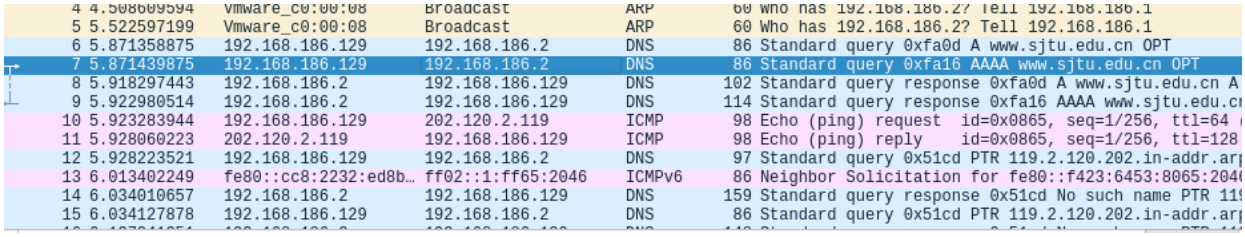
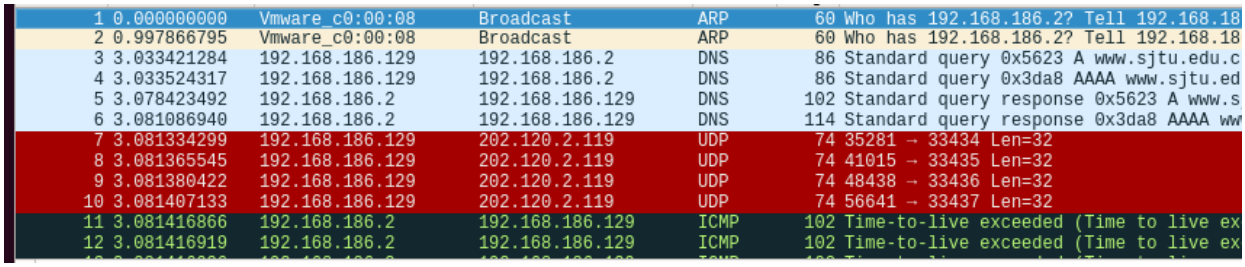
1.



4	4.508609594	Vmware_c0:00:08	Broadcast	ARP	60 Who has 192.168.186.2? Tell 192.168.186.1
5	5.522597199	Vmware_c0:00:08	Broadcast	ARP	60 Who has 192.168.186.2? Tell 192.168.186.1
6	5.871358875	192.168.186.129	192.168.186.2	DNS	86 Standard query 0xfa0d A www.sjtu.edu.cn OPT
7	5.871439875	192.168.186.129	192.168.186.2	DNS	86 Standard query 0xfa16 AAAA www.sjtu.edu.cn OPT
8	5.918297443	192.168.186.2	192.168.186.129	DNS	102 Standard query response 0xfa0d A www.sjtu.edu.cn A
9	5.922980514	192.168.186.2	192.168.186.129	DNS	114 Standard query response 0xfa16 AAAA www.sjtu.edu.cn
10	5.923283944	192.168.186.129	202.120.2.119	ICMP	98 Echo (ping) request id=0x0865, seq=1/256, ttl=64
11	5.928060223	202.120.2.119	192.168.186.129	ICMP	98 Echo (ping) reply id=0x0865, seq=1/256, ttl=128
12	5.928223521	192.168.186.129	192.168.186.2	DNS	97 Standard query 0x51cd PTR 119.2.120.202.in-addr.arpa
13	6.013402249	fe80::cc8:2232:ed8b…	ff02::1:ff65:2046	ICMPv6	86 Neighbor Solicitation for fe80::f423:6453:8065:2046
14	6.034010657	192.168.186.2	192.168.186.129	DNS	159 Standard query response 0x51cd No such name PTR 119
15	6.034127878	192.168.186.129	192.168.186.2	DNS	86 Standard query 0x51cd PTR 119.2.120.202.in-addr.arpa

Ping uses DNS.



1	0.000000000	Vmware_c0:00:08	Broadcast	ARP	60 Who has 192.168.186.2? Tell 192.168.18
2	0.997866795	Vmware_c0:00:08	Broadcast	ARP	60 Who has 192.168.186.2? Tell 192.168.18
3	3.033421284	192.168.186.129	192.168.186.2	DNS	86 Standard query 0x5623 A www.sjtu.edu.c
4	3.033524317	192.168.186.129	192.168.186.2	DNS	86 Standard query 0x3da8 AAAA www.sjtu.ed
5	3.078423492	192.168.186.2	192.168.186.129	DNS	102 Standard query response 0x5623 A www.s
6	3.081086940	192.168.186.2	192.168.186.129	DNS	114 Standard query response 0x3da8 AAAA ww
7	3.081334299	192.168.186.129	202.120.2.119	UDP	74 35281 → 33434 Len=32
8	3.081365545	192.168.186.129	202.120.2.119	UDP	74 41015 → 33435 Len=32
9	3.081380422	192.168.186.129	202.120.2.119	UDP	74 48438 → 33436 Len=32
10	3.081407133	192.168.186.129	202.120.2.119	UDP	74 56641 → 33437 Len=32
11	3.081416866	192.168.186.2	192.168.186.129	ICMP	102 Time-to-live exceeded (Time to live ex
12	3.081416919	192.168.186.2	192.168.186.129	ICMP	102 Time-to-live exceeded (Time to live ex

Traceroute uses UDP.

2.

202.120.2.119

```
dajiaohuang@ubuntu:~$ ping www.sjtu.edu.cn
PING www.sjtu.edu.cn (202.120.2.119) 56(84) bytes of data.
64 bytes from 202.120.2.119 (202.120.2.119): icmp_seq=1 ttl=128 time=16.3 ms
64 bytes from 202.120.2.119 (202.120.2.119): icmp_seq=2 ttl=128 time=5.93 ms
64 bytes from 202.120.2.119 (202.120.2.119): icmp_seq=3 ttl=128 time=5.60 ms
64 bytes from 202.120.2.119 (202.120.2.119): icmp_seq=4 ttl=128 time=6.53 ms
64 bytes from 202.120.2.119 (202.120.2.119): icmp_seq=5 ttl=128 time=6.36 ms
64 bytes from 202.120.2.119 (202.120.2.119): icmp_seq=6 ttl=128 time=3.26 ms
64 bytes from 202.120.2.119 (202.120.2.119): icmp_seq=7 ttl=128 time=3.92 ms
64 bytes from 202.120.2.119 (202.120.2.119): icmp_seq=8 ttl=128 time=8.95 ms
```

3.

```
dajiaohuang@ubuntu:~$ ping www.sjtu.edu.cn
PING www.sjtu.edu.cn (202.120.2.119) 56(84) bytes of data.
64 bytes from 202.120.2.119 (202.120.2.119): icmp_seq=1 ttl=128 time=5.15 ms
64 bytes from 202.120.2.119 (202.120.2.119): icmp_seq=2 ttl=128 time=3.99 ms
64 bytes from 202.120.2.119 (202.120.2.119): icmp_seq=3 ttl=128 time=4.12 ms
64 bytes from 202.120.2.119 (202.120.2.119): icmp_seq=4 ttl=128 time=3.46 ms
64 bytes from 202.120.2.119 (202.120.2.119): icmp_seq=5 ttl=128 time=4.26 ms
64 bytes from 202.120.2.119 (202.120.2.119): icmp_seq=6 ttl=128 time=4.37 ms
64 bytes from 202.120.2.119 (202.120.2.119): icmp_seq=7 ttl=128 time=4.28 ms
64 bytes from 202.120.2.119 (202.120.2.119): icmp_seq=8 ttl=128 time=3.09 ms
64 bytes from 202.120.2.119 (202.120.2.119): icmp_seq=9 ttl=128 time=4.08 ms
64 bytes from 202.120.2.119 (202.120.2.119): icmp_seq=10 ttl=128 time=4.80 ms
^C
--- www.sjtu.edu.cn ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9013ms
rtt min/avg/max/mdev = 3.092/4.163/5.159/0.562 ms
```

```
dajiaohuang@ubuntu:~$ ping stanford.edu
PING stanford.edu (171.67.215.200) 56(84) bytes of data.
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=1 ttl=128 time=162 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=2 ttl=128 time=164 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=3 ttl=128 time=163 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=4 ttl=128 time=161 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=5 ttl=128 time=162 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=6 ttl=128 time=163 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=7 ttl=128 time=163 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=8 ttl=128 time=162 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=9 ttl=128 time=162 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=10 ttl=128 time=162 ms
^C
--- stanford.edu ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9013ms
rtt min/avg/max/mdev = 161.711/162.955/164.059/0.671 ms
```

RTT from my vm to www.sjtu.edu.cn is 4.163ms. RTT from my vm to stanford.edu is 162.955ms.

The latter is longer because the signal needs to travel overseas, which is longer.

4.

vm1 as server

```
dajiaohuang@ubuntu:~$ iperf3 -s
-----------------------------------------------------------
Server listening on 5201
-----------------------------------------------------------
Accepted connection from 192.168.186.130, port 60070
[  5] local 192.168.186.129 port 5201 connected to 192.168.186.130 port 60072
[ ID] Interval           Transfer     Bandwidth
[  5]   0.00-1.00   sec   848 MBytes  7.12 Gbits/sec
[  5]   1.00-2.00   sec   854 MBytes  7.17 Gbits/sec
[  5]   2.00-3.00   sec   854 MBytes  7.16 Gbits/sec
[  5]   3.00-4.00   sec   842 MBytes  7.07 Gbits/sec
[  5]   4.00-5.00   sec   861 MBytes  7.22 Gbits/sec
[  5]   5.00-6.00   sec   855 MBytes  7.17 Gbits/sec
[  5]   6.00-7.00   sec   847 MBytes  7.10 Gbits/sec
[  5]   7.00-8.00   sec   851 MBytes  7.14 Gbits/sec
[  5]   8.00-9.00   sec   845 MBytes  7.09 Gbits/sec
[  5]   9.00-10.00  sec   791 MBytes  6.63 Gbits/sec
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bandwidth
[  5]   0.00-10.00  sec  0.00 Bytes  0.00 bits/sec                  sender
[  5]   0.00-10.00  sec  8.25 GBytes  7.09 Gbits/sec                  receiver
-----------------------------------------------------------
Server listening on 5201
-----------------------------------------------------------
```

vm2 as host

```
dajiaohuang@ubuntu:~$ iperf3 -c 192.168.186.129
Connecting to host 192.168.186.129, port 5201
[  4] local 192.168.186.130 port 60072 connected to 192.168.186.129 port 5201
[ ID] Interval           Transfer     Bandwidth       Retr  Cwnd
[  4]   0.00-1.00   sec   852 MBytes  7.14 Gbits/sec  116   1.77 MBytes
[  4]   1.00-2.00   sec   855 MBytes  7.17 Gbits/sec    3   1.63 MBytes
[  4]   2.00-3.00   sec   853 MBytes  7.16 Gbits/sec    1   1.46 MBytes
[  4]   3.00-4.00   sec   842 MBytes  7.07 Gbits/sec    0   1.83 MBytes
[  4]   4.00-5.00   sec   861 MBytes  7.22 Gbits/sec    1   1.69 MBytes
[  4]   5.00-6.00   sec   855 MBytes  7.17 Gbits/sec   10   1.55 MBytes
[  4]   6.00-7.00   sec   846 MBytes  7.10 Gbits/sec    1   1.37 MBytes
[  4]   7.00-8.00   sec   851 MBytes  7.14 Gbits/sec    0   1.78 MBytes
[  4]   8.00-9.00   sec   842 MBytes  7.07 Gbits/sec    1   1.62 MBytes
[  4]   9.00-10.00  sec   793 MBytes  6.65 Gbits/sec    7   1.42 MBytes
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bandwidth       Retr
[  4]   0.00-10.00  sec  8.25 GBytes  7.09 Gbits/sec  140             sender
[  4]   0.00-10.00  sec  8.25 GBytes  7.09 Gbits/sec                  receiver

iperf Done.
```

The bandwidth if 7.09Gbits/sec.

5.

vm1 as server

```
dajiaohuang@ubuntu:~$ sudo systemctl status ssh
● ssh.service - OpenBSD Secure Shell server
     Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor preset: ena
     Active: active (running) since Sun 2023-03-12 21:51:12 PDT; 29min ago
   Main PID: 764 (sshd)
      Tasks: 1 (limit: 4630)
     CGroup: /system.slice/ssh.service
             └─764 /usr/sbin/sshd -D

Mar 12 21:51:13 ubuntu sshd[764]: Server listening on :: port 22.
Mar 12 22:10:54 ubuntu sshd[4391]: Invalid user xjk from 192.168.186.130 port 4
Mar 12 22:11:00 ubuntu sshd[4391]: pam_unix(sshd:auth): check pass; user unknow
Mar 12 22:11:00 ubuntu sshd[4391]: pam_unix(sshd:auth): authentication failure;
Mar 12 22:11:03 ubuntu sshd[4391]: Failed password for invalid user xjk from 19
Mar 12 22:11:06 ubuntu sshd[4391]: pam_unix(sshd:auth): check pass; user unknow
Mar 12 22:11:08 ubuntu sshd[4391]: Failed password for invalid user xjk from 19
Mar 12 22:11:18 ubuntu sshd[4391]: Failed password for invalid user xjk from 19
Mar 12 22:11:18 ubuntu sshd[4391]: Connection closed by invalid user xjk 192.16
Mar 12 22:11:18 ubuntu sshd[4391]: PAM 1 more authentication failure; logname=
lines 1-18/18 (END)
```

vm2 as host

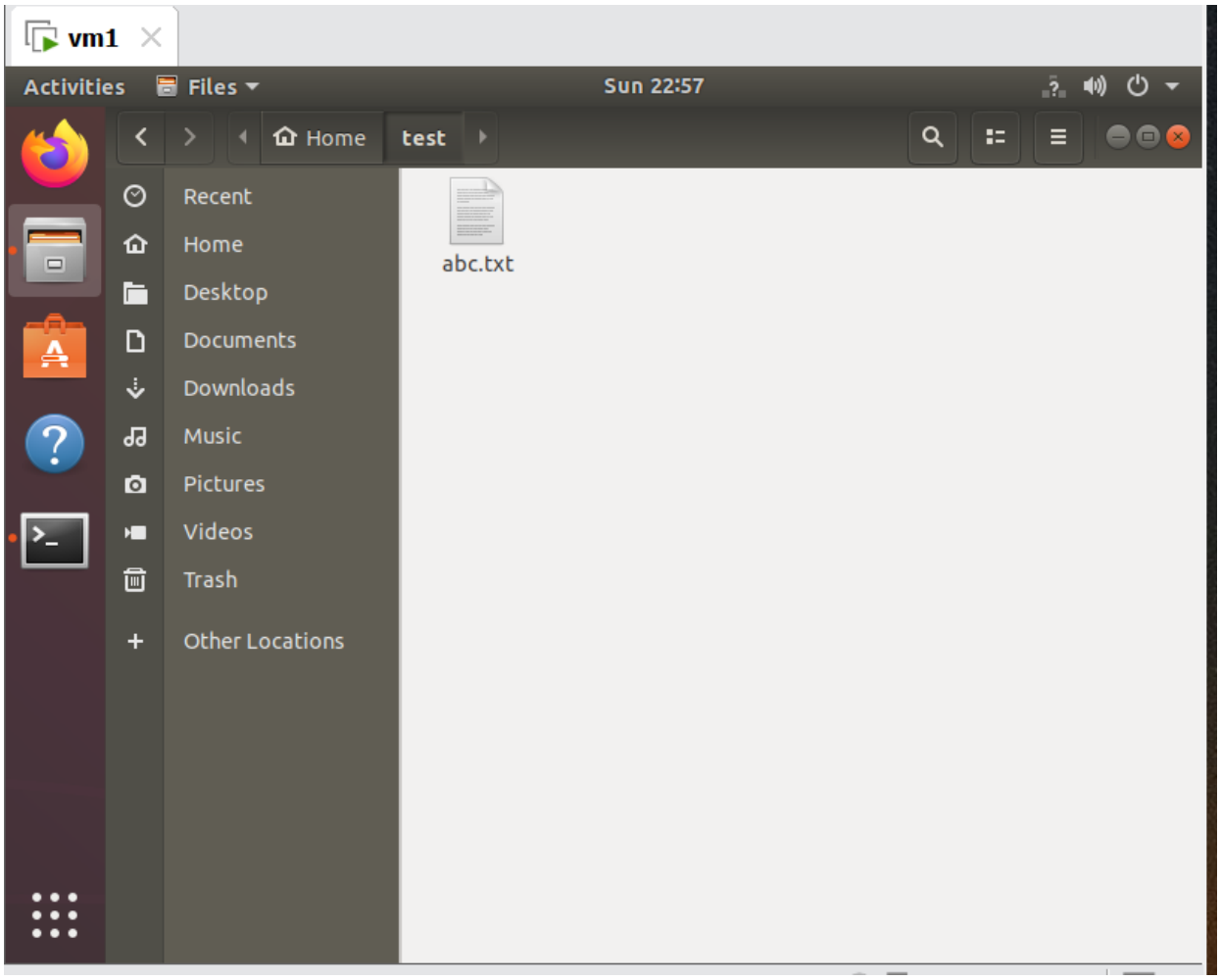
```
dajiaohuang@ubuntu:~$ ssh dajiaohuang@192.168.186.129
dajiaohuang@192.168.186.129's password:
Welcome to Ubuntu 18.04.6 LTS (GNU/Linux 5.4.0-84-generic x86_64)

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

268 updates can be applied immediately.
244 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Your Hardware Enablement Stack (HWE) is supported until April 2023.

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.
```

6.

abc.txt copied from the host vm2:

```
dajiaohuang@ubuntu:~/test$ scp -p 4588  abc.txt dajiaohuang@192.168.186.129:tes
t
dajiaohuang@192.168.186.129's password:
4588: No such file or directory
abc.txt                                       100%    0     0.0KB/s   00:00
```

anc.txt copied to vm1:


vm1
Activities
Files
Sun 22:57
Home
test
Recent
Home
Desktop
Documents
Downloads
Music
Pictures
Videos
Trash
Other Locations
abc.txt