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CS 335, Assignment 4

Total = 55

1.

(i) [4] Define forwarding and routing.

Solution ->

Forwarding is moving packets from input link to it's appropriate output link and routing is determining which path packets should follow to from source to destination.

(ii) [3] Give three fundamental components of a router architecture.

Solution -> The three fundamentals of router architecture are

- Input ports
- Switch fabric
- Output ports

(iii) [2] In the IP datagram, what does "time to live" mean?

Solution -> the time to live is determines how many hops the packet will travel before its lost.

(iv) [2] Why do we need fragmentation?

Solution -> when the size of the datagram is bigger than the size the maximum transmission unit, then we divide the datagram in parts and that's why we need fragmentation.

(v) [2+4] Give two advantages that DHCP has over manually assigning IP addresses. Give the steps, how does a DHCP client obtain an IP address from a DHCP server?

Solution -> Dynamic host configuration protocol helps in reusing the addresses and support dynamic devices entering and leaving the network.

- First host broadcast to find if there is a DHCP server
- Then DHCP server responds to the host
- Then the Host request IP address from DHCP server
- DHCP server send ID address to the host

2.

(i) [2] Consider a subnet with prefix 128.119.40.128/26. Give the range of the IP addresses that can be assigned in this network.

Solution -> Ip Range -> 128.119.40.128 to 128.119.40.191

(ii) [4] Suppose an ISP owns the block of addresses of the form 128.119.40.64/26. Suppose it wants to create four subnets from this block, with each block having the same number of IP addresses. What are the prefixes (of form a.b.c.d/x) for the four subnets?

Solution ->

Subnets -

- 128.119.40.64/28
- 128.119.40.80/28
- 128.119.40.96/28

- 128.119.40.112/28

(iii) Consider the network setup in Figure 4.25 of the textbook (seventh edition). Suppose that the ISP instead assigns the router the address 24.34.112.235 and that the network address of the home network is 192.168.1/24.
(a) [4] Assign addresses to all interfaces in the home network.
(b) [6] Suppose each host has two outgoing TCP connections, all to port 80 at host 128.119.40.86. Provide the six corresponding entries in the NAT translation table.
Soution ->
Home addresses:
- 192.168.1.1
- 192.168.1.2
- 192.168.1.3
- 192.168.1.4(router)

Wan Ip	Local Ip
24.34.112.235, 6000	192.168.1.1, 3345
24.34.112.235, 6001	192.168.1.1, 3346
24.34.112.235, 6002	192.168.1.2, 3345
24.34.112.235, 6003	192.168.1.2, 3346
24.34.112.235, 6004	192.168.1.3, 3345
24.34.112.235, 6005	192.168.1.3, 3346

3. (i) [10] Consider the following network. With the indicated link costs, use Dijkstra’s algorithm to compute the shortest path from x to all network nodes.

Solution ->

step	N'	D(z)	D(y)	D(v)	D(w)	D(u)	D(t)
0	x	8(x)	6(x)	3(x)	6(x)	∞	∞
1	xv	8(x)	6(x)		6(x)	6(v)	7(v)
2	xvy	8(x)		3(x)	6(x)	6(v)	7(v)
3	xvyw	8(x)	6(x)	3(x)		6(v)	7(v)
4	xvywu	8(x)	6(x)	3(x)	6(x)		7(v)
5	xvywut	8(x)	6(x)	3(x)	6(x)	6(v)	7(v)
6	xvywvtz	8(x)	6(x)	3(x)	6(x)	6(v)	7(v)

(ii) [12] Consider the network shown below, and assume that each node initially knows the costs to each of its neighbors. Consider the distance vector algorithm and show the distance table entries at node z.

Znode

	U	V	X	Y	Z
V	∞	∞	∞	∞	∞
X	∞	∞	∞	∞	∞
Z	∞	6	2	∞	0

Unode

	U	V	X	Y	Z
V	1	0	3	∞	6
X	∞	3	0	3	2
Z	7	5	2	5	0

Xnode

	U	V	X	Y	Z
V	1	0	3	3	5
X	4	3	0	3	2
Z	6	5	2	5	0

	U	V	X	Y	Z
V	1	0	3	3	5
X	4	3	0	3	2
Z	6	5	2	5	0