Department of Computer Science and Engineering
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MINOR ASSIGNMENT-02

UNIX Network Programming (CSE 4042)

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Working with basic UNIX network commands and IPV4 address configuration

1. Acquaintance with simple networking commands: Type the following commands on a terminal and observe the outputs. Refer to the man page(s) to get more details about theses command usages.

   (a) ifconfig
   (b) ping < ipaddresses/url >
   (c) ping -b broadcast IP
   (d) traceroute
   (e) netstat -i
   (f) netstat -ni
   (g) netstat -nr
   (h) nslookup
   (i) whois
   (j) hostname
   (k) tcpdump

2. Study of IP addressing and IP configuration: classful IP addressing, classless IP addressing and setting mask and subnet masking

   (a) Find the class of each address.
      (i) 00000001 00001011 00001011 11101111
      (ii) 11000001 10000011 00011011 11111111
      (iii) 14.23.120.8
      (iv) 252.5.15.111

   (b) Given the address 23.56.7.91, find the network address.

   (c) Given the address 132.6.17.85, find the network address.

   (d) Given the network address 17.0.0.0, find the class.

   (e) A class A IP address and mask given as $8.20.15.1$ and $255.0.0.0$. Find the network address using mask.
   Answer hint: IP address **bitwise AND** Mask = Network address
   $8.20.15.1$ **bitwise AND** $255.0.0.0 = 8.0.0.0$

   (f) Design 4 subnets for the given class C IP 200.1.2.0. Find the network address for each subnet and subnet mask of the network.

   (g) Let us consider a routing table is given below. Find the interface on which the packet will move with the destination address 200.1.2.22

Network address	subnet mask	Interface
200.1.2.0	255.255.255.192	a
200.1.2.64	255.255.255.192	b
200.1.2.128	255.255.255.192	c
200.1.2.192	255.255.255.192	d
0.0.0.0	0.0.0.0.0	e (default entry)

   (h) Suppose a router has build up the routing table shown in the table-1. The router can deliver packet directly over the interface 0 and 1 or it can forward packet to routers R_2, R_3, and R_4. Describe what the router does with the packet addressed to each of the following destinations.

(a) 128.96.39.10
(b) 128.96.40.12
(c) 128.96.40.151
(d) 192.4.153.17
(e) 192.4.153.90

Network address	Subnet mask	Interface
128.96.39.0	255.255.255.128	0
128.96.39.128	255.255.255.128	1
128.96.40.0	255.255.255.128	R_2
192.4.153.0	255.255.255.192	R_3
default	—-	R_4

Table 1: Routing table

(i) Suppose a router has build up the routing table shown in the table-2. The router can deliver packet directly over the interface 0 and 1 or it can forward packet to routers R_2, R_3, and R_4. Describe what the router does with the packet addressed to each of the following destinations.

(a) 128.96.171.92
(b) 128.96.167.151
(c) 128.96.163.151
(d) 128.96.169.192
(e) 128.96.165.121

Network address	Subnet mask	Interface
128.96.170.0	255.255.254.0	0
128.96.168.0	255.255.254.0	1
128.96.166.0	255.255.254.0	R_2
128.96.164.0	255.255.252.0	R_3
default	—-	R_4

Table 2: Routing table

(j) Consider a Class C IP 200.1.2.0. Design 3 subnets each of IPs 128, 64 and 64 respectively. Find the range of address, subnetwork address, and subnet mask.

(k) Let us consider a routing table is given below. Find the interface on which the packet will move with the destination address 200.1.2.194

Network address	subnet mask	Interface
200.1.2.0	255.255.255.128	a
200.1.2.128	255.255.255.192	b
200.1.2.192	255.255.255.192	c
0.0.0.0	0.0.0.0.0	e (default entry)

(l) A network on the Internet has a classful subnet mask of 255.255.240.0. What is the maximum number of hosts it can handle?

(m) Suppose that instead of using 16 bits for the network part of a class B address originally, 20 bits had been used. How many class B networks would there have been?

(n) Mask in classful address is given as 255.192.0.0. Find out the number of Hosts, and subnet present.

(o) What is a mask in IPV4 addressing? What is a default mask in IPV4 addressing?

(p) What is the network address in a block of addresses? How can we find the network address if one of the addresses in a block is given?

(q) An address space uses the three symbols 0, 1, and 2 to represent addresses. If each address is made of 10 symbols, how many addresses are available in this system?

(r) Test Whether the given addresses is a CIDR block or not.

100.1.2.32
100.1.2.33
⋮
100.1.2.47

(s) Test Whether the given addresses is a CIDR block or not.

205.16.37.32
205.16.37.33
⋮
205.16.37.47

(t) Test Whether the given addresses is a CIDR block or not.

150.10.20.64
150.10.20.65
⋮
150.10.20.127

(u) Given the CIDR block, find the first address and last address, and total number of addresses

(i) 20.10.30.35/ 27
(ii) 100.0.2.35/ 28
(iii) 100.1.2.35/ 20
(iv) 205.16.37.39/ 28

(v) In a block of addresses, we know the IP address of one host is 25.34.12.56/16. What are the first address and the last address in this block?

(w) In a block of addresses, we know the IP address of one host is 182.44.82.16/26. What are the first address and the last address in this block?

(x) Asssume a CIDR block is given as 20.30.40.10/25. Divide the block in two subblocks, and find the first address, last address, subnet mask of each block.

(y) Asssume a CIDR block is given as 20.30.40.10/25. Divide the block in 4 subblocks, and find the first address, last address, subnet mask of each block.

(z) suppose an organization is given the block 17.12.40.0/26, which contains 64 addresses. The organization has three offices and needs to divide the addresses into three subblocks of 32, 16, and 16 addresses. Find the first address, last address , and subnet mask of each block.

3. More on IP addressing

   (a) An ISP is granted a block of addresses starting with 190.100.0.0/16 (65,536 addresses). The ISP needs to distribute these addresses to three groups of customers as follows:

      i) The first group has 64 customers; each needs 256 addresses.
      ii) The second group has 128 customers; each needs 128 addresses.
      iii) The third group has 128 customers; each needs 64 addresses.

      Design the subblocks and find out how many addresses are still available after these allocations.

   (b) An address space has a total of 1024 addresses. How many bits are needed to represent an address?

   (c) An ISP is granted a block of addresses starting with 120.60.4.0/22. The ISP wants to distribute these blocks to 100 organizations with each organization receiving just eight addresses. Design the subblocks and give the slash notation for each subblock. Find out how many addresses are still available after these allocations.

   (d) Find the netid and the hostid of the following classful IP addresses.

      a. 114.34.2.8
      b. 132.56.8.6
      c. 208.34.54.12

   (e) Find the mask of the block, if the CIDR block is represented as 12.36.56.1/27

   (f) A large number of consecutive IP addresses are available starting at 198.16.0.0. Suppose that four organizations, A, B, C, and D, request 4000, 2000, 4000, and 8000 addresses, respectively, and in that order. For each of these, give the first IP address assigned, the last IP address assigned, and the mask in the w.x.y.z/s notation.

   (g) You know the usages of the command **`ifconfig`**. The command **`ifconfig`** displays the status of the currently active interfaces. You got the **inet addr:172.17.162.101**, **Bcast:172.17.159.255** and **Mask:255.255.240.0** after running **`ifconfig`** in your UNP lab. Let us assume the displayed IP address is classful IPV4 addresses. So compute the following:

      (a) Is the classful IP is subnetted or not? If subnetted, then how many number of subnets are there.
      (b) Find the subnetwork address, first usable host address, last usable host address, and broadcast address of each network.
      (c) Determine whether the given IP address **172.17.144.142** is a network address or a usable host address or a broadcast addresses.

   (h) An organization has a class C network 200.1.1.0 and wants to form subnets for 4 Departments A, B, C,and D respectively. The organisation has planned to give Department A - 126 usable hosts, Department B- 62 usable hosts, Department C - 30 usable hosts and Department D- 30 usable hosts.

      (a) Give a possible arrangement of subnets with first and last addresses.
      (b) Find the subnet mask of each department in dotted decimal notation as well as in slash notation