Ref:

https://wiki.openssl.org/index.php/Simple_TLS_Server

https://www.cs.cmu.edu/~srini/15-441/F02/Projects/lab01/reference/part1.pdf

Certificates generated from the commands given below:

Generating CA:

```
openssl req \
-x509 \
-nodes \
-days 3650 \
-newkey rsa:4096 \
-keyout CA/ca_key.pem \
-out CA/ca_cert.pem \
-subj "/C=IN/ST=Delhi/L=Delhi/O=Certifying Authority/CN=root.ca.com"
```

Generating server keys:

```
openssl genrsa -out Server/server_key.pem 4096
openssl req -new \
-key Server/server_key.pem \
-out Server/server.csr \
-subj "/C=IN/ST=Delhi/L=Delhi/O=IIITD/CN=127.0.0.1:7777"
```

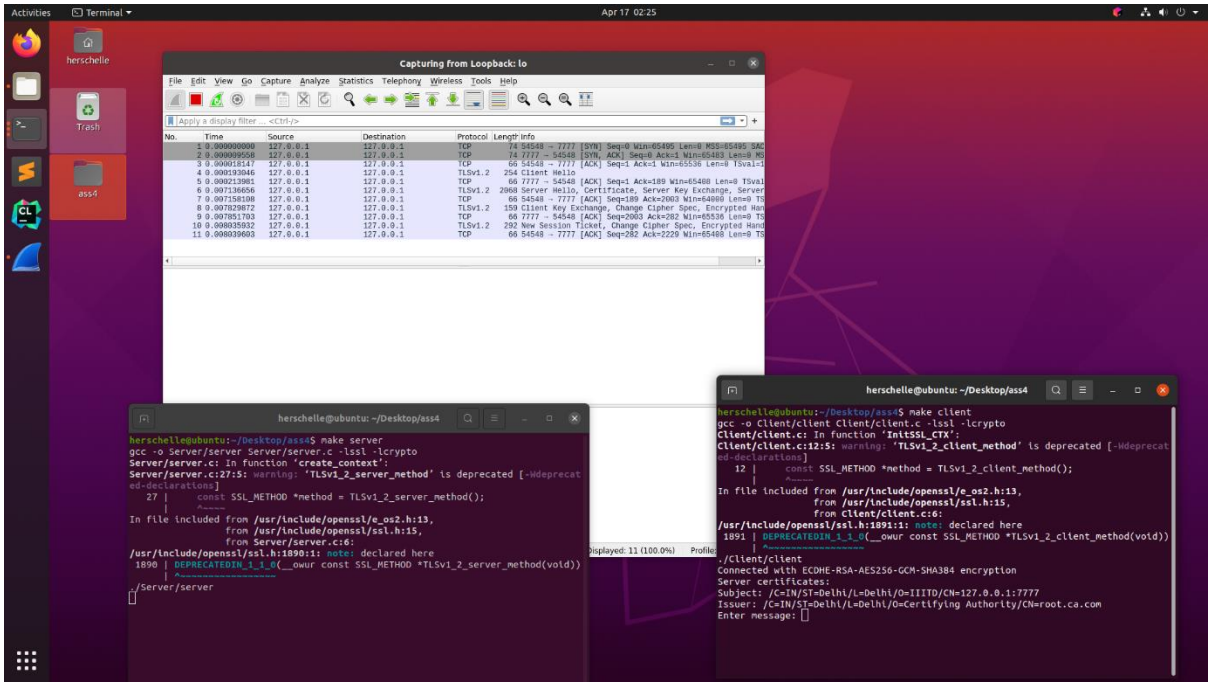
Generating and signing server's certificate with CA:

```
openssl x509 -req -days 1460 -in Server/server.csr \
-CA CA/ca_cert.pem -CAkey CA/ca_key.pem \
-CAcreateserial -out Server/server_cert.pem
```

Run wireshark and start capturing packets on loopback interface.

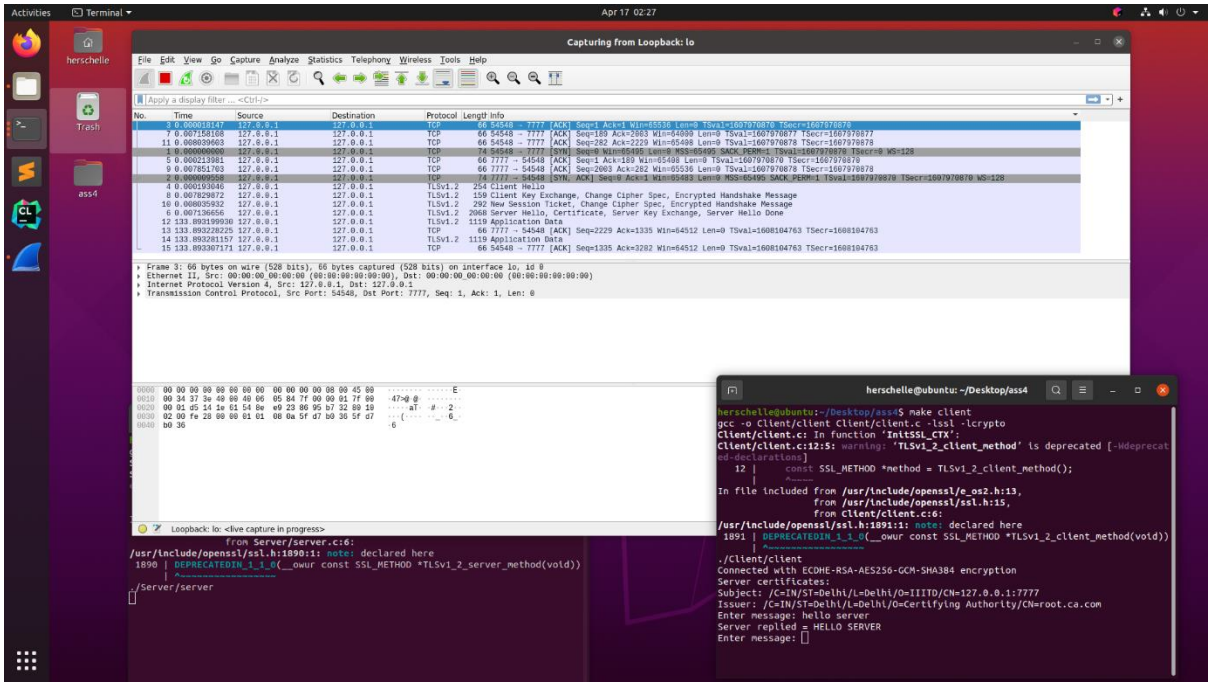
Open 2 terminals, on one type "make server" and "make client" on other.

TLS handshake and key exchange can be seen below.

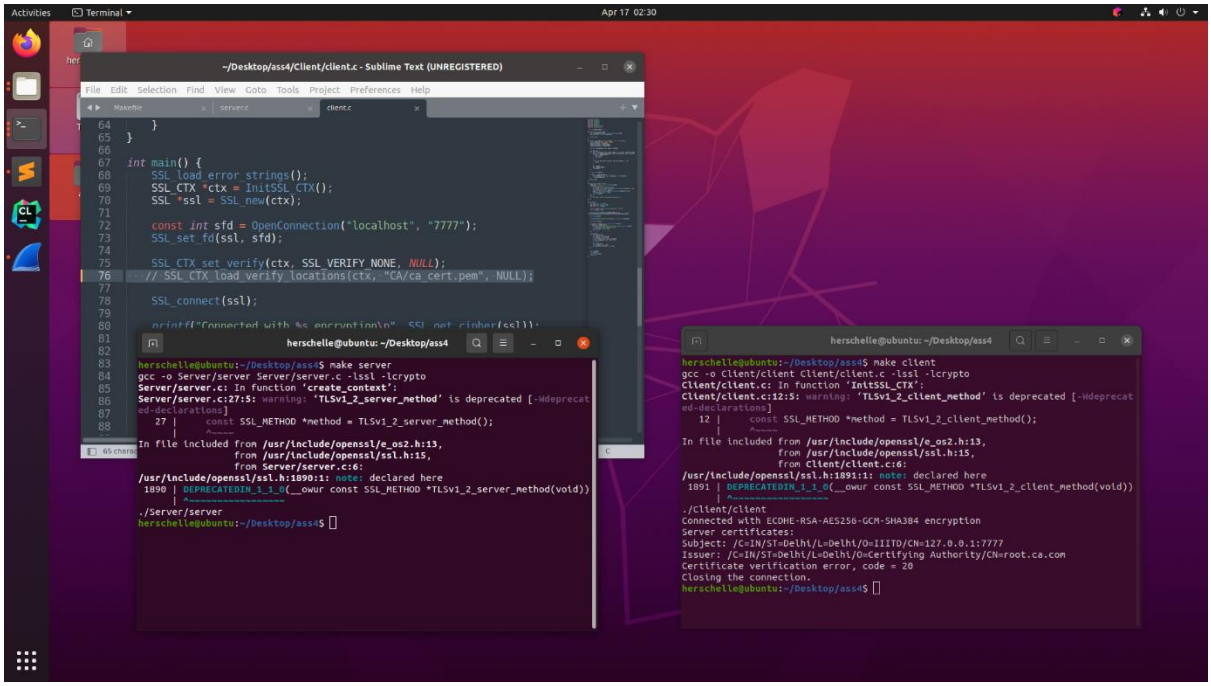


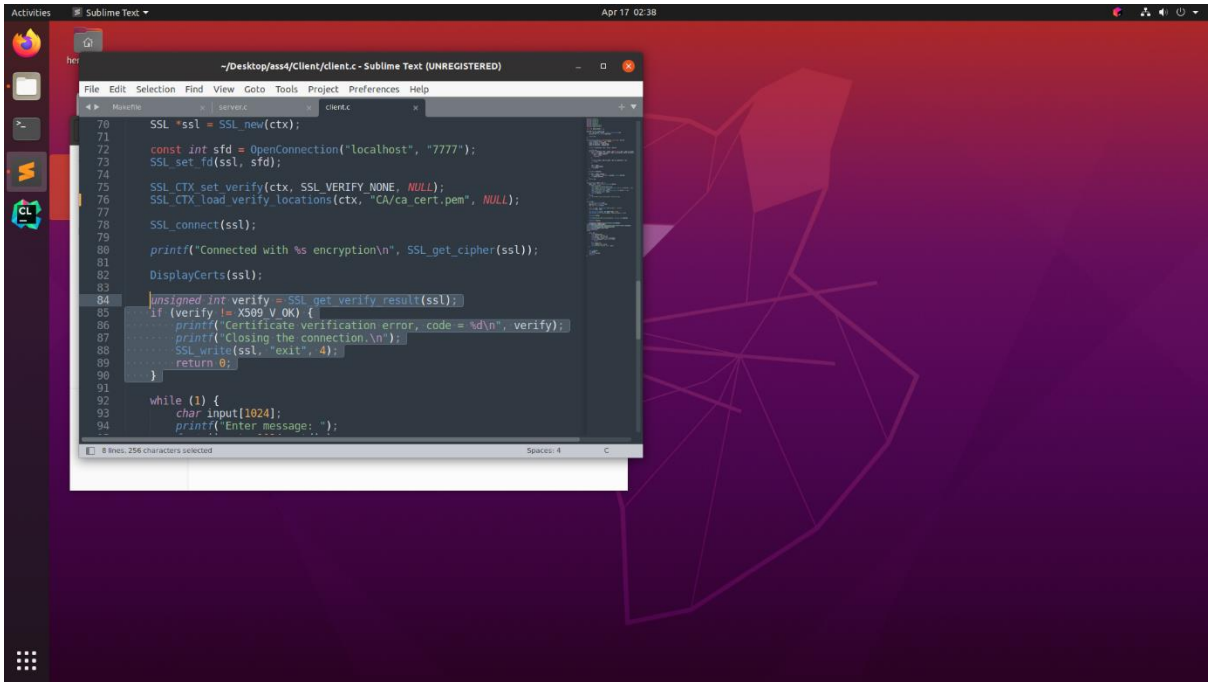
Now we can enter message and server sends it back in all caps. Send “exit” to close the connection.

These captured packets .pcap file is submitted along with the code.



Finally, we can test if the code is actually verifying the certificate by commenting the shown line in the image below or giving wrong path of the CA file. We receive error code 20 which is unable to obtain certificate. We can also give some other cerificate in which case we receive error code 20 which means first server certificate verification failed.


Activities
Terminal
Apr 17 02:30
~/Desktop/ass4/Client/client.c - Sublime Text (UNREGISTERED)
File Edit Selection Find View Goto Tools Project Preferences Help
Makefile
server.c
client.c
herschelle@ubuntu: ~/Desktop/ass4
herschelle@ubuntu:~/Desktop/ass4$ make server
gcc -o Server/server Server/server.c -lssl -lcrypto
Server/server.c: In function 'create_context':
Server/server.c:27:5: warning: 'TLSv1_2_server_method' is deprecated [-Wdeprecated-declarations]
In file included from /usr/include/openssl/e_os2.h:13,
from /usr/include/openssl/ssl.h:15,
from Server/server.c:6:
/usr/include/openssl/ssl.h:1890:1: note: declared here
./Server/server
herschelle@ubuntu:~/Desktop/ass4$
herschelle@ubuntu: ~/Desktop/ass4
herschelle@ubuntu:~/Desktop/ass4$ make client
gcc -o Client/client Client/client.c -lssl -lcrypto
Client/client.c: In function 'InitSSL_CTX':
Client/client.c:12:5: warning: 'TLSv1_2_client_method' is deprecated [-Wdeprecated-declarations]
In file included from /usr/include/openssl/e_os2.h:13,
from /usr/include/openssl/ssl.h:15,
from Client/client.c:6:
/usr/include/openssl/ssl.h:1891:1: note: declared here
./Client/client
Connected with ECDHE-RSA-AES256-GCM-SHA384 encryption
Server certificates:
Subject: /C=IN/ST=Delhi/L=Delhi/O=IIITD/CN=127.0.0.1:7777
Issuer: /C=IN/ST=Delhi/L=Delhi/O=Certifying Authority/CN=root.ca.com
Certificate verification error, code = 20
Closing the connection.
herschelle@ubuntu:~/Desktop/ass4$


Activities
Sublime Text
Apr 17 02:38
~/Desktop/ass4/Client/client.c - Sublime Text (UNREGISTERED)
File Edit Selection Find View Goto Tools Project Preferences Help
Makefile
server.c
client.c
8 lines, 256 characters selected
Spaces: 4
C