

Lab – UDP Pinger

Running ifconfig:

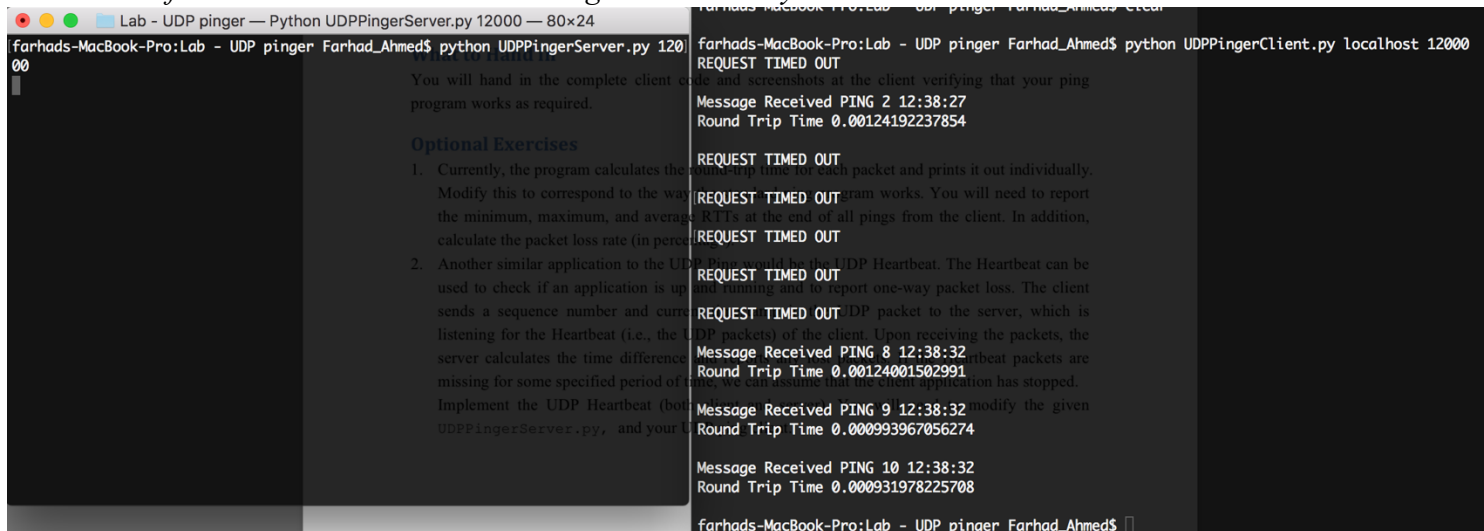
```
farhads-MacBook-Pro:~ Farhad_Ahmed$ ifconfig
lo0: flags=8049<UP,LOOPBACK,RUNNING,MULTICAST> mtu 16384
    options=1203<RXCSUM,TXCSUM,TXSTATUS,SW_TIMESTAMP>
    inet 127.0.0.1 netmask 0xff000000
    inet6 ::1 prefixlen 128
    inet6 fe80::1%lo0 prefixlen 64 scopeid 0x1
    nd6 options=201<PERFORMNUD,DAD>
gif0: flags=8010<POINTOPOINT,MULTICAST> mtu 1280
stf0: flags=0<> mtu 1280
XHC20: flags=0<> mtu 0
en0: flags=8863<UP,BROADCAST,SMART,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    ether ac:bc:32:91:a2:af
    inet6 fe80::1cef:6e2b:c794:2a4%en0 prefixlen 64 secured scopeid 0x5
    inet6 2604:2000:6aa5:4500:42f:6470:410b:b373 prefixlen 64 autoconf secured
    inet6 2604:2000:6aa5:4500:c939:f5d3:b1bc:229b prefixlen 64 autoconf temporary
    inet 192.168.0.3 netmask 0xffffffff broadcast 192.168.0.255
    nd6 options=201<PERFORMNUD,DAD>
    media: autoselect
    status: active
p2p0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 2304
    ether 0e:bc:32:91:a2:af
    media: autoselect
    status: inactive
awd10: flags=8943<UP,BROADCAST,RUNNING,PROMISC,SIMPLEX,MULTICAST> mtu 1484
    ether fa:a3:79:0f:85:80
    inet6 fe80::f8a3:79ff:fe0f:8580%awd10 prefixlen 64 scopeid 0x7
    nd6 options=201<PERFORMNUD,DAD>
    media: autoselect
    status: active
en1: flags=8963<UP,BROADCAST,SMART,RUNNING,PROMISC,SIMPLEX,MULTICAST> mtu 1500
    options=60<TS04,TS06>
    ether 4a:00:02:92:f1:80
    media: autoselect <full-duplex>
    status: inactive
en2: flags=8963<UP,BROADCAST,SMART,RUNNING,PROMISC,SIMPLEX,MULTICAST> mtu 1500
    options=60<TS04,TS06>
    ether 4a:00:02:92:f1:81
    media: autoselect <full-duplex>
    status: inactive
```

```

status: inactive
bridge0: flags=8863<UP,BROADCAST,SMART,RUNNING,SIMPLEX,MULTICAST> mtu 1500
options=63<RXCSUM,TXCSUM,TS04,TS06>
ether 4a:00:02:92:f1:80
Configuration:
    id 0:0:0:0:0:0 priority 0 hellotime 0 fwddelay 0
    maxage 0 holdcnt 0 proto stp maxaddr 100 timeout 1200
    root id 0:0:0:0:0:0 priority 0 ifcost 0 port 0
    ipfilter disabled flags 0x2
member: en1 flags=3<LEARNING,DISCOVER>
    ifmaxaddr 0 port 8 priority 0 path cost 0
member: en2 flags=3<LEARNING,DISCOVER>
    ifmaxaddr 0 port 9 priority 0 path cost 0
nd6 options=201<PERFORMNUD,DAD>
media: <unknown type>
status: inactive
utun0: flags=8051<UP,POINTOPOINT,RUNNING,MULTICAST> mtu 2000
inet6 fe80::98a3:bf24:a130:cfaa%utun0 prefixlen 64 scopeid 0xb
nd6 options=201<PERFORMNUD,DAD>
utun1: flags=8051<UP,POINTOPOINT,RUNNING,MULTICAST> mtu 1380
inet6 fe80::861f:5390:b5db:3a74%utun1 prefixlen 64 scopeid 0xc
nd6 options=201<PERFORMNUD,DAD>
farhads-MacBook-Pro:~ Farhad_Ahmed$

```

Screenshot of UDP Server and Client Running Simultaneously:



The screenshot shows two terminal windows running simultaneously on a Mac. The left window is titled 'Lab - UDP pinger — Python UDPPingerServer.py 12000 — 80x24' and shows the execution of the server script. The right window is titled 'farhads-MacBook-Pro:Lab - UDP pinger Farhad_Ahmed\$ python UDPPingerClient.py localhost 12000' and shows the execution of the client script.

Left Terminal (Server):

```

farhads-MacBook-Pro:Lab - UDP pinger Farhad_Ahmed$ python UDPPingerServer.py 12000
You will hand in the complete client code and screenshots at the client verifying that your
program works as required.

Optional Exercises
1. Currently, the program calculates the round-trip time for each packet and prints it out individually.
   Modify this to correspond to the way that ping works. You will need to report
   the minimum, maximum, and average RTTs at the end of all pings from the client. In addition,
   calculate the packet loss rate (in percent).
2. Another similar application to the UDP Ping would be the UDP Heartbeat. The Heartbeat can be
   used to check if an application is up and running and to report one-way packet loss. The client
   sends a sequence number and current time to the server, which is
   listening for the Heartbeat (i.e., the UDP packets) of the client. Upon receiving the packets, the
   server calculates the time difference between the received packet and the last heartbeat packets are
   missing for some specified period of time, we can assume that the client application has stopped.
   Implement the UDP Heartbeat (both UDPPingerServer.py, and your UDPPingerClient.py).

```

Right Terminal (Client):

```

farhads-MacBook-Pro:Lab - UDP pinger Farhad_Ahmed$ python UDPPingerClient.py localhost 12000
REQUEST TIMED OUT
Message Received PING 2 12:38:27
Round Trip Time 0.00124192237854
REQUEST TIMED OUT
REQUEST TIMED OUT
REQUEST TIMED OUT
REQUEST TIMED OUT
REQUEST TIMED OUT
Message Received PING 8 12:38:32
Round Trip Time 0.00124001502991
Message Received PING 9 12:38:32
Round Trip Time 0.00093967056274
Message Received PING 10 12:38:32
Round Trip Time 0.000931978225708
farhads-MacBook-Pro:Lab - UDP pinger Farhad_Ahmed$

```