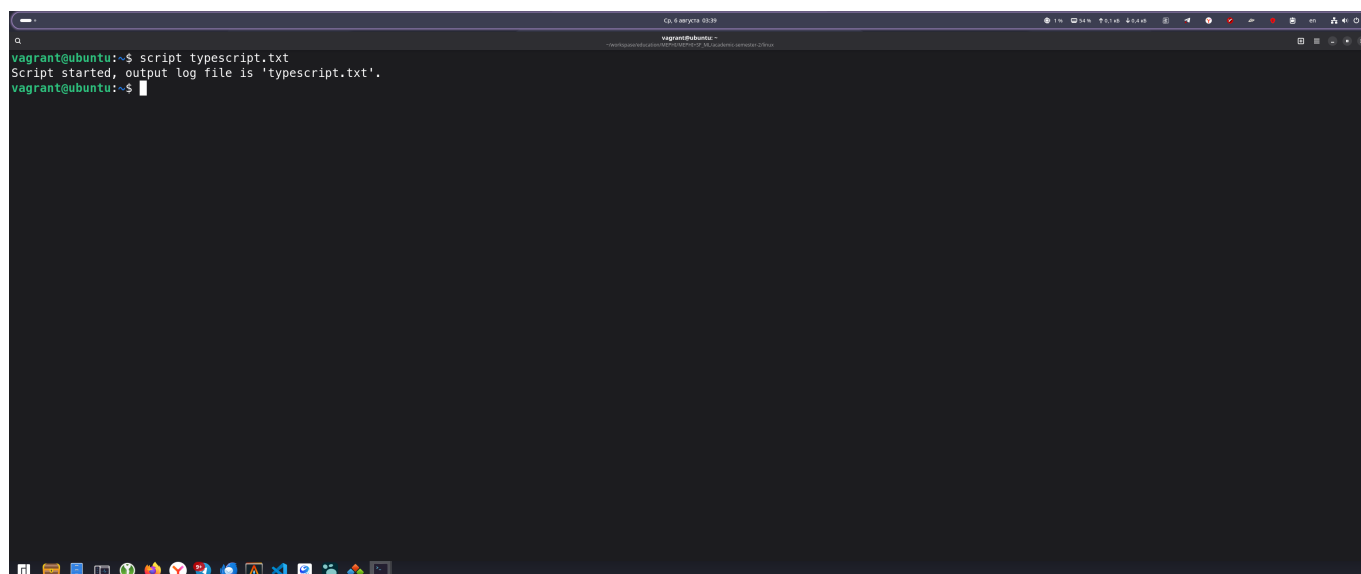


Домашняя работа № 8

Выполнил: Груданов Николай Алексеевич

Запуск записи сессии

```
script typescript.txt
```

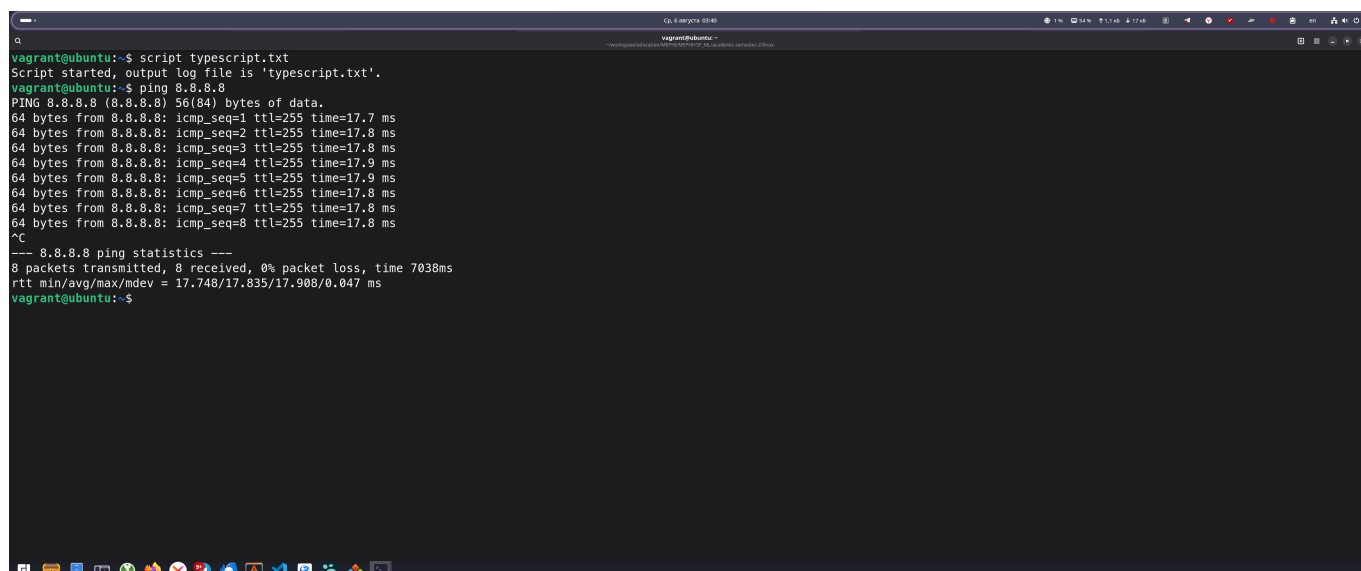


```
vagrant@ubuntu:~$ script typescript.txt
Script started, output log file is 'typescript.txt'.
vagrant@ubuntu:~$
```

Выполнение базовых команд

1. Проверка DNS сервера Google

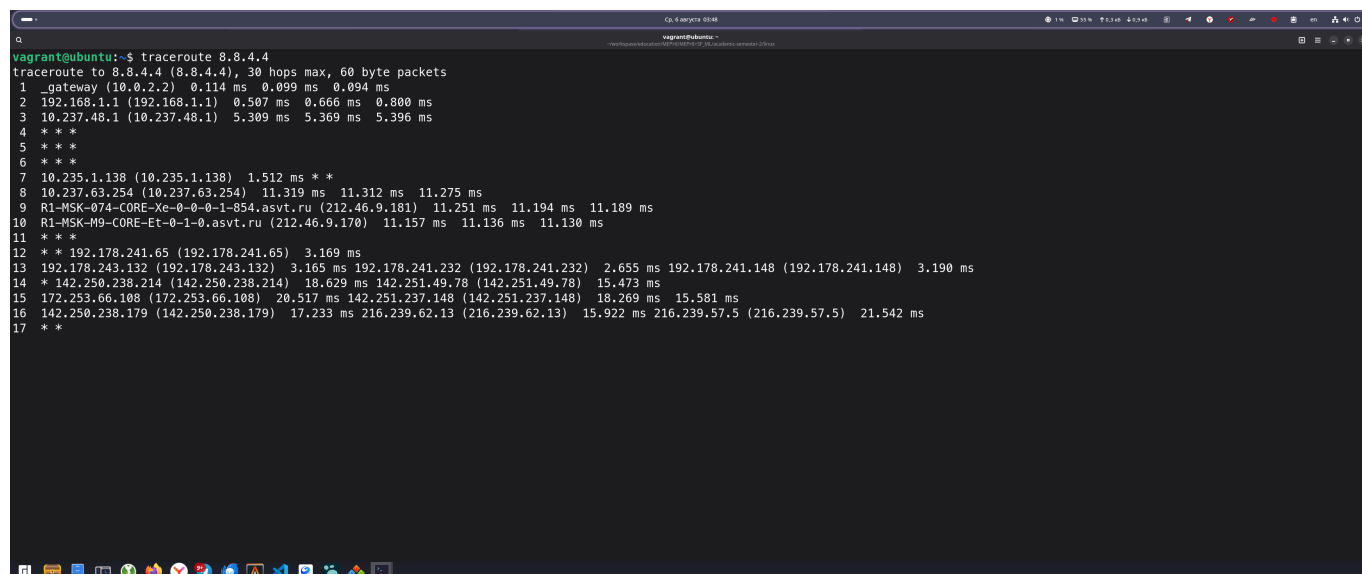
```
ping 8.8.8.8
```



```
vagrant@ubuntu:~$ script typescript.txt
Script started, output log file is 'typescript.txt'.
vagrant@ubuntu:~$ ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data:
64 bytes from 8.8.8.8: icmp_seq=1 ttl=255 time=17.7 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=255 time=17.8 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=255 time=17.8 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=255 time=17.9 ms
64 bytes from 8.8.8.8: icmp_seq=5 ttl=255 time=17.9 ms
64 bytes from 8.8.8.8: icmp_seq=6 ttl=255 time=17.8 ms
64 bytes from 8.8.8.8: icmp_seq=7 ttl=255 time=17.8 ms
64 bytes from 8.8.8.8: icmp_seq=8 ttl=255 time=17.8 ms
^C
--- 8.8.8.8 ping statistics ---
8 packets transmitted, 8 received, 0% packet loss, time 7038ms
rtt min/avg/max/mdev = 17.748/17.835/17.908/0.047 ms
vagrant@ubuntu:~$
```

2. Трассировка маршрута

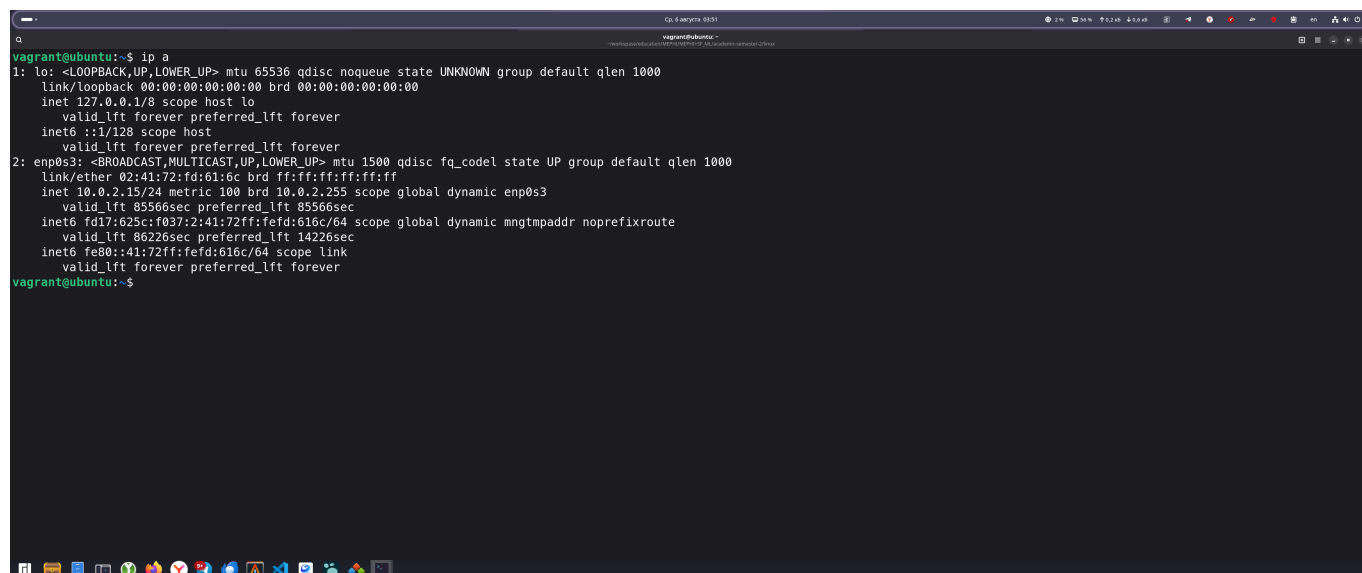
```
traceroute 8.8.4.4
```



```
vagrant@ubuntu:~$ traceroute 8.8.4.4
traceroute to 8.8.4.4 (8.8.4.4), 30 hops max, 60 byte packets
 1  _gateway (10.0.2.2)  0.114 ms  0.099 ms  0.094 ms
 2  192.168.1.1 (192.168.1.1)  0.507 ms  0.666 ms  0.800 ms
 3  10.237.48.1 (10.237.48.1)  5.309 ms  5.369 ms  5.396 ms
 4  * * *
 5  * * *
 6  * * *
 7  10.235.1.138 (10.235.1.138)  1.512 ms  * *
 8  10.237.63.254 (10.237.63.254)  11.319 ms  11.312 ms  11.275 ms
 9  R1-MSK-074-CORE-Xe-0-0-0-1-854.asvt.ru (212.46.9.181)  11.251 ms  11.194 ms  11.189 ms
10  R1-MSK-M9-CORE-Et-0-1-0.asvt.ru (212.46.9.170)  11.157 ms  11.136 ms  11.130 ms
11  * * *
12  * * 192.178.241.65 (192.178.241.65)  3.169 ms
13  192.178.243.132 (192.178.243.132)  3.165 ms  192.178.241.232 (192.178.241.232)  2.655 ms  192.178.241.148 (192.178.241.148)  3.190 ms
14  * 142.250.238.214 (142.250.238.214)  18.629 ms  142.251.49.78 (142.251.49.78)  15.473 ms
15  172.253.66.108 (172.253.66.108)  20.517 ms  142.251.237.148 (142.251.237.148)  18.269 ms  15.581 ms
16  142.250.238.179 (142.250.238.179)  17.233 ms  216.239.62.13 (216.239.62.13)  15.922 ms  216.239.57.5 (216.239.57.5)  21.542 ms
17  * *
```

3. Определение сетевого адреса VM

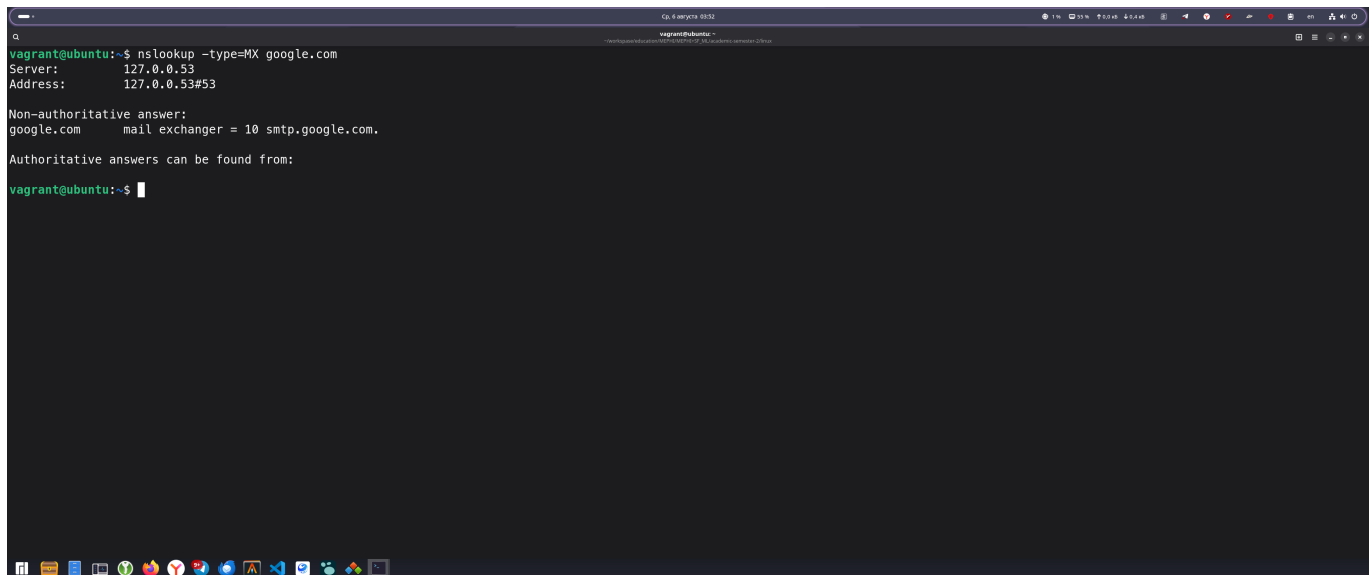
```
ip a
```



```
vagrant@ubuntu:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 02:41:72:fd:61:6c brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 metric 100 brd 10.0.2.255 scope global dynamic enp0s3
        valid_lft 85566sec preferred_lft 85566sec
    inet6 fd17:625c:f037:2:41:72ff:fed:616c/64 scope global dynamic mngtmpaddr noprefixroute
        valid_lft 86226sec preferred_lft 14226sec
    inet6 fe80::41:72ff:fed:616c/64 scope link
        valid_lft forever preferred_lft forever
vagrant@ubuntu:~$
```

4. MX-запись домена

```
nslookup -type=MX google.com
```



```
vagrant@ubuntu:~$ nslookup -type=MX google.com
Server:      127.0.0.53
Address:     127.0.0.53#53

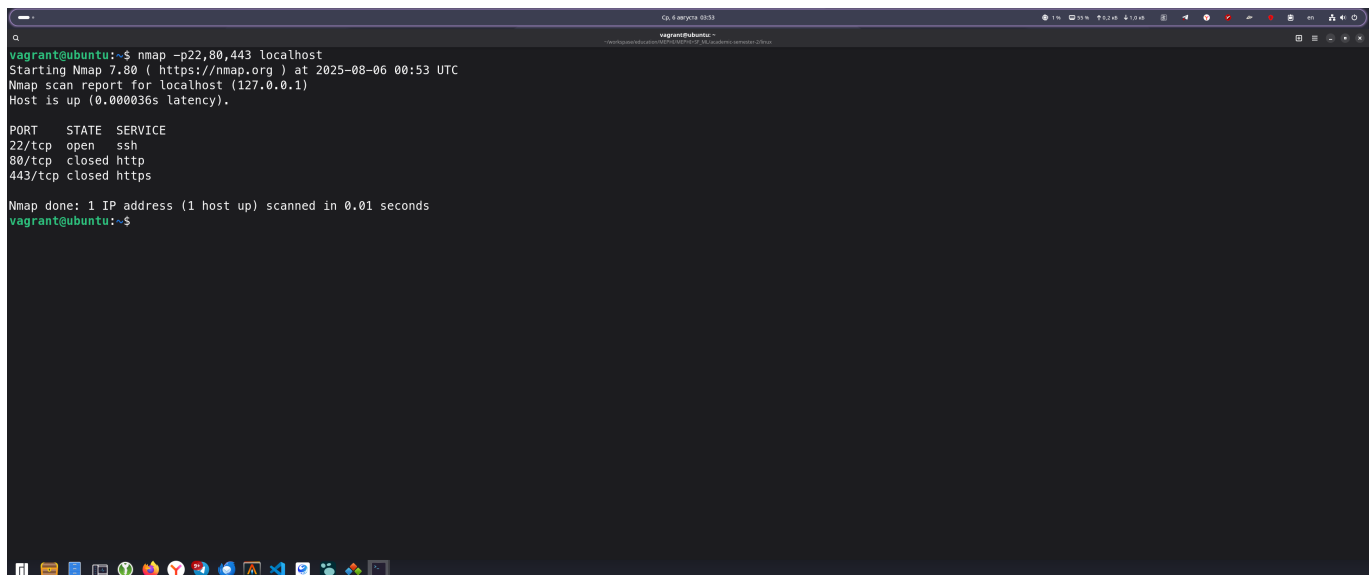
Non-authoritative answer:
google.com   mail exchanger = 10 smtp.google.com.

Authoritative answers can be found from:

vagrant@ubuntu:~$
```

5. Сканирование портов

```
nmap -p22,80,443 localhost
```



```
vagrant@ubuntu:~$ nmap -p22,80,443 localhost
Starting Nmap 7.80 ( https://nmap.org ) at 2025-08-06 00:53 UTC
Nmap scan report for localhost (127.0.0.1)
Host is up (0.000036s latency).

PORT      STATE SERVICE
22/tcp    open  ssh
80/tcp    closed http
443/tcp   closed https

Nmap done: 1 IP address (1 host up) scanned in 0.01 seconds
vagrant@ubuntu:~$
```

6. Запрос DNS информации

```
dig @8.8.8.8 google.com
```

```
22/tcp open  ssh
80/tcp closed http
443/tcp closed https

Nmap done: 1 IP address (1 host up) scanned in 0.01 seconds
vagrant@ubuntu:~$ dig @8.8.8.8 google.com

; <<>> DiG 9.18.30-0ubuntu0.22.04.2-Ubuntu <<>> @8.8.8.8 google.com
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->HEADER<<- opcode: QUERY, status: NOERROR, id: 50774
;; flags: qr rd ra; QUERY: 1, ANSWER: 6, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:;, udp: 512
;; QUESTION SECTION:
;google.com.                IN      A
;; ANSWER SECTION:
google.com.                193     IN      A      173.194.221.139
google.com.                193     IN      A      173.194.221.138
google.com.                193     IN      A      173.194.221.100
google.com.                193     IN      A      173.194.221.102
google.com.                193     IN      A      173.194.221.113
google.com.                193     IN      A      173.194.221.101

;; Query time: 12 msec
;; SERVER: 8.8.8.8#53(8.8.8.8) (UDP)
;; WHEN: Wed Aug 06 00:58:06 UTC 2025
;; MSG SIZE rcvd: 135

vagrant@ubuntu:~$
```

7. Захват сетевого трафика

```
sudo tcpdump > tcp.dump
```

```
vagrant@ubuntu:~$ sudo tcpdump > tcp.dump
tcpdump: verbose output suppressed, use -v[v]... for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), snapshot length 262144 bytes

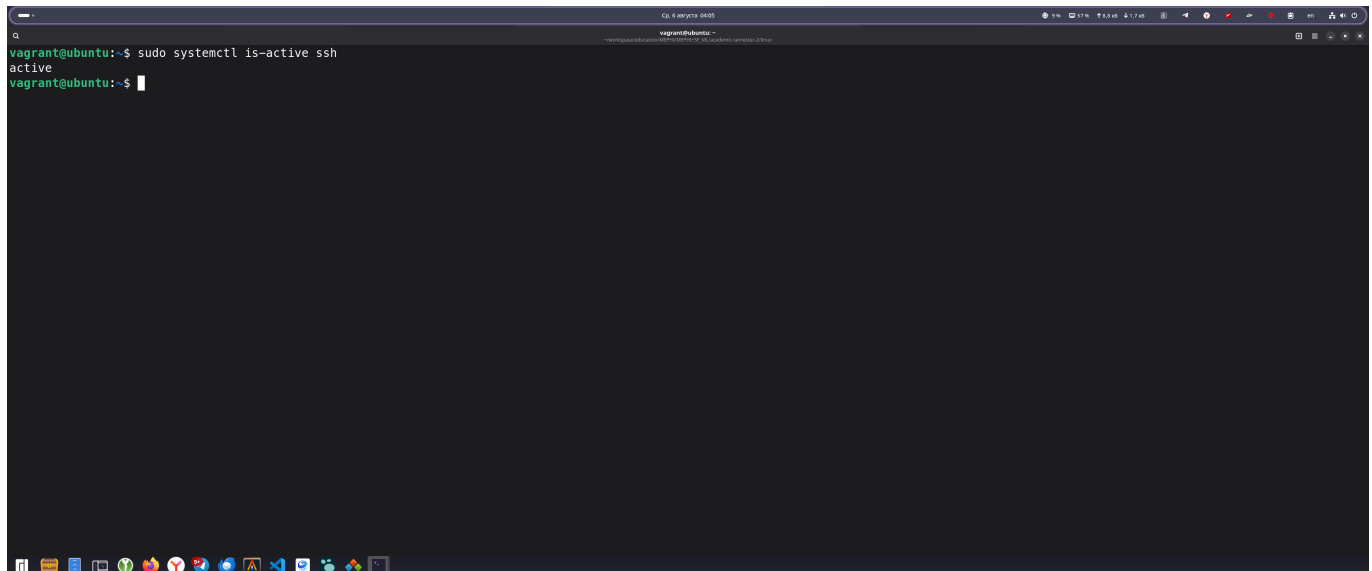
vagrant@ubuntu:~$
```

```
vagrant@ubuntu:~$ sudo tcpdump > tcp.dump
tcpdump: verbose output suppressed, use -v[v]... for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), snapshot length 262144 bytes
^C25 packets captured
27 packets received by filter
0 packets dropped by kernel
vagrant@ubuntu:~$
```

Настройка SSH

1. Проверка службы SSH

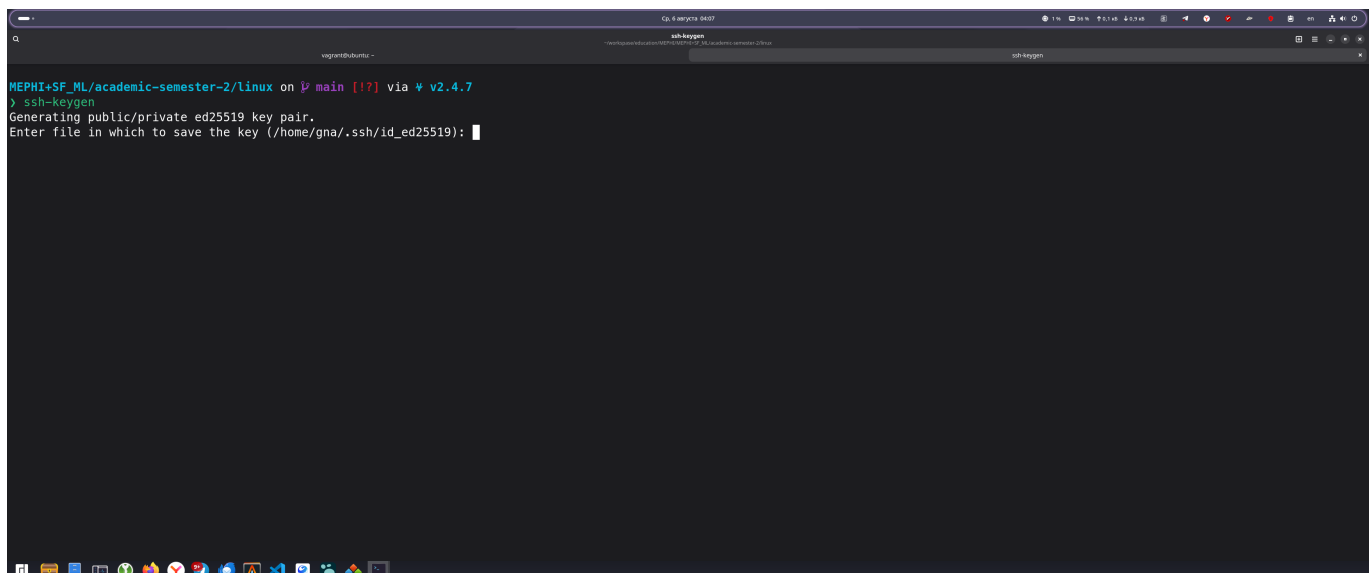
```
sudo systemctl is-active ssh
```



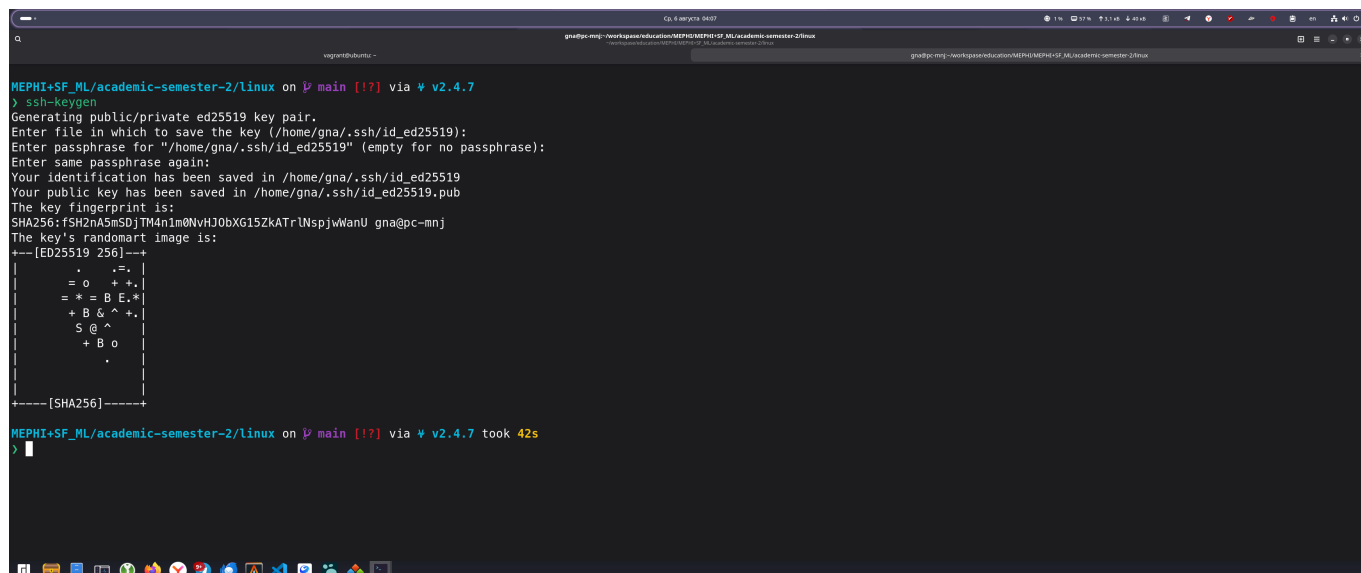
```
q
vagrant@ubuntu:~$ sudo systemctl is-active ssh
active
vagrant@ubuntu:~$
```

2. Создание SSH ключей

```
ssh-keygen
```



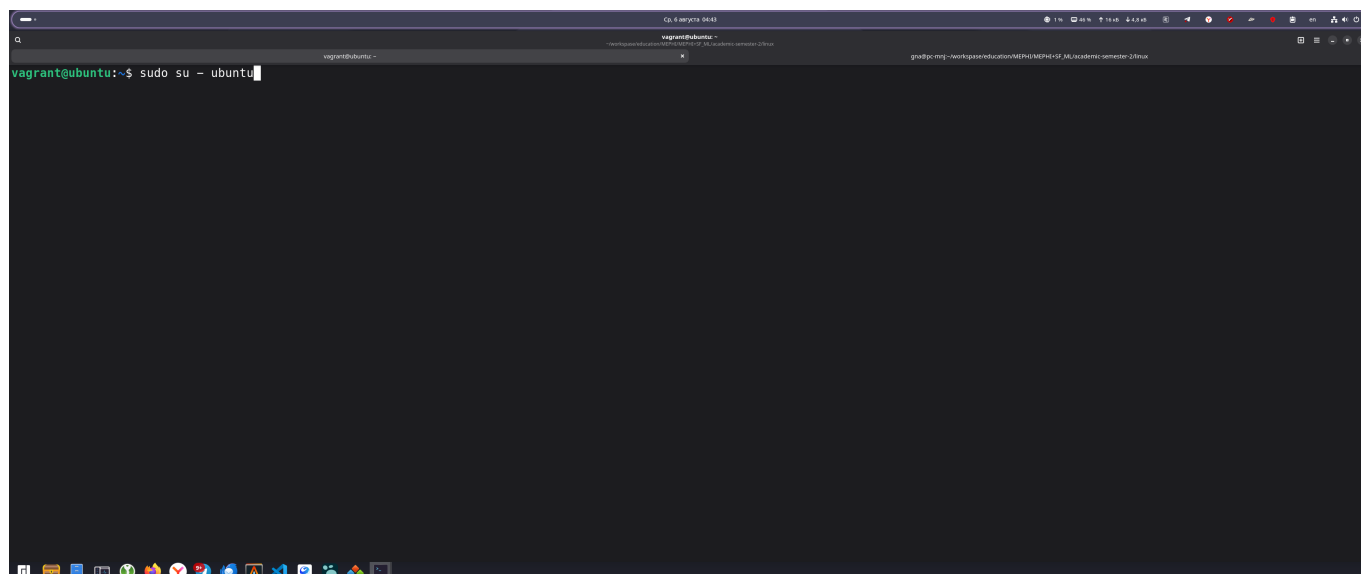
```
MEPHI+SF_ML/academic-semester-2/linux on 17 main [!7] via 2 v2.4.7
> ssh-keygen
Generating public/private ed25519 key pair.
Enter file in which to save the key (/home/gna/.ssh/id_ed25519):
```



```
MEPHI+SF_ML/academic-semester-2/linux on 17 via v2.4.7
> ssh-keygen
Generating public/private ed25519 key pair.
Enter file in which to save the key (/home/gna/.ssh/id_ed25519):
Enter passphrase for "/home/gna/.ssh/id_ed25519" (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/gna/.ssh/id_ed25519
Your public key has been saved in /home/gna/.ssh/id_ed25519.pub
The key fingerprint is:
SHA256:fSH2nA5mSDjTM4n1m0NvHJ0bXG15ZkATrLNsPjWanU gna@pc-mnj
The key's randomart image is:
+--[ED25519 256]--+
|      .  .  .  |
| = 0  +  +  +  |
| = * = B E *   |
| + B & ^ + +   |
| S @ ^         |
| + B 0         |
|              . |
+---[SHA256]-----+
MEPHI+SF_ML/academic-semester-2/linux on 17 via v2.4.7 took 42s
>
```

4. Настройка пользователя ubuntu

```
sudo su - ubuntu
mkdir -p ~/.ssh
vim ~/.ssh/authorized_keys
```



```
vagrant@ubuntu:~$ sudo su - ubuntu
```

```
vagrant@ubuntu:~$ sudo su - ubuntu
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

ubuntu@ubuntu:~$ mkdir -p ~/.ssh
ubuntu@ubuntu:~$ ls -l
total 0
ubuntu@ubuntu:~$ ls -lah
total 28K
drwxr-x--- 3 ubuntu ubuntu 4.0K Aug 6 01:43 .
drwxr-xr-x 4 root root 4.0K Jun 8 18:47 ..
-rw-r----- 1 ubuntu ubuntu 5 Aug 6 01:43 .bash_history
-rw-r----- 1 ubuntu ubuntu 220 Jan 6 2022 .bash_logout
-rw-r----- 1 ubuntu ubuntu 3.7K Jan 6 2022 .bashrc
-rw-r----- 1 ubuntu ubuntu 807 Jan 6 2022 .profile
drwx----- 2 ubuntu ubuntu 4.0K Jun 8 18:47 .ssh
ubuntu@ubuntu:~$
```

Выполняем на хосте

```
MEPHI+SF_ML/academic-semester-2/linux on ♡ main [!?] via ♡ v2.4.7 took 37s
> cd ~/.ssh

~/.ssh
> ls -lah
итого 52K
drwx----- 2 gna gna 4,0K авг 6 04:07 .
drwx----- 74 gna gna 4,0K авг 6 04:49 ..
-rwxr-xr-x 1 gna gna 378 апр 16 18:22 config
-rw-r----- 1 gna gna 399 авг 6 04:07 id_ed25519
-rw-r----- 1 gna gna 92 авг 6 04:07 id_ed25519.pub
-rw-r----- 1 gna gna 419 апр 16 17:43 id_gitverse
-rw-r----- 1 gna gna 110 апр 16 17:43 id_gitverse.pub
-rw-r----- 1 gna gna 3,4K ноя 26 2024 id_rsa
-rw-r----- 1 gna gna 748 ноя 26 2024 id_rsa.pub
-rw-r----- 1 gna gna 2,6K мар 19 2022 id_vpn
-rwxr-xr-x 1 gna gna 595 мар 19 2022 id_vpn.pub
-rw-r----- 1 gna gna 1,8K апр 16 18:06 known_hosts
-rw-r----- 1 gna gna 923 янв 20 2025 known_hosts.old

~/.ssh
>
```

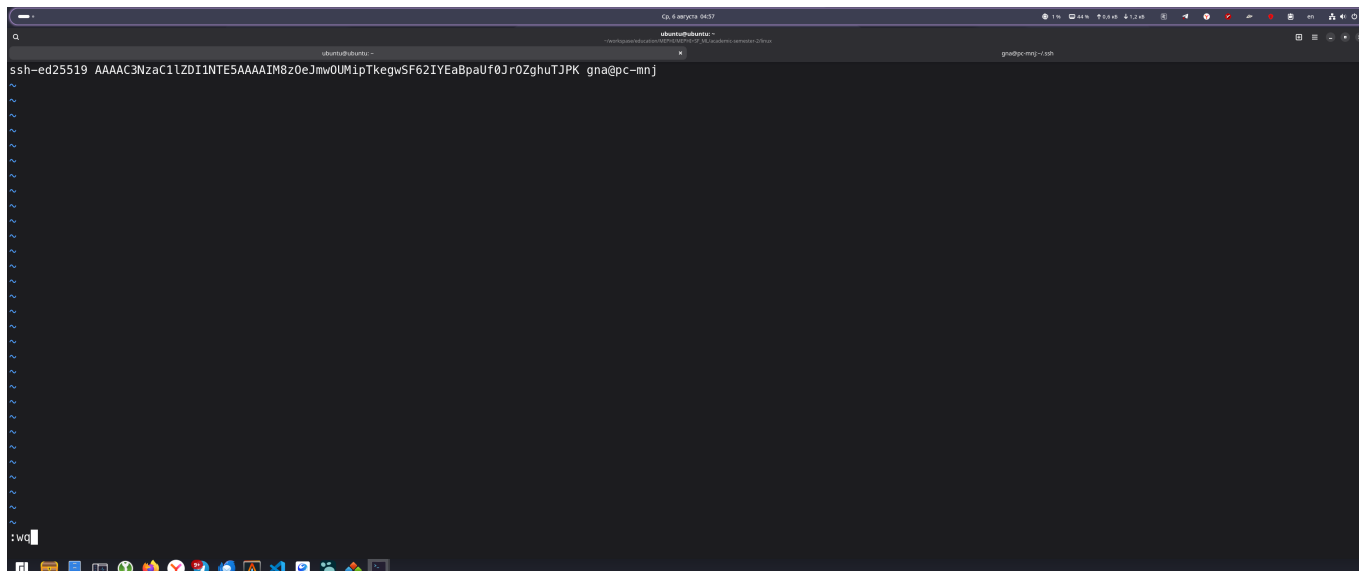
```
MEPHI+SF_ML/academic-semester-2/linux on ♡ main [!?] via ♡ v2.4.7 took 37s
> cd ~/.ssh

~/.ssh
> ls -lah
итого 52K
drwx----- 2 gna gna 4,0K авг 6 04:07 .
drwx----- 74 gna gna 4,0K авг 6 04:49 ..
-rwxr-xr-x 1 gna gna 378 апр 16 18:22 config
-rw-r----- 1 gna gna 399 авг 6 04:07 id_ed25519
-rw-r----- 1 gna gna 92 авг 6 04:07 id_ed25519.pub
-rw-r----- 1 gna gna 419 апр 16 17:43 id_gitverse
-rw-r----- 1 gna gna 110 апр 16 17:43 id_gitverse.pub
-rw-r----- 1 gna gna 3,4K ноя 26 2024 id_rsa
-rw-r----- 1 gna gna 748 ноя 26 2024 id_rsa.pub
-rw-r----- 1 gna gna 2,6K мар 19 2022 id_vpn
-rwxr-xr-x 1 gna gna 595 мар 19 2022 id_vpn.pub
-rw-r----- 1 gna gna 1,8K апр 16 18:06 known_hosts
-rw-r----- 1 gna gna 923 янв 20 2025 known_hosts.old

~/.ssh
> cat id_ed25519.pub
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAIM8z0eJmw0UMipTkegwSF62IYEaBpaUf0Jr0ZghuTJPK gna@pc-mnj

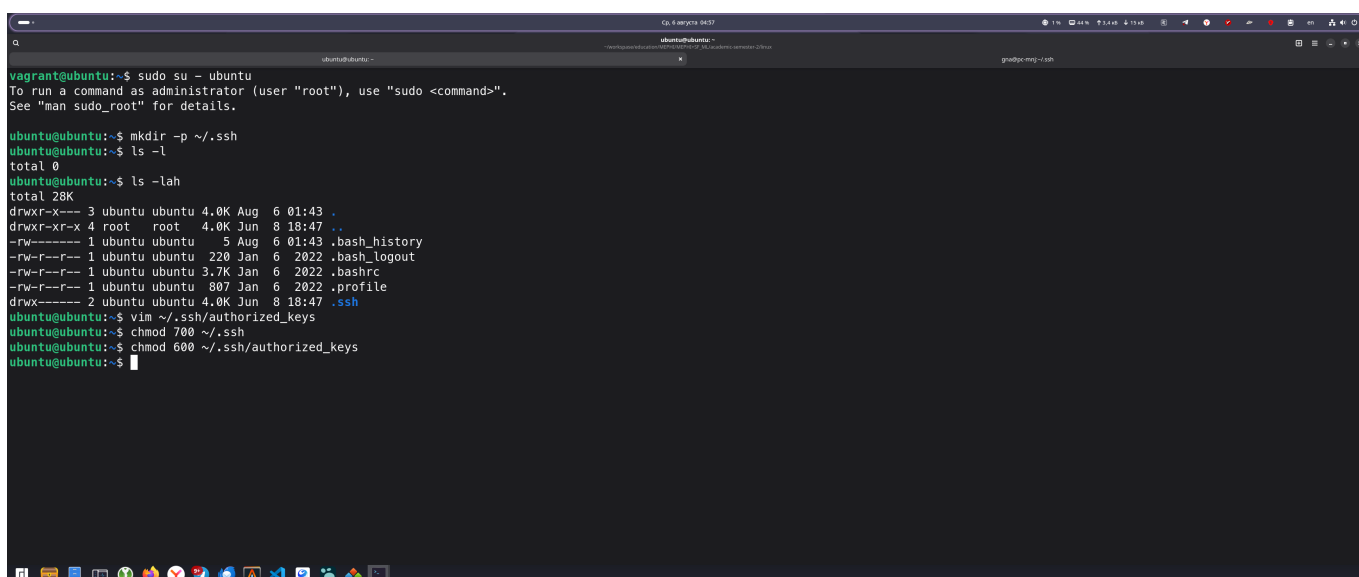
~/.ssh
>
```

Скопируем весь вывод команды `cat ~/.ssh/id_ed25519.pub` и вставим в файл `authorized_keys` на виртуальной машине



5. Настройка прав доступа

```
chmod 700 ~/.ssh
chmod 600 ~/.ssh/authorized_keys
```



6. Создание резервной копии конфигурации

```
sudo cp /etc/ssh/sshd_config /etc/ssh/sshd_config.backup
```



```
vagrant@ubuntu:~$ sudo su - ubuntu
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

ubuntu@ubuntu:~$ mkdir -p ~/.ssh
ubuntu@ubuntu:~$ ls -l
total 0
ubuntu@ubuntu:~$ ls -lah
total 28K
drwxr-x--- 3 ubuntu ubuntu 4.0K Aug 6 01:43 .
drwxr-xr-x 4 root root 4.0K Jun 8 18:47 ..
-rw----- 1 ubuntu ubuntu 5 Aug 6 01:43 .bash_history
-rw-r--r-- 1 ubuntu ubuntu 220 Jan 6 2022 .bash_logout
-rw-r--r-- 1 ubuntu ubuntu 3.7K Jan 6 2022 .bashrc
-rw-r--r-- 1 ubuntu ubuntu 807 Jan 6 2022 .profile
drwx----- 2 ubuntu ubuntu 4.0K Jun 8 18:47 .ssh
ubuntu@ubuntu:~$ vim ~/.ssh/authorized_keys
ubuntu@ubuntu:~$ chmod 700 ~/.ssh
ubuntu@ubuntu:~$ chmod 600 ~/.ssh/authorized_keys
ubuntu@ubuntu:~$ sudo cp /etc/ssh/sshd_config /etc/ssh/sshd_config.backup
ubuntu@ubuntu:~$
```

7. Редактирование конфигурации SSH

```
sudo vim /etc/ssh/sshd_config
```

```
ubuntu@ubuntu:~$ sudo vim /etc/ssh/sshd_config
```

```
#LogLevel INFO

# Authentication:

LoginGraceTime 10s
#PermitRootLogin prohibit-password
#StrictModes yes
MaxAuthTries 2
MaxSessions 2

PubkeyAuthentication yes

# Expect .ssh/authorized_keys2 to be disregarded by default in future.
#AuthorizedKeysFile .ssh/authorized_keys .ssh/authorized_keys2

#AuthorizedPrincipalsFile none

#AuthorizedKeysCommand none
#AuthorizedKeysCommandUser nobody

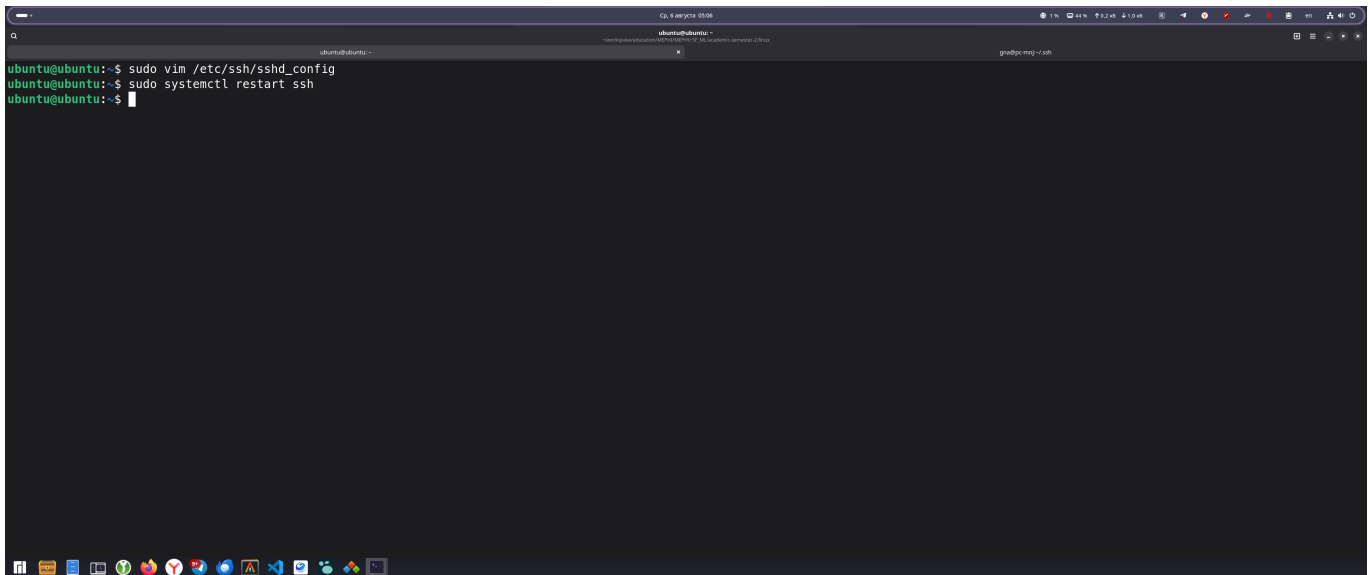
# For this to work you will also need host keys in /etc/ssh/ssh_known_hosts
#HostbasedAuthentication no
# Change to yes if you don't trust ~/.ssh/known_hosts for
# HostbasedAuthentication
#IgnoreUserKnownHosts no
# Don't read the user's ~/.rhosts and ~/.shosts files
#IgnoreRhosts yes

# To disable tunneled clear text passwords, change to no here!
PasswordAuthentication no
PermitEmptyPasswords no
```

33,1 29%

8. Перезапуск службы SSH

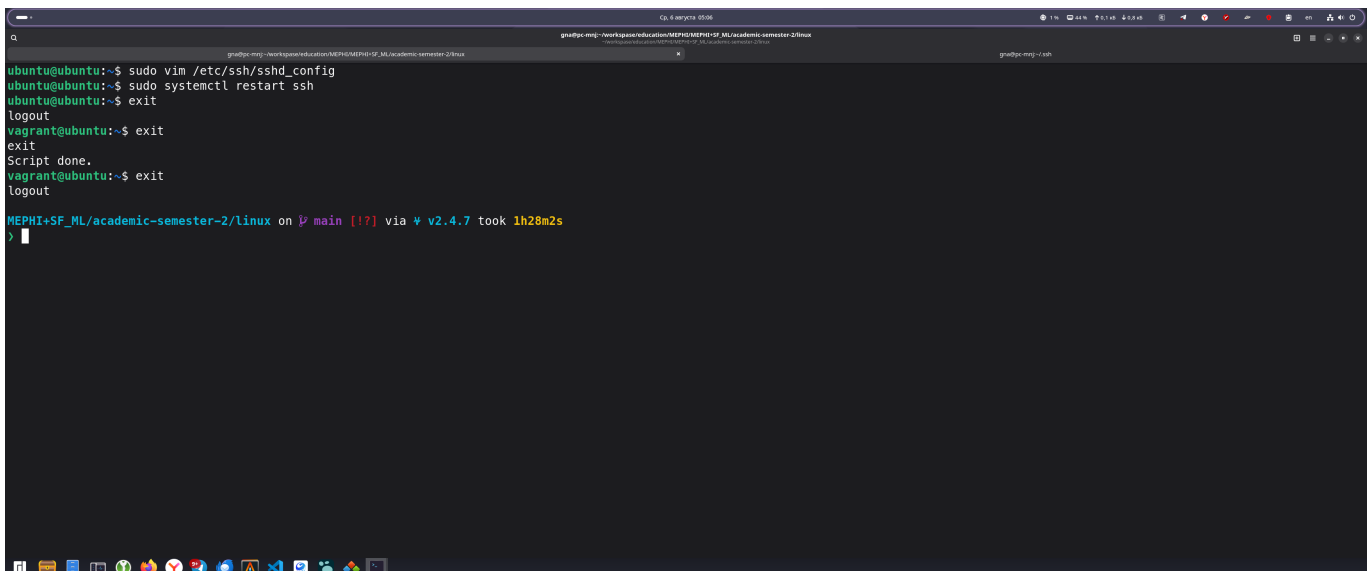
```
sudo systemctl restart ssh
```



```
ubuntu@ubuntu:~$ sudo vim /etc/ssh/sshd_config
ubuntu@ubuntu:~$ sudo systemctl restart ssh
ubuntu@ubuntu:~$
```

9. Выход из VM

```
exit
```



```
ubuntu@ubuntu:~$ sudo vim /etc/ssh/sshd_config
ubuntu@ubuntu:~$ sudo systemctl restart ssh
ubuntu@ubuntu:~$ exit
logout
vagrant@ubuntu:~$ exit
exit
Script done.
vagrant@ubuntu:~$ exit
logout
MEPHI+SF_ML/academic-semester-2/linux on 17 via v v2.4.7 took 1h28m2s
>
```

10. Тестирование подключения с хоста с использованием ключа

```
ssh -p 2222 -i ~/.ssh/id_ed25519 ubuntu@127.0.0.1
```

```
ubuntu@ubuntu:~$ sudo vim /etc/ssh/sshd_config
ubuntu@ubuntu:~$ sudo systemctl restart ssh
ubuntu@ubuntu:~$ exit
logout
vagrant@ubuntu:~$ exit
exit
Script done.
vagrant@ubuntu:~$ exit
logout

MEPH1+SF_ML/academic-semester-2/linux on main via v v2.4.7 took 1h28m2s
> ssh -p 2222 -i ~/.ssh/id_ed25519 ubuntu@127.0.0.1
The authenticity of host '[127.0.0.1]:2222 ([127.0.0.1]:2222)' can't be established.
ED25519 key fingerprint is SHA256:1Uz0dy0Ly8vS2r5J8jZuIq6n5Y/ifuVuyI9Ynch5bNs.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? 
```

```
Memory usage:      10%
Swap usage:        0%
Processes:         103
Users logged in:   0
IPv4 address for enp0s3: 10.0.2.15
IPv6 address for enp0s3: fd17:625c:f037:2:41:72ff:fe6d:616c

* Strictly confined Kubernetes makes edge and IoT secure. Learn how MicroK8s
  just raised the bar for easy, resilient and secure K8s cluster deployment.

https://ubuntu.com/engage/secure-kubernetes-at-the-edge

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

1 additional security update can be applied with ESM Apps.
Learn more about enabling ESM Apps service at https://ubuntu.com/esm

New release '24.04.2 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

ubuntu@ubuntu:~$ 
```