Assignment-8: Ping using Raw Sockets

15CS10053,15CS10001

1st April 2018

1 Documentation

There are 2 files (must be kept in same folder):

1. *ping.c* : contains code to send ECHO Request
2. *Makefile*

This is an implementation of ping application using ICMP protocol and raw sockets. The compilation and running procedure are detailed below. A time-out of 10 seconds has been set.

2 Compilation

To compile, run make as:

```
aayush Ping $ make
gcc -o ping ping.c -lm
```

3 Running

To run ping, enter executable, destination address and number of pings on command line:

```
aayush Ping $ sudo ./ping 10.5.18.101 5
```

4 Sample input-output

```
aayush Ping $ sudo ./ping 10.5.18.101 5
PING 10.5.18.101 (10.5.18.101) 16(44) bytes of data.
24 bytes received from 10.5.18.101 icmp_sequence=0 ttl=62 time=8.244ms
24 bytes received from 10.5.18.101 icmp_sequence=1 ttl=62 time=1.194ms
24 bytes received from 10.5.18.101 icmp_sequence=2 ttl=62 time=1.576ms
24 bytes received from 10.5.18.101 icmp_sequence=3 ttl=62 time=2.472ms
24 bytes received from 10.5.18.101 icmp_sequence=4 ttl=62 time=5.829ms

5 packets transmitted, 5 received, 0.000% packet loss, time 19.556 ms
rtt min/avg/max/mdev = 1.194/3.863/8.244/6.111 ms
```

5 Observation

1. Not all packets take same amount of time to reach the destination.
2. TTL value in the output is set by the destination
3. If destination is unreachable (due to some network problem) no output is received.

6 Justification

1. **PING 10.5.18.101 (10.5.18.101) 16(44) bytes of data**
   ping first takes the URL (10.5.18.101) and converts it to IP address by DNS lookup and then sends ECHO Request packets to destination. 16 is the size of ICMP payload in bytes. 44 is the size of IP datagram in bytes.
2. **24 bytes received from 10.5.18.101 icmp sequence=0 ttl=62**
   24 is the size of IP payload received from destination 10.5.18.101 with sequence number = 0 and time-to-live = 62. TTL is set by the sender to restrict the lifetime of an ECHO Request packet in the network.
3. **time = 8.244ms**
   This is the round trip time between sending ECHO Request message and receiving ECHO Reply message.
4. **5 packets transmitted, 5 received, 0.000% packet loss**
   This tells how many ECHO Request messages were transmitted and how many ECHO Reply messages were received which is then used to calculate percentage packet loss.
5. **rtt min/avg/max/mdev = 1.194/3.863/8.244/6.111 ms**
   Ping reports these statistics to determine variations in a particular connection. The information provided here are minimum round trip time (rtt), maximum rtt, average rtt and mean deviation.