Рис. 14: Проверка автоматического подключения удалённого ресурса

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

Рис. 15: Проверка содержимого /srv/nfs

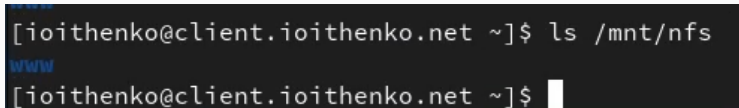
```
,user_id=1001,group_id=1001)  
[ioithenko@client.ioithenko.net ~]$ ls /mnt/nfs  
www  
[ioithenko@client.ioithenko.net ~]$
```

Рис. 16: Проверка содержимого /mnt/nfs

A terminal window with a dark background and light text. The title bar at the top shows a window icon, the text 'root@server:~', and standard window controls (search, menu, close). The terminal content shows two lines of text: '/srv/nfs \*(ro)' and '/srv/nfs/www 192.168.0.0/16(rw)'. Below these lines are four blue tilde characters '~' on separate lines, indicating a scrollable history. A vertical scrollbar is visible on the right side of the terminal area.

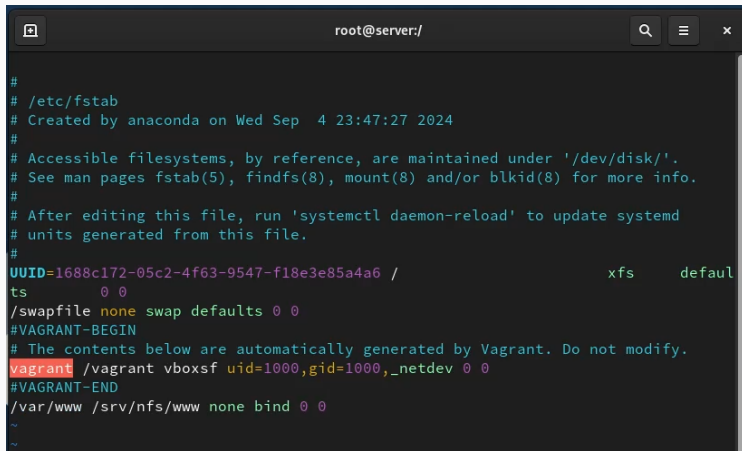
```
root@server:~  
/srv/nfs *(ro)  
/srv/nfs/www 192.168.0.0/16(rw)  
~  
~  
~  
~
```

Рис. 17: Добавление в файл `/etc/exports` экспорт каталога веб-сервера



```
www [ioithenko@client.ioithenko.net ~]$ ls /mnt/nfs  
www [ioithenko@client.ioithenko.net ~]$
```

Рис. 18: Проверка содержимого /mnt/nfs

A terminal window titled 'root@server:/' with search, menu, and close icons in the top right. The terminal displays the content of the /etc/fstab file. The text is as follows:

```
#  
# /etc/fstab  
# Created by anaconda on Wed Sep  4 23:47:27 2024  
#  
# Accessible filesystems, by reference, are maintained under '/dev/disk/'.  
# See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info.  
#  
# After editing this file, run 'systemctl daemon-reload' to update systemd  
# units generated from this file.  
#  
UUID=1688c172-05c2-4f63-9547-f18e3e85a4a6 /                xfs      default  
ts          0 0  
/swapfile none swap defaults 0 0  
#VAGRANT-BEGIN  
# The contents below are automatically generated by Vagrant. Do not modify.  
vagrant /vagrant vboxsf uid=1000,gid=1000,_netdev 0 0  
#VAGRANT-END  
/var/www /srv/nfs/www none bind 0 0  
~  
~
```

Рис. 19: Добавление записи в файл /etc/fstab

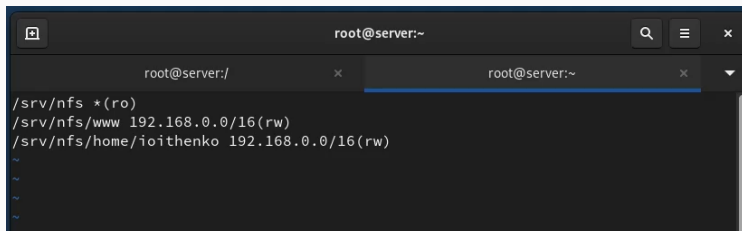
```
[ioithenko@client.ioithenko.net ~]$ ls /mnt/nfs  
www  
[ioithenko@client.ioithenko.net ~]$
```

Рис. 20: Проверка содержимого /mnt/nfs

```
[ioithenko@server.ioithenko.net ~]$ mkdir -p -m 700 ~/common
[ioithenko@server.ioithenko.net ~]$ cd ~/common
[ioithenko@server.ioithenko.net common]$ touch ioithenko@server.txt
[ioithenko@server.ioithenko.net common]$ sudo -i
[sudo] password for ioithenko:
[root@server.ioithenko.net ~]# mkdir -p /srv/nfs/home/ioithenko
[root@server.ioithenko.net ~]# mount -o bind /home/ioithenko/common /srv/nfs/home/ioithenko
mount: (hint) your fstab has been modified, but systemd still uses
        the old version; use 'systemctl daemon-reload' to reload.
```

Рис. 21: Проверка прав доступа на каталог

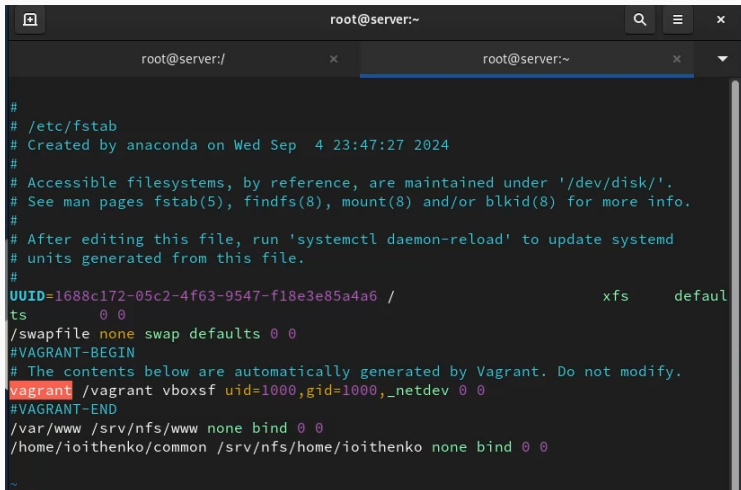




A terminal window titled 'root@server:~' with search, menu, and close icons in the top right. It contains two tabs: 'root@server:/' and 'root@server:~'. The active tab shows the following text:

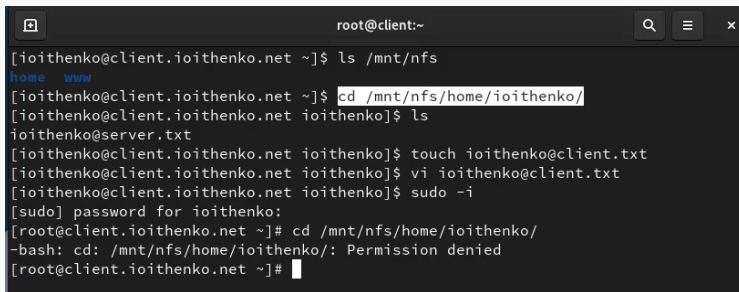
```
/srv/nfs *(ro)
/srv/nfs/www 192.168.0.0/16(rw)
/srv/nfs/home/ioithenko 192.168.0.0/16(rw)
~
~
~
~
```

Рис. 22: Подключение каталога пользователя в файле `/etc/exports`

A terminal window titled 'root@server:~' with two tabs. The active tab shows the content of the /etc/fstab file. The text is as follows:

```
#  
# /etc/fstab  
# Created by anaconda on Wed Sep  4 23:47:27 2024  
#  
# Accessible filesystems, by reference, are maintained under '/dev/disk/'.  
# See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info.  
#  
# After editing this file, run 'systemctl daemon-reload' to update systemd  
# units generated from this file.  
#  
UUID=1688c172-05c2-4f63-9547-f18e3e85a4a6 /                xfs      default  
ts          0 0  
/swapfile none swap defaults 0 0  
#VAGRANT-BEGIN  
# The contents below are automatically generated by Vagrant. Do not modify.  
vagrant /vagrant vboxsf uid=1000,gid=1000,_netdev 0 0  
#VAGRANT-END  
/var/www /srv/nfs/www none bind 0 0  
/home/ioithenko/common /srv/nfs/home/ioithenko none bind 0 0  
~
```

Рис. 23: Добавление записи в файл /etc/fstab



```
root@client:~  
[ioithenko@client.ioithenko.net ~]$ ls /mnt/nfs  
home  www  
[ioithenko@client.ioithenko.net ~]$ cd /mnt/nfs/home/ioithenko/  
[ioithenko@client.ioithenko.net ioithenko]$ ls  
ioithenko@server.txt  
[ioithenko@client.ioithenko.net ioithenko]$ touch ioithenko@client.txt  
[ioithenko@client.ioithenko.net ioithenko]$ vi ioithenko@client.txt  
[ioithenko@client.ioithenko.net ioithenko]$ sudo -i  
[sudo] password for ioithenko:  
[root@client.ioithenko.net ~]# cd /mnt/nfs/home/ioithenko/  
-bash: cd: /mnt/nfs/home/ioithenko/: Permission denied  
[root@client.ioithenko.net ~]#
```

Рис. 24: Проверка содержимого /mnt/nfs

```
[root@server.ioithenko.net ~]# ls /home/ioithenko/common  
ioithenko@client.txt  ioithenko@server.txt  
[root@server.ioithenko.net ~]#
```

Рис. 25: Скрипта файла /vagrant/provision/server/nfs.sh

В результате выполнения лабораторной работы я приобрела практические навыки настройки сервера NFS для удалённого доступа к ресурсам.