

TO RUN THE SERVER

python3 server.py

1) IMPORTED MODULES (PYTHON3)

- 1] socket : For establishing a TCP connection between server and clients
- 2] os : For using various functionalities of os.path
- 3] threading : For load balancing using multiple threads to handle requests
- 4] mimetypes : To get the appropriate mimetype of the file in response header
- 5] datetime : For the Date attribute in response header

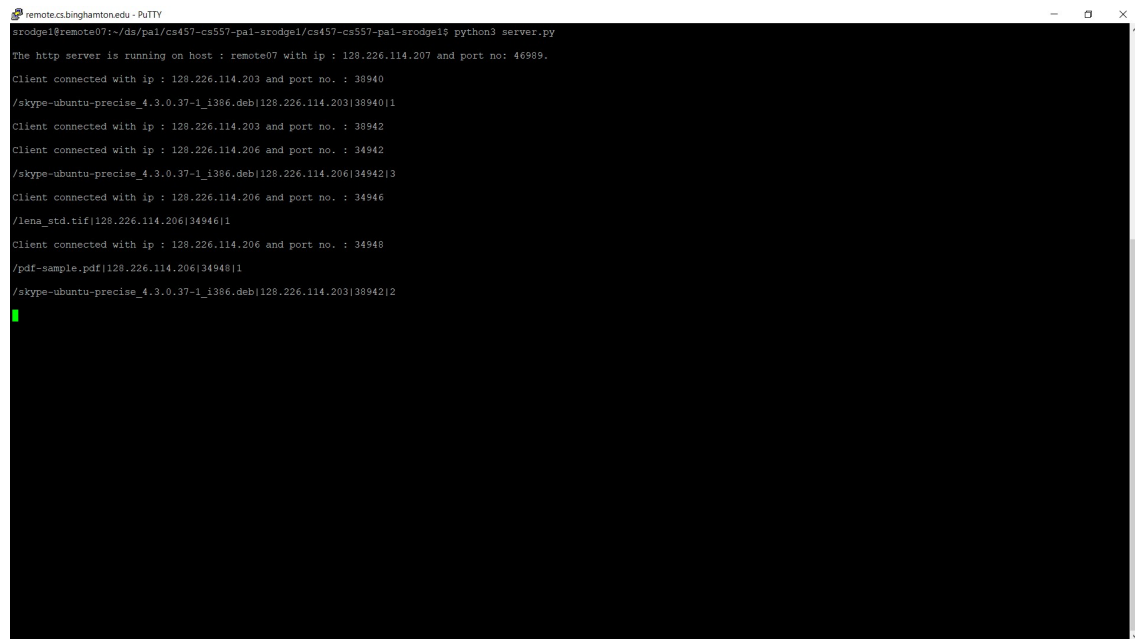
2) IMPLEMENTATION DETAILS

- When the sever.py file is run a server socket bound to ('',0) is created.
'' : represents this server will accept requests from any ip address.
0 : is port no. So that os will dynamically allot a free port.
After created socket server will enter into infinite loop that is always ON.
At most it can have 5 connection requests as backlog.
- If the www directory does not exist the server will shutdown and will not cater to any further or earlier requests.
- After accepting a connection request a new thread is created per each connection. This thread has target set to function **http_response** which is responsible for creating the proper response, whether the file/resource is found in www directory or not. Status code "200 OK" if found else "404 Not Found".
- The client socket object and address of the client connected are passed as arguments to the thread.

- Each thread reads the corresponding file in binary mode, that will be the response body. As per the requirements response header is encoded in utf-8 format and appended with `\n\n` to separate it from response body.
- `Sendall()` is used for sending the response body, but with `wget` it was not sending all the data in one pass so I put it inside a loop.
- A **global dictionary `num_access`** is used to keep track of number of times the files were requested since the start of server. The values in this dictionary are read and updated with a **`num_access_lock`**. That is it will display in the sequence of number of times a particular file was requested. It wouldn't matter which client received the file first.

MULTITHREADING INPUT/OUTPUT SAMPLES:

Mul-server



```
remote.cs.binghamton.edu - PuTTY
srodgel@remote07:~/ds/pai/cs457-pai-srodgel/cs457-pai-srodgel$ python3 server.py
The http server is running on host : remote07 with ip : 128.226.114.207 and port no: 46989.
Client connected with ip : 128.226.114.203 and port no. : 38940
/skype-ubuntu-precise_4.3.0.37-1_1386.deb|128.226.114.203|38940|1
Client connected with ip : 128.226.114.203 and port no. : 38942
Client connected with ip : 128.226.114.206 and port no. : 34942
/skype-ubuntu-precise_4.3.0.37-1_1386.deb|128.226.114.206|34942|3
Client connected with ip : 128.226.114.206 and port no. : 34946
/lens_std.tif|128.226.114.206|34946|1
Client connected with ip : 128.226.114.206 and port no. : 34948
/pdf-sample.pdf|128.226.114.206|34948|1
/skype-ubuntu-precise_4.3.0.37-1_1386.deb|128.226.114.203|38942|2
```

Mul-client1

```
remote.cs.binghamton.edu - PuTTY
arodgel@remote03:~/test_ds$ wget http://remote07:46989/skype-ubuntu-precise_4.3.0.37-1_i386.deb --limit-rate=100k
--2018-09-20 17:52:33-- http://remote07:46989/skype-ubuntu-precise_4.3.0.37-1_i386.deb
Resolving remote07 (remote07)... 128.226.114.207
Connecting to remote07 (remote07)[128.226.114.207]:46989... connected.
HTTP request sent, awaiting response... 200 OK
Length: 20112698 (19M) [application/x-debian-package]
Saving to: 'skype-ubuntu-precise_4.3.0.37-1_i386.deb'

skype-ubuntu-precise_4.3.0.37-1_i386.deb      60%[=====>] 1 11.53M 100KB/s eta 79s
```

Mul-client2

```
remote.cs.binghamton.edu - PuTTY
arodgel@remote06:~/test_ds$ wget http://remote07:46989/skype-ubuntu-precise_4.3.0.37-1_i386.deb
--2018-09-20 17:52:39-- http://remote07:46989/skype-ubuntu-precise_4.3.0.37-1_i386.deb
Resolving remote07 (remote07)... 128.226.114.207
Connecting to remote07 (remote07)[128.226.114.207]:46989... connected.
HTTP request sent, awaiting response... 200 OK
Length: 20112698 (19M) [application/x-debian-package]
Saving to: 'skype-ubuntu-precise_4.3.0.37-1_i386.deb.1'

skype-ubuntu-precise_4.3.0.37-1_i386.deb.1    100%[=====>] 19.18M --.-KB/s in 0.03s

2018-09-20 17:52:39 (603 MB/s) - 'skype-ubuntu-precise_4.3.0.37-1_i386.deb.1' saved [20112698/20112698]

arodgel@remote06:~/test_ds$ wget http://remote07:50571/lena_std.tif
--2018-09-20 17:53:27-- http://remote07:50571/lena_std.tif
Resolving remote07 (remote07)... 128.226.114.207
Connecting to remote07 (remote07)[128.226.114.207]:50571... failed: Connection refused.
arodgel@remote06:~/test_ds$ wget http://remote07:46989/lena_std.tif
--2018-09-20 17:53:41-- http://remote07:46989/lena_std.tif
Resolving remote07 (remote07)... 128.226.114.207
Connecting to remote07 (remote07)[128.226.114.207]:46989... connected.
HTTP request sent, awaiting response... 200 OK
Length: 786572 (768K) [image/tiff]
Saving to: 'lena_std.tif'

lena_std.tif                                100%[=====>] 768.14K --.-KB/s in 0.002s

2018-09-20 17:53:41 (329 MB/s) - 'lena_std.tif' saved [786572/786572]

arodgel@remote06:~/test_ds$ wget http://remote07:46989/pdf-sample.pdf --limit-rate=10k
--2018-09-20 17:54:07-- http://remote07:46989/pdf-sample.pdf
Resolving remote07 (remote07)... 128.226.114.207
Connecting to remote07 (remote07)[128.226.114.207]:46989... connected.
HTTP request sent, awaiting response... 200 OK
Length: 7945 (7.8K) [application/pdf]
Saving to: 'pdf-sample.pdf'

pdf-sample.pdf                              100%[=====>] 7.76K 10.0KB/s in 0.8s

2018-09-20 17:54:08 (10.0 KB/s) - 'pdf-sample.pdf' saved [7945/7945]

arodgel@remote06:~/test_ds$
```

DIFF COMMAND SAMPLES:

=====

Diff-server

```
remote.cs.binghamton.edu - PuTTY
arodgel@remote07:~/ds/pal/cs457-cs557-pal-sroddgel/cs457-cs557-pal-sroddgel$ python3 server.py
The http server is running on host : remote07 with ip : 128.226.114.207 and port no: 50571.
Client connected with ip : 128.226.114.206 and port no. : 52028
/test.html|128.226.114.206|52028|1
Client connected with ip : 128.226.114.206 and port no. : 52030
/pdf-sample.pdf|128.226.114.206|52030|1
Client connected with ip : 128.226.114.206 and port no. : 52032
/lena_std.tif|128.226.114.206|52032|1
Client connected with ip : 128.226.114.206 and port no. : 52034
/skype-ubuntu-precise_4.3.0.37-1_i386.deb|128.226.114.206|52034|1
█
```

Diff-client

```
remote.cs.binghamton.edu - PuTTY
HTTP request sent, awaiting response... 200 OK
length: 251 [text/html]
Saving to: 'test.html'

test.html                                     100%[=====] 251  --.-KB/s  in 0s

2018-09-20 17:39:17 (13.4 MB/s) - 'test.html' saved [251/251]

arodgel@remote06:~/test_ds$ wget http://remote07:50571/pdf-sample.pdf
--2018-09-20 17:39:32-- http://remote07:50571/pdf-sample.pdf
Resolving remote07 (remote07)... 128.226.114.207
Connecting to remote07 (remote07)[128.226.114.207]:50571... connected.
HTTP request sent, awaiting response... 200 OK
length: 7945 (7.8K) [application/pdf]
Saving to: 'pdf-sample.pdf'

pdf-sample.pdf                               100%[=====] 7.76K  --.-KB/s  in 0s

2018-09-20 17:39:32 (397 MB/s) - 'pdf-sample.pdf' saved [7945/7945]

arodgel@remote06:~/test_ds$ wget http://remote07:50571/lena_std.tif
--2018-09-20 17:39:49-- http://remote07:50571/lena_std.tif
Resolving remote07 (remote07)... 128.226.114.207
Connecting to remote07 (remote07)[128.226.114.207]:50571... connected.
HTTP request sent, awaiting response... 200 OK
length: 786372 (768K) [image/tiff]
Saving to: 'lena_std.tif'

lena_std.tif                                100%[=====] 768.14K  --.-KB/s  in 0.003s

2018-09-20 17:39:49 (284 MB/s) - 'lena_std.tif' saved [786372/786372]

arodgel@remote06:~/test_ds$ wget http://remote07:50571/skype-ubuntu-precise_4.3.0.37-1_i386.deb
--2018-09-20 17:40:33-- http://remote07:50571/skype-ubuntu-precise_4.3.0.37-1_i386.deb
Resolving remote07 (remote07)... 128.226.114.207
Connecting to remote07 (remote07)[128.226.114.207]:50571... connected.
HTTP request sent, awaiting response... 200 OK
length: 20112698 (19M) [application/x-debian-package]
Saving to: 'skype-ubuntu-precise_4.3.0.37-1_i386.deb'

skype-ubuntu-precise_4.3.0.37-1_i386.deb      100%[=====] 19.18M  --.-KB/s  in 0.03s

2018-09-20 17:40:33 (722 MB/s) - 'skype-ubuntu-precise_4.3.0.37-1_i386.deb' saved [20112698/20112698]

arodgel@remote06:~/test_ds$ cd ..
arodgel@remote06:~/test_ds$ diff test_ds/test.html ds/pal/cs457-cs557-pal-sroddgel/www/test.html
diff: ds/pal/cs457-cs557-pal-sroddgel/www/test.html: No such file or directory
arodgel@remote06:~/test_ds$ diff test_ds/test.html ds/pal/cs457-cs557-pal-sroddgel/cs457-cs557-pal-sroddgel/www/test.html
arodgel@remote06:~/test_ds$ diff test_ds/pdf-sample.pdf ds/pal/cs457-cs557-pal-sroddgel/cs457-cs557-pal-sroddgel/www/pdf-sample.pdf
arodgel@remote06:~/test_ds$ diff test_ds/skype-ubuntu-precise_4.3.0.37-1_i386.deb ds/pal/cs457-cs557-pal-sroddgel/cs457-cs557-pal-sroddgel/www/skype-ubuntu-precise_4.3.0.37-1_i386.deb
arodgel@remote06:~/test_ds$ diff test_ds/lena_std.tif ds/pal/cs457-cs557-pal-sroddgel/cs457-cs557-pal-sroddgel/www/lena_std.tif
arodgel@remote06:~/test_ds$ █
```

Note:

- 1] All the images are available in the screenshots folder in the same directory
- 2] The same file is also available in pdf format Readme.pdf