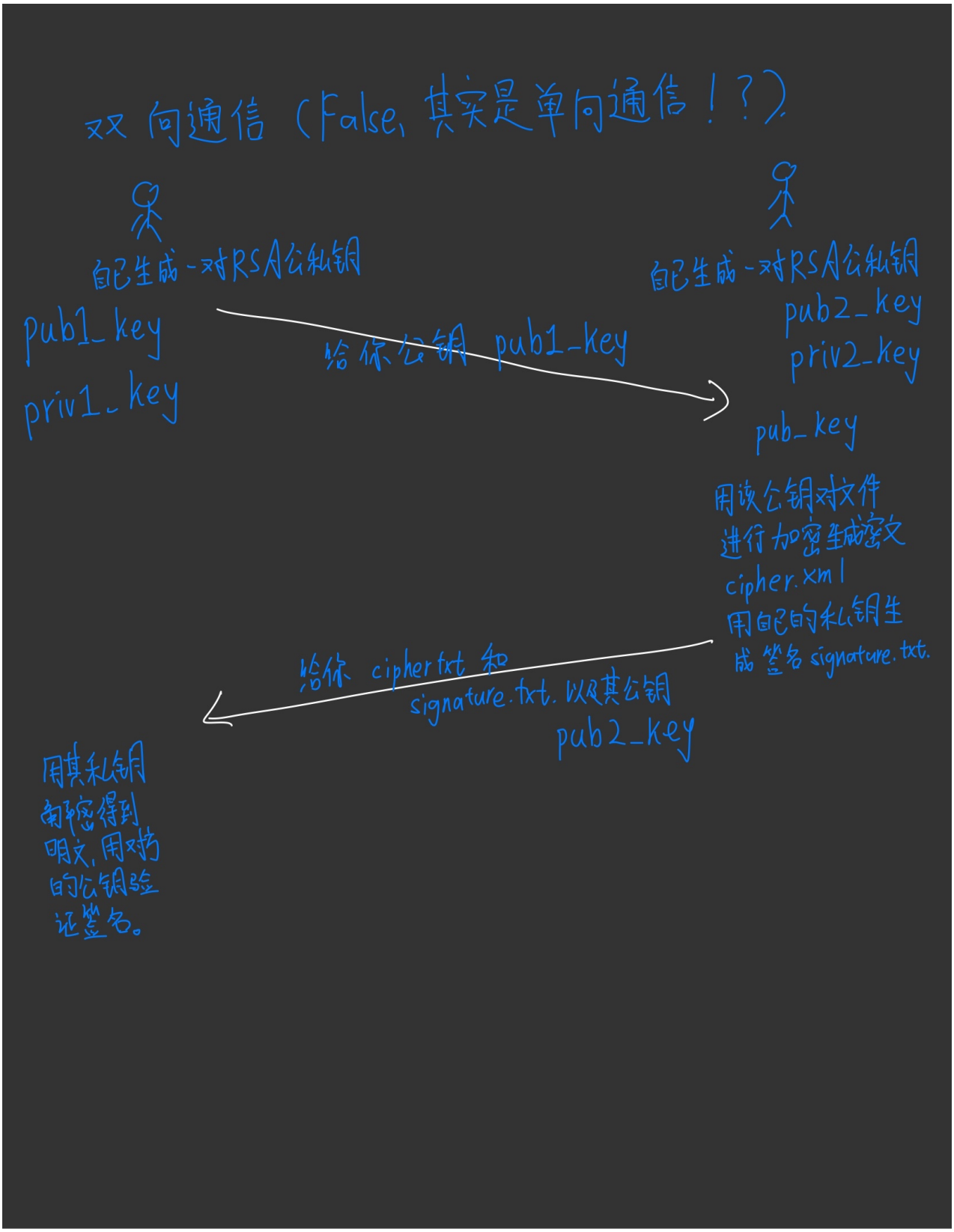


关键字：python 、socket 、 openssl

发送方

```
import socket
import tqdm
import os
import sys
```

```python
# 传输数据分隔符
SEPAEATOR = "<SEPARATOR>"

# 服务器信息
host = "192.168.178.129"
port = 5555

# 文件传输的缓冲区
BUFFER_SIZE = 4096

# 待传输文件名字
filename = str(sys.argv[1])

# 文件大小
file_size = os.path.getsize(filename)

# 创建socket连接
s = socket.socket()

# 连接服务器
print(f"服务器连接中{host}:{port}")
s.connect((host, port))
print("与服务器连接成功")

# 发送文件名字和文件大小，必须进行编码处理encode()
s.send(f"{filename}{SEPAEATOR}{file_size}".encode())

# 文件传输 progress进度条
progress = tqdm.tqdm(range(file_size), f"发送{filename}", unit="B",
unit_divisor=1024)
with open(filename, "rb") as f:
    for _ in progress:
        # 读取文件
        bytes_read = f.read(BUFFER_SIZE)
        if not bytes_read:
            break
        # sendall确保即使网络忙碌的时候，数据仍然可以传输
        s.sendall(bytes_read)
        progress.update(len(bytes_read))

# 关闭资源
s.close()
```

接受方

```
import socket
import tqdm
import os

# 设置服务器的IP和端口
SERVER_HOST = "192.168.178.129"
SERVER_PORT = 5555

# 设置文件读写缓冲区
BUFFER_SIZE = 4096

# 传输数据分隔符
SEPAEATOR = "<SEPARATOR>"

# 创建Server
s = socket.socket()
s.bind((SERVER_HOST, SERVER_PORT))

# 设置连接监听数
s.listen(5)
print(f"服务器端监听{SERVER_HOST}:{SERVER_PORT}")

# 接受客户端连接
client_socket, address = s.accept()

# 打印客户端的IP
print(f"客户端{address}连接")

# 接受客户端信息
received = client_socket.recv(BUFFER_SIZE).decode()
filename, file_size = received.split(SEPAEATOR)

# 获取文件名字
filename = os.path.basename(filename)
file_size = int(file_size)

# 文件接受处理
progress = tqdm.tqdm(
    range(file_size), f"接受{filename}", unit="B", unit_divisor=1024,
unit_scale=True
)
```

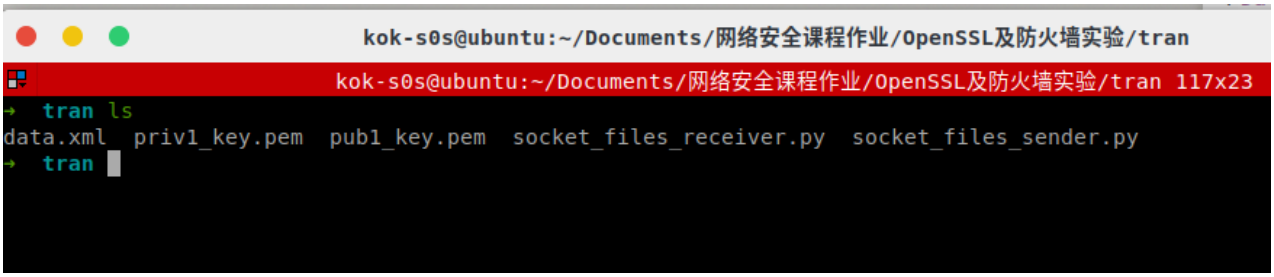
```python
with open(filename, "wb") as f:
    for _ in progress:
        bytes_read = client_socket.recv(BUFFER_SIZE)
        # 如果没有数据传输内容
        if not bytes_read:
            break
        # 读取写入
        f.write(bytes_read)
        # 更新进度条
        progress.update(len(bytes_read))

# 关闭资源
client_socket.close()
s.close()
```

people_1:：Ubuntu20.04 host：`192.168.178.128`

people_2：kali host：`192.168.178.129`

people_1生成公私钥



people_2生成公私钥

people_1和people_2互相交换公钥

```
kok-s0s@ubuntu:~/Documents/网络安全课程作业/OpenSSL及防火墙实验/tran
kok-s0s@ubuntu:~/Documents/网络安全课程作业/OpenSSL及防火墙实验/tran 117x23
→  tran ls
data.xml  priv1_key.pem  pub1_key.pem  socket_files_receiver.py  socket_files_sender.py
→  tran python3 socket_files_sender.py pub1_key.pem
服务器连接中192.168.178.129:5555
与服务器连接成功
发送pub1_key.pem:   0%|                                                    | 1/451 [00:00<00:00, 5242.88B/s]
→  tran python3 socket_files_receiver.py
服务器端监听192.168.178.128:5555
客户端('192.168.178.129', 50624)连接
接受pub2_key.pem:   0%|                                                    | 1.00/451 [00:00<00:00, 8.02kB/s]
→  tran ls
data.xml  priv1_key.pem  pub1_key.pem  pub2_key.pem  socket_files_receiver.py  socket_files_sender.py
→  tran
```

```
kali@kali: ~/Documents/tran
File  Actions  Edit  View  Help
kali@kali:~/Documents/tran$ ls
priv2_key.pem  pub2_key.pem  socket_files_receiver.py  socket_files_sender.py
kali@kali:~/Documents/tran$ python3 socket_files_receiver.py
服务器端监听192.168.178.129:5555
客户端('192.168.178.128', 32982)连接
接受pub1_key.pem: 100%|                                                    | 451/451 [00:00<00:00, 145kB/s]
kali@kali:~/Documents/tran$ ls
priv2_key.pem  pub1_key.pem  pub2_key.pem  socket_files_receiver.py  socket_files_sender.py
kali@kali:~/Documents/tran$ python3 socket_files_sender.py pub2_key.pem
Traceback (most recent call last):
  File "socket_files_sender.py", line 23, in <module>
    file_size = os.path.getsize(filename)
  File "/usr/lib/python3.8/genericpath.py", line 50, in getsize
    return os.stat(filename).st_size
FileNotFoundError: [Errno 2] No such file or directory: 'data.xml'
kali@kali:~/Documents/tran$ python3 socket_files_sender.py pub2_key.pem
服务器连接中192.168.178.128:5555
与服务器连接成功
发送pub2_key.pem: 100%|                                                    | 451/451 [00:00<00:00, 215964.28B/s]
kali@kali:~/Documents/tran$
```

people_1用people_2给的公钥做加密操作生成加密文件cipher.txt

```
kok-s0s@ubuntu:~/Documents/网络安全课程作业/OpenSSL及防火墙实验/tran
kok-s0s@ubuntu:~/Documents/网络安全课程作业/OpenSSL及防火墙实验/tran 104x23
→  tran ls
data.xml  priv1_key.pem  pub1_key.pem  pub2_key.pem  socket_files_receiver.py  socket_files_sender.py
→  tran openssl rsautl -encrypt -pubin -inkey pub2_key.pem -in data.xml -out cipher.txt
→  tran ls
cipher.txt  priv1_key.pem  pub2_key.pem              socket_files_sender.py
data.xml    pub1_key.pem   socket_files_receiver.py
→  tran
```

people_1用自己的私钥对加密文件做签名操作生成signature.txt

```
kok-s0s@ubuntu:~/Documents/网络安全课程作业/OpenSSL及防火墙实验/tran
kok-s0s@ubuntu:~/Documents/网络安全课程作业/OpenSSL及防火墙实验/tran 104x23
→  tran openssl dgst -sha256 -sign priv1_key.pem -out signature.txt cipher.txt
→  tran ls
cipher.txt  priv1_key.pem  pub2_key.pem   socket_files_receiver.py
data.xml    pub1_key.pem   signature.txt  socket_files_sender.py
→  tran
```

people_1将cipher.txt和signature.txt发送给people_2

```
kok-s0s@ubuntu:~/Documents/网络安全课程作业/OpenSSL及防火墙实验/tran
kok-s0s@ubuntu:~/Documents/网络安全课程作业/OpenSSL及防火墙实验/tran 104x23
→  tran ls
cipher.txt  priv1_key.pem  pub2_key.pem              socket_files_sender.py
data.xml    pub1_key.pem   socket_files_receiver.py
→  tran openssl dgst -sha256 -sign priv1_key.pem -out signature.txt data.xml
→  tran ls
cipher.txt  priv1_key.pem  pub2_key.pem   socket_files_receiver.py
data.xml    pub1_key.pem   signature.txt  socket_files_sender.py
→  tran python3 socket_files_sender.py cipher.txt
服务器连接中192.168.178.129:5555
与服务器连接成功
发送cipher.txt:   0%||                                                  | 1/256 [00:00<00:00, 6061.13B/s]
→  tran python3 socket_files_sender.py signature.txt
服务器连接中192.168.178.129:5555
与服务器连接成功
发送signature.txt:   0%||                                              | 1/256 [00:00<00:00, 6087.52B/s]
→  tran
```

```
kali@kali: ~/Documents/tran
File  Actions  Edit  View  Help
kali@kali:~/Documents/tran$ ls
priv2_key.pem  pub1_key.pem  pub2_key.pem  socket_files_receiver.py  socket_files_sender.py
kali@kali:~/Documents/tran$ python3 socket_files_receiver.py
服务器端监听192.168.178.129:5555
客户端('192.168.178.128', 33016)连接
接受cipher.txt: 100%|                                                | 256/256 [00:00<00:00, 106kB/s]
kali@kali:~/Documents/tran$ python3 socket_files_receiver.py
服务器端监听192.168.178.129:5555
客户端('192.168.178.128', 33018)连接
接受signature.txt: 100%|                                             | 256/256 [00:00<00:00, 93.2kB/s]
kali@kali:~/Documents/tran$ ls
cipher.txt  priv2_key.pem  pub1_key.pem  pub2_key.pem  signature.txt  socket_files_receiver.py  socket_files_sender.py
kali@kali:~/Documents/tran$
```

people_2用自己的私钥解密加密文件得到原始文件

```
kali@kali: ~/Documents/tran
File  Actions  Edit  View  Help
kali@kali:~/Documents/tran$ ls
cipher.txt     pub1_key.pem  signature.txt            socket_files_sender.py
priv2_key.pem  pub2_key.pem  socket_files_receiver.py
kali@kali:~/Documents/tran$ openssl rsautl -decrypt -inkey priv2_key.pem -in cipher.txt -out new_data.xml
kali@kali:~/Documents/tran$ cat new_data.xml
dasdasdasdsadsadasdasdasdasd
kali@kali:~/Documents/tran$
```

这是people_1中data.xml存储的数据

```
kok-s0s@ubuntu:~/Documents/网络安全课程作业/OpenSSL及防火墙实验/tran
kok-s0s@ubuntu:~/Documents/网络安全课程作业/OpenSSL及防火墙实验/tran 104x23
→  tran cat data.xml
dasdasdasdsadsadasdasdasdasd
→  tran
```

people_2用people_1给的公钥验证该签名

```
File  Actions  Edit  View  Help

kali@kali:~/Documents/tran$ ls
cipher.txt     priv2_key.pem  pub2_key.pem   socket_files_receiver.py
new_data.xml   pub1_key.pem   signature.txt  socket_files_sender.py
kali@kali:~/Documents/tran$ openssl dgst -sha256 -verify pub1_key.pem -signature signature.txt cipher.txt
Verified OK
kali@kali:~/Documents/tran$
```

至此，该xml文件被认为是安全传输到目的主机。