



МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РФ
ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ БЮДЖЕТНОЕ
ОБРАЗОВАТЕЛЬНОЕ УЧРЕЖДЕНИЕ ВЫСШЕГО ОБРАЗОВАНИЯ
«ЛИПЕЦКИЙ ГОСУДАРСТВЕННЫЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ»

Факультет автоматизации и информатики
Кафедра автоматизированных систем управления

Лабораторная работа № 6
по дисциплине “Linux”

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Липецк 2024

1. Смотрим ip

```
maxim_boldyrev@maxbo: ~  
maxim_boldyrev@maxbo:~$ ip a  
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default  
    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 08:00:27:1b:18:81 brd ff:ff:ff:ff:ff:ff  
    inet 192.168.3.16/24 metric 100 brd 192.168.3.255 scope global dynamic enp0s3  
        valid_lft 84664sec preferred_lft 84664sec  
    inet6 fe80::a00:27ff:fe1b:1881/64 scope link  
        valid_lft forever preferred_lft forever  
maxim_boldyrev@maxbo:~$
```

2. Подключаемся по ssh

```
maxim_boldyrev@maxbo: ~  
maxim_boldyrev@maxbo:~$ ip a  
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default  
    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 08:00:27:1b:18:81 brd ff:ff:ff:ff:ff:ff  
    inet 192.168.3.16/24 metric 100 brd 192.168.3.255 scope global dynamic enp0s3  
        valid_lft 84664sec preferred_lft 84664sec  
    inet6 fe80::a00:27ff:fe1b:1881/64 scope link  
        valid_lft forever preferred_lft forever  
maxim_boldyrev@maxbo:~$ ssh maxim_boldyrev@127.0.0.1  
The authenticity of host '127.0.0.1 (127.0.0.1)' can't be established.  
ED25519 key fingerprint is SHA256:FSZI6f24xI39oqvul28YLNW3zZuu7Ctr5WffeAtiW0A.  
This host key is known by the following other names/addresses:  
  ~/.ssh/known_hosts:1: [hashed name]  
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes  
Warning: Permanently added '127.0.0.1' (ED25519) to the list of known hosts.  
maxim_boldyrev@127.0.0.1's password:
```

3. Генерируем ключ

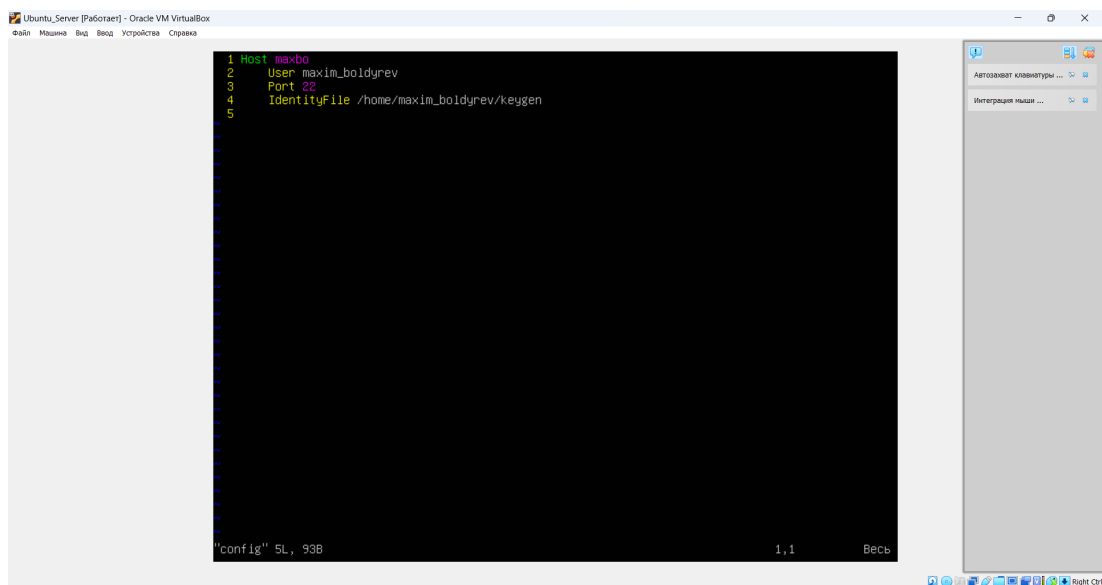
```
maxim_boldyrev@maxbo: ~  
* Support:      https://ubuntu.com/advantage  
  
System information as of Чт 07 дек 2023 16:02:29 UTC  
  
System load: 0.0107421875      Processes:      164  
Usage of /: 28.6% of 30.83GB    Users logged in: 1  
Memory usage: 5%               IPv4 address for enp0s3: 192.168.3.16  
Swap usage: 0%  
  
Расширенное поддержание безопасности (ESM) для Applications выключено.  
  
94 обновления может быть применено немедленно.  
58 из этих обновлений, являются стандартными обновлениями безопасности.  
Чтобы просмотреть дополнительные обновления выполните: apt list --upgradable  
  
Включите ESM Apps для получения дополнительных будущих обновлений безопасности.  
Смотрите https://ubuntu.com/esm или выполните: sudo pro status  
  
Last login: Thu Dec 7 16:00:17 2023 from 192.168.3.5  
maxim_boldyrev@maxbo:~$ ssh-keygen  
Generating public/private rsa key pair.  
Enter file in which to save the key (/home/maxim_boldyrev/.ssh/id_rsa):
```

```
maxim_boldyrev@maxbo: ~/.ssh  
maxim_boldyrev@maxbo:~/.ssh$ ssh-keygen  
Generating public/private rsa key pair.  
Enter file in which to save the key (/home/maxim_boldyrev/.ssh/id_rsa): keygen  
Enter passphrase (empty for no passphrase):  
Enter same passphrase again:  
Your identification has been saved in keygen  
Your public key has been saved in keygen.pub  
The key fingerprint is:  
SHA256:i6K0DmElDdfgvhtDlv/nPH3icuHjLAn0N/povJUn3dE maxim_boldyrev@maxbo  
The key's randomart image is:  
+---[RSA 3072]-----+  
| . oo                |  
| = .                 |  
| . +                 |  
| + . .               |  
|.. = . S             .E|  
|..o o o o +o . .|  
|. .+... + *+oo . |  
| o o+.. .X+*o.  |  
|. +. . +=X=+      |  
+----[SHA256]-----+  
maxim_boldyrev@maxbo:~/.ssh$
```

4. Перемещаем файл конфигурации

Левая панель		Файл	Команда
< ~/.ssh			
.и	Имя	Размер	
/..		-ВВЕРХ-	
authorized_keys		570	

5. Смотрим файл конфигурации

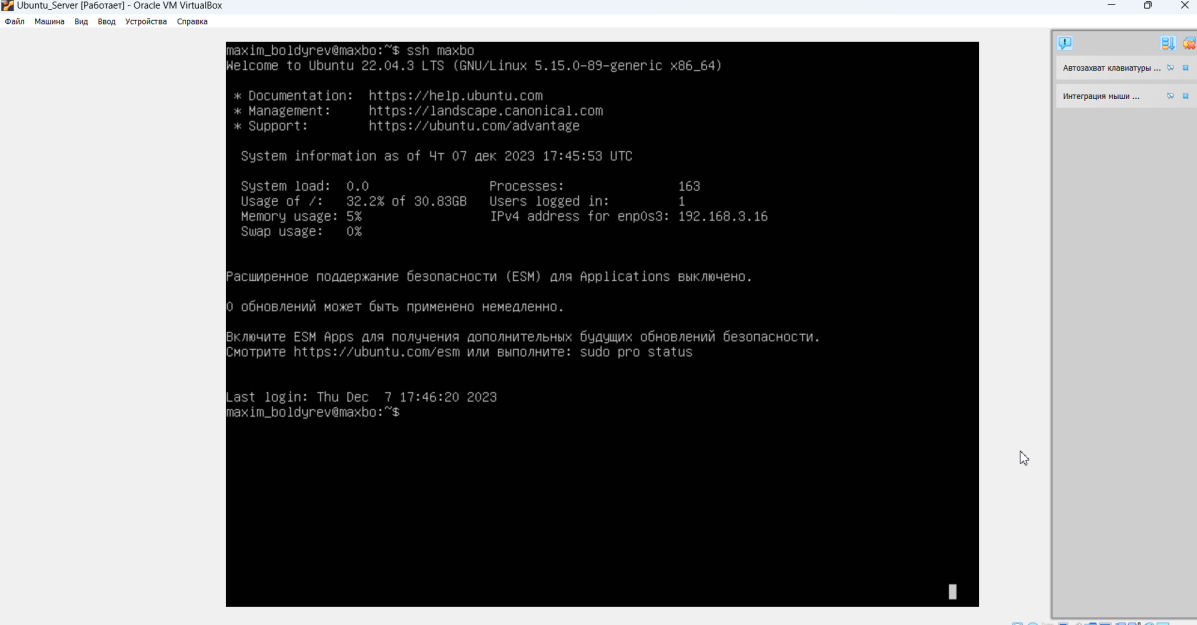


The screenshot shows a terminal window titled "Ubuntu_Server [Paforgae] - Oracle VM VirtualBox". The terminal displays the following configuration for the host:

```
1 host maxbo
2 User maxim_boldyrev
3 Port 22
4 IdentityFile /home/maxim_boldyrev/keygen
5
```

At the bottom of the terminal, it says "config" 5L, 98B and "1,1" and "Весь".

6. Входим без пароля



The screenshot shows a terminal window titled "Ubuntu_Server (Рабочий) - Oracle VM VirtualBox". The terminal output is as follows:

```
maxim_boldyrev@maxbo:~$ ssh maxbo
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 5.15.0-89-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

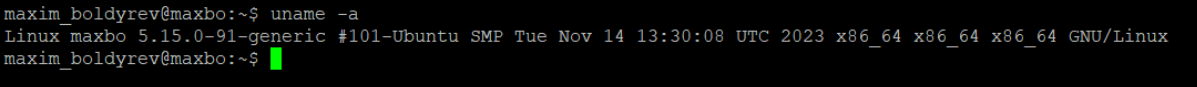
System information as of 4т 07 дек 2023 17:45:53 UTC

System load:  0.0               Processes:    163
Usage of /:   32.2% of 30.83GB   Users logged in: 1
Memory usage: 5%               IPv4 address for enp0s3: 192.168.3.16
Swap usage:  0%

Расширенное поддержание безопасности (ESM) для Applications выключено.
0 обновлений может быть применено немедленно.
Включите ESM Apps для получения дополнительных будущих обновлений безопасности.
Смотрите https://ubuntu.com/esm или выполните: sudo pro status

Last login: Thu Dec  7 17:46:20 2023
maxim_boldyrev@maxbo:~$
```

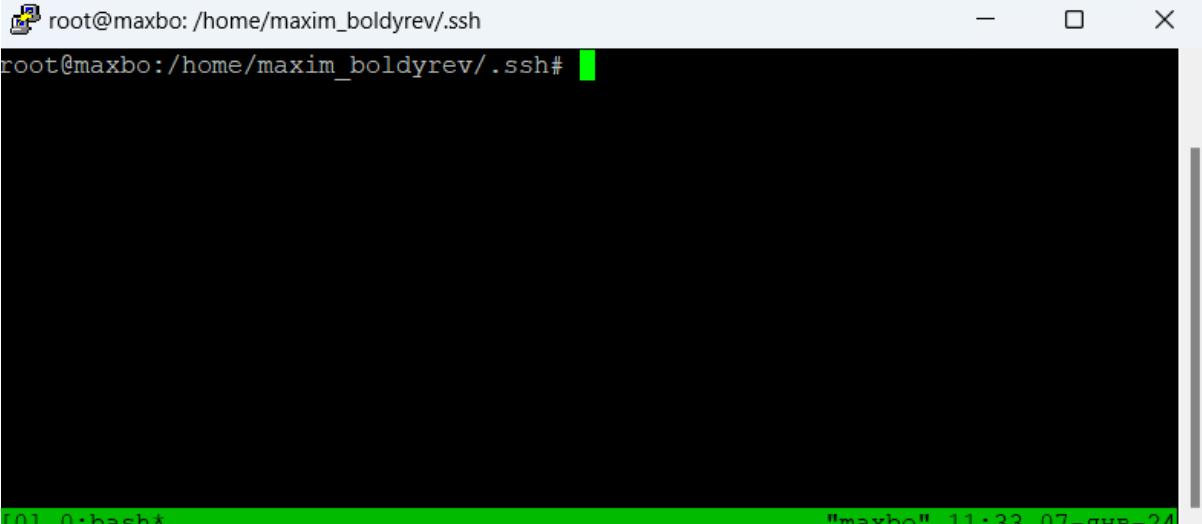
7. Смотрим информацию о системе



The screenshot shows a terminal window with the following output:

```
maxim_boldyrev@maxbo:~$ uname -a
Linux maxbo 5.15.0-91-generic #101-Ubuntu SMP Tue Nov 14 13:30:08 UTC 2023 x86_64 x86_64 x86_64 GNU/Linux
maxim_boldyrev@maxbo:~$
```

8. Запускаем tmux



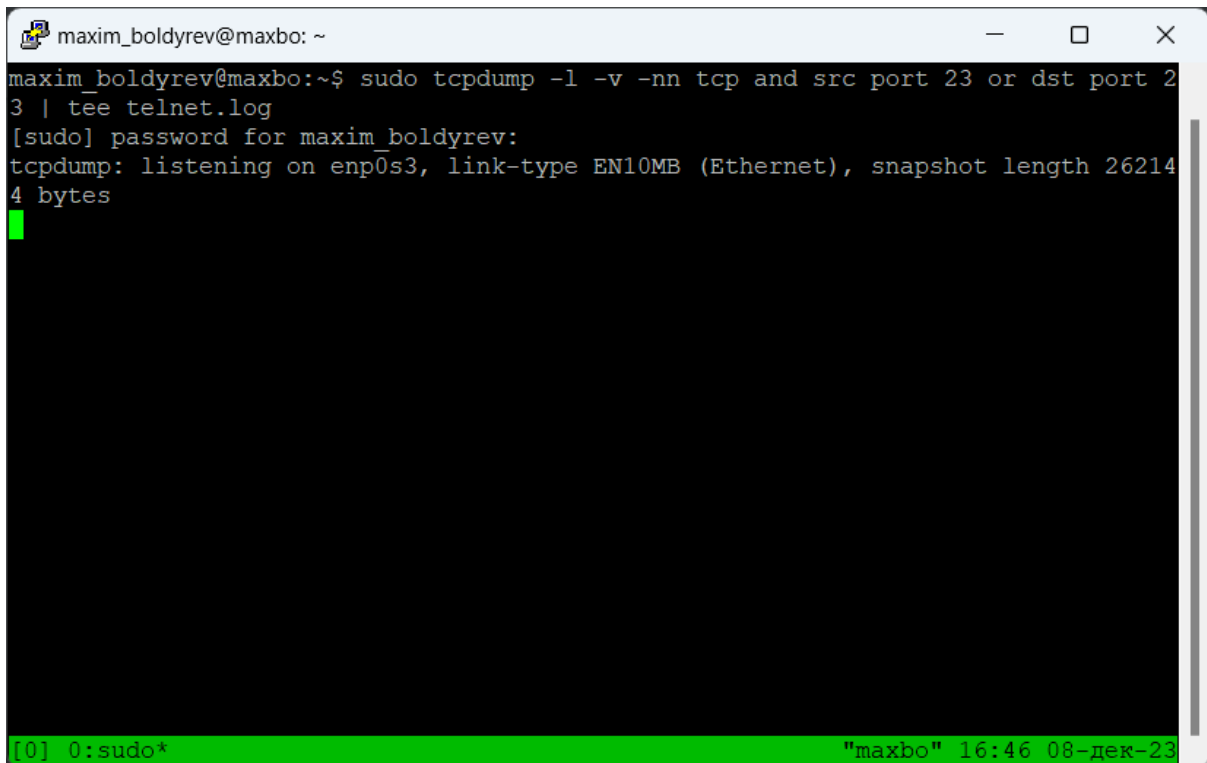
The screenshot shows a tmux terminal window titled "root@maxbo: /home/maxim_boldyrev/.ssh". The terminal output is as follows:

```
root@maxbo: /home/maxim_boldyrev/.ssh#
```

At the bottom of the window, there is a green status bar with the following text:

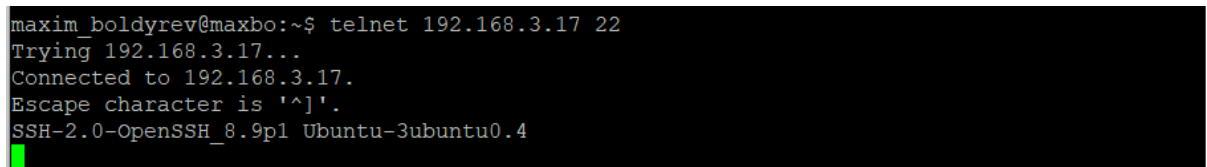
```
[0] 0:bash* "maxbo" 11:33 07-январь-24
```

9. Запускаем tcpdump по порту 23

A terminal window titled 'maxim_boldyrev@maxbo: ~' with standard window controls. The terminal shows the command 'sudo tcpdump -l -v -nn tcp and src port 23 or dst port 23 | tee telnet.log' being executed. It prompts for a password, then shows 'tcpdump: listening on enp0s3, link-type EN10MB (Ethernet), snapshot length 262144 bytes'. A green status bar at the bottom displays '[0] 0:sudo*' on the left and '"maxbo" 16:46 08-дек-23' on the right.

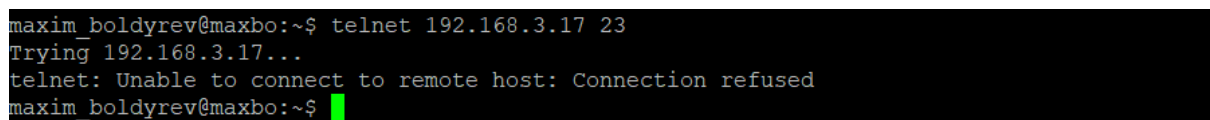
```
maxim_boldyrev@maxbo:~$ sudo tcpdump -l -v -nn tcp and src port 23 or dst port 23 | tee telnet.log
[sudo] password for maxim_boldyrev:
tcpdump: listening on enp0s3, link-type EN10MB (Ethernet), snapshot length 262144 bytes
```

10. Установка соединения с удаленной системой по 22 порту

A terminal window showing a successful telnet connection to 192.168.3.17 on port 22. The output shows the connection attempt, success message, escape character, and SSH banner.

```
maxim_boldyrev@maxbo:~$ telnet 192.168.3.17 22
Trying 192.168.3.17...
Connected to 192.168.3.17.
Escape character is '^]'.
SSH-2.0-OpenSSH_8.9p1 Ubuntu-3ubuntu0.4
```

11. Установка соединения с удаленной системой по 23 порту. Получаем ошибку

A terminal window showing a failed telnet connection to 192.168.3.17 on port 23. The output shows the connection attempt and the 'Connection refused' error message.

```
maxim_boldyrev@maxbo:~$ telnet 192.168.3.17 23
Trying 192.168.3.17...
telnet: Unable to connect to remote host: Connection refused
maxim_boldyrev@maxbo:~$
```

12. Содержимое файла telnet.log

```

n 502, options [nop,nop,TS val 1211959124 ecr 1710431442], length 0
15:01:18.373444 IP (tos 0x0, ttl 64, id 15535, offset 0, flags [DF], proto TCP (6), length 93)
    192.168.0.104.22 > 192.168.0.102.47728: Flags [P.], cksum 0xb350 (correct), seq 1:42, ack 1, win
    510, options [nop,nop,TS val 1710431456 ecr 1211959124], length 41: SSH: SSH-2.0-OpenSSH_8.9p1 Ubuntu-3ubuntu0.6
15:01:18.373495 IP (tos 0x10, ttl 64, id 48847, offset 0, flags [DF], proto TCP (6), length 52)
    192.168.0.102.47728 > 192.168.0.104.22: Flags [.], cksum 0x8245 (incorrect -> 0xe078), ack 42, u
in 502, options [nop,nop,TS val 1211959139 ecr 1710431456], length 0
15:01:43.962360 IP (tos 0x10, ttl 64, id 48848, offset 0, flags [DF], proto TCP (6), length 57)
    192.168.0.102.47728 > 192.168.0.104.22: Flags [P.], cksum 0x824a (incorrect -> 0x7683), seq 1:6
ack 42, win 502, options [nop,nop,TS val 1211984728 ecr 1710431456], length 5
15:01:43.963310 IP (tos 0x0, ttl 64, id 15536, offset 0, flags [DF], proto TCP (6), length 52)
    192.168.0.104.22 > 192.168.0.102.47728: Flags [.], cksum 0x187f (correct), ack 6, win 510, optio
ns [nop,nop,TS val 1710457047 ecr 1211984728], length 0
15:01:44.562798 IP (tos 0x10, ttl 64, id 48849, offset 0, flags [DF], proto TCP (6), length 54)
    192.168.0.102.47728 > 192.168.0.104.22: Flags [P.], cksum 0x8247 (incorrect -> 0x091b), seq 6:8
ack 42, win 502, options [nop,nop,TS val 1211985328 ecr 1710457047], length 2
15:01:44.563586 IP (tos 0x0, ttl 64, id 15537, offset 0, flags [DF], proto TCP (6), length 52)
    192.168.0.104.22 > 192.168.0.102.47728: Flags [.], cksum 0x13cd (correct), ack 8, win 510, optio
ns [nop,nop,TS val 1710457647 ecr 1211985328], length 0
15:01:44.564801 IP (tos 0x0, ttl 64, id 15538, offset 0, flags [DF], proto TCP (6), length 86)
    192.168.0.104.22 > 192.168.0.102.47728: Flags [P.], cksum 0x9173 (correct), seq 42:76, ack 8, w
in 510, options [nop,nop,TS val 1710457648 ecr 1211985328], length 34
15:01:44.564829 IP (tos 0x10, ttl 64, id 48850, offset 0, flags [DF], proto TCP (6), length 52)
    192.168.0.102.47728 > 192.168.0.104.22: Flags [.], cksum 0x8245 (incorrect -> 0x13b0), ack 76, u
in 502, options [nop,nop,TS val 1211985330 ecr 1710457648], length 0
15:01:44.565803 IP (tos 0x0, ttl 64, id 15539, offset 0, flags [DF], proto TCP (6), length 54)
    192.168.0.104.22 > 192.168.0.102.47728: Flags [FP.], cksum 0x0694 (correct), seq 76:78, ack 8, u
in 510, options [nop,nop,TS val 1710457649 ecr 1211985328], length 2
15:01:44.565927 IP (tos 0x10, ttl 64, id 48851, offset 0, flags [DF], proto TCP (6), length 52)
    192.168.0.102.47728 > 192.168.0.104.22: Flags [F.], cksum 0x8245 (incorrect -> 0x13aa), seq 8, a
ck 79, win 502, options [nop,nop,TS val 1211985331 ecr 1710457649], length 0
15:01:44.566507 IP (tos 0x0, ttl 64, id 15540, offset 0, flags [DF], proto TCP (6), length 52)
    192.168.0.104.22 > 192.168.0.102.47728: Flags [.], cksum 0x13a1 (correct), ack 9, win 510, optio
ns [nop,nop,TS val 1710457650 ecr 1211985331], length 0

```

13. Содержимое файла ssh.log

```

192.168.0.102.49552 > 192.168.0.104.22: Flags [P.], cksum 0x82c9 (incorrect -> 0x2dc1), seq 3526
:3658, ack 3374, win 501, options [nop,nop,TS val 1211683787 ecr 1710156105], length 132
14:56:43.023216 IP (tos 0x8, ttl 64, id 15487, offset 0, flags [DF], proto TCP (6), length 88)
192.168.0.104.22 > 192.168.0.102.49552: Flags [P.], cksum 0xb3f0 (correct), seq 3374:3410, ack 3
658, win 501, options [nop,nop,TS val 1710156107 ecr 1211683787], length 36
14:56:43.023779 IP (tos 0x8, ttl 64, id 21529, offset 0, flags [DF], proto TCP (6), length 88)
192.168.0.102.49552 > 192.168.0.104.22: Flags [P.], cksum 0x8269 (incorrect -> 0x8ab9), seq 3658
:3694, ack 3410, win 501, options [nop,nop,TS val 1211683789 ecr 1710156107], length 36
14:56:43.028360 IP (tos 0x8, ttl 64, id 15488, offset 0, flags [DF], proto TCP (6), length 88)
192.168.0.104.22 > 192.168.0.102.49552: Flags [P.], cksum 0x1184 (correct), seq 3410:3446, ack 3
694, win 501, options [nop,nop,TS val 1710156112 ecr 1211683789], length 36
14:56:43.030064 IP (tos 0x8, ttl 64, id 15489, offset 0, flags [DF], proto TCP (6), length 140)
192.168.0.104.22 > 192.168.0.102.49552: Flags [P.], cksum 0x870f (correct), seq 3446:3534, ack 3
694, win 501, options [nop,nop,TS val 1710156114 ecr 1211683789], length 88
14:56:43.030256 IP (tos 0x8, ttl 64, id 21530, offset 0, flags [DF], proto TCP (6), length 52)
192.168.0.102.49552 > 192.168.0.104.22: Flags [P.], cksum 0x8245 (incorrect -> 0x2f7c), ack 3534
, win 501, options [nop,nop,TS val 1211683796 ecr 1710156112], length 0
14:56:43.030424 IP (tos 0x8, ttl 64, id 21531, offset 0, flags [DF], proto TCP (6), length 88)
192.168.0.102.49552 > 192.168.0.104.22: Flags [P.], cksum 0x8269 (incorrect -> 0x6385), seq 3694
:3730, ack 3534, win 501, options [nop,nop,TS val 1211683796 ecr 1710156112], length 36
14:56:43.030562 IP (tos 0x8, ttl 64, id 21532, offset 0, flags [DF], proto TCP (6), length 112)
192.168.0.102.49552 > 192.168.0.104.22: Flags [P.], cksum 0x8281 (incorrect -> 0xce05), seq 3730
:3790, ack 3534, win 501, options [nop,nop,TS val 1211683796 ecr 1710156112], length 60
14:56:43.030694 IP (tos 0x8, ttl 64, id 21533, offset 0, flags [DF], proto TCP (6), length 52)
192.168.0.102.49552 > 192.168.0.104.22: Flags [F.], cksum 0x8245 (incorrect -> 0x2f1b), seq 3790
, ack 3534, win 501, options [nop,nop,TS val 1211683796 ecr 1710156112], length 0
14:56:43.032495 IP (tos 0x8, ttl 64, id 15490, offset 0, flags [DF], proto TCP (6), length 52)
192.168.0.104.22 > 192.168.0.102.49552: Flags [P.], cksum 0x2f17 (correct), ack 3791, win 501, op
tions [nop,nop,TS val 1710156116 ecr 1211683796], length 0
14:56:43.044979 IP (tos 0x8, ttl 64, id 15491, offset 0, flags [DF], proto TCP (6), length 52)
192.168.0.104.22 > 192.168.0.102.49552: Flags [F.], cksum 0x2f09 (correct), seq 3534, ack 3791,
win 501, options [nop,nop,TS val 1710156129 ecr 1211683796], length 0
14:56:43.045029 IP (tos 0x8, ttl 64, id 0, offset 0, flags [DF], proto TCP (6), length 52)
192.168.0.102.49552 > 192.168.0.104.22: Flags [P.], cksum 0x2efb (correct), ack 3535, win 501, op
tions [nop,nop,TS val 1211683810 ecr 1710156129], length 0

```