Goal

Develop a UDP pinger that can measure the average RTT between a client machine and multiple servers.

Description

Your client will send a simple ping message to a server, receive a corresponding pong message back from the server, and determine the delay between when the client sent the ping message and received the pong message. This delay is what we call the Round Trip Time (RTT).

The functionality provided by the client and server is similar to the functionality provided by standard ping program available in modern operating systems. However, standard ping programs use the Internet Control Message Protocol (ICMP) (which we will study in Chapter 4). Here we will create a nonstandard (but simple!) UDP-based ping program.

Your ping program is to send 10 ping messages to the target server over UDP. For each message, your client is to determine and print the RTT when the corresponding pong message is returned. Because UDP is an unreliable protocol, a packet sent by the client or server may be lost. For this reason, the client cannot wait indefinitely for a reply to a ping message. You should have the client wait up to one second for a reply from the server; if no reply is received, the client should assume that the packet was lost and print a message accordingly.

Details

In this assignment, you will be given the complete code for the server; through the programing assignment via Gradescope, and it’s also available in the companion Web site (www.pearsonhighered.com/cs-resources).

Your task is to write the client code, which will be very similar to the server code. It is recommended that you first study carefully the server code. You can then write your client code, liberally cutting and pasting lines from the server code (if you want).

When you run the code, make sure to print out the RTT recorded for each ping. You can represent a timeout with a *, similar to what the standard ping. You will need these values to complete your final report.

How to test the code?

First, run both the client and the server locally, and measure the RTT of the 10 pings. Complete the corresponding part of the report.

Then, run the server on a different machine, and measure the RTT of the 10 pings. Complete the corresponding part of the report.

Hint: Design the client code in a way that lets the user enter the server IP. This will save you some time!
What to submit?

You will need to submit the complete client code, along with a complete final report with the RTT values and screenshots at the client verifying that your ping program works as required. The template of the final report can be found here:

https://docs.google.com/document/d/1IYMuf10Fg_syAmAKhvJzAurkJLNqgX99y2FWQHbczG0/edit?usp=sharing