

DHCP Server-Client

The newly constructed KCIS building in IIIT has been equipped with fast ethernet and WiFi capabilities. KCIS has multiple labs, and it is essential that computers of each lab are in a different network (disjoint), meaning they should be unable to communicate and sense the presence of machines of other labs **locally**, but they should be able to communicate with machines in the same lab **locally** (sharing locally is different from sharing over internet). However, the IP address range available is small, and different labs have different number of machines.

You are the system administrator, and you are given the names of labs and the number of corresponding machines in each lab. Furthermore, you are given MAC addresses of machines and the labs they belong to.

Input - The Server will read from a file "**subnets.conf**", which will have the following format (please adhere strictly to the format, including spaces, as evaluations may be automated. See the sample subnets.conf) -

1st Line - Generic Network Address with CIDR

2nd Line - Number of labs:**n**

Next **n** lines - Lab_name<colon>capacity

Next to end of file- MAC Address<space>Lab_name

You may assume Lab_name to be a single word. The server should simply run by: **./server**

Functionality - Given the above configuration, **assume** your server has some IP in the given address range and output it. Next, the server has to listen to client requests, and assign appropriate IP address and subnet mask upon receiving a request from the client (the client will identify itself to the server with its MAC). Essentially, the server has to allocate addresses depending upon which lab the client belongs to, and send it back to the client.

Essentially, at least the following information should be sent back to the client, and displayed in the following order and style:

- IP Address with Subnet (CIDR format)
- Network Address
- Broadcast Address
- Sample Gateway (assume some IP in the same network - for all clients in same lab)
- Sample DNS (assume some IP in the same network - for all clients in same lab)

Sample Output (assuming 192.168.137.1 is DHCP server) -

```
192.168.137.2/24
192.168.137.0
192.168.137.255
192.168.137.1
192.168.137.1
```

If such division of the network is not possible completely, send appropriate error messages to clients who can't be allocated addresses. If a client, whose MAC is not registered in subnets.conf, sends a request, the server should assign an IP from a network which is also different and disjoint from the given labs. If such allocation is again not possible (eg: too many unknown clients so no IPs left, or there is no room for unknown clients) it should send an appropriate error message.

The client shall send a request asking for an address to the DHCP server, using sockets. It should be run as following:

`./client -m <mac_address>`

If the -m parameter is omitted (i.e. mac is omitted), it should read the MAC address of the appropriate interface of the system it is being run from (you can choose to hardcode the interface you wish to use, and you may choose any interface if you wish to run on localhost itself).

You will be judged on your error handling, edge cases, implementation of the addressing with subnet masks, and DHCP Packet Sending requests. You may assume that the clients know the IP of the server, but extra credits will be awarded if they don't and are still able to allocate addresses and communicate.

Please note that extra credits shall be awarded for actually assigning client's system address using the client program (using system calls), for exact DHCP implementation (eg: client doesn't know what is the IP of DHCP server when connected to a network etc.), for adhering to DHCP request standards, etc.

Submission Format: Roll1_Roll2.zip. Two folders, one with server & a sample subnets.conf file, and another with client. Keep separate README files for both.

Plagiarism is strictly prohibited, and if caught, your team shall be awarded ZERO credits for the mini-project.