

1 модуль 1 задание

ISP:

su -

hostnamectl set-hostname ISP; exec bash

CLI:

su -

hostnamectl set-hostname CLI; exec bash

HQ-R:

su -

hostnamectl set-hostname HQ-R; exec bash

HQ-SRV:

su -

hostnamectl set-hostname HQ-SRV; exec bash

BR-R:

su -

hostnamectl set-hostname BR-R; exec bash

BR-SRV:

su -

hostnamectl set-hostname BR-SRV; exec bash

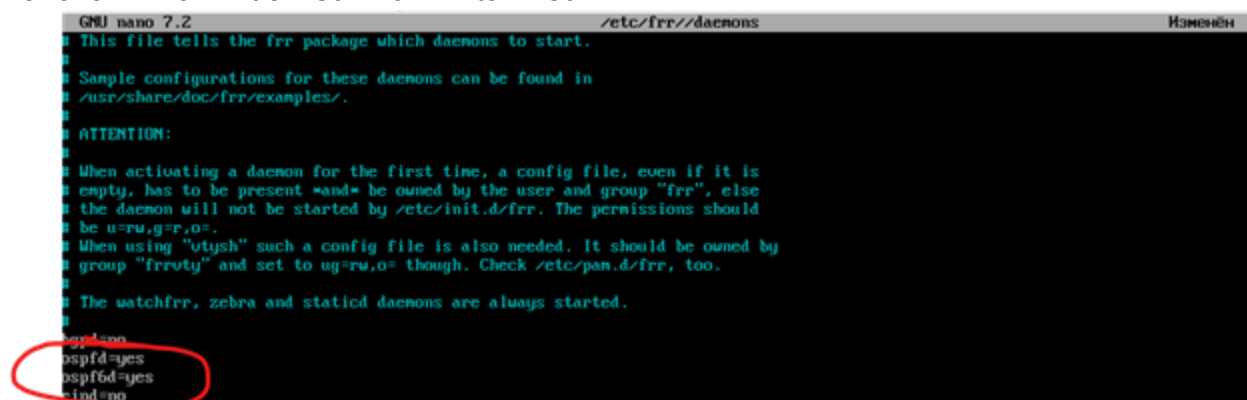
1 модуль 2 задание

[BR-R]

Команды для настройки

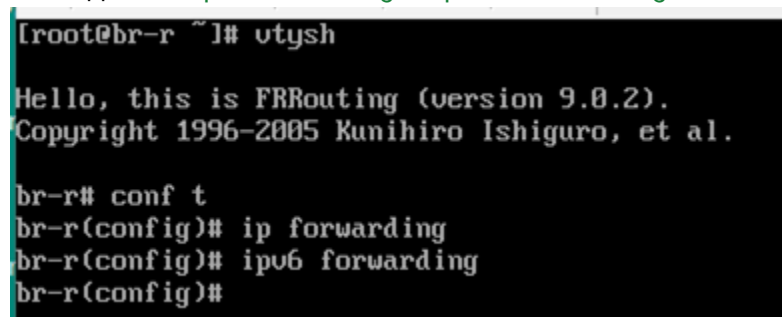
```
nano /etc/frr/daemons
ospfd=yes
ospf6d=yes //необяз
systemctl start frr.service
vtysh
conf t
ip forwarding
ipv6 forwarding
int eth0
ip address 10.10.11.6/30
no shutdown
int eth1
ip address 192.168.2.1/29
no shutdown
ex
router ospf
network 10.10.11.4/30 a 0
network 192.168.2.0/28 a 0
end
do wri
ex
systemctl restart frr.service
```

1) После входа в устройства пишем `su -` и переходим для редакции файла командой `nano /etc/frr/daemons` и меняем 2 параметра `ospfd` и `ospf6d`, с `no` на `yes` (рисунок 1). После изменения нажимаем `Ctrl + o > Enter > Ctrl + x`



```
GNU nano 7.2 /etc/frr/daemons
# This file tells the frr package which daemons to start.
#
# Sample configurations for these daemons can be found in
# /usr/share/doc/frr/examples/.
#
# ATTENTION:
#
# When activating a daemon for the first time, a config file, even if it is
# empty, has to be present *and* be owned by the user and group "frr", else
# the daemon will not be started by /etc/init.d/frr. The permissions should
# be u=rw,g=r,o=.
#
# When using "vtysh" such a config file is also needed. It should be owned by
# group "frrty" and set to ug=rw,o= though. Check /etc/pass.d/frr, too.
#
# The watchfrr, zebra and staticd daemons are always started.
#
ospfd=yes
ospf6d=yes
ospf6d=yes
ind=no
```

2) Запускаем службу `systemctl start frr.service`. И заходим в службу для редакции апи адресов `vtysh`. После входа переходим в конфигурации `conf t`. Выключаем фигню командными `ip forwarding` и `ipv6 forwarding`.



```
[root@br-r ~]# vtysh
Hello, this is FRRouting (version 9.0.2).
Copyright 1996-2005 Kunihiro Ishiguro, et al.

br-r# conf t
br-r(config)# ip forwarding
br-r(config)# ipv6 forwarding
br-r(config)#
```

3) Задаем апи командами

```
int eth0

ip address 10.10.11.6/30

no shutdown

int eth1

ip address 192.168.2.1/29

no shutdown

ex
```



```
br-r(config)# int eth0
br-r(config-if)# ip address 10.10.11.6/30
br-r(config-if)# no shutdown
br-r(config-if)# int eth1
br-r(config-if)# ip address 192.168.2.1/27
br-r(config-if)# no shutdown
```

4) Настройка OSPF

```
router ospf

network 10.10.11.4/30 a 0

network 192.168.1.0/28 a 0

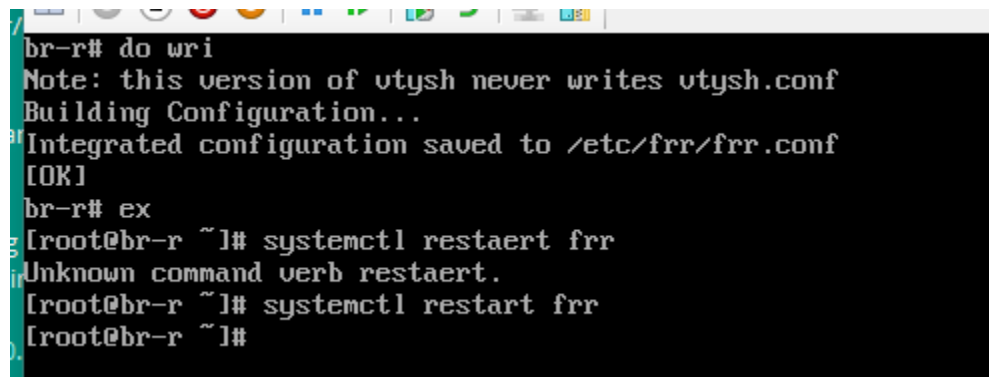
end
```

5) Сохранение и перезапуск фrrr

```
do wri

ex

systemctl restart frr.service
```



```
br-r# do wri
Note: this version of vtysh never writes vtysh.conf
Building Configuration...
Integrated configuration saved to /etc/frr/frr.conf
[OK]
br-r# ex
[root@br-r ~]# systemctl restaert frr
Unknown command verb restaert.
[root@br-r ~]# systemctl restart frr
[root@br-r ~]#
```

[HQ-R]

Аналогично BR-R настраиваем и HQ-R

```
nano /etc/frr/daemons
ospfd=yes
ospf6d=yes
systemctl start frr.service
vtysh
conf t
ip forwarding
ipv6 forwarding
int eth0
ip address 10.10.11.2/30
no shutdown
int eth1
```

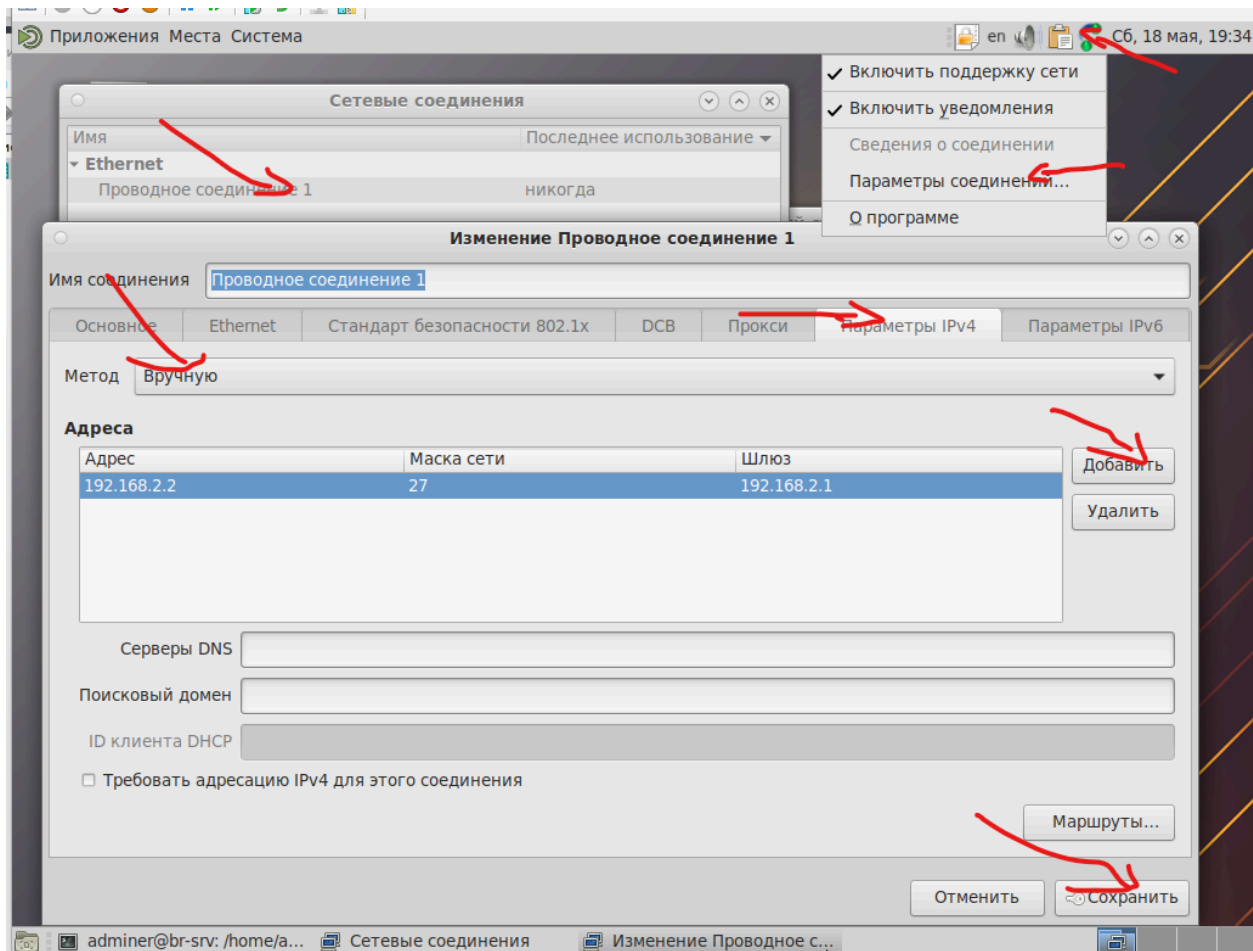
```
ip address 192.168.1.1/28
no shutdown
ex
router ospf
network 10.10.11.0/30 a 0
network 192.168.1.0/28 a 0
do wri
end
ex
systemctl restart frr.service
```

[ISP]

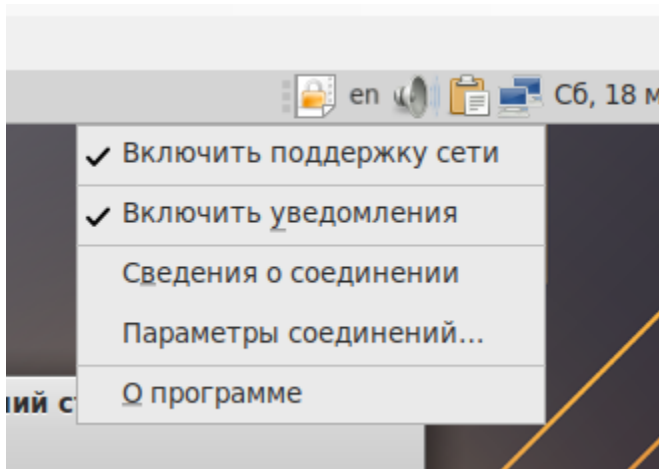
включаем форвадинг и поднимаем порты

```
vttysh
conf t
ip forwarding
ipv6 forwarding
int eth0
no shutdown
int eth1
no shutdown
int eth1
no shutdown
do wri
end
ex
```

BR-SRV (192.168.2.2 МАСКА 29 ШЛЮЗ 192.168.2.1) и CLI (192.168.0.2 МАСКА 24 ШЛЮЗ 192.168.0.1)



После настройки нужно выключить и включить поддержку сети



[CLI]

HQ-SRV не трогаем

После успешной настройки с br-srv должен пинговаться до hq-r 192.168.1.1

```
rtt min/avg/max/mdev = 1.143/1.739/1.988/0.346 ms
[adminer@br-srv Рабочий стол]$ ping 192.168.1.1
PING 192.168.1.1 (192.168.1.1) 56(84) bytes of data.
64 bytes from 192.168.1.1: icmp_seq=1 ttl=62 time=1.28 ms
64 bytes from 192.168.1.1: icmp_seq=2 ttl=62 time=1.60 ms
64 bytes from 192.168.1.1: icmp_seq=3 ttl=62 time=1.91 ms
64 bytes from 192.168.1.1: icmp_seq=4 ttl=62 time=1.91 ms
^C
--- 192.168.1.1 ping statistics ---
```

Не забудьте составить топологию сети L3. и заполнить таблицу адресов

1 модуль 3 задание

Роутер HQ-R

ddns-update-style none;

subnet 192.168.1.0 netmask 255.255.255.240 {

option routers 192.168.1.1;

option subnet-mask 255.255.255.240;

#range dynamic-bootp 192.168.1.2 192.168.1.4;

default-lease-time 120;

max-lease-time 240;

host hqsr {

fixed-address 192.168.1.2;

hardware ethernet НАЙДИ СВОЙ;

}

нажать enter

1 модуль 4 задание

Переходим в суперпользователя через su-

Добавляем пользователей

adduser логин

usermod -aG wheel логин

passwd логин

(предложит поставить пароль)

CLI логин - пароль

admin - P@ssw0rd

HQ-SRV

admin - P@ssw0rd

HQ-R

admin - P@ssw0rd

network_admin - P@ssw0rd

BR-SRV

branch_admin - P@ssw0rd

network_admin - P@ssw0rd

BR-R

network_admin - P@ssw0rd

branch_admin - P@ssw0rd

1 модуль 5 задание

ISP как сервер:

если надо открыть порт `iptables -A INPUT -p tcp --dport 5201 -j ACCEPT`

`iperf3 -s`

[HQ-R]

`iperf3 -c 10.10.11.1 -f M`

```
[root@isp ~]# iperf3 -s
Server listening on 5201 (test #1)
Accepted connection from 10.10.11.2, port 44808
[ 5] local 10.10.11.1 port 5201 connected to 10.10.11.2 port 44808
[ ID] Interval      Transfer      Bitrate      Retr      Cwnd
[ 5] 0.00-1.00 sec  1.11 GBytes  9.49 Gbits/sec  0      3.12 MBytes
[ 5] 1.00-2.00 sec  1.13 GBytes  9.69 Gbits/sec  0      3.12 MBytes
[ 5] 2.00-3.00 sec  1.13 GBytes  9.73 Gbits/sec  0      3.12 MBytes
[ 5] 3.00-4.00 sec  1.15 GBytes  9.88 Gbits/sec  0      3.12 MBytes
[ 5] 4.00-5.00 sec  1.07 GBytes  9.22 Gbits/sec  0      3.12 MBytes
[ 5] 5.00-6.00 sec  1.14 GBytes  9.80 Gbits/sec  0      3.12 MBytes
[ 5] 6.00-7.00 sec  1.13 GBytes  9.69 Gbits/sec  0      3.12 MBytes
[ 5] 7.00-8.00 sec  1.21 GBytes  10.4 Gbits/sec  0      3.12 MBytes
[ 5] 8.00-9.00 sec  1.13 GBytes  9.71 Gbits/sec  0      3.12 MBytes
[ 5] 9.00-10.00 sec 1.14 GBytes  9.76 Gbits/sec  0      3.12 MBytes
[ 5] 10.00-10.00 sec 1.38 MBytes  8.80 Gbits/sec
[ ID] Interval      Transfer      Bitrate
[ 5] 0.00-10.00 sec 11.3 GBytes  9.73 Gbits/sec
Server listening on 5201 (test #2)
```

```
[root@hq-r ~]# iperf3 -c 10.10.11.1 -f M
Connecting to host 10.10.11.1, port 5201
[ 5] local 10.10.11.2 port 44820 connected to 10.10.11.1 port 5201
[ ID] Interval      Transfer      Bitrate      Retr      Cwnd
[ 5] 0.00-1.00 sec  1.11 GBytes  1135 Mbytes/sec  0      3.12 MBytes
[ 5] 1.00-2.00 sec  1.13 GBytes  1154 Mbytes/sec  0      3.12 MBytes
[ 5] 2.00-3.00 sec  1.13 GBytes  1162 Mbytes/sec  0      3.12 MBytes
[ 5] 3.00-4.00 sec  1.15 GBytes  1177 Mbytes/sec  0      3.12 MBytes
[ 5] 4.00-5.00 sec  1.07 GBytes  1099 Mbytes/sec  0      3.12 MBytes
[ 5] 5.00-6.00 sec  1.14 GBytes  1169 Mbytes/sec  0      3.12 MBytes
[ 5] 6.00-7.00 sec  1.13 GBytes  1155 Mbytes/sec  0      3.12 MBytes
[ 5] 7.00-8.00 sec  1.21 GBytes  1235 Mbytes/sec  0      3.12 MBytes
[ 5] 8.00-9.00 sec  1.13 GBytes  1157 Mbytes/sec  0      3.12 MBytes
[ 5] 9.00-10.00 sec 1.14 GBytes  1163 Mbytes/sec  0      3.12 MBytes
[ ID] Interval      Transfer      Bitrate      Retr
[ 5] 0.00-10.00 sec 11.3 GBytes  1161 Mbytes/sec  0      sender
[ 5] 0.00-10.00 sec 11.3 GBytes  1160 Mbytes/sec  0      receiver
iperf Done.
[root@hq-r ~]#
```

1 модуль 6 задание

Создадим директорию для хранения скрипта резервного копирования `backup-script` и директорию для хранения архивов резервных копий `backup`

```
# mkdir /var/{backup,backup-script}
```

Создадим файл скрипта


```
# nano /var/backup-script/backup.sh
```

Пример скрипта резервного копирования:

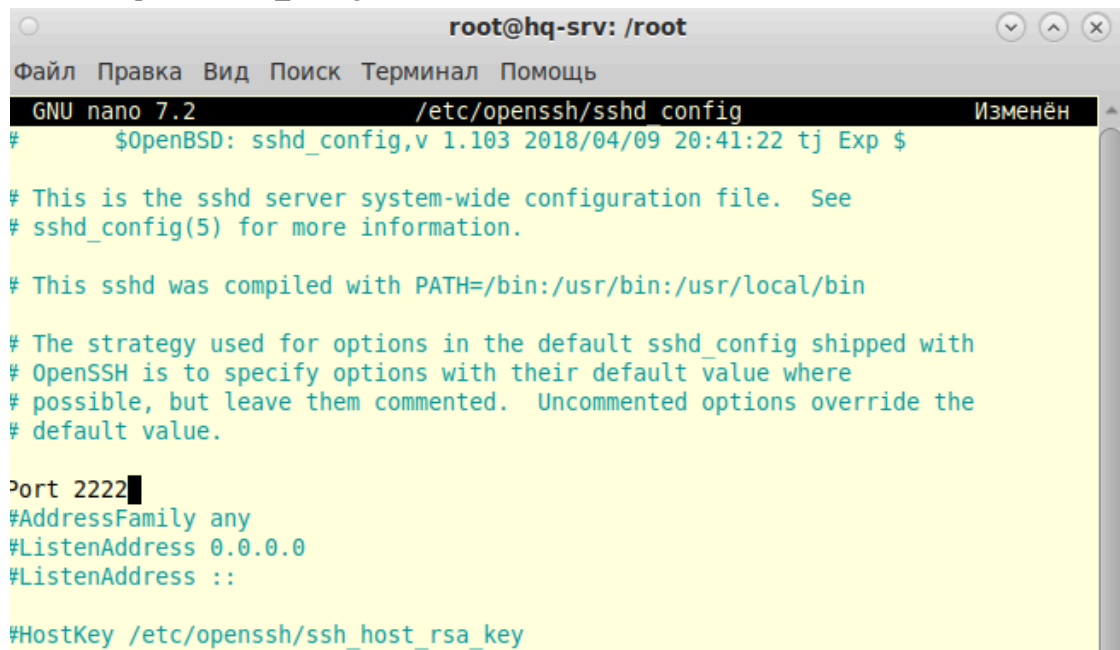
```
#!/bin/bash

data=$(date +%d.%m.%Y-%H:%M:%S)
mkdir /var/backup/$data
cp -r /etc/frr /var/backup/$data
cp -r /etc/nftables /var/backup/$data
cp -r /etc/NetworkManager/system-connections /var/backup/$data
cp -r /etc/dhcp /var/backup/$data
cd /var/backup
tar czf "$data.tar.gz" "$data"
rm -r /var/backup/$data
```

1 модуль 7 задание

[HQ-SRV]

```
nano /etc/openssh/sshd_config
```



```
root@hq-srv: /root
Файл Правка Вид Поиск Терминал Помощь
GNU nano 7.2 /etc/openssh/sshd config Изменён
# $OpenBSD: sshd_config,v 1.103 2018/04/09 20:41:22 tj Exp $

# This is the sshd server system-wide configuration file. See
# sshd_config(5) for more information.

# This sshd was compiled with PATH=/bin:/usr/bin:/usr/local/bin

# The strategy used for options in the default sshd_config shipped with
# OpenSSH is to specify options with their default value where
# possible, but leave them commented. Uncommented options override the
# default value.

Port 2222
#AddressFamily any
#ListenAddress 0.0.0.0
#ListenAddress ::

#HostKey /etc/openssh/ssh_host_rsa_key
```

```
systemctl restart sshd
```

Тестируем подключение. С HQ-R подключаемся к HQ-SRV на порту 2020

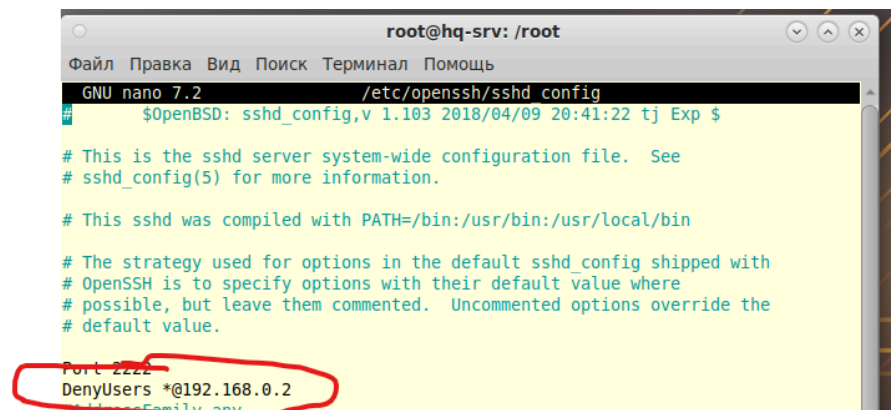
```
[root@hq-r ~]# ssh admin@192.168.1.2 -p 2222
The authenticity of host '[192.168.1.2]:2222 ([192.168.1.2]:2222)' can't be established.
ED25519 key fingerprint is SHA256:zba/tpBkEaLiHuwB18tfaCOC6mobYUGxCk0SZ9znKBw.
Are you sure you want to continue connecting (yes/no)? y
Please type 'yes' or 'no': yes
Warning: Permanently added '[192.168.1.2]:2222' (ED25519) to the list of known hosts.
admin@192.168.1.2's password:
ssh: Permission denied, please try again.
admin@192.168.1.2's password:
[admin@hq-srv ~]$
```

1 модуль 8 задание

[HQ-SRV]

nano /etc/openssh/sshd_config

Вместо 192.168.0.2 указывайте свой если он изменяется, можете вообще заблокировать сеть 192.168.0.* но это не точно



```
root@hq-srv: /root
Файл Правка Вид Поиск Терминал Помощь
GNU nano 7.2 /etc/openssh/sshd_config
# $OpenBSD: sshd_config,v 1.103 2018/04/09 20:41:22 tj Exp $

# This is the sshd server system-wide configuration file. See
# sshd_config(5) for more information.

# This sshd was compiled with PATH=/bin:/usr/bin:/usr/local/bin

# The strategy used for options in the default sshd_config shipped with
# OpenSSH is to specify options with their default value where
# possible, but leave them commented. Uncommented options override the
# default value.

Port 2222
DenyUsers *@192.168.0.2
#DenyUsers Family any
```