

Лабораторная работа

Номер 13

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Информация

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Приобретение навыков настройки сервера NFS для удалённого доступа к ресурсам

Установка пакета nfs-utils на сервере

```
[root@server.dmmosharov.net ~]# dnf -y install nfs-utils
Rocky Linux 10 - BaseOS                               722 B/s | 4.3 kB    00:06
Rocky Linux 10 - BaseOS                               22 MB/s | 9.9 MB    00:00
Rocky Linux 10 - AppStream                             400 B/s | 4.3 kB    00:11
Rocky Linux 10 - AppStream                             6.3 MB/s | 2.1 MB    00:00
Rocky Linux 10 - CRB                                   826 B/s | 4.3 kB    00:05
Rocky Linux 10 - CRB                                   1.6 MB/s | 499 kB    00:00
Rocky Linux 10 - Extras                               6.6 kB/s | 3.1 kB    00:00
Rocky Linux 10 - Extras                               21 kB/s | 5.9 kB    00:00
Dependencies resolved.
=====
Package           Arch      Version           Repository      Size
=====
Installing:
nfs-utils          x86_64    1:2.8.3-0.el10    baseos          475 k
Upgrading:
libipa_hbac        x86_64    2.11.1-2.el10_1.1 baseos           34 k
libldb              x86_64    4.22.4-106.el10   baseos          181 k
libsmbclient       x86_64    4.22.4-106.el10   baseos           75 k
libsss_certmap     x86_64    2.11.1-2.el10_1.1 baseos           81 k
libsss_idmap       x86_64    2.11.1-2.el10_1.1 baseos           41 k
libsss_nss_idmap   x86_64    2.11.1-2.el10_1.1 baseos           44 k
libsss_sudo        x86_64    2.11.1-2.el10_1.1 baseos           33 k
libtalloc          x86_64    2.4.3-100.el10    baseos           33 k
libtdb              x86_64    1.4.13-100.el10   baseos           55 k
libtevent          x86_64    0.16.2-100.el10   baseos           50 k
libwbclient        x86_64    4.22.4-106.el10   baseos           43 k
samba-client-libs  x86_64    4.22.4-106.el10   baseos          5.3 M
samba-common       noarch    4.22.4-106.el10   baseos          174 k
samba-common-libs  x86_64    4.22.4-106.el10   baseos          104 k
sssd               x86_64    2.11.1-2.el10_1.1 baseos           25 k
sssd-ad            x86_64    2.11.1-2.el10_1.1 baseos          195 k
sssd-client        x86_64    2.11.1-2.el10_1.1 baseos          152 k
sssd-common        x86_64    2.11.1-2.el10_1.1 baseos          1.5 M
sssd-common-pac    x86_64    2.11.1-2.el10_1.1 baseos           89 k
sssd-ipa           x86_64    2.11.1-2.el10_1.1 baseos          274 k
```

Рис. 1: Установка пакета nfs-utils на сервере

Создание каталога и открытие файла конфигурации

```
[root@server.dmmosharov.net ~]# mkdir -p /srv/nfs  
[root@server.dmmosharov.net ~]# nano /etc/exports
```

Рис. 2: Создание каталога и открытие файла конфигурации



```
GNU nano 8.1 /etc/exports
/srv/nfs *(ro)
```

Рис. 3: Настройка экспорта каталога

Настройка SELinux, запуск служб и настройка firewall

```
[root@server.dmmosharov.net ~]# semanage fcontext -a -t nfs_t "/srv/nfs(/.*)?"
[root@server.dmmosharov.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.dmmosharov.net ~]# systemctl start nfs-server.service
[root@server.dmmosharov.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.dmmosharov.net ~]# firewall-cmd --add-service=nfs
success
[root@server.dmmosharov.net ~]# firewall-cmd --add-service=nfs --permanent
success
[root@server.dmmosharov.net ~]# firewall-cmd --reload
success
[root@server.dmmosharov.net ~]#
```

Рис. 4: Настройка SELinux, запуск служб и настройка firewall

Установка nfs-utils на клиенте

```
[root@client.dmmosharov.net ~]# dnf -y install nfs-utils
Extra Packages for Enterprise Linux 10 - x86_64                157 kB/s | 39 kB    00:00
Extra Packages for Enterprise Linux 10 - x86_64                8.4 MB/s | 5.6 MB    00:00
Rocky Linux 10 - BaseOS                                       8.3 kB/s | 4.3 kB    00:00
Rocky Linux 10 - BaseOS                                       20 MB/s | 9.9 MB    00:00
Rocky Linux 10 - AppStream                                     14 kB/s | 4.3 kB    00:00
Rocky Linux 10 - CRB                                          14 kB/s | 4.3 kB    00:00
Rocky Linux 10 - Extras                                       2.1 kB/s | 3.1 kB    00:01
Dependencies resolved.
=====
Package                Architecture      Version              Repository            Size
=====
Installing:
nfs-utils              x86_64            1:2.8.3-0.el10      baseos                475 k
Upgrading:
libipa_hbac            x86_64            2.11.1-2.el10_1.1   baseos                34 k
libldb                 x86_64            4.22.4-106.el10     baseos                181 k
libsmbclient          x86_64            4.22.4-106.el10     baseos                75 k
libsss_certmap         x86_64            2.11.1-2.el10_1.1   baseos                81 k
libsss_idmap           x86_64            2.11.1-2.el10_1.1   baseos                41 k
libsss_nss_idmap       x86_64            2.11.1-2.el10_1.1   baseos                44 k
libsss_sudo            x86_64            2.11.1-2.el10_1.1   baseos                33 k
libtalloc              x86_64            2.4.3-100.el10      baseos                33 k
libtdb                 x86_64            1.4.13-100.el10     baseos                55 k
libtevent              x86_64            0.16.2-100.el10     baseos                50 k
libwbclient            x86_64            4.22.4-106.el10     baseos                43 k
samba-client-libs      x86_64            4.22.4-106.el10     baseos                5.3 M
samba-common           noarch            4.22.4-106.el10     baseos                174 k
samba-common-libs      x86_64            4.22.4-106.el10     baseos                104 k
sssd                   x86_64            2.11.1-2.el10_1.1   baseos                25 k
sssd-ad                x86_64            2.11.1-2.el10_1.1   baseos                195 k
```

Рис. 5: Установка nfs-utils на клиенте

Остановка межсетевого экрана на сервере

```
[dmmosharov@server.dmmosharov.net ~]$ systemctl stop firewalld.service  
[dmmosharov@server.dmmosharov.net ~]$
```

Рис. 7: Остановка межсетевого экрана на сервере

Успешный просмотр списка экспорта при отключенном фаерволе

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

Рис. 8: Успешный просмотр списка экспорта при отключенном фаерволе

Запуск firewalld и просмотр открытых портов

```
[dmmosharov@server.dmmosharov.net ~]$ lsof | grep TCP
firefox    9490                dmmosharov  102u        IPv4
             49366              0t0          TCP server.dmmosharov.net:59120->34.107.243.9
3:https (ESTABLISHED)
firefox    9490  9510 AsyncSi~l      dmmosharov  102u        IPv4
             49366              0t0          TCP server.dmmosharov.net:59120->34.107.243.9
3:https (ESTABLISHED)
firefox    9490  9511 pool-spaw     dmmosharov  102u        IPv4
             49366              0t0          TCP server.dmmosharov.net:59120->34.107.243.9
3:https (ESTABLISHED)
firefox    9490  9512 gmain           dmmosharov  102u        IPv4
             49366              0t0          TCP server.dmmosharov.net:59120->34.107.243.9
3:https (ESTABLISHED)
```

Рис. 9: Запуск firewalld и просмотр открытых портов

Службы rpcbind и mountd в выводе lsof

systemd	1	root	89u	IPv6	9794	0t0	TCP *:websm (LISTEN)
systemd	1	root	89u	IPv6	9794	0t0	TCP *:websm (LISTEN)
rpcbind	883	rpc	5u	IPv4	5864	0t0	TCP *:sunrpc (LISTEN)
rpcbind	883	rpc	7u	IPv6	5870	0t0	TCP *:sunrpc (LISTEN)
cupsd	1335	root	7u	IPv6	9184	0t0	TCP localhost:ipp (LISTEN)
cupsd	1335	root	8u	IPv4	9185	0t0	TCP localhost:ipp (LISTEN)
ecbd	1348	root	7u	IPv4	11115	0t0	TCP *:ecb (LISTEN)

Рис. 10: Службы rpcbind и mountd в выводе lsof

Просмотр UDP-соединений с помощью lsof (начало вывода)

```
[dmmosharov@server.dmmosharov.net ~]$ sudo lsof | grep UDP
[sudo] password for dmmosharov:
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    43u      IPv4        6247      0t0      UDP *:sunrpc
systemd      1          root    45u      IPv6        6253      0t0      UDP *:sunrpc
rpcbind     883         rpc      6u      IPv4        6247      0t0      UDP *:sunrpc
rpcbind     883         rpc      8u      IPv6        6253      0t0      UDP *:sunrpc
avahi-daemon 937        avahi    12u     IPv4        9975      0t0      UDP *:mdns
avahi-daemon 937        avahi    13u     IPv6        9976      0t0      UDP *:mdns
chronyd      986        chrony   5u      IPv4        8041      0t0      UDP localhost:323
chronyd      986        chrony   6u      IPv6        8042      0t0      UDP localhost:323
chronyd      986        chrony   7u      IPv4        8043      0t0      UDP *:ntp
named        1414       named    41u     IPv4       11536      0t0      UDP localhost:domain
named        1414       named    42u     IPv4       11537      0t0      UDP localhost:domain
named        1414       named    43u     IPv4       11538      0t0      UDP localhost:domain
named        1414       named    44u     IPv4       11539      0t0      UDP localhost:domain
named        1414       named    53u     IPv4       11544      0t0      UDP server.dmmosharov.n
named        1414       named    54u     IPv4       11545      0t0      UDP server.dmmosharov.n
named        1414       named    55u     IPv4       11546      0t0      UDP server.dmmosharov.n
```

Рис. 11: Просмотр UDP соединений с помощью lsof (начало вывода)

Просмотр UDP-соединений с помощью lsof (окончание вывода)

```
rpc.statd 1658                rpcuser  5u      IPv4
           14376             0t0      UDP localhost:986
rpc.statd 1658                rpcuser  8u      IPv4
           14381             0t0      UDP *:58507
rpc.statd 1658                rpcuser 10u      IPv6
           13843             0t0      UDP *:34024
rpc.mount 1659                root     4u      IPv4
           14340             0t0      UDP *:mountd
rpc.mount 1659                root     6u      IPv6
           14346             0t0      UDP *:mountd
NetworkMa 5101                root    27u      IPv4
           22874             0t0      UDP server.dmmosharov.net:bootpc->_gateway
:bootps
NetworkMa 5101 5105 gmain                root    27u      IPv4
           22874             0t0      UDP server.dmmosharov.net:bootpc->_gateway
:bootps
```

Рис. 12: Просмотр UDP-соединений с помощью lsof (окончание вывода)

Проверка экспорта NFS-ресурса командой showmount

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

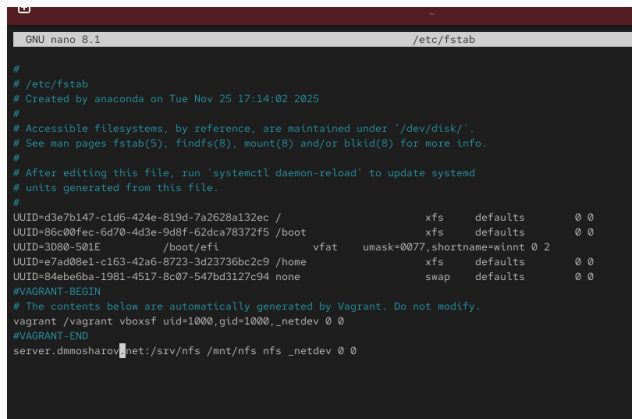
Рис. 14: Проверка экспорта NFS-ресурса командой showmount

Монтирование каталога NFS на клиенте и проверка через mount

```
[root@client.dmosharov.net ~]# mkdir -p /mnt/nfs
[root@client.dmosharov.net ~]# mount server.dmosharov.net:/srv/nfs /mnt/nfs
mount: (hint) your fstab has been modified, but systemd still uses
       the old version; use 'systemctl daemon-reload' to reload.
[root@client.dmosharov.net ~]# mount
/dev/mapper/zl_10-root on / type xfs (rw,relatime,seclabel,attr2,inode64,logbufs=8,logbsize=32k,noquota)
devptsfs on /dev type devptsfs (rw,nosuid,seclabel,size=4096k,nr_inodes=460474,mode=755,inode64)
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)
sysfs on /sys type sysfs (rw,nosuid,nodev,noexec,relatime,seclabel)
securityfs on /sys/kernel/security type securityfs (rw,nosuid,nodev,noexec,relatime)
cgroup2 on /sys/fs/cgroup type cgroup2 (rw,nosuid,nodev,noexec,relatime,seclabel,nfsdelegate,memory_recursiveprot)
pstore on /sys/fs/pstore type pstore (rw,nosuid,nodev,noexec,relatime,seclabel)
efivarfs on /sys/firmware/efi/efivars type efivarfs (rw,nosuid,nodev,noexec,relatime)
bpf on /sys/fs/bpf type bpf (rw,nosuid,nodev,noexec,relatime,mode=700)
configfs on /sys/kernel/config type configfs (rw,nosuid,nodev,noexec,relatime)
proc on /proc type proc (rw,nosuid,nodev,noexec,relatime)
tmpfs on /run type tmpfs (rw,nosuid,nodev,seclabel,size=744288k,nr_inodes=819200,mode=755,inode64)
selinuxfs on /sys/fs/selinux type selinuxfs (rw,nosuid,noexec,relatime)
systemd-1 on /proc/sys/fs/binfmt_misc type autofs (rw,relatime,fd=36,pgrip=1,timeout=0,minproto=5,maxproto=5,direct,pipe_ino=3978)
hugetlbfs on /dev/hugepages type hugetlbfs (rw,nosuid,nodev,relatime,seclabel,pagesize=2M)
mqueue on /dev/mqueue type mqueue (rw,nosuid,nodev,noexec,relatime,seclabel)
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)
tmpfs on /run/credentials/systemd-journald.service type tmpfs (rw,nosuid,nodev,noexec,relatime,nosymfollow,seclabel,size=1024k,nr_inodes=1024,mode=700,inode64,noswap)
fusectl on /sys/fs/fuse/connections type fusectl (rw,nosuid,nodev,noexec,relatime)
/dev/sda2 on /boot type xfs (rw,relatime,seclabel,attr2,inode64,logbufs=8,logbsize=32k,noquota)
/dev/sdal on /boot/efi type vfat (rw,relatime,fmask=0077,dmask=0077,codepage=437,iocharset=ascii,shortname=winnt,errors=remount-ro)
/dev/mapper/zl_10-home on /home type xfs (rw,relatime,seclabel,attr2,inode64,logbufs=8,logbsize=32k,noquota)
sunrpc on /var/lib/nfs/rpc-pipefs type rpc_pipefs (rw,relatime)
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,network)
tmpfs on /run/user/1000 type tmpfs (rw,nosuid,nodev,relatime,seclabel,size=372136k,nr_inodes=93034,mode=700,uid=1000,gid=1000,inode64)
gvfsd-fuse on /run/user/1000/gvfs type fuse.gvfsd-fuse (rw,nosuid,nodev,relatime,user_id=1000,group_id=1000)
portal on /run/user/1000/doc type fuse.portal (rw,nosuid,nodev,relatime,user_id=1000,group_id=1000)
tmpfs on /run/user/1001 type tmpfs (rw,nosuid,nodev,relatime,seclabel,size=372136k,nr_inodes=93034,mode=700,uid=1001,gid=1001,inode64)
server.dmosharov.net:/srv/nfs on /mnt/nfs type nfs4 (rw,relatime,vers=4.2,sz=524288,sw=524288,naclen=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.dmosharov.net ~]#
```

Рис. 15: Монтирование каталога NFS на клиенте и проверка через mount

Настройка автоматического монтирования в /etc/fstab



```
GNU nano 8.1 /etc/fstab

#
# /etc/fstab
# Created by anaconda on Tue Nov 25 17:14:02 2025
#
# 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=d3e7b147-c1d6-424e-819d-7a2628a132ec / xfs defaults 0 0
UUID=86c00fec-6d70-4d3e-9d8f-62dca78372f5 /boot xfs defaults 0 0
UUID=3D80-501E /boot/efi vfat umask=0077,shortname=winnt 0 2
UUID=e7ad08e1-c163-42a6-8723-3d23736bc2c9 /home xfs defaults 0 0
UUID=84ebe6ba-1981-4517-8c07-547bd3127c94 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.dmmosharov.net:/srv/nfs /mnt/nfs nfs _netdev 0 0
```

Рис. 16: Настройка автоматического монтирования в /etc/fstab

Проверка статуса remote-fs.target

```
[root@client.dmmosharov.net ~]# 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 Sun 2026-02-01 20:15:30 UTC; 1min 39s ago
 Invocation: dce231f1d0914acba09d279b9f267c3e
    Docs: man:systemd.special(7)

Feb 01 20:15:30 client.dmmosharov.net systemd[1]: Reached target remote-fs.target - Remote File Systems.
[root@client.dmmosharov.net ~]#
```

Рис. 17: Проверка статуса remote-fs.target

Проверка подключенных ресурсов командой mount

```
[root@client.dmosharov.net ~]# mount
/dev/mapper/rl_10-root on / type xfs (rw,relatime,seclabel,attr2,inode64,logbufs=8,logbsize=32k,noquota)
devtmpfs on /dev type devtmpfs (rw,nosuid,seclabel,size=4096K,nr_inodes=460476,mode=755,inode64)
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)
sysfs on /sys type sysfs (rw,nosuid,nodev,noexec,relatime,seclabel)
securityfs on /sys/kernel/security type securityfs (rw,nosuid,nodev,noexec,relatime)
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)
efivarfs on /sys/firmware/efi/efivars type efivarfs (rw,nosuid,nodev,noexec,relatime)
bpf on /sys/fs/bpf type bpf (rw,nosuid,nodev,noexec,relatime,mode=700)
configfs on /sys/kernel/config type configfs (rw,nosuid,nodev,noexec,relatime)
proc on /proc type proc (rw,nosuid,nodev,noexec,relatime)
tmpfs on /run type tmpfs (rw,nosuid,nodev,seclabel,size=744284K,nr_inodes=819200,mode=755,inode64)
selinuxfs on /sys/fs/selinux type selinuxfs (rw,nosuid,noexec,relatime)
systemd-1 on /proc/sys/fs/binfmt_misc type autofs (rw,relatime,fd=36,pgrip=1,timeout=0,minproto=5,maxproto=5,direct,pipe_ino=3904)
debugfs on /sys/kernel/debug type debugfs (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,nosuid,nodev,relatime,seclabel,pagesize=2M)
tracefs on /sys/kernel/tracing type tracefs (rw,nosuid,nodev,noexec,relatime,seclabel)
tmpfs on /run/credentials/systemd-journald.service type tmpfs (ro,nosuid,nodev,noexec,relatime,nosynfollow,seclabel,size=1024K,nr_inodes=1024,mode=700,inode64,noswap)
fusectl on /sys/fs/fuse/connections type fusectl (rw,nosuid,nodev,noexec,relatime)
/dev/sda2 on /boot type xfs (rw,relatime,seclabel,attr2,inode64,logbufs=8,logbsize=32k,noquota)
/dev/sda1 on /boot/efi type vfat (rw,relatime,fmask=0077,dmask=0077,codepage=437,iocharset=ascii,shortname=wint.errors=recount-ro)
/dev/mapper/rl_10-home on /home type xfs (rw,relatime,seclabel,attr2,inode64,logbufs=8,logbsize=32k,noquota)
sunrpc on /var/lib/nfs/rpc_pipefs type rpc_pipefs (rw,relatime)
vagrant on /vagrant type vboxsf (rw,nodev,relatime,iocharset=utf8,uid=1000,gid=1000)
server.dmosharov.net:/srv/nfs on /mnt/nfs type nfs4 (rw,relatime,vers=4.2,rsize=524288,wsize=524288,namlen=255,hard,proto=tcp,timeo=600,retrns=2,sec=sys,clientaddr=192.168.1.30,local_lock=none,addr=192.168.1.1,_netdev)
vagrant on /vagrant type vboxsf (rw,nodev,relatime,iocharset=utf8,uid=1000,gid=1000,_netdev)
tmpfs on /run/user/1000 type tmpfs (rw,nosuid,nodev,relatime,seclabel,size=372140K,nr_inodes=93035,mode=700,uid=1000,gid=1000,inode64)
gvfsd-fuse on /run/user/1000/gvfs type fuse.gvfsd-fuse (rw,nosuid,nodev,relatime,user_id=1000,group_id=1000)
portal on /run/user/1000/doc type fuse.portal (rw,nosuid,nodev,relatime,user_id=1000,group_id=1000)
tmpfs on /run/user/1001 type tmpfs (rw,nosuid,nodev,relatime,seclabel,size=372140K,nr_inodes=93035,mode=700,uid=1001,gid=1001,inode64)
[root@client.dmosharov.net ~]#
```

Рис. 18: Проверка подключенных ресурсов командой mount

Bind-монтирование каталога веб-сервера на сервере NFS

```
[root@server.dmmosharov.net ~]# mkdir -p /srv/nfs/www
[root@server.dmmosharov.net ~]# mount -o bind /var/www/ /srv/nfs/www/
mount: (hint) your fstab has been modified, but systemd still uses
        the old version; use 'systemctl daemon-reload' to reload.
[root@server.dmmosharov.net ~]# ls /srv/fs
ls: cannot access '/srv/fs': No such file or directory
[root@server.dmmosharov.net ~]# ls /srv/nfs
www
[root@server.dmmosharov.net ~]#
```

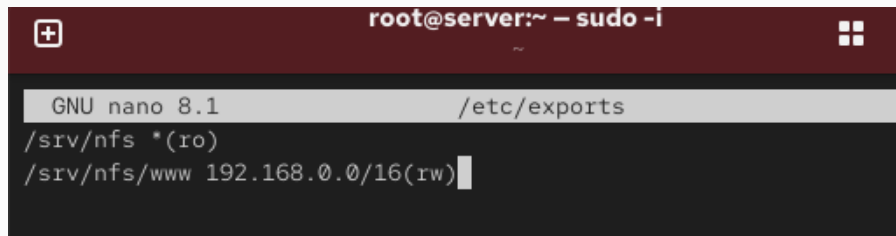
Рис. 19: Bind-монтирование каталога веб-сервера на сервере NFS

Проверка отображения нового каталога на клиенте

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


Рис. 20: Проверка отображения нового каталога на клиенте

Редактирование файла /etc/exports на сервере



```
root@server:~ - sudo -i
GNU nano 8.1 /etc/exports
/srv/nfs *(ro)
/srv/nfs/www 192.168.0.0/16(rw)
```

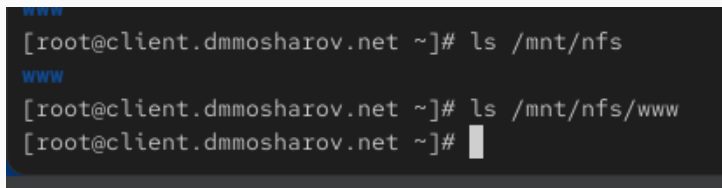
Рис. 21: Редактирование файла /etc/exports на сервере

A screenshot of a terminal window with a dark background. The prompt is [root@server.dmmosharov.net ~]#. The command exportfs -r is entered. The first part of the command is highlighted in blue. A white cursor is at the end of the command.

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

Рис. 22: Экспорт каталогов командой exportfs

Проверка наличия каталога www на клиенте



A terminal window with a dark background and light gray text. The prompt is [root@client.dmmosharov.net ~]#. The first command is ls /mnt/nfs, followed by a new line. The second command is ls /mnt/nfs/www, followed by a new line. The third command is a blank line, followed by a new line. The text www is highlighted in blue in the first and second lines.

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

Рис. 23: Проверка наличия каталога www на клиенте

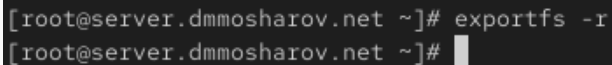
Добавление bind-монтирования в /etc/fstab

```
GNU nano 8.1 /etc/fstab

#
# /etc/fstab
# Created by anaconda on Tue Nov 25 17:14:02 2025
#
# 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=d3e7b147-c1d6-424e-819d-7a2628a132ec / xfs
UUID=86c00fec-6d70-4d3e-9d8f-62dca78372f5 /boot xfs
UUID=3D80-501E /boot/efi vfat umask=0077,showmount=0
UUID=e7ad08e1-c163-42a6-8723-3d23736bc2c9 /home xfs
UUID=84ebe6ba-1981-4517-8c07-547bd3127c94 none swap
#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. 24: Добавление bind-монтирования в /etc/fstab

Повторный запуск exportfs на сервере



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

Рис. 25: Повторный запуск exportfs на сервере

Проверка доступа к каталогу www на клиенте

```
Last login: Sun Feb  1 20:16:32 UTC 2026 on pts/0
[dmmosharov@client.dmmosharov.net ~]$ ls /mnt/nfs
www
[dmmosharov@client.dmmosharov.net ~]$ ls /mnt/nfs/www
cgi-bin  html
[dmmosharov@client.dmmosharov.net ~]$
```

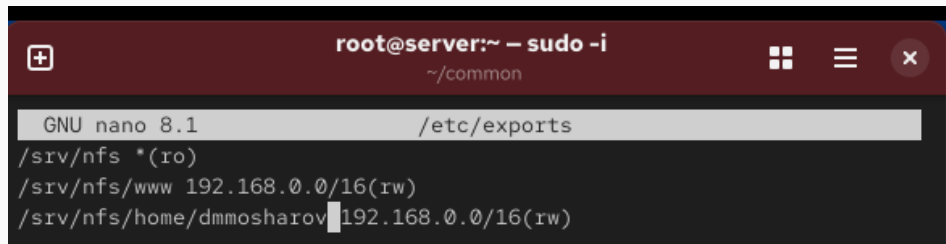
Рис. 26: Проверка доступа к каталогу www на клиенте

Подготовка каталога пользователя и bind-монтирование на сервере

```
[dmmosharov@server.dmmosharov.net ~]$ mkdir -p -m 700 ~/common
[dmmosharov@server.dmmosharov.net ~]$ cd ~/common
[dmmosharov@server.dmmosharov.net common]$ touch dmmosharov@server.txt
[dmmosharov@server.dmmosharov.net common]$ sudo mkdir -p /srv/nfs/home
/dmmosharov
[sudo] password for dmmosharov:
[dmmosharov@server.dmmosharov.net common]$ mount -o bind /home/dmmosha
rov/common /srv/nfs/home/dmmosharov
mount: /srv/nfs/home/dmmosharov: must be superuser to use mount.
      dmesg(1) may have more information after failed mount system ca
ll.
mount: (hint) your fstab has been modified, but systemd still uses
      the old version; use 'systemctl daemon-reload' to reload.
[dmmosharov@server.dmmosharov.net common]$ sudo mount -o bind /home/dm
mosharov/common /srv/nfs/home/dmmosharov
mount: (hint) your fstab has been modified, but systemd still uses
      the old version; use 'systemctl daemon-reload' to reload.
[dmmosharov@server.dmmosharov.net common]$
```

Рис. 27: Подготовка каталога пользователя и bind-монтирование на сервере

Настройка экспорта каталога пользователя



The screenshot shows a terminal window with a dark red title bar. The title bar contains a plus icon on the left, the text 'root@server:~ – sudo -i' in the center, and window control icons (four squares, a hamburger menu, and a close 'x') on the right. Below the title bar, the terminal content shows the GNU nano 8.1 editor editing the file /etc/exports. The file contains three lines of export configurations: '/srv/nfs *(ro)', '/srv/nfs/www 192.168.0.0/16(rw)', and '/srv/nfs/home/dmmosharov 192.168.0.0/16(rw)'. The cursor is positioned at the end of the third line.

```
root@server:~ – sudo -i
~/common

GNU nano 8.1 /etc/exports
/srv/nfs *(ro)
/srv/nfs/www 192.168.0.0/16(rw)
/srv/nfs/home/dmmosharov 192.168.0.0/16(rw)
```

Рис. 28: Настройка экспорта каталога пользователя

Настройка автоматического bind-монтирования в fstab

```
GNU nano 8.1 /etc/fstab

#
# /etc/fstab
# Created by anaconda on Tue Nov 25 17:14:02 2025
#
# 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=d3e7b147-c1d6-424e-819d-7a2628a132ec / xfs
UUID=86c00fec-6d70-4d3e-9d8f-62dca78372f5 /boot xfs
UUID=3D80-501E /boot/efi vfat umask=0077,showexec
UUID=e7ad08e1-c163-42a6-8723-3d23736bc2c9 /home xfs
UUID=84ebe6ba-1981-4517-8c07-547bd3127c94 none swap
#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/dmmosharov/common /srv/nfs/home/dmmosharov none bind 0 0
```

Рис. 29: Настройка автоматического bind-монтирования в fstab

Проверка доступа к каталогу home на клиенте

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

Рис. 30: Проверка доступа к каталогу home на клиенте

Проверка доступа к смонтированному каталогу пользователя на клиенте

```
[dmmosharov@client.dmmosharov.net ~]$ cd /mnt/nfs/home/dmmosharov
[dmmosharov@client.dmmosharov.net dmmosharov]$ touch dmmosharov@client.txt
[dmmosharov@client.dmmosharov.net dmmosharov]$ echo "123123" >> dmmosharov@client.txt
[dmmosharov@client.dmmosharov.net dmmosharov]$ sudo -i
[sudo] password for dmmosharov:
[root@client.dmmosharov.net ~]# cd /mnt/nfs/home/dmmosharov
-bash: cd: /mnt/nfs/home/dmmosharov: Permission denied
[root@client.dmmosharov.net ~]#
```

Рис. 31: Проверка доступа к смонтированному каталогу пользователя на клиенте

Проверка изменений в каталоге common на сервере

```
[root@server.dmmosharov.net ~]# logout
[dmmosharov@server.dmmosharov.net common]$ ls
dmmosharov@client.txt  dmmosharov@server.txt
[dmmosharov@server.dmmosharov.net common]$ cat dmmosharov@client.txt
123123
[dmmosharov@server.dmmosharov.net common]$
```

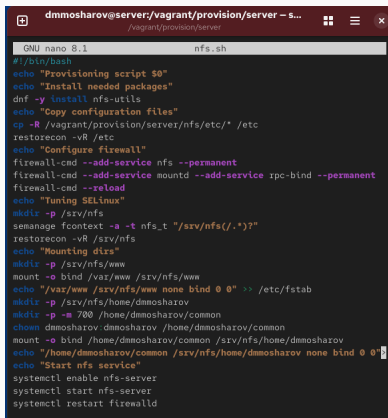
Рис. 32: Проверка изменений в каталоге common на сервере

Подготовка каталогов и создание скрипта nfs.sh на сервере

```
[dmmosharov@server.dmmosharov.net server]$ sudo mkdir -p /vagrant/provision/server/nfs/etc
[sudo] password for dmmosharov:
Sorry, try again.
[sudo] password for dmmosharov:
[dmmosharov@server.dmmosharov.net server]$ sudo cp -R /etc/exports /vagrant/provision/server/nfs/etc/
[dmmosharov@server.dmmosharov.net server]$ cd /vagrant/provision/server
[dmmosharov@server.dmmosharov.net server]$ touch nfs.sh
[dmmosharov@server.dmmosharov.net server]$ chmod +x nfs.sh
[dmmosharov@server.dmmosharov.net server]$ sudo nano nfs.sh
```

Рис. 33: Подготовка каталогов и создание скрипта nfs.sh на сервере

Содержимое скрипта автоматической настройки сервера



```
dmmosharov@server:/vagrant/provision/server - ssh
/vagrant/provision/server
GNU nano 8.1      nfs.sh
#!/bin/bash
echo "Provisioning script $0"
echo "Install needed packages"
dnf -y install nfs-utils
echo "Copy configuration files"
cp -R /vagrant/provision/server/nfs/etc/* /etc
restorecon -vR /etc
echo "Configure firewall"
firewall-cmd --add-service nfs --permanent
firewall-cmd --add-service mountd --add-service rpc-bind --permanent
firewall-cmd --reload
echo "Tuning SELinux"
mkdir -p /srv/nfs
semanage fcontext -a -t nfs_t "/srv/nfs(/.*)?"
restorecon -vR /srv/nfs
echo "Mounting dirs"
mkdir -p /srv/nfs/www
mount -o bind /var/www /srv/nfs/www
echo "/var/www /srv/nfs/www none bind 0 0" >> /etc/fstab
mkdir -p /srv/nfs/home/dmmosharov
mkdir -p -m 700 /home/dmmosharov/common
chown dmmosharov:dmmosharov /home/dmmosharov/common
mount -o bind /home/dmmosharov/common /srv/nfs/home/dmmosharov
echo "/home/dmmosharov/common /srv/nfs/home/dmmosharov none bind 0 0"
echo "Start nfs service"
systemctl enable nfs-server
systemctl start nfs-server
systemctl restart firewallld
```

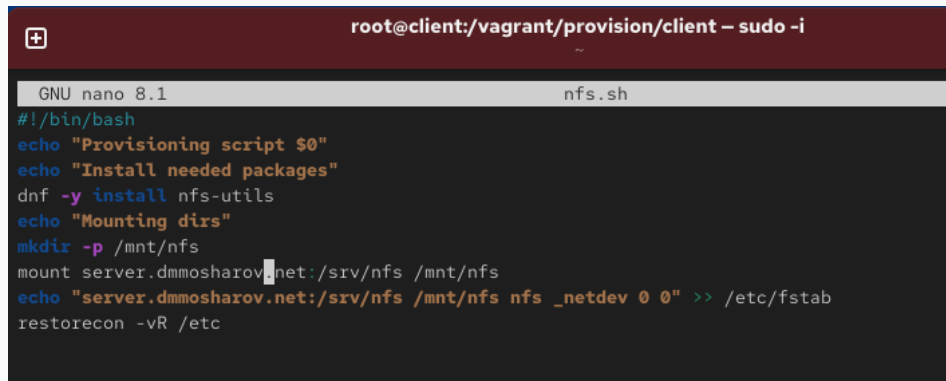
Рис. 34: Содержимое скрипта автоматической настройки сервера

Создание скрипта nfs.sh на клиенте

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

Рис. 35: Создание скрипта nfs.sh на клиенте

Скрипт настройки NFS на клиенте



```
root@client:/vagrant/provision/client - sudo -i
GNU nano 8.1                                nfs.sh
#!/bin/bash
echo "Provisioning script $0"
echo "Install needed packages"
dnf -y install nfs-utils
echo "Mounting dirs"
mkdir -p /mnt/nfs
mount server.dmmosharov.net:/srv/nfs /mnt/nfs
echo "server.dmmosharov.net:/srv/nfs /mnt/nfs nfs _netdev 0 0" >> /etc/fstab
restorecon -vR /etc
```

Рис. 36: Скрипт настройки NFS на клиенте

Добавление запуска скриптов в Vagrantfile

```
123 server.vm.provision "server_nfs",
124     type: "shell",
125     preserve_order: true,
126     path: "provision/server/nfs.sh"
127 end
128
129 ## Client configuration
130 config.vm.define "client", autostart: false do |client|
131   client.vm.box = "rockylinux8"
132   client.vm.hostname = "client"
133
134   client.vm.boot_timeout = 1440
135
136   client.ssh.insert_key = false
137   client.ssh.username = "vagrant"
138   client.ssh.password = "vagrant"
139
140   client.vm.network :private_network,
141     type: "dhcp",
142     virtualbox____l2t2: true
143
144   client.vm.provider :virtualbox do |virtualbox|
145     virtualbox.customize ["modifyvm", :id, "--vrdm", "on"]
146     virtualbox.customize ["modifyvm", :id, "--vrdmport", "2092"]
147   end
148
149   client.vm.provision "Client dummy",
150     type: "shell",
151     preserve_order: true,
152     path: "provision/client/01-dummy.sh"
153
154   client.vm.provision "client routing",
155     type: "shell",
156     preserve_order: true,
157     run: "always",
158     path: "provision/client/01-routing.sh"
159
160   client.vm.provision "client mail",
161     type: "shell",
162     preserve_order: true,
163     path: "provision/client/mail.sh"
164
165   client.vm.provision "client ntp",
166     type: "shell",
167     preserve_order: true,
168     path: "provision/client/ntp.sh"
169
170   client.vm.provision "client nfs",
171     type: "shell",
172     preserve_order: true,
173     path: "provision/client/nfs.sh"
174 end
175 end
```

Рис. 37: Добавление запуска скриптов в Vagrantfile

В результате выполнения лабораторной работы были получены навыки работы с nfs и сетевыми хранилищами, а так же их настройка