

LAB 2 REPORT

In socket programming, to establish the connection between server and client, the first thing we do is to get the IP address of the server so that the client can connect. It's pretty handful to implement this, we can just use `getaddrinfo()` function.

Then we feed the address information into the socket, `socket()` will return with a socket descriptor what we can use. Next the server would bind the port and begin to listen from the network. After that, the client is able to connect with the server.

server.cpp

During the whole process of DHCP operation, basically the server side first receives the broadcast message from the client, then responds with the IP address it is going to offer to the client. After the client send formal request that he wants to take this offer and the server receive the request, finally it would send acknowledge message to the client and allow the client to use that IP address.

To implement the whole process on the server side, what I do is to use `send()` and `recv()` function in socket programming. Since every message is appended with a transaction ID, it's important to check if transaction ID is identical to the ID which the client side sent.

Screenshot for running server on nunki:

```
tcsh: using dumb terminal settings.
nunki.usc.edu(1): ./server
server: waiting for connections...
server: got connection from ::ffff:68.181.201.3
Message Received, with Transaction ID: 93
I can offer you with IP address: 62.60.114.93, with Transaction ID: 114
Received acknowledgment, with transaction ID: 215
Now you can use this address: 62.60.114.93, with Transaction ID: 239
```

client.cpp

The client side first broadcast to the whole network with the message that he wants someone to provide him with an IP address. And if there is any offer from the DHCP server, he would take the offer and use that IP address.

Screenshot for running client on nunki:

```
tcsh: using dumb terminal settings.
nunki.usc.edu(1): ./client nunki.usc.edu
client: connecting to 68.181.201.3
Broadcast: "Can someone give me an address?", with Transaction ID: 93
Offer received, IP address: 62.60.114.93, with transaction ID: 114
Ok, I want to take this offer: 62.60.114.93, with transaction ID: 215
Completed. Now using address: 62.60.114.93
```