Ping and Traceroute Report

Cedric Bone

1 Introduction

This report shows the results of the implementation of ping and traceroute in Python. Both use raw sockets to create packets.

2 Implementation

2.1 my_ping.py

- `-c count`: Stop after sending and receiving count packets
- `-i wait`: Wait specified time between sending packets
- `-s packetsize`: Specify the number of data bytes to send
- `-t timeout`: Specify a timeout for packet responses

2.2 my_traceroute.py

- `-n`: Print hop addresses numerically only
- `-q nqueries`: Set the number of probes per TTL
- `-S`: Print a summary of unanswered probes

3 Test Results

3.1 my_ping.py

```
(base) cedricbone@Cedrics-MacBook-Air-5 cedric_bone_hw2 % sudo python3 my_ping.py google.com
PING google.com (google.com) 56 data bytes
84 bytes from google.com: icmp_seq=1 ttl=119 time=29.005 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=28.540 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=28.050 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=28.123 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=37.194 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=27.861 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=27.997 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=30.565 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=28.261 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=27.079 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=34.394 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=28.144 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=29.527 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=27.534 ms
^CTraceback (most recent call last):
  File "/Users/cedricbone/Desktop/School/RIT/networks/cedric_bone_hw2/my_ping.py", line 94, in <module>
    main()
  File "/Users/cedricbone/Desktop/School/RIT/networks/cedric_bone_hw2/my_ping.py", line 89, in main
    time.sleep(sleep_time)
TypeError: handle_interrupt() missing 4 required positional arguments: 'sent_count', 'received_count', 'rtts', and 'destination'
(base) cedricbone@Cedrics-MacBook-Air-5 cedric_bone_hw2 %
```

Figure 1: Basic ping

```
(base) cedricbone@Cedrics-MacBook-Air-5 cedric_bone_hw2 % sudo python3 my_ping.py -c 5 google.com
PING google.com (google.com) 56 data bytes
84 bytes from google.com: icmp_seq=1 ttl=119 time=29.269 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=27.774 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=34.024 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=28.476 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=27.182 ms
(base) cedricbone@Cedrics-MacBook-Air-5 cedric_bone_hw2 %
```

Figure 2: Ping with -c option for number of packets

```
(base) cedricbone@Cedrics-MacBook-Air-5 cedric_bone_hw2 % sudo python3 my_ping.py -c 5 -i 1  google.com
PING google.com (google.com) 56 data bytes
84 bytes from google.com: icmp_seq=1 ttl=119 time=42.510 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=26.750 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=27.794 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=25.708 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=26.094 ms
(base) cedricbone@Cedrics-MacBook-Air-5 cedric_bone_hw2 %
```

Figure 3: Ping with -i option for wait time

```
(base) cedricbone@Cedrics-MacBook-Air-5 cedric_bone_hw2 % sudo python3 my_ping.py -c 5 -s 100 google.com
PING google.com (google.com) 100 data bytes
128 bytes from google.com: icmp_seq=1 ttl=119 time=23.657 ms
128 bytes from google.com: icmp_seq=1 ttl=119 time=27.839 ms
128 bytes from google.com: icmp_seq=1 ttl=119 time=28.054 ms
128 bytes from google.com: icmp_seq=1 ttl=119 time=24.438 ms
128 bytes from google.com: icmp_seq=1 ttl=119 time=26.146 ms
(base) cedricbone@Cedrics-MacBook-Air-5 cedric_bone_hw2 %
```

Figure 4: Ping with -s option for data bytes

```
(base) cedricbone@Cedrics-MacBook-Air-5 cedric_bone_hw2 % sudo python3 my_ping.py -c 5 -t 1 google.com
PING google.com (google.com) 56 data bytes
84 bytes from google.com: icmp_seq=1 ttl=119 time=32.212 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=27.755 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=33.485 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=24.496 ms
84 bytes from google.com: icmp_seq=1 ttl=119 time=28.224 ms
(base) cedricbone@Cedrics-MacBook-Air-5 cedric_bone_hw2 %
(base) cedricbone@Cedrics-MacBook-Air-5 cedric_bone_hw2 %
```

Figure 5: Ping with -t option for timeout

```
(base) cedricbone@Cedrics-MacBook-Air-5 cedric_bone_hw2 % sudo python3 my_ping.py -c 3 -i 1 -s 99 -t 1 google.com
PING google.com (google.com) 99 data bytes
127 bytes from google.com: icmp_seq=1 ttl=120 time=30.975 ms
127 bytes from google.com: icmp_seq=1 ttl=120 time=114.336 ms
127 bytes from google.com: icmp_seq=1 ttl=120 time=24.194 ms
(base) cedricbone@Cedrics-MacBook-Air-5 cedric_bone_hw2 %
```

Figure 6: Ping with multiple command-line options

3.2 my_traceroute.py

```
(base) cedricbone@Cedrics-MacBook-Air-5 cedric_bone_hw2 % sudo python3 my_traceroute.py -n google.com
traceroute to google.com (142.250.81.238), 30 hops max
 1  10.117.255.253  15.195 ms  6.613 ms  5.837 ms
 2  * * *
 3  * * *
 4  199.109.111.9  9.011 ms  7.129 ms  7.465 ms
 5  199.109.107.213  9.142 ms  9.646 ms  8.840 ms
 6  199.109.107.226  12.511 ms  11.524 ms  11.523 ms
 7  199.109.107.70  23.747 ms  18.539 ms  19.545 ms
 8  72.14.202.166  19.682 ms  19.253 ms  18.026 ms
 9  * * *
10  142.251.65.92  21.467 ms  19.233 ms  16.485 ms
11  142.251.60.235  17.257 ms  17.046 ms  18.445 ms
12  209.85.255.36  19.233 ms  18.434 ms  16.602 ms
(base) cedricbone@Cedrics-MacBook-Air-5 cedric_bone_hw2 %
```

Figure 7: Traceroute with -n option for numeric display

```
(base) cedricbone@Cedrics-MacBook-Air-5 cedric_bone_hw2 % sudo python3 my_traceroute.py -q 2 google.com
traceroute to google.com (142.250.81.238), 30 hops max
 1  10.117.255.253  5.577 ms  4.513 ms
 2  * *
 3  * *
 4  buf-9208-rit-cdn.nysernet.net (199.109.111.9)  13.038 ms  9.345 ms
 5  buf-55a1-buf-9208-cdn.nysernet.net (199.109.107.213)  10.271 ms  9.178 ms
 6  syr-57c3-buf-55a1-cdn.nysernet.net (199.109.107.226)  12.469 ms  11.991 ms
 7  199.109.107.70  17.043 ms  18.499 ms
 8  72.14.202.166  21.126 ms  20.541 ms
 9  * *
10  108.170.235.132  27.784 ms  17.345 ms
11  192.178.106.18  16.977 ms  16.948 ms
12  142.251.69.62  21.539 ms  20.183 ms
(base) cedricbone@Cedrics-MacBook-Air-5 cedric_bone_hw2 %
```

Figure 8: Traceroute with -q option for number of probes

```
(base) cedricbone@Cedrics-MacBook-Air-5 cedric_bone_hw2 % sudo python3 my_traceroute.py -S google.com
traceroute to google.com (142.250.81.238), 30 hops max
 1  10.117.255.253  12.507 ms  5.091 ms  5.832 ms
 2  * * *
 3  * * *
 4  buf-9208-rit-cdn.nysernet.net (199.109.111.9)  28.875 ms  18.484 ms  10.458 ms
 5  buf-55a1-buf-9208-cdn.nysernet.net (199.109.107.213)  7.387 ms  7.677 ms  9.234 ms
 6  syr-57c3-buf-55a1-cdn.nysernet.net (199.109.107.226)  10.012 ms  10.822 ms  13.739 ms
 7  199.109.107.70  16.070 ms  19.808 ms  17.297 ms
 8  72.14.202.166  20.186 ms  22.514 ms  19.376 ms
 9  * * *
10  108.170.236.90  22.842 ms  18.989 ms  18.268 ms
11  142.251.60.233  18.358 ms  20.874 ms  18.057 ms
12  209.85.255.36  16.666 ms  17.958 ms  19.057 ms

Probe Response Summary:
  TTL 2: 3/3 unanswered (100.0%)
  TTL 3: 3/3 unanswered (100.0%)
  TTL 9: 3/3 unanswered (100.0%)
(base) cedricbone@Cedrics-MacBook-Air-5 cedric_bone_hw2 %
```

Figure 9: Traceroute with -S option for summary

```
(base) cedricbone@Cedrics-MacBook-Air-5 cedric_bone_hw2 % sudo python3 my_traceroute.py -n -q 2 -S google.com
traceroute to google.com (142.250.81.238), 30 hops max
 1  10.117.255.253  7.772 ms  6.069 ms
 2  * *
 3  * *
 4  199.109.111.9  7.886 ms  7.069 ms
 5  199.109.107.213  8.542 ms  7.239 ms
 6  199.109.107.226  11.599 ms  14.181 ms
 7  199.109.107.70  17.388 ms  17.711 ms
 8  72.14.202.166  23.033 ms  20.876 ms
 9  * *
10  142.250.46.192  22.310 ms  17.981 ms
11  142.251.60.233  16.566 ms  32.307 ms
12  142.250.81.238  30.600 ms  20.267 ms

Probe Response Summary:
  TTL 2: 2/2 unanswered (100.0%)
  TTL 3: 2/2 unanswered (100.0%)
  TTL 9: 2/2 unanswered (100.0%)
(base) cedricbone@Cedrics-MacBook-Air-5 cedric_bone_hw2 %
```

Figure 10: Traceroute with multiple command-line options

4 Conclusion

The Python implementations of ping and traceroute replicate the functionality of the Linux commands.