

Презентация по лабораторной работе №13

Настройка NFS

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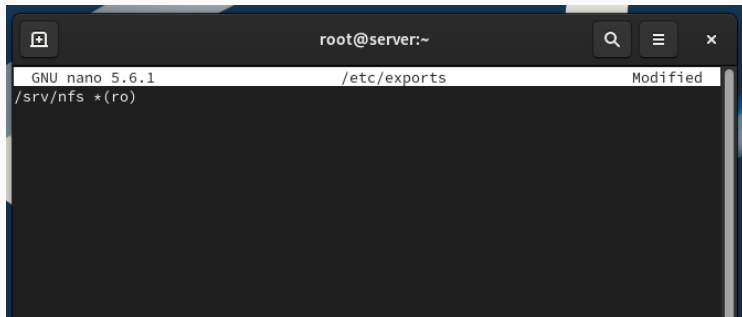
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- Российский университет дружбы народов

Приобретение навыков настройки сервера NFS для удалённого доступа к ресурсам.

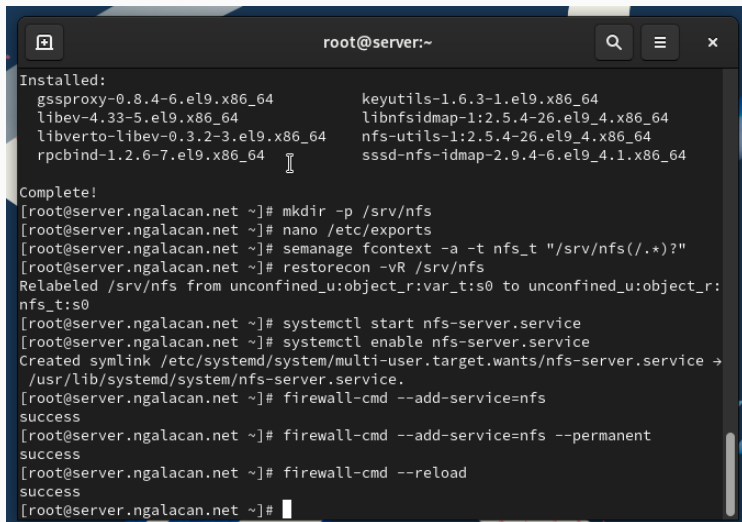
Настройка сервера NFSv4

```
dnf -y install nfs-utils
```



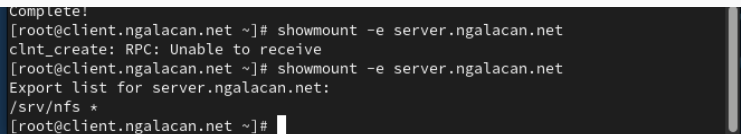
The image shows a terminal window with a dark background. The title bar at the top reads "root@server:~". Inside the terminal, the GNU nano 5.6.1 text editor is open, editing the file "/etc/exports". The editor's status bar at the top shows "GNU nano 5.6.1", the file path "/etc/exports", and the word "Modified". The first line of the file contains the text "/srv/nfs *(ro)".

Рис. 1: Редактирование файла /etc/exports



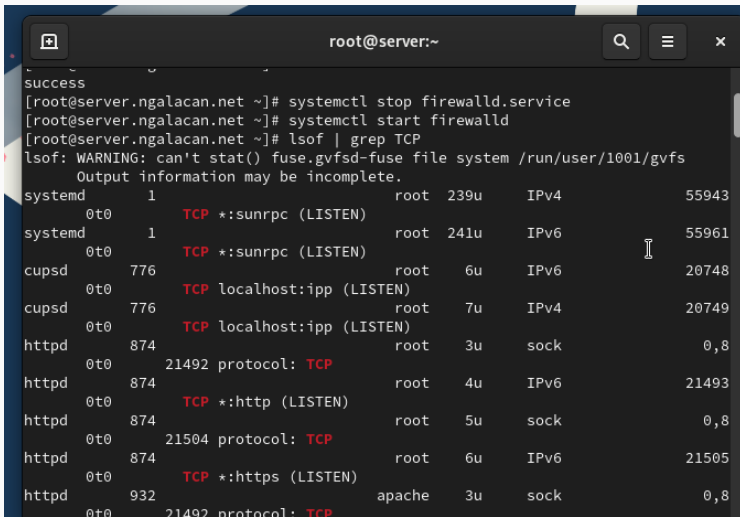
```
root@server:~  
Installed:  
gssproxy-0.8.4-6.el9.x86_64      keyutils-1.6.3-1.el9.x86_64  
libev-4.33-5.el9.x86_64        libnfsidmap-1:2.5.4-26.el9_4.x86_64  
libverto-libev-0.3.2-3.el9.x86_64  nfs-utils-1:2.5.4-26.el9_4.x86_64  
rpcbind-1.2.6-7.el9.x86_64      sssd-nfs-idmap-2.9.4-6.el9_4.1.x86_64  
  
Complete!  
[root@server.ngalacan.net ~]# mkdir -p /srv/nfs  
[root@server.ngalacan.net ~]# nano /etc/exports  
[root@server.ngalacan.net ~]# semanage fcontext -a -t nfs_t "/srv/nfs(/.*)?"  
[root@server.ngalacan.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.ngalacan.net ~]# systemctl start nfs-server.service  
[root@server.ngalacan.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.ngalacan.net ~]# firewall-cmd --add-service=nfs  
success  
[root@server.ngalacan.net ~]# firewall-cmd --add-service=nfs --permanent  
success  
[root@server.ngalacan.net ~]# firewall-cmd --reload  
success  
[root@server.ngalacan.net ~]#
```

Рис. 2: Контекст безопасности, запуск NFS и настройка межсетевого экрана

A terminal window with a dark background and light-colored text. The text shows a sequence of commands and their outputs in a root shell on a client machine named client.ngalacan.net. The commands are 'showmount -e server.ngalacan.net' and 'showmount -e server.ngalacan.net'. The outputs are 'Complete!', 'clnt_create: RPC: Unable to receive', and 'Export list for server.ngalacan.net: /srv/nfs *'. The prompt returns to the root shell.

```
Complete!  
[root@client.ngalacan.net ~]# showmount -e server.ngalacan.net  
clnt_create: RPC: Unable to receive  
[root@client.ngalacan.net ~]# showmount -e server.ngalacan.net  
Export list for server.ngalacan.net:  
/srv/nfs *  
[root@client.ngalacan.net ~]#
```

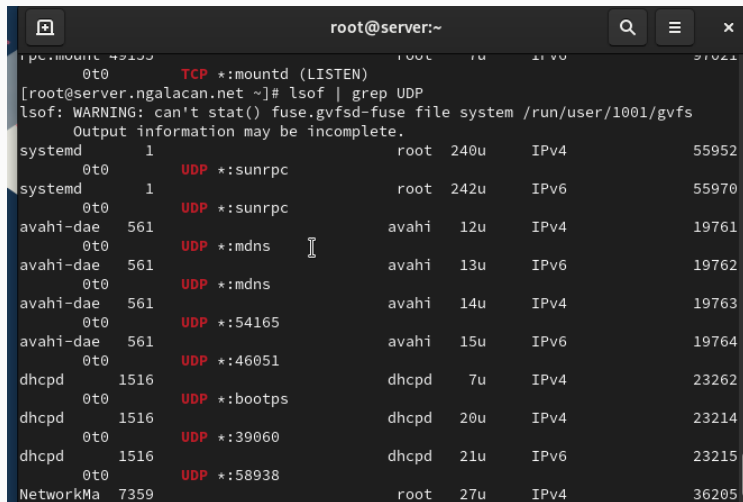
Рис. 3: Попытки просмотра подмонтированных удаленных устройств



```
root@server:~  
success  
[root@server.ngalacan.net ~]# systemctl stop firewalld.service  
[root@server.ngalacan.net ~]# systemctl start firewalld  
[root@server.ngalacan.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      TCP *:sunrpc (LISTEN)      root    239u      IPv4      55943  
systemd      1      TCP *:sunrpc (LISTEN)      root    241u      IPv6      55961  
cupsd        776    TCP localhost:ipp (LISTEN)  root     6u      IPv6      20748  
cupsd        776    TCP localhost:ipp (LISTEN)  root     7u      IPv4      20749  
httpd        874    21492 protocol: TCP      root     3u      sock      0,8  
httpd        874    TCP *:http (LISTEN)        root     4u      IPv6      21493  
httpd        874    21504 protocol: TCP      root     5u      sock      0,8  
httpd        874    TCP *:https (LISTEN)       root     6u      IPv6      21505  
httpd        932    21492 protocol: TCP      apache   3u      sock      0,8
```

Рис. 4: Просмотр задействованных при удалённом монтировании служб

Выполнение лабораторной работы

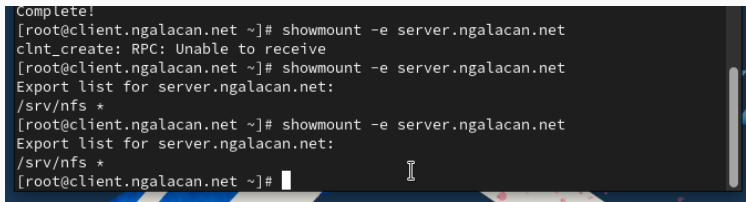


```
root@server:~  
[root@server.ngalacan.net ~]# lsof | grep UDP  
lsof: WARNING: can't stat() fuse.gvfsd-fuse file system /run/user/1001/gvfs  
Output information may be incomplete.  
systemd      1      root    240u      IPv4      55952  
0t0          TCP *:sunrpc  
systemd      1      root    242u      IPv6      55970  
0t0          UDP *:sunrpc  
avahi-dae    561    avahi    12u      IPv4      19761  
0t0          UDP *:mdns  
avahi-dae    561    avahi    13u      IPv6      19762  
0t0          UDP *:mdns  
avahi-dae    561    avahi    14u      IPv4      19763  
0t0          UDP *:54165  
avahi-dae    561    avahi    15u      IPv6      19764  
0t0          UDP *:46051  
dhcpcd       1516   dhcpcd    7u      IPv4      23262  
0t0          UDP *:bootps  
dhcpcd       1516   dhcpcd   20u      IPv4      23214  
0t0          UDP *:39060  
dhcpcd       1516   dhcpcd   21u      IPv6      23215  
0t0          UDP *:58938  
NetworkMa    7359   root     27u      IPv4      36205
```

Рис. 5: Просмотр задействованных при удалённом монтировании служб

```
-local xmpp-server zabbix-agent zabbix-server zerotier
[root@server.ngalacan.net ~]# firewall-cmd --add-service=mountd --add-service=rpc-bind
success
[root@server.ngalacan.net ~]# firewall-cmd --add-service=mountd --add-service=rpc-bind --permanent
success
[root@server.ngalacan.net ~]# firewall-cmd --reload
success
[root@server.ngalacan.net ~]#
```

Рис. 6: Настройка межсетевого экрана

A terminal window with a dark background and light-colored text. The text shows a sequence of commands and their outputs in a Linux environment. The prompt is [root@client.ngalacan.net ~]#. The first command is showmount -e server.ngalacan.net, which results in an error: clnt_create: RPC: Unable to receive. The second command is the same, but it successfully displays the export list for server.ngalacan.net, which is /srv/nfs *. The third command is also the same, and it again displays the export list. The cursor is at the end of the third command line.

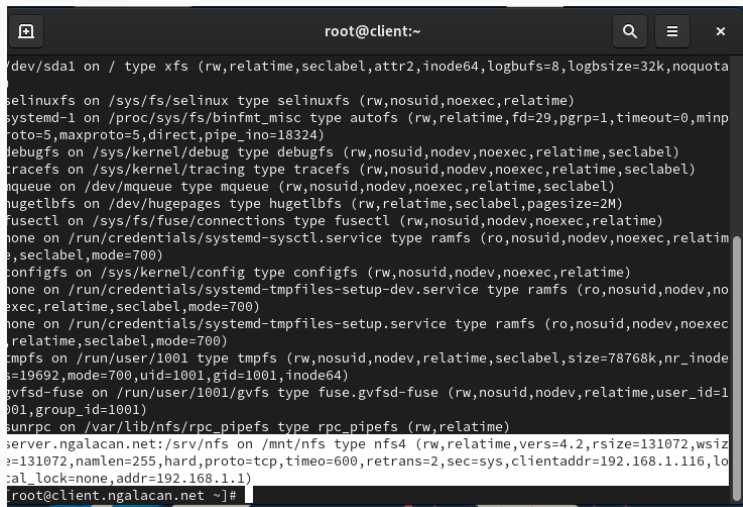
```
Complete!  
[root@client.ngalacan.net ~]# showmount -e server.ngalacan.net  
clnt_create: RPC: Unable to receive  
[root@client.ngalacan.net ~]# showmount -e server.ngalacan.net  
Export list for server.ngalacan.net:  
/srv/nfs *  
[root@client.ngalacan.net ~]# showmount -e server.ngalacan.net  
Export list for server.ngalacan.net:  
/srv/nfs *  
[root@client.ngalacan.net ~]#
```

Рис. 7: Просмотр подмонтированных удаленных устройств после настройки межсетевого экрана

Монтирование NFS на клиенте

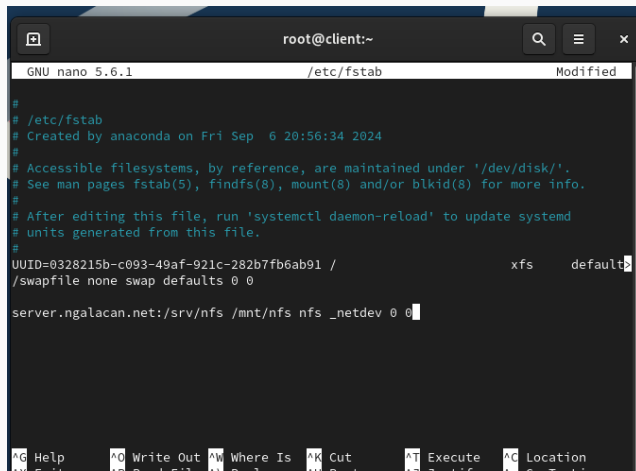
```
mkdir -p /mnt/nfs
```

```
mount server.ngalacan.net:/srv/nfs /mnt/nfs
```

A terminal window titled 'root@client:~' with search, menu, and close icons in the title bar. It displays a list of SELinux file contexts for various system files and directories. The list includes entries for /dev/sda1, /sys/fs/selinux, /proc/sys/fs/binfmt_misc, /sys/kernel/debug, /sys/kernel/tracing, /dev/mqueue, /dev/hugepages, /sys/fs/fuse/connections, /run/credentials/systemd-sysctl.service, /sys/kernel/config, /run/credentials/systemd-tmpfiles-setup-dev.service, /run/credentials/systemd-tmpfiles-setup.service, /run/user/1001, /run/user/1001/gvfs, /var/lib/nfs/rpc_pipefs, and a remote NFS mount from server.ngalacan.net. The terminal text is as follows:

```
root@client:~  
/dev/sda1 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,minp  
roto=5,maxproto=5,direct,pipe_ino=18324)  
debugfs on /sys/kernel/debug type debugfs (rw,nosuid,nodev,noexec,relatime,seclabel)  
tracefs on /sys/kernel/tracing type tracefs (rw,nosuid,nodev,noexec,relatime,seclabel)  
mqueue on /dev/mqueue type mqueue (rw,nosuid,nodev,noexec,relatime,seclabel)  
hugetlbfs on /dev/hugepages type hugetlbfs (rw,relatime,seclabel,pagesize=2M)  
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,relatim  
e,seclabel,mode=700)  
configfs on /sys/kernel/config type configfs (rw,nosuid,nodev,noexec,relatime)  
none on /run/credentials/systemd-tmpfiles-setup-dev.service type ramfs (ro,nosuid,nodev,no  
exec,relatime,seclabel,mode=700)  
none on /run/credentials/systemd-tmpfiles-setup.service type ramfs (ro,nosuid,nodev,noexec  
relatime,seclabel,mode=700)  
tmpfs on /run/user/1001 type tmpfs (rw,nosuid,nodev,relatime,seclabel,size=78768k,nr_inode  
s=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=1  
001,group_id=1001)  
sunrpc on /var/lib/nfs/rpc_pipefs type rpc_pipefs (rw,relatime)  
server.ngalacan.net:/srv/nfs on /mnt/nfs type nfs4 (rw,relatime,vers=4.2,rsz=131072,wsiz  
e=131072,namlen=255,hard,proto=tcp,timeo=600,retrans=2,sec=sys,clientaddr=192.168.1.116,lo  
cal_lock=none,addr=192.168.1.1)  
root@client.ngalacan.net ~]#
```

Рис. 8: Проверка правильности монтирования дерева NFS



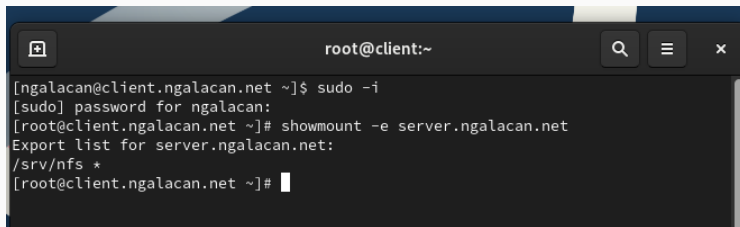
```
root@client:~
GNU nano 5.6.1 /etc/fstab Modified
#
# /etc/fstab
# Created by anaconda on Fri Sep  6 20:56:34 2024
#
# Accessible filesystems, by reference, are maintained under '/dev/disk/'.
# See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info.
#
# After editing this file, run 'systemctl daemon-reload' to update systemd
# units generated from this file.
#
UUID=0328215b-c093-49af-921c-282b7fb6ab91 /                xfs      default
/swapfile none swap defaults 0 0

server.galacan.net:/srv/nfs /mnt/nfs nfs _netdev 0 0
```

Рис. 9: Редактирование файла /etc/fstab на клиенте


```
192.168.1.116, local_lock=none, addr=192.168.1.1)
[root@client.ngalacan.net ~]# nano /etc/fstab
[root@client.ngalacan.net ~]# systemctl status remote-fs.target
● remote-fs.target - Remote File Systems
   Loaded: loaded (/usr/lib/systemd/system/remote-fs.target; enabled; preset: e>
   Active: active since Mon 2024-10-28 08:58:08 UTC; 19min ago
     Until: Mon 2024-10-28 08:58:08 UTC; 19min ago
    Docs: man:systemd.special(7)
lines 1-5/5 (END)
```

Рис. 10: Проверка наличия автоматического монтирования удаленные ресурсов при запуске ОС



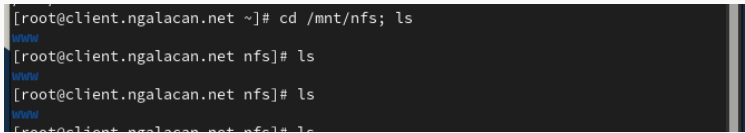
```
root@client:~  
[ngalacan@client.ngalacan.net ~]$ sudo -i  
[sudo] password for ngalacan:  
[root@client.ngalacan.net ~]# showmount -e server.ngalacan.net  
Export list for server.ngalacan.net:  
/srv/nfs *  
[root@client.ngalacan.net ~]#
```

Рис. 11: Просмотр подмонтированных удаленных устройств после перезапуска клиента

Подключение каталогов к дереву NFS

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

Рис. 12: Создание общего каталога, монтирование каталога веб-сервера, проверка содержимого общего каталога

A terminal window with a dark background and light gray text. The prompt is [root@client.ngalacan.net ~]#. The command cd /mnt/nfs; ls is entered. The output is www. The prompt changes to [root@client.ngalacan.net nfs]#. The command ls is entered. The output is www. The prompt changes to [root@client.ngalacan.net nfs]#. The command ls is entered. The output is www. The prompt changes to [root@client.ngalacan.net nfs]#. The command ls is entered. The output is www.

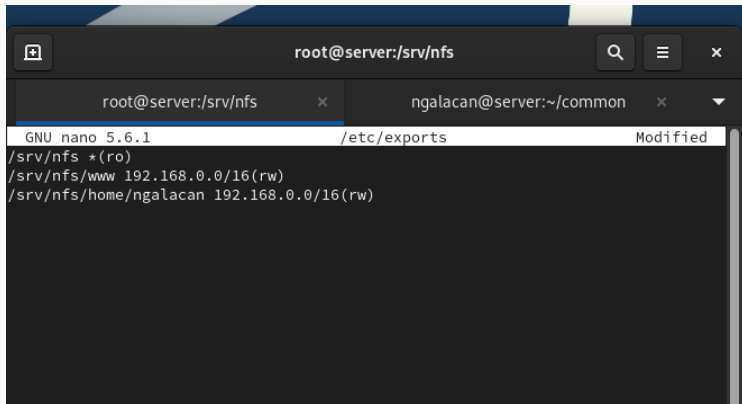
```
[root@client.ngalacan.net ~]# cd /mnt/nfs; ls
www
[root@client.ngalacan.net nfs]# ls
www
[root@client.ngalacan.net nfs]# ls
www
[root@client.ngalacan.net nfs]# ls
www
```

Рис. 13: Проверка содержимого `/mnt/nfs` на клиенте после внесения изменений в файлы

Подключение каталогов для работы
пользователей

```
mkdir -p -m 700 ~/common  
cd ~/common  
touch ngalacan@server.txt  
mkdir -p /srv/nfs/home/ngalacan
```

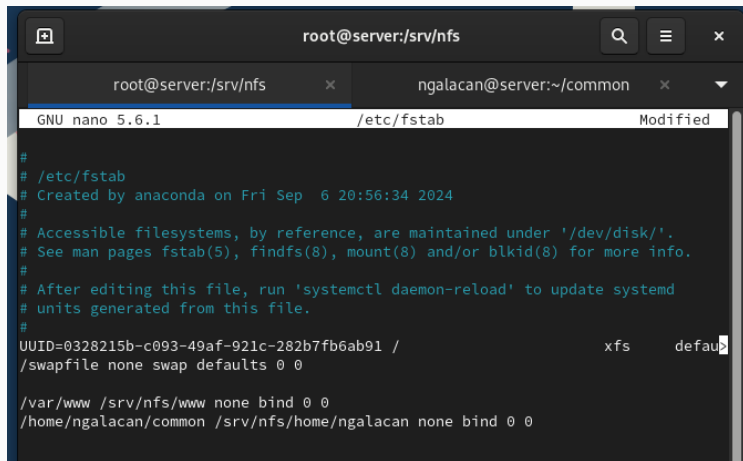
```
mount -o bind /home/user/common /srv/nfs/home/ngalacan
```

The screenshot shows a terminal window with a dark theme. The title bar at the top reads 'root@server:/srv/nfs'. Below the title bar, there are two tabs: 'root@server:/srv/nfs' (active) and 'ngalacan@server:~/common'. The main area of the terminal shows the GNU nano 5.6.1 text editor editing the file /etc/exports. The content of the file is as follows:

```
GNU nano 5.6.1 /etc/exports Modified
/srv/nfs *(ro)
/srv/nfs/www 192.168.0.0/16(rw)
/srv/nfs/home/ngalacan 192.168.0.0/16(rw)
```

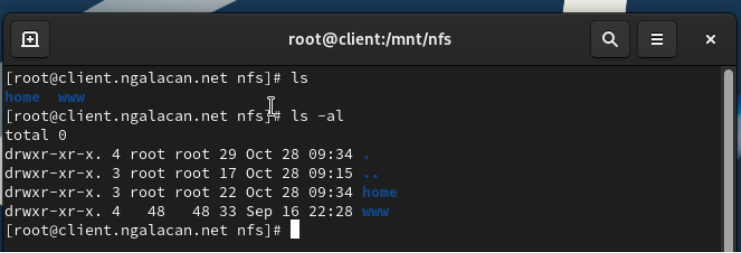
Рис. 14: Подключение каталога пользователя в файле /etc/exports



The screenshot shows a terminal window with a dark theme. The title bar at the top reads 'root@server:/srv/nfs'. Below the title bar, there are two tabs: 'root@server:/srv/nfs' and 'ngalacan@server:~/common'. The active tab is 'root@server:/srv/nfs'. The main content area shows the GNU nano 5.6.1 text editor editing the file /etc/fstab. The editor's status bar at the top right indicates 'Modified'. The content of the file is as follows:

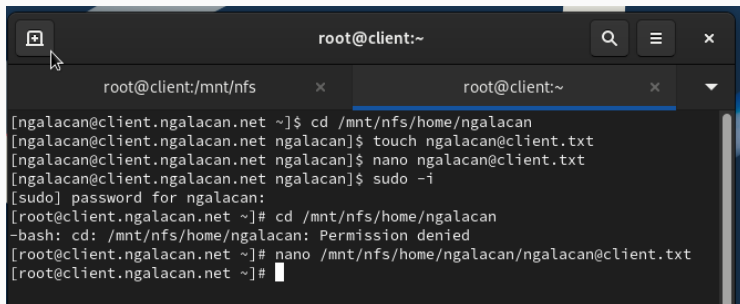
```
#  
# /etc/fstab  
# Created by anaconda on Fri Sep  6 20:56:34 2024  
#  
# Accessible filesystems, by reference, are maintained under '/dev/disk/'.  
# See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info.  
#  
# After editing this file, run 'systemctl daemon-reload' to update systemd  
# units generated from this file.  
#  
UUID=0328215b-c093-49af-921c-282b7fb6ab91 / xfs defau>  
/swapfile none swap defaults 0 0  
  
/var/www /srv/nfs/www none bind 0 0  
/home/ngalacan/common /srv/nfs/home/ngalacan none bind 0 0
```

Рис. 15: Редактирование файла /etc/fstab

A terminal window titled 'root@client:/mnt/nfs' with search, menu, and close icons in the title bar. The terminal shows the execution of 'ls' and 'ls -al' commands. The output of 'ls' shows 'home' and 'www' in blue. The output of 'ls -al' shows a directory listing with permissions, owner, group, size, date, and filename.

```
root@client:/mnt/nfs
[root@client.ngalacan.net nfs]# ls
home  www
[root@client.ngalacan.net nfs]# ls -al
total 0
drwxr-xr-x. 4 root root 29 Oct 28 09:34 .
drwxr-xr-x. 3 root root 17 Oct 28 09:15 ..
drwxr-xr-x. 3 root root 22 Oct 28 09:34 home
drwxr-xr-x. 4  48  48 33 Sep 16 22:28 www
[root@client.ngalacan.net nfs]#
```

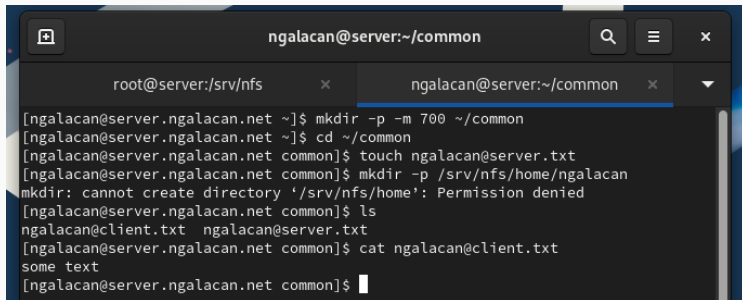
Рис. 16: Проверка /mnt/nfs на клиенте



A terminal window titled 'root@client:~' with a search icon, menu icon, and close button. It has two tabs: 'root@client:/mnt/nfs' and 'root@client:~'. The active tab shows the following commands and output:

```
[ngalacan@client.ngalacan.net ~]$ cd /mnt/nfs/home/ngalacan
[ngalacan@client.ngalacan.net ngalacan]$ touch ngalacan@client.txt
[ngalacan@client.ngalacan.net ngalacan]$ nano ngalacan@client.txt
[ngalacan@client.ngalacan.net ngalacan]$ sudo -i
[sudo] password for ngalacan:
[root@client.ngalacan.net ~]# cd /mnt/nfs/home/ngalacan
-bash: cd: /mnt/nfs/home/ngalacan: Permission denied
[root@client.ngalacan.net ~]# nano /mnt/nfs/home/ngalacan/ngalacan@client.txt
[root@client.ngalacan.net ~]#
```

Рис. 17: Переход в общий каталог на клиенте, создание и редактирование файла

A terminal window titled 'ngalacan@server:~/common' with search, menu, and close icons. It shows a sequence of commands and their outputs. The user 'ngalacan' is logged in. The commands executed are: 'mkdir -p -m 700 ~/common', 'cd ~/common', 'touch ngalacan@server.txt', and 'mkdir -p /srv/nfs/home/ngalacan'. The last command results in a 'Permission denied' error. Finally, 'ls' shows 'ngalacan@client.txt' and 'ngalacan@server.txt', and 'cat ngalacan@client.txt' outputs 'some text'.

```
ngalacan@server:~/common

root@server:/srv/nfs x ngalacan@server:~/common x

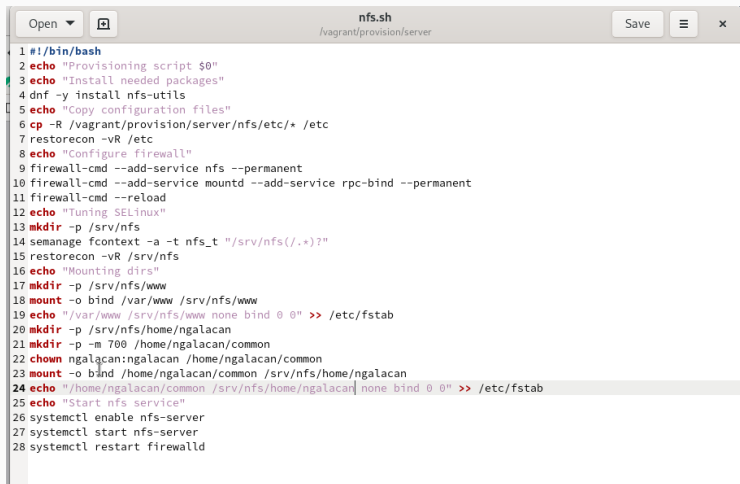
[ngalacan@server.ngalacan.net ~]$ mkdir -p -m 700 ~/common
[ngalacan@server.ngalacan.net ~]$ cd ~/common
[ngalacan@server.ngalacan.net common]$ touch ngalacan@server.txt
[ngalacan@server.ngalacan.net common]$ mkdir -p /srv/nfs/home/ngalacan
mkdir: cannot create directory '/srv/nfs/home': Permission denied
[ngalacan@server.ngalacan.net common]$ ls
ngalacan@client.txt  ngalacan@server.txt
[ngalacan@server.ngalacan.net common]$ cat ngalacan@client.txt
some text
[ngalacan@server.ngalacan.net common]$
```

Рис. 18: Проверка сохранения изменений на сервере

Внесение изменений в настройки
внутреннего окружения
виртуальной машины

```
cd /vagrant/provision/server  
mkdir -p /vagrant/provision/server/nfs/etc  
cp -R /etc/exports /vagrant/provision/server/nfs/etc/
```

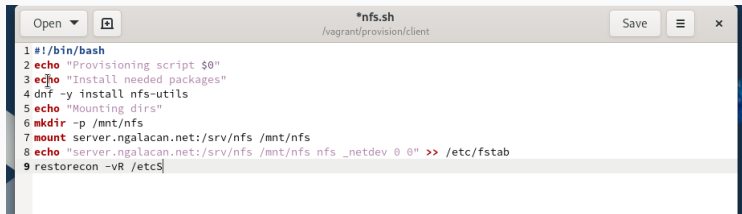
Выполнение лабораторной работы



The image shows a terminal window titled 'nfs.sh' with the path '/vagrant/provision/server'. The window contains a bash script for configuring NFS on a server. The script includes commands for installing packages, copying configuration files, setting up the firewall, tuning SELinux, creating directories, and mounting NFS shares. The script is numbered from 1 to 28.

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

Рис. 19: Редактирование nfs.sh на сервере



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

Рис. 20: Редактирование nfs.sh на клиенте

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

```
client.vm.provision "client nfs",  
  type: "shell",  
  preserve_order: true,  
  path: "provision/client/nfs.sh"
```

В результате выполнения работы были приобретены навыки настройки сервера NFS для удалённого доступа к ресурсам.