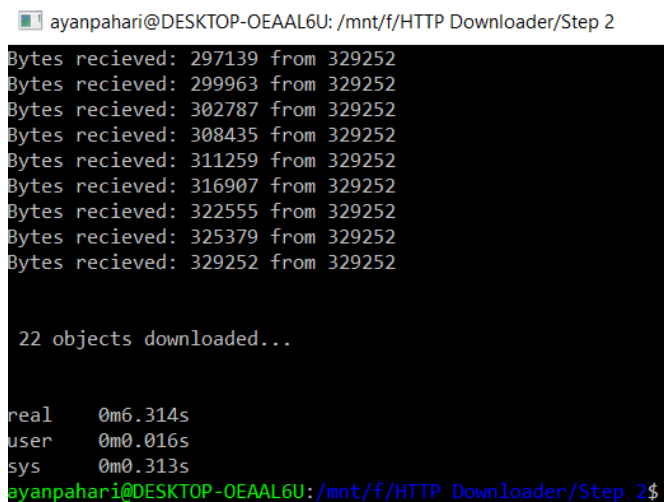


Socket Programming: HTTP Downloader

Screenshot of the output:



ayanpahari@DESKTOP-OEAAAL6U: /mnt/f/HTTP Downloader/Step 2

```
Bytes recieved: 297139 from 329252
Bytes recieved: 299963 from 329252
Bytes recieved: 302787 from 329252
Bytes recieved: 308435 from 329252
Bytes recieved: 311259 from 329252
Bytes recieved: 316907 from 329252
Bytes recieved: 322555 from 329252
Bytes recieved: 325379 from 329252
Bytes recieved: 329252 from 329252

22 objects downloaded...

real    0m6.314s
user    0m0.016s
sys     0m0.313s
ayanpahari@DESKTOP-OEAAAL6U: /mnt/f/HTTP Downloader/Step 2$
```

- Using the time command in linux to calculate the time of download

Now, repeating this 10 times for both persistent and non-persistent connections. (here 22 objects are being downloaded)

Sno.	Persistent Connection(sec)	Non-Persistent Connection(sec)
1.	7.432	6.183
2.	4.963	6.773
3.	6.827	5.992
4.	5.015	8.227
5.	4.651	7.334
6.	6.469	8.459
7.	5.304	6.335
8.	5.401	5.893
9.	7.103	8.387
10.	5.294	7.567
Avg.	5.8459	7.115

The avg time taken by persistent connection is less than non-persistent connection because in non-persistent connection separate connections are made for each of the objects to be downloaded while in case of persistent connection only 1 connection is required.

Comparing one of the results with wireshark to confirm that these are indeed the time required for the download. Below I have considered one of the example downloads for persistent connections.

```
ayanpahari@DESKTOP-OEAA6U: /mnt/f/HTTP Downloader/Step 3
Bytes recieved: 216886 from 329252
Bytes recieved: 219710 from 329252
Bytes recieved: 222534 from 329252
Bytes recieved: 225358 from 329252
Bytes recieved: 228182 from 329252
Bytes recieved: 233830 from 329252
Bytes recieved: 239478 from 329252
Bytes recieved: 242302 from 329252
Bytes recieved: 245126 from 329252
Bytes recieved: 247950 from 329252
Bytes recieved: 250774 from 329252
Bytes recieved: 253354 from 329252
Bytes recieved: 256178 from 329252
Bytes recieved: 259002 from 329252
Bytes recieved: 267474 from 329252
Bytes recieved: 281594 from 329252
Bytes recieved: 311254 from 329252
Bytes recieved: 316902 from 329252
Bytes recieved: 322550 from 329252
Bytes recieved: 325374 from 329252
Bytes recieved: 329252 from 329252

22 objects downloaded...

real    0m4.761s
user    0m0.000s
sys     0m0.219s
ayanpahari@DESKTOP-OEAA6U: /mnt/f/HTTP Downloader/Step 3$
```

Time reported by the program in the terminal : 4.761 secs

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help								
http								
No.	Time	Source	Destination	Protocol	Length	Time	Info	
119	2.749528	192.168.1.6	199.232.22.208	HTTP	201		GET /photo-1558981285-6f0c94958bb6?ixlib=rb-1.2.1&ixid=eyJhcnBfawQiojEyMDd9&auto=format&fit=crop&w=50	
152	2.764651	199.232.22.208	192.168.1.6	HTTP	801		HTTP/1.1 200 OK (JPEG JFIF image)	
164	2.887040	192.168.1.6	199.232.22.208	HTTP	201		GET /photo-1558981420-c532902e58b4?ixlib=rb-1.2.1&ixid=eyJhcnBfawQiojEyMDd9&auto=format&fit=crop&w=50	
172	2.899410	199.232.22.208	192.168.1.6	HTTP	970		HTTP/1.1 200 OK (JPEG JFIF image)	
183	2.943975	192.168.1.6	199.232.22.208	HTTP	201		GET /photo-1558981408-db0ecd8a1ee4?ixlib=rb-1.2.1&ixid=eyJhcnBfawQiojEyMDd9&auto=format&fit=crop&w=50	
236	2.961943	199.232.22.208	192.168.1.6	HTTP	1427		HTTP/1.1 200 OK (JPEG JFIF image)	
252	3.006446	192.168.1.6	199.232.22.208	HTTP	205		GET /photo-1502943693086-33b5b1cfd2f2?ixlib=rb-1.2.1&ixid=eyJhcnBfawQiojEyMDd9&auto=format&fit=crop&w=50	
308	3.025601	199.232.22.208	192.168.1.6	HTTP	955		HTTP/1.1 200 OK (JPEG JFIF image)	
321	3.052370	192.168.1.6	199.232.22.208	HTTP	204		GET /photo-1496871455396-14e56815f1f4?ixlib=rb-1.2.1&ixid=eyJhcnBfawQiojEyMDd9&auto=format&fit=crop&w=50	
383	3.069414	199.232.22.208	192.168.1.6	HTTP	709		HTTP/1.1 200 OK (JPEG JFIF image)	
394	3.102019	192.168.1.6	199.232.22.208	HTTP	204		GET /photo-1503249023995-51b0f3778ccf?ixlib=rb-1.2.1&ixid=eyJhcnBfawQiojEyMDd9&auto=format&fit=crop&w=50	
429	3.119184	199.232.22.208	192.168.1.6	HTTP	140		HTTP/1.1 200 OK (JPEG JFIF image)	
444	3.154867	192.168.1.6	199.232.22.208	HTTP	204		GET /photo-1529348915581-73628f0cf212?ixlib=rb-1.2.1&ixid=eyJhcnBfawQiojEyMDd9&auto=format&fit=crop&w=50	
506	3.180492	199.232.22.208	192.168.1.6	HTTP	198		HTTP/1.1 200 OK (JPEG JFIF image)	
519	3.212599	192.168.1.6	199.232.22.208	HTTP	204		GET /photo-1498036882173-b41c28a8ba34?ixlib=rb-1.2.1&ixid=eyJhcnBfawQiojEyMDd9&auto=format&fit=crop&w=50	
588	3.232995	199.232.22.208	192.168.1.6	HTTP	446		HTTP/1.1 200 OK (JPEG JFIF image)	
600	3.262480	192.168.1.6	199.232.22.208	HTTP	204		GET /photo-1507608616759-54f48f0af0ee?ixlib=rb-1.2.1&ixid=eyJhcnBfawQiojEyMDd9&auto=format&fit=crop&w=50	
617	3.272431	199.232.22.208	192.168.1.6	HTTP	566		HTTP/1.1 200 OK (JPEG JFIF image)	
627	3.313574	192.168.1.6	199.232.22.208	HTTP	204		GET /photo-1429593800333-b2dd6d71b5f?ixlib=rb-1.2.1&ixid=eyJhcnBfawQiojEyMDd9&auto=format&fit=crop&w=50	
672	3.328704	199.232.22.208	192.168.1.6	HTTP	634		HTTP/1.1 200 OK (JPEG JFIF image)	

> Frame 119: 201 bytes on wire (1608 bits), 201 bytes captured (1608 bits) on interface \Device\NPF_{7EA88004-1B82-4141-A86D-66222E2499FA}, id 0

> Ethernet II, Src: LiteonTe_f1:e9:f5 (e8:2a:44:f1:e9:f5), Dst: HuaweiTe_8f:0b:92 (0c:41:e9:8f:0b:92)

> Internet Protocol Version 4, Src: 192.168.1.6, Dst: 199.232.22.208

> Transmission Control Protocol, Src Port: 56206, Dst Port: 80, Seq: 1, Ack: 1, Len: 147

> Hypertext Transfer Protocol

Start Time in wireshark : 2.749 secs

No.	Time	Source	Destination	Protocol	Length	Time	Info
786	3.472411	192.168.1.6	199.232.22.208	HTTP	204		GET /photo-1a56354424719-343289fc118b?ixlib=rb-1.2.1&ixid=eyJhcHBfawQ10jEyMDd9&auto=format&fit=crop&w=500&q=60 HTTP/1.1
809	3.487327	199.232.22.208	192.168.1.6	HTTP	384		HTTP/1.1 200 OK (JPEG JFIF image)
822	3.542883	192.168.1.6	199.232.22.208	HTTP	204		GET /photo-1502675135457-e971002afadbf?ixlib=rb-1.2.1&ixid=eyJhcHBfawQ10jEyMDd9&auto=format&fit=crop&w=500&q=60 HTTP/1.1
885	3.562951	199.232.22.208	192.168.1.6	HTTP	656		HTTP/1.1 200 OK (JPEG JFIF image)
895	3.593174	192.168.1.6	199.232.22.208	HTTP	204		GET /photo-1514282401047-d79a71a590e8?ixlib=rb-1.2.1&ixid=eyJhcHBfawQ10jEyMDd9&auto=format&fit=crop&w=500&q=60 HTTP/1.1
956	3.609636	199.232.22.208	192.168.1.6	HTTP	120		HTTP/1.1 200 OK (JPEG JFIF image)
967	3.644599	192.168.1.6	199.232.22.208	HTTP	204		GET /photo-1507667522877-ad03f0c7b0e0?ixlib=rb-1.2.1&ixid=eyJhcHBfawQ10jEyMDd9&auto=format&fit=crop&w=500&q=60 HTTP/1.1
986	3.656195	199.232.22.208	192.168.1.6	HTTP	231		HTTP/1.1 200 OK (JPEG JFIF image)
997	4.036352	192.168.1.6	144.76.199.105	HTTP	133		GET /application/uploads/2014/12/pdf-sample.pdf HTTP/1.1
1007	4.178858	144.76.199.105	192.168.1.6	HTTP	1276		HTTP/1.1 200 OK (application/pdf)
1016	4.376761	192.168.1.6	144.76.199.105	HTTP	133		GET /application/uploads/2014/12/pdf-sample.pdf HTTP/1.1
1027	4.524858	144.76.199.105	192.168.1.6	HTTP	1276		HTTP/1.1 200 OK (application/pdf)
1037	4.713317	192.168.1.6	144.76.199.105	HTTP	133		GET /application/uploads/2014/12/pdf-sample.pdf HTTP/1.1
1046	4.863109	144.76.199.105	192.168.1.6	HTTP	1276		HTTP/1.1 200 OK (application/pdf)
1056	5.040279	192.168.1.6	151.101.38.2	HTTP	202		GET /media/8fbfue877M4xsUhcPc/giphy.gif?cid=ecf05e477sy8luo14bczrbz1wldvur10hg1mms5ep5v8czt&rid=giphy.gif&ct=g HTTP/1.1
2105	6.028168	151.101.38.2	192.168.1.6	HTTP	1006		HTTP/1.1 200 OK (GIF89a)
2122	6.349723	192.168.1.6	54.192.66.61	HTTP	134		GET /images/samples/imageeffects.gif HTTP/1.1
2162	6.600400	54.192.66.61	192.168.1.6	HTTP	1015		HTTP/1.1 200 OK (GIF89a)
2178	6.772252	192.168.1.6	151.101.38.2	HTTP	202		GET /media/3o7TKJ3KGfXQXusIdVY/giphy.gif?cid=ecf05e470c83pizwmp6o3qsej5b5d1gjs4o9ojntn1o2zayt&rid=giphy.gif&ct=g HTTP/1.1
2631	7.396185	151.101.38.2	192.168.1.6	HTTP	1108		HTTP/1.1 200 OK (GIF89a)

< >

> Frame 119: 201 bytes on wire (1608 bits), 201 bytes captured (1608 bits) on interface \Device\NPF_{7EA88004-18B2-4141-A86D-66222E2499FA}, id 0

> Ethernet II, Src: LiteonTe_f1:e9:f5 (e8:2a:44:f1:e9:f5), Dst: HuaweiTe_8f:0b:92 (0c:41:e9:8f:0b:92)

> Internet Protocol Version 4, Src: 192.168.1.6, Dst: 199.232.22.208

> Transmission Control Protocol, Src Port: 56206, Dst Port: 80, Seq: 1, Ack: 1, Len: 147

> Hypertext Transfer Protocol

End time in wireshark: 7.396 secs

Time for download as per wireshark: $7.396 - 2.749 = 4.647$ secs

Time reported by the program in the terminal : 4.761 secs

As the results are almost the same so this confirms that the time reported in the table is indeed correct.