

To run the code use the following commands or ones similar

```
python3 server.py -p 9000 -s abc23432sal
```

This is to start the server, make sure to use the same port, designated after a -p for the client.

Then run the client with the following or something similar

```
python3 client.py -a 127.0.0.1 -p 9000 -s 100 -f /home/file.txt
```

This one needs to have the save port after -p as the server. Also it requires the IP Address after the -a to be 127.0.0.1

Output to the console from the server

```
PS C:\Users\fr0st\Desktop\Visual Studio\Wets-PA2> python3 server.py -s abc23432salt -p 9000
Server listening...
connection made with ('127.0.0.1', 51813)
Client disconnected
█
```

Output to the console from the client

```
PS C:\Users\fr0st\Desktop\Visual Studio\Wets-PA2> python3 client.py -p 9000 -s 100 -f file.txt -a 127.0.0.1
Connected to server!
Initialization sent.
ACK received from server.
New Hashed File Created.
Done! Closing files and sockets.
```

Here is a few test files and their outputs

```
1 I have brought peace, freedom, justice, and security to my new empire.
2 Your new empire.
3 If you are not with me, then you are my enemy.
4 Only a sith deals in absolutes, I will do what I must.
5 You will try.|
```

```
d0648cfc6ff308846c375de9ef6553dca3c28db5047359377d6f917ba37b6cfb
a2fd28a4d960e131f22a1778622d87c3425af92889032ccd5c70618b0413d49a
b8293181cd194998a4f42889152b323d596afa39fcfcdb5be8bdf68eca67d5d
```

Descripon.

In this assignment, you will be wri4ng a TCP server and client, where the TCP server's job is to take input requests from a TCP client to generate hash and send it back to the client. The client has a file and wants to obtain the hashes for various segments of the data inside the file. The client will send a message to the server for each segment, and the server will respond with the hash of the segment. The client converts each hash into a hexadecimal string representa4on and prints it to the console. The server must be able to handle more than one client concurrently. The details of the protocol followed in this case is described below.

Protocol Overview.

The protocol between the client and server will use four types of messages:

Ini\$aliza\$on, Acknowledgement,

HashRequest, and HashResponse. The client starts by sending an Ini\$aliza\$on message to the server, which informs the server of the size of the input data that the client will send (denoted by the variable S). Aierwards, the client sends N HashRequest messages to the server, where each HashRequest contains the data segment to be hashed. The server responds to the Ini\$aliza\$on message with an Acknowledgement, which informs the client about the total length of the response (40*S). Aier this, the server responds to each HashRequest with a HashResponse that contains the hash of the corresponding data included in HashRequest.

Format of messages.

For the sake of convenience, all the messages in this protocol follow same structure as shown below. However, some of the aPributes in the messages will be different depending on the type of message.

|

hashes_data.txt

```
1 279e25ea6560f77f94ae6a06cefdff1a6479c556b3859c2beb2fe1c2a5b3f417
2 ef1c91e847d20e64ee504c963dd0f5c11df55c3504fd12c6bef2627026b4892c
3 882b1eabbaae3130a931a2ae5b16c2de806bd86e2335453ffcf2e5c083f976d7
4 3d22a325606071906ecf3d0248c077a7ae3d41611bd0457fc0818b6b48d5008c
5 daf824b8f7ee93cba48e9a4f74a58ad4b31a4f37acbb98dca36448eedcf1c424
6 9d704cac6004b8f09a0325f873d46091facd5828c2082509049d17c27ea449ca
7 64acffd9872ef7fc49978ffdc69d8186579a170d50cf6c815c7307a2829f2805
8 ce7959aaa01817f6734dc772ba4c38c7c44254c7f740105e210565d398b98eb9
9 113bcb474df5be950620ed07b642a1500779e0d9ec7a345329e557e85d8796a8
10 0a4fc08e6b1d8f61ef12e6a6fdc1eceb527a31decba6ce73cb47bc5206631086
11 894243cba7b52f0776692a76acd00a11a42a22cb223004a838533a14314c076a
12 5cff478c20b39729258ea2111a5858b097c5f579c1767913cccc882f7e4af72f
13 75f2e8ca13825301652210df1a8e8fa910438f9882700a139ea51877d20eeeee
14 7051fbe36db1ff553fbc8687c4a5c2bc2d3fb167c73873872925c881946d74b1
15 5ec0abb0ea4c96b23a55a492df491782a0c94dca1ca85b981ca881193991fc1
16 4595f32266d3ea9c0f180d237dd9b0487b4b3ae3b624bf270b79070bb6f35472
17 bd474ecd6429dce4f4ec6fff6db706b27707e33b2dfd47e087f4eca88051d5855
18 |
```

The entire Declaration of Independence, The picture and output are much longer but the point is clear

```
WHEN, in the Course of human Events, it becomes necessary for one
People to dissolve the Political Bands which have connected them with
another, and to assume, among the Powers of the Earth, the separate
and equal Station to which the Laws of Nature and of Nature's GOD
entitle them, a decent Respect to the Opinions of Mankind requires
that they should declare the Causes which impel them to the
Separation.

We hold these Truths to be self-evident, that all Men are created
equal, that they are endowed, by their CREATOR, with certain
unalienable Rights, that among these are Life, Liberty, and the
Pursuit of Happiness.--That to secure these Rights, Governments are
instituted among Men, deriving their just Powers from the Consent of
the Governed, that whenever any Form of Government becomes destructive
of these Ends, it is the Right of the People to alter or to abolish
it, and to institute new Government, laying its Foundation on such
Principles, and organizing its Powers in such Form, as to them shall
seem most likely to effect their Safety and Happiness. Prudence,
indeed, will dictate, that Governments long established, should not be
changed for light and transient Causes; and accordingly all Experience
hath shewn, that Mankind are more disposed to suffer, while Evils are
sufferable, than to right themselves by abolishing the Forms to which
they are accustomed. But when a long Train of Abuses and Usurpations,
pursuing invariably the same Object, evinces a Design to reduce them
under absolute Despotism, it is their Right, it is their Duty, to
throw off such Government, and to provide new Guards for their future
Security. Such has been the patient Sufferance of these Colonies; and
such is now the Necessity which constrains them to alter their former
Systems of Government. The History of the present King of
Great-Britain is a History of repeated Injuries and Usurpations, all
having in direct Object the Establishment of an absolute Tyranny over
these States. To prove this, let Facts be submitted to a candid World.

HE has refused his Assent to Laws, the most wholesome and necessary
for the public Good.

HE has forbidden his Governors to pass Laws of immediate and pressing
Importance, unless suspended in their Operation till his Assent should
be obtained; and when so suspended, he has utterly neglected to attend
to them.

HE has refused to pass other Laws for the Accommodation of large
Districts of People, unless those People would relinquish the Right of
Representation in the Legislature, a Right inestimable to them, and
formidable to Tyranny only.

HE has called together Legislative Bodies at Places unusual,
uncomfortable, and distant from the Depository of their public
```

LEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

📄 hashed_data.txt

```
1 74c3491454ac6b1e413a4aaf8ce519defa728d221dfb8c55637f4eb16c947e5d
2 47f8632bf087fedd68236abf2580bafde184db9897be5e2b0b52aa64519a654b
3 bd7f3bd8b2ecc796dcbe773caa3dd4d83e59916b4ccc1442ae8b126b435640ee
4 850274c4378493b4a3392cca6d4492d2f7bd157ec77a0abc67253274596fc1f
5 2b12513a71aa49caaa0e0a75f788e649cb27c8447480c36c7d4c2434317be1c0
6 bcb0de07ec3bf5c785355bb3c10bbd2de53268b8fc8d4892d54ef1d7ef92fa6
7 fd2dc47b539bb35e2f0386c90dda1b3d1db0c6a788f9df64b55909cc6b76a310
8 fb5a0e47fd56b39885283820e5c547c2b1a542d06744b7156624f234faa6c48c
9 c3b5c278846ea9063e1326ccdaf6b106416e36075f6856617bacf140c752a92d
10 0b1a9cca142d8094e822e0ab855b606b9d1e359374e74afb249c70b4daa7d2c9
11 7572e8eb6246e7abffec95b2beb24be67a9019a428bde0ce93f52b3ff8e4d566d
12 8ac06adda45565af415863f1eade373e4853b0d299c4c08b3bc616139992232c
13 6f5d6fad0efd182877d5be9c6228395506801297fbd9f2e0d077dfb4f58f9f5c
14 e265da1601518e2e6386d195873352367285d89603f1f5f293143c9aa8a7c939
15 48a701f750e39ba100a08e64fb743f4a1a408dfab65cea6f423395f579ff6408
16 56d18d4f5b9fd1821d64386b9068356dce4149f16eccc9d0058c35c395b4baab
17 0135637f79bcc6ee0feaaabb1f447bbe04cf6ef51559423bfae0b6ae60c18010
18 ebcf4dfef6371f0d60cb5314f629db2ee67a847120c903f18c8f3facb0db912
19 67a521a16c85031a4842227e43e9e7fc50ab43a91d28ee060a1fc3d87f7b6ef9
20 f3c08f70e8266df78fb5ec90b72ac714c8bc8b5bac9256a47d489bf2e9ef1df3
21 bbc838fd9c2f8657f4571fb7fd829495cc299114f65d7d59e0a0d4ddd41df621
22 7cc1ae2e4bd37c1282deac969f5a218c274107eb7b711f1c4094024a33d571e4
23 dadcdbe56e46dccc60f5e1f1b796b22d3e64aaedc4701b0ca3fa6aa230e6a806
24 6e5aec04cc49e6cd7ae6e4f839b80010565a53dddeb5d4cc2d1128eaea29f239
25 e5a0a0837ea6d043b206466819693e311678ba6745aff3fd394a7377731c4631
26 134437fccb05cd939d89949dee5ca7ce1622485dc4d3331a18983f7f52ccf99c
27 b1617295383f4a03eab31bf3ce856c66033f40fbd7d751929c389010c4685a2a
28 14a45ff6bf719ec7b2b1d80510016cce71511ca6688b73c6265120de5ca9e433
29 a6a918599865fa0a31fc72ade4470457112f6be3d7b8eb800b6223b89d881e13
30 c12ba23e3320697b0ebc1012810ae9e6533a8f91131ccd144bef3301f800af
31 896840fe3b2c81879b46cbaf58f73d024cb2b29cf6b4b00abc5166b8457d1ca
32 1a5944facc588eb41efc83aefdc8be16507ef642e3775c9b5bd0d81e2a18eea3
33 883f8c60d0f0bab297c7096398b5ce4d727c58e3d38957a5d0287ef554017127
34 09f715405c47d9f18a0cdf570072bfc82580b3dd2326ab44fff58b8843d80122
35 725ae7ee59737de33f68d492788f0780029292bca74bb06a7407435178af2325
36 318c30e1f66846e6f1a72a3b68f54fbb4d80b004768bed207e483e190e4a2191
37 3da8abaf56b6243d98784fb0c7f4453c019ab57a1851751e0944b41df7a699df
38 b81610875e9bf40dfa1790f3b02b5deee6d9baf0a9a5234f6cfcfebfad598432
39 85abebf7191abad5d5791ce8ea9d79011cbcb2f64efbd8bf1ed461f654ede0bd
40 0a9cea44be55d37053f3f880b2488012eb8402b248a4b273cd7c56a2067a6b98
41 bc81cad071a3cd9daa00fca7545eba23160195c868e1647dbc333298bf89fd4c
42 a370d7bc44ff7be111f129e44fa9550a9d49a3945a5d1ede57af3bd798c707e5
43 fdccaeaddccf93f757c6f8cf5cd3d865775d212bbfba4f9a5f7bd7b336ce431a
44 df7f372b16437dc07b5d76102bcc74ee08188860e05c3e895b133bccf99177af
45 93dba184de2556574bc1df8c695b2508160ae5098c89e05db5a58d41c453b8f
46 8d21219323c280b6b3f5f4ed3dfb11577ae884ea5fc5bd0ffe60a27f2a613289
47 b2d5e5ca2fcd7e7c25104af6f1b65b8ee6bc2a5749775e1d3dc7f15135b7bee
48 adfa51afa31813ec4c99c7e368200f3adf6271c368afbe66a74021fe3c2e7254
49 692594fd140387136da2171892cf3bfe75816ec741c7e628c8b3d89e3b1d9810
50 eedcb95c5e11743e8aa99d75ca7d53d2f42737488819ce18c04923fc8c84b22c
51 bf0b4de8b290146412ee255bf229277ec65b8e0994eb1fb58c85e38b418a8991
52 5287fd3e92236c6999634de39e1783175faaf357463e33af645d81971c3df1c5
53 e0815e238b364c26231f10e419136dad451e8eb7b6d920a852345263f42cad89
54 8d7621dc794958ca403b1656b7f9f5a68b52415e9cb1ad98cc8b97f25f5dbef9
55 66b58fcd81505d66e6949b824035643ae28a7c2f2ca1c7726a5e914f92c1a3b8
56 4775e3e6bc6bbe3e7ba5e5fc4a1bd72d3356e2aa9099d013fd92fb9f653840f9
57 6a510f0692a2c781073100a80615d3b02503beddf029ca63e84cf4dd0887d91
58 3c42b4628fbfda56bd88acf1d539be4afe6776806e2f8c3ff7da0f65c99306d5
59 de52bfbff18aaf1d7e7dc6da929ffcc579304ceb0e04602998e7109e0169c9158
60 5f34f5df97e0b1610c9dc85c7602d85bbda01376c994b2575c687700060a345
61 cceb4f1709e87ec67f6493450d4a811332a107351e94138d59711552b79b7fcd
62 801522919bdb3857e6543e08e21a3e3eb0ea44d4fe3a714174c6b9ce4db74824
63 4f57b51cf509fbc111ae3f5311471ec0c4d647ab1e1fe49d97e80eddc4e15b9
64 030f16e6f8fc57c73bce3c3fce8dad2861e93ac252abcd495055c20be643bb55
65 46cc606282b80152072a36efead38b0f80f7550d2ae48eafefd77329462159ec
66 a5d01873c50028c6f720612bf38766c76d4e73f6e84cf84eaa1b2768f35e4de2
67 c8c7a9bd916e0ed0557c577e35e4bba6fc5b295b85783647dc9baeff093c56f
68 fce2e38c1aea000c14ebdd477851ff1658036758f3c9dc4b347ff560cde0c1
69 219be500a051e5436a19eb8607762c6767d7c3c05a07425de5d1c68c1f9fd5a1
70 dee1673f607a2e517ahf089f705529d6407aah65b4503112c8c206f0f5h6a37d
```