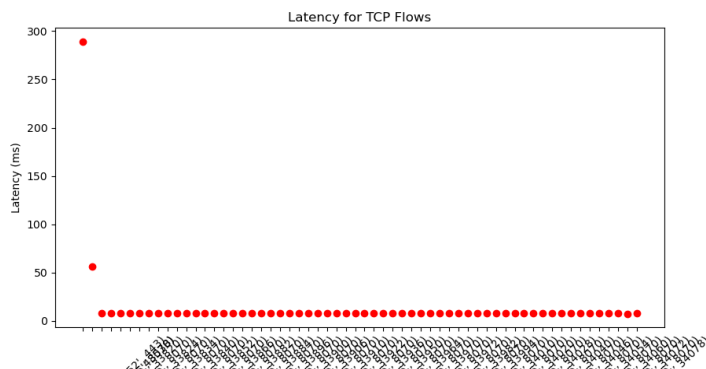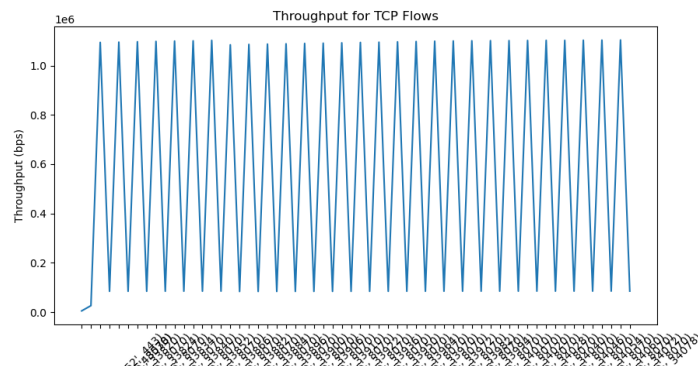Ques 1 and 2)
The server files are submitted.
The select io multiplexing can handle a maximum of 1025 file descriptors. Code runs accordingly.
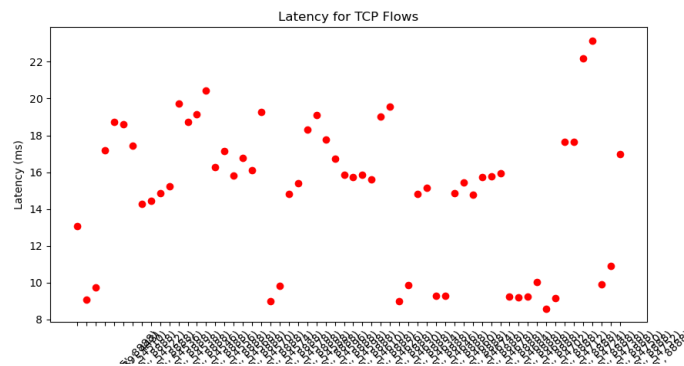
Ques 3)
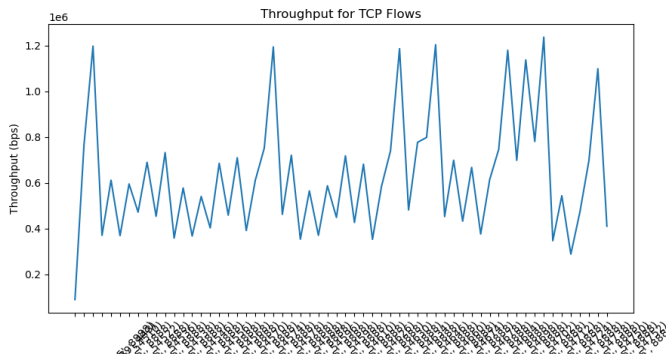   (a) Pcap files are submitted.
    (b)

Throughput and latency for fork for 3000 concurrent clients with 50 requests :

Throughput and latency for fork for 1000 concurrent clients with 50 request

Throughput for TCP Flows

Latency for TCP Flows

Throughput and latency for fork for 500 concurrent clients with 50 requests :

Throughput and latency for thread for 500 concurrent clients with 50 requests :

Throughput for TCP Flows

Latency for TCP Flows

Throughput and latency for thread for 1000 concurrent clients with 50 requests :

Throughput for TCP Flows

Latency for TCP Flows

Throughput and latency for select for 3000 concurrent clients with 50 requests :

Throughput and latency for select for 1000 concurrent clients with 50 requests :

Throughput and latency for select for 500 concurrent clients with 50 requests :

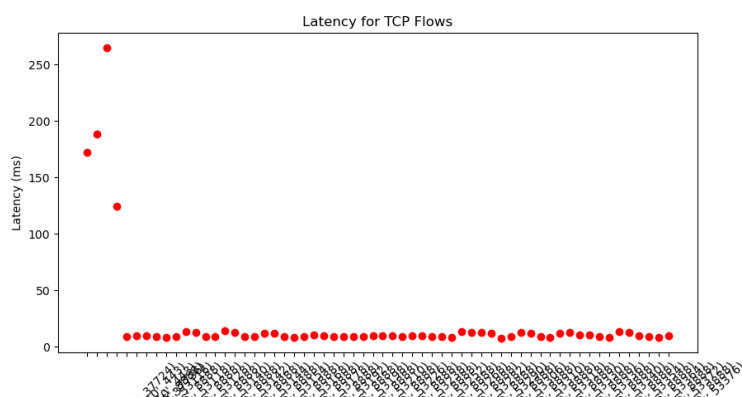Throughput for TCP Flows

Latency for TCP Flows

Throughput and latency for poll for 3000 concurrent clients with 50 requests :

Throughput for TCP Flows

Latency for TCP Flows

Throughput and latency for poll for 1000 concurrent clients with 50 requests :

Throughput for TCP Flows

Latency for TCP Flows

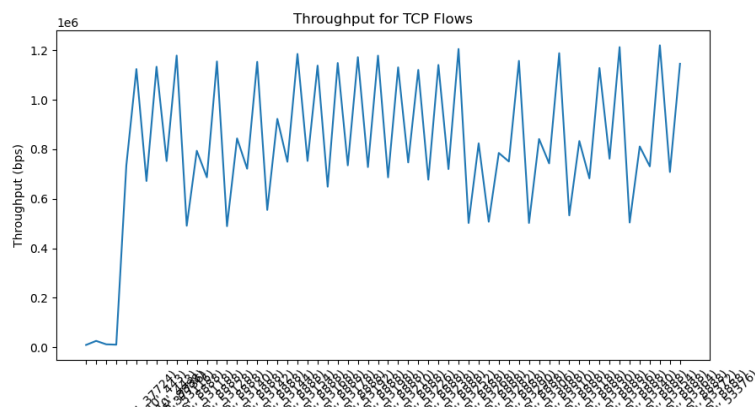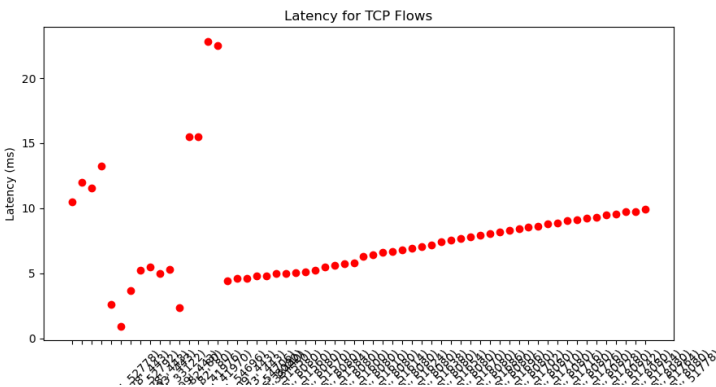Throughput and latency for poll for 500 concurrent clients with 50 requests :
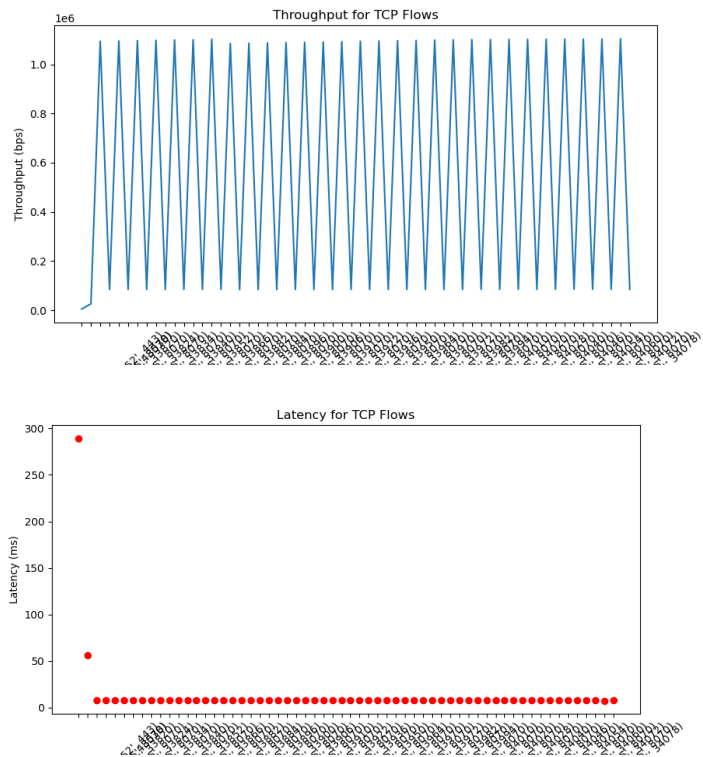
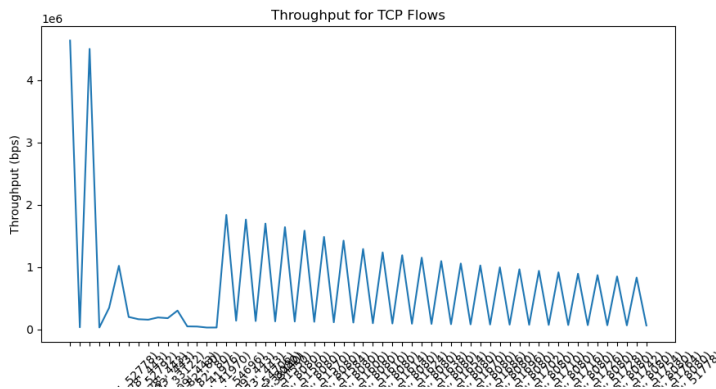Throughput and latency for epoll for 3000 concurrent clients with 50 requests :

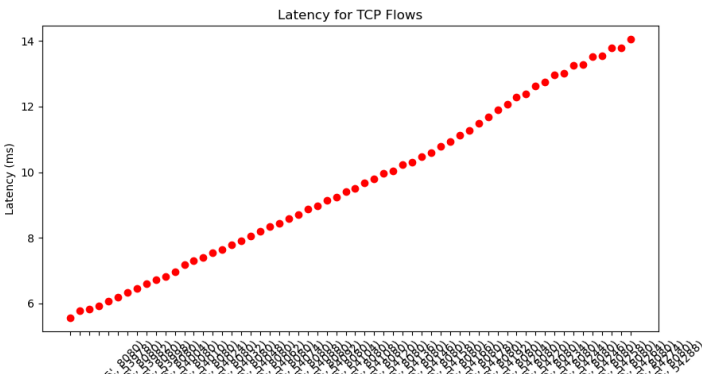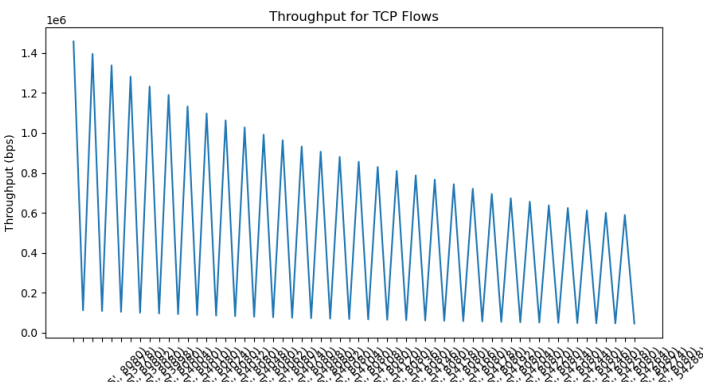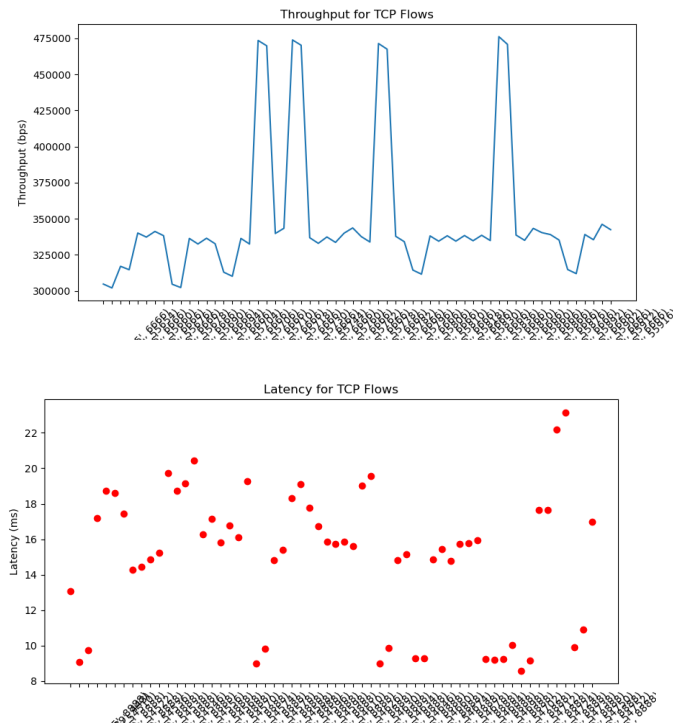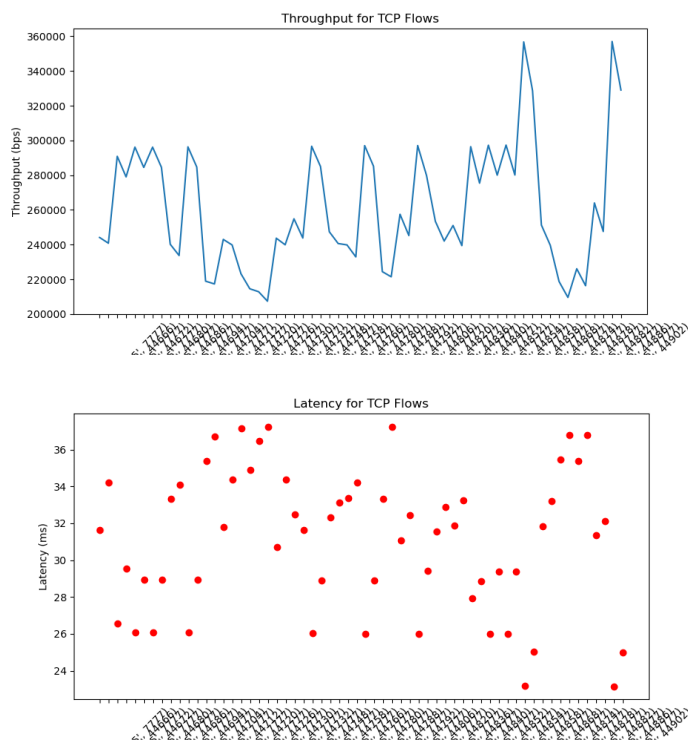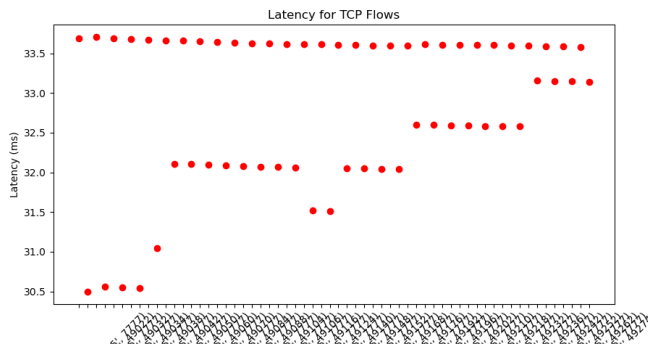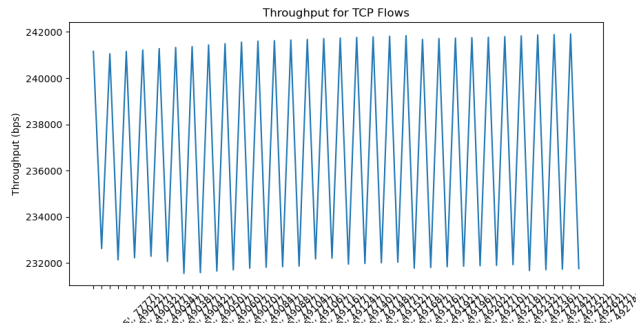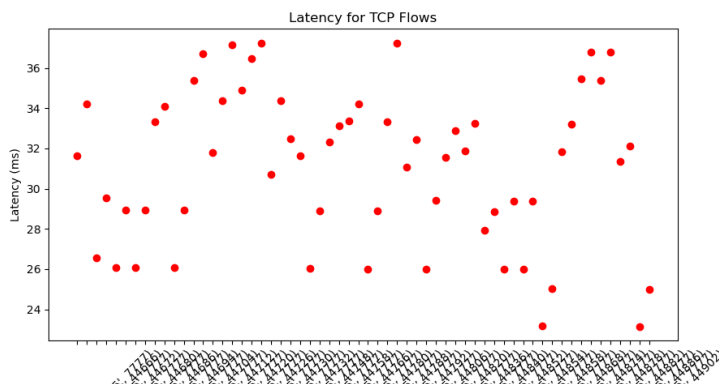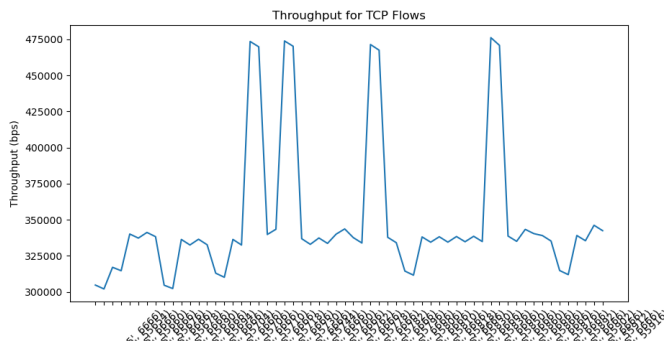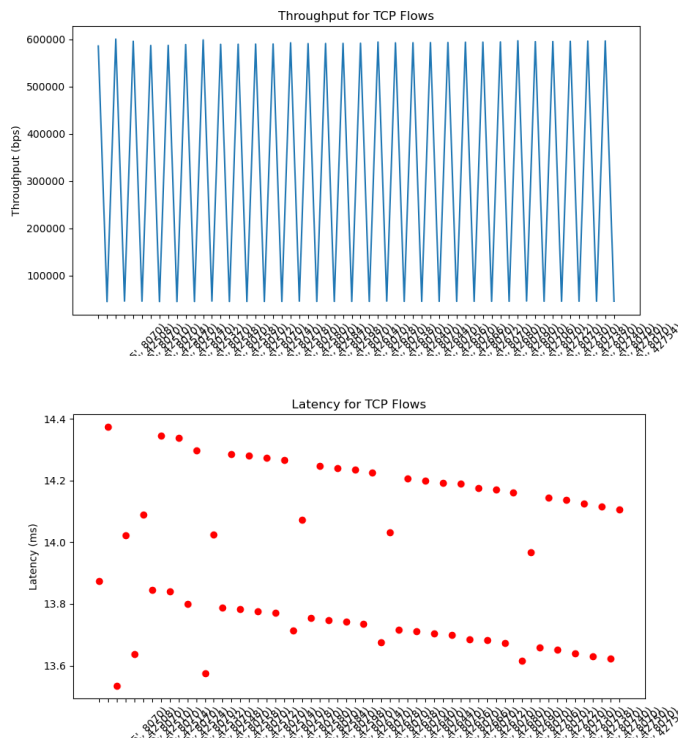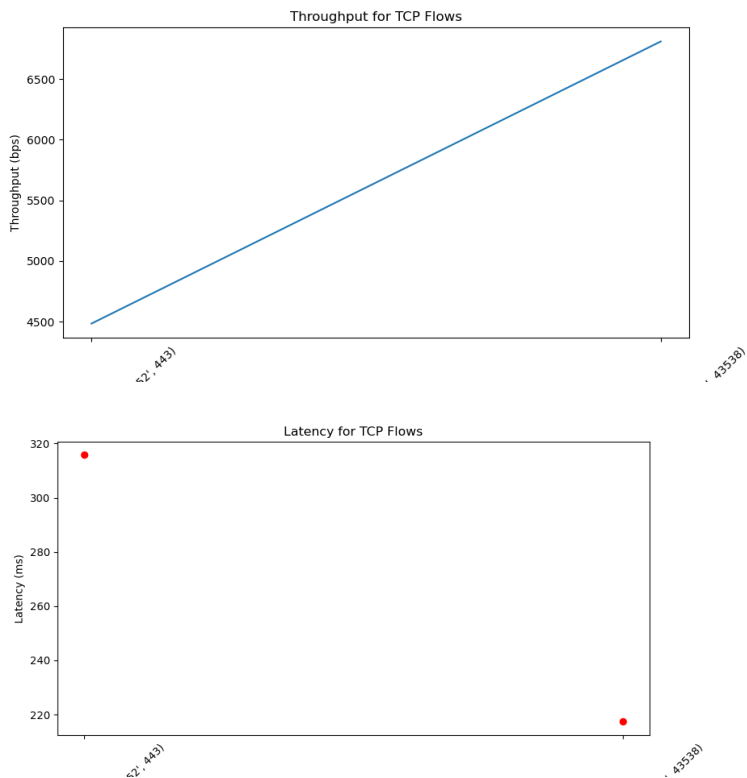Throughput and latency for epoll for 1000 concurrent clients with 50 requests :
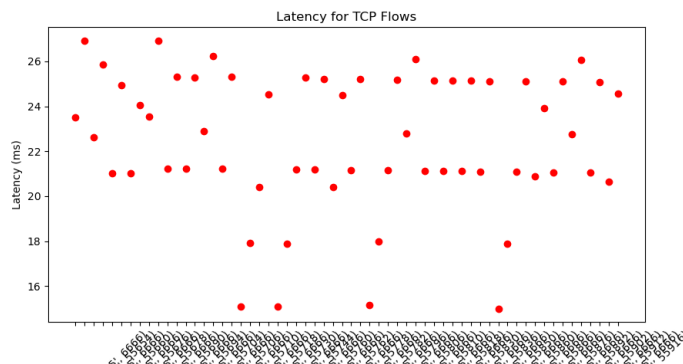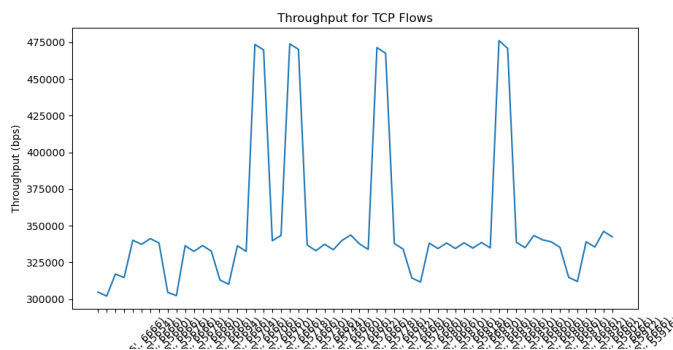
Throughput and latency for epoll for 500 concurrent clients with 50 requests :
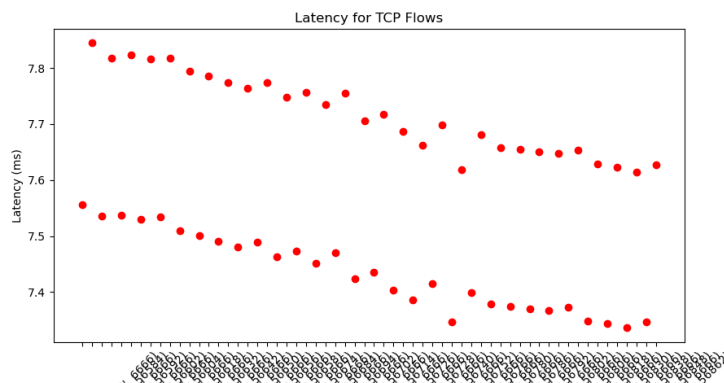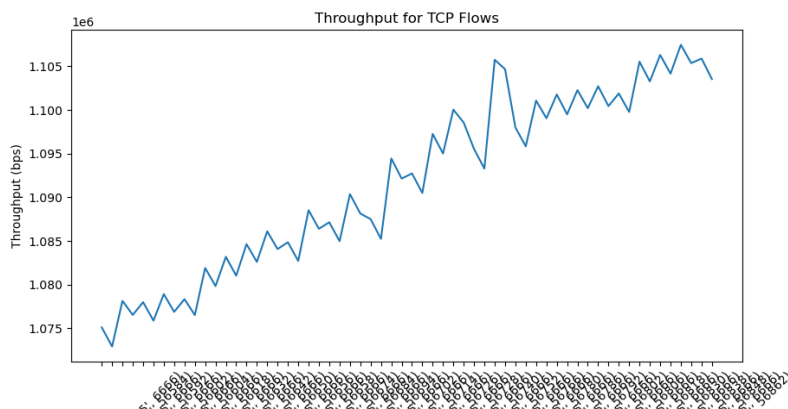
(c)
Time -

```
server@server-VirtualBox:~/Desktop/final$ /usr/bin/time -v ./thread
/usr/bin/time: cannot run ./thread: No such file or directory
Command exited with non-zero status 127
        Command being timed: "./thread"
        User time (seconds): 0.00
        System time (seconds): 0.00
        Percent of CPU this job got: 79%
        Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.00
        Average shared text size (kbytes): 0
        Average unshared data size (kbytes): 0
        Average stack size (kbytes): 0
        Average total size (kbytes): 0
        Maximum resident set size (kbytes): 768
        Average resident set size (kbytes): 0
        Major (requiring I/O) page faults: 0
        Minor (reclaiming a frame) page faults: 29
        Voluntary context switches: 1
        Involuntary context switches: 0
        Swaps: 0
        File system inputs: 0
        File system outputs: 0
        Socket messages sent: 0
        Socket messages received: 0
        Signals delivered: 0
        Page size (bytes): 4096
        Exit status: 127
```

```
server@server-VirtualBox:~/Desktop/final$ /usr/bin/time -v ./select
^CCommand terminated by signal 2
        Command being timed: "./select"
        User time (seconds): 0.00
        System time (seconds): 0.00
        Percent of CPU this job got: 0%
        Elapsed (wall clock) time (h:mm:ss or m:ss): 0:08.08
        Average shared text size (kbytes): 0
        Average unshared data size (kbytes): 0
        Average stack size (kbytes): 0
        Average total size (kbytes): 0
        Maximum resident set size (kbytes): 1024
        Average resident set size (kbytes): 0
        Major (requiring I/O) page faults: 0
        Minor (reclaiming a frame) page faults: 59
        Voluntary context switches: 2
        Involuntary context switches: 1
        Swaps: 0
        File system inputs: 0
        File system outputs: 0
        Socket messages sent: 0
        Socket messages received: 0
        Signals delivered: 0
        Page size (bytes): 4096
        Exit status: 0
```

```
server@server-VirtualBox:~/Desktop/final$ /usr/bin/time -v ./poll
Server listening on port 8070
poll: Invalid argument
        Command being timed: "./poll"
        User time (seconds): 0.00
        System time (seconds): 0.00
        Percent of CPU this job got: 0%
        Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.00
        Average shared text size (kbytes): 0
        Average unshared data size (kbytes): 0
        Average stack size (kbytes): 0
        Average total size (kbytes): 0
        Maximum resident set size (kbytes): 1664
        Average resident set size (kbytes): 0
        Major (requiring I/O) page faults: 1
        Minor (reclaiming a frame) page faults: 81
        Voluntary context switches: 1
        Involuntary context switches: 0
        Swaps: 0
        File system inputs: 8
        File system outputs: 0
        Socket messages sent: 0
        Socket messages received: 0
        Signals delivered: 0
        Page size (bytes): 4096
        Exit status: 0
server@server-VirtualBox:~/Desktop/final$ /usr/bin/time -v ./epoll
Server listening on port 6666
^CCommand terminated by signal 2
        Command being timed: "./epoll"
        User time (seconds): 0.00
        System time (seconds): 0.00
        Percent of CPU this job got: 0%
        Elapsed (wall clock) time (h:mm:ss or m:ss): 0:02.73
        Average shared text size (kbytes): 0
        Average unshared data size (kbytes): 0
        Average stack size (kbytes): 0
        Average total size (kbytes): 0
        Maximum resident set size (kbytes): 1536
        Average resident set size (kbytes): 0
        Major (requiring I/O) page faults: 1
        Minor (reclaiming a frame) page faults: 80
        Voluntary context switches: 2
        Involuntary context switches: 0
        Swaps: 0
        File system inputs: 8
        File system outputs: 0
        Socket messages sent: 0
        Socket messages received: 0
        Signals delivered: 0
        Page size (bytes): 4096
        Exit status: 0
```

```
                    Exit status: 0
server@server-VirtualBox:~/Desktop/final$ /usr/bin/time -v ./fork
^CCommand terminated by signal 2
        Command being timed: "./fork"
        User time (seconds): 0.00
        System time (seconds): 0.00
        Percent of CPU this job got: 0%
        Elapsed (wall clock) time (h:mm:ss or m:ss): 0:05.22
        Average shared text size (kbytes): 0
        Average unshared data size (kbytes): 0
        Average stack size (kbytes): 0
        Average total size (kbytes): 0
        Maximum resident set size (kbytes): 1024
        Average resident set size (kbytes): 0
        Major (requiring I/O) page faults: 1
        Minor (reclaiming a frame) page faults: 58
        Voluntary context switches: 2
        Involuntary context switches: 0
        Swaps: 0
        File system inputs: 8
        File system outputs: 0
        Socket messages sent: 0
        Socket messages received: 0
        Signals delivered: 0
        Page size (bytes): 4096
        Exit status: 0
```

Memory -

Thread 1000

```
  0[|||                                    3.9%]   4[||
  1[|                                      0.7%]   5[|
  2[|||                                    3.4%]   6[|||
  3[||                                     2.0%]   7[||||||||||||
Mem[||||||||||||||||||||||||||||||||||    1.05G/3.81G]   Tasks: 121, 301 thr; 2 running
Swp[                                      0K/3.81G]   Load average: 0.32 0.33 0.19
                                                    Uptime: 00:20:30

  PID USER      PRI  NI  VIRT   RES   SHR S CPU%▽MEM%   TIME+  Command
 4796 server     20   0 10968  1536  1536 S 14.4  0.0  0:01.79 ./thread
 6183 server     20   0 10968  1536  1536 R  0.0  0.0  0:00.00 ./thread




























terDone EscClear     Filter: ./thread
```

Fork 1000

```
  0[||||||||||                        12.2%]   4[|||||||||||||
  1[||||||||                          12.9%]   5[||||||
  2[|||||||||                         11.5%]   6[|||||||
  3[||||||                            10.7%]   7[||||||||||||||||||||||||
Mem[|||||||||||||||||||||||||||||||||||||||| 1.16G/3.81G]  Tasks: 1121, 300 thr; 8 running
Swp[                                   0K/3.81G]  Load average: 0.06 0.21 0.16
                                                 Uptime: 00:23:12

    PID USER      PRI  NI  VIRT   RES   SHR S CPU%▽MEM%   TIME+  Command
   9842 server     20   0  2640  1024  1024 S 10.3  0.0  0:00.15 ./fork
   9845 server     20   0  2640   768   768 S  1.4  0.0  0:00.02 ./fork
   9871 server     20   0  2640   640   640 S  0.7  0.0  0:00.01 ./fork
   9929 server     20   0  2640   640   640 S  0.7  0.0  0:00.01 ./fork
   9980 server     20   0  2640   640   640 S  0.7  0.0  0:00.01 ./fork
   9997 server     20   0  2640   640   640 S  0.7  0.0  0:00.01 ./fork
  10034 server     20   0  2640   640   640 S  0.7  0.0  0:00.01 ./fork
  10289 server     20   0  2640   768   768 S  0.7  0.0  0:00.01 ./fork
   9843 server     20   0  2640   768   768 S  0.0  0.0  0:00.00 ./fork
   9844 server     20   0  2640   640   640 S  0.0  0.0  0:00.00 ./fork
   9846 server     20   0  2640   768   768 S  0.0  0.0  0:00.00 ./fork
   9847 server     20   0  2640   768   768 S  0.0  0.0  0:00.00 ./fork
   9848 server     20   0  2640   768   768 S  0.0  0.0  0:00.00 ./fork
   9849 server     20   0  2640   768   768 S  0.0  0.0  0:00.00 ./fork
   9850 server     20   0  2640   640   640 S  0.0  0.0  0:00.00 ./fork
   9851 server     20   0  2640   640   640 S  0.0  0.0  0:00.00 ./fork
   9852 server     20   0  2640   640   640 S  0.0  0.0  0:00.00 ./fork
   9853 server     20   0  2640   768   768 S  0.0  0.0  0:00.00 ./fork
   9854 server     20   0  2640   768   768 S  0.0  0.0  0:00.00 ./fork
   9855 server     20   0  2640   768   768 S  0.0  0.0  0:00.00 ./fork
   9856 server     20   0  2640   768   768 S  0.0  0.0  0:00.00 ./fork
   9857 server     20   0  2640   640   640 S  0.0  0.0  0:00.00 ./fork
   9858 server     20   0  2640   768   768 S  0.0  0.0  0:00.00 ./fork
   9859 server     20   0  2640   768   768 S  0.0  0.0  0:00.00 ./fork
   9860 server     20   0  2640   640   640 S  0.0  0.0  0:00.00 ./fork
   9861 server     20   0  2640   640   640 S  0.0  0.0  0:00.00 ./fork
   9862 server     20   0  2640   640   640 S  0.0  0.0  0:00.00 ./fork
   9863 server     20   0  2640   640   640 S  0.0  0.0  0:00.00 ./fork
   9864 server     20   0  2640   640   640 S  0.0  0.0  0:00.00 ./fork
EnterDone  EscClear    Filter: ./fork
```

Select 1000

```
  0[||                                 2.0%]   4[|
  1[|                                  0.7%]   5[
  2[||||||||||||||||||||||||||||||||  47.7%]   6[||
  3[|                                  1.3%]   7[||||||||||||||
Mem[||||||||||||||||||||||||||||||||||| 1.07G/3.81G]  Tasks: 121, 300 thr; 2 running
Swp[                                   0K/3.81G]  Load average: 0.17 0.20 0.17
                                                 Uptime: 00:25:31

    PID USER      PRI  NI  VIRT   RES   SHR S CPU%▽MEM%   TIME+  Command
  10913 server     20   0  2640  1408  1408 S 48.3  0.0  0:01.08 ./select
EnterDone  EscClear    Filter: ./select
```
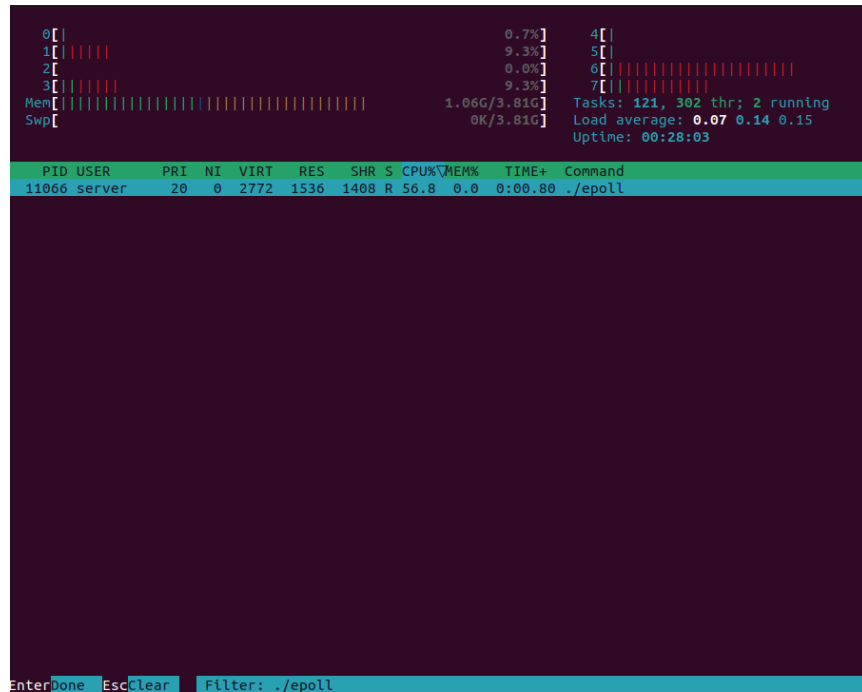
Epoll 1000


```
  0[|                                    0.7%]   4[|
  1[||||||                               9.3%]   5[|
  2[                                     0.0%]   6[||||||||||||||||||||||||
  3[|||||||                              9.3%]   7[|||||||||||
Mem[||||||||||||||||||||||||||||||||||||     1.06G/3.81G]   Tasks: 121, 302 thr; 2 running
Swp[                                     0K/3.81G]   Load average: 0.07 0.14 0.15
                                                   Uptime: 00:28:03

   PID USER      PRI  NI  VIRT   RES   SHR S CPU%▽MEM%   TIME+  Command
 11066 server     20   0  2772  1536  1408 R 56.8  0.0  0:00.80 ./epoll
```

EnterDone EscClear   Filter: ./epoll

Fork 500

server@server-VirtualBox: ~/Desktop/final

```
  0[|||||                                6.6%]   4[|||||
  1[||||||                               9.3%]   5[|||||
  2[|||||||                             12.1%]   6[||||||
  3[|||||||                             11.0%]   7[||||||||||||||||||
Mem[|||||||||||||||||||||||||||||||||||||     928M/3.81G]   Tasks: 1123, 303 thr; 1 running
Swp[                                     0K/3.81G]   Load average: 0.56 0.50 0.24
                                                   Uptime: 00:04:29

   PID USER      PRI  NI  VIRT   RES   SHR S CPU%▽MEM%   TIME+  Command
  4580 server     20   0  2640  1024  1024 S  3.3  0.0  0:00.10 ./fork
```

F1Help   F2Setup F3Search F4Filter F5Tree   F6SortBy F7Nice -F8Nice +F9Kill   F10Quit

Thread 500

```
  0[|||                           4.5%]    4[||
  1[|||                           4.0%]    5[|||
  2[||                            2.0%]    6[||||
  3[|                            0.7%]    7[|||||||||||||
Mem[|||||||||||||||||||||||||||||||||||]  931M/3.81G]   Tasks: 122, 302 thr; 1 running
Swp[                                      0K/3.81G]    Load average: 0.41 0.47 0.25
                                                       Uptime: 00:05:46

  PID USER      PRI  NI  VIRT   RES   SHR S CPU%▽MEM%   TIME+  Command
 5610 server     20   0 10968  1536  1536 S 15.0  0.0  0:00.43 ./thread
 5962 server     20   0 10968  1536  1536 S  0.0  0.0  0:00.00 ./thread
```

```
EnterDone   EscClear      Filter: ./thread
```

Thread 3000

```
  0[||||                          5.9%]    4[|
  1[|                            1.3%]    5[
  2[||                            2.0%]    6[|||
  3[|                            0.7%]    7[|||||||||||||
Mem[|||||||||||||||||||||||||||||||||||]  955M/3.81G]   Tasks: 122, 300 thr; 1 running
Swp[                                      0K/3.81G]    Load average: 0.29 0.43 0.24
                                                       Uptime: 00:06:26

  PID USER      PRI  NI  VIRT   RES   SHR S CPU%▽MEM%   TIME+  Command
 6147 server     20   0 10968  1536  1536 S 15.0  0.0  0:00.74 ./thread
 6807 server     20   0 10968  1536  1536 S  0.0  0.0  0:00.00 ./thread
```
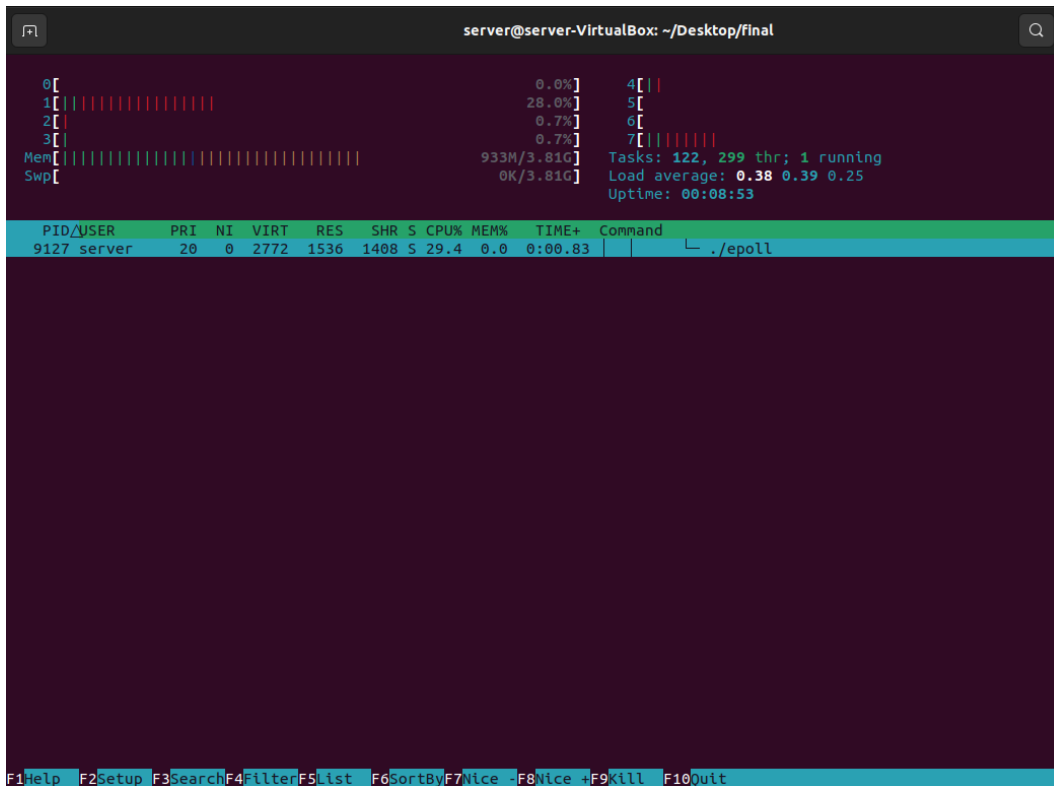
```
F1Help   F2Setup  F3Search F4Filter F5Tree   F6SortByF7Nice -F8Nice +F9Kill   F10Quit
```

Select 500
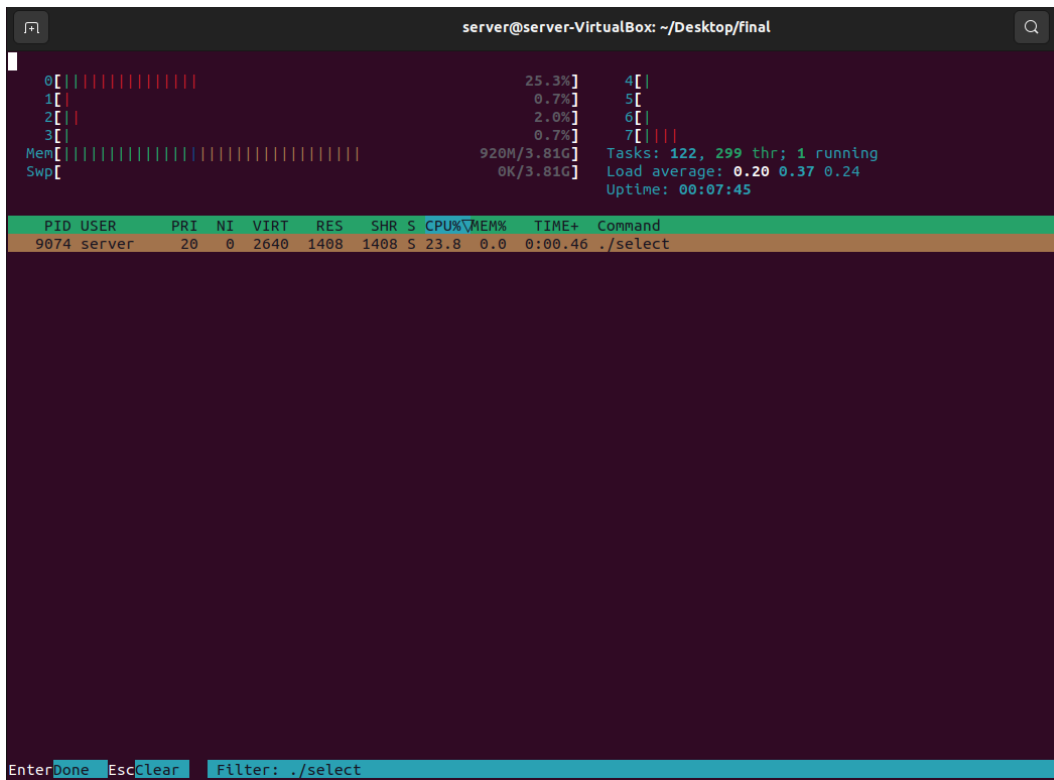
Epoll 500

Epoll 3000


```
                                    server@server-VirtualBox: ~/Desktop/final

  0[||                                          1.4%]    4[|
  1[||                                          2.8%]    5[
  2[|||||||||||||||||||||||||                  48.0%]    6[
  3[                                            0.0%]    7[||||||||||||||||||||||
Mem[|||||||||||||||||||||||||||||||||      952M/3.81G]    Tasks: 122, 299 thr; 1 running
Swp[                                        0K/3.81G]    Load average: 0.18 0.33 0.24
                                                         Uptime: 00:09:37

  PID△USER      PRI  NI  VIRT   RES   SHR S CPU% MEM%   TIME+  Command
 9129 server     20   0  2772  1664  1536 S 60.6  0.0  0:00.84 │ │        └ ./epoll




F1Help   F2Setup  F3Search F4Filter F5List   F6SortBy F7Nice -F8Nice +F9Kill   F10Quit
```