

EE4221 Lecture 2 Questions

A Simplified Infrastructure of Data Centers - Part 2

Q1. An IP address 10.0.1.3 belongs to a network that uses a subnet mask of 255.255.0.0. What is the network address of the network?

- a. 10.0.1.3
- b. 10.0.1.0
- c. 10.0.0.0 **
- d. I don't know

Q2. An IP address 111.0.21.33 belongs to a network having a network address of 111.0.21.0. What is the possible subnet mask of the network?

- a. 255.0.0.0
- b. 255.255.0.0
- c. 255.255.255.0 **
- d. I don't know

Q3. 255.255.0.255 is a valid subnet mask.

- a. true
- b. false **
- c. not sure

Q4. 255.255.128.0 is a valid subnet mask.

- a. true **
- b. false
- c. not sure

Q5. A data center has a network with network address 123.1.0.0. A computer A connected to the networks is going to send an IP packet to computer B. The IP addresses of A and B are 123.1.1.3 and 123.1.4.5 respectively. Then,

- a. the source IP address of the packet is 123.1.1.3 and the destination IP address is 123.1.4.5 **
- b. the source IP address of the packet is 123.1.4.5 and the destination IP address is 123.1.1.3
- c. the source IP address of the packet is 123.1.1.3 and the destination IP address is the IP address of the default gateway of the network
- d. I don't know

Q6. Do you know how to find the subnet mask and default gateway of the workstation that you are using?

- a. yes, I know
- b. no, I don't know

Q7. A data center has a network with network address 123.1.0.0 and subnet mask 255.255.255.0. A computer A connected to the networks is going to send an IP packet to computer B. The IP addresses of A and B are 123.1.1.3 and 123.1.1.5 respectively. Then, the IP packet will be sent

- a. directly to 123.1.1.5 **
- b. to the default gateway of the network
- c. I don't know

Q8. A data center has a network with network address 123.1.0.0 and subnet mask 255.255.255.0. A computer A connected to the networks is going to send an IP packet to computer B. The IP addresses of A and B are 123.1.1.3 and 123.1.4.5 respectively. Then, the IP packet will be sent

- a. directly to 123.1.4.5
- b. to the default gateway of the network **
- c. I don't know

Q9. Assuming that the MAC addresses of

Computer A is: MAC-A
Computer B is: MAC-B
Default Gateway: MAC-DG

What are the MAC addresses of the frame that carries the IP packet as mentioned in Q7?

Source MAC: MAC-A
Destination MAC: MAC-B

What are the MAC addresses of the frame that carries the IP packet as mentioned in Q7?

Source MAC: MAC-A
Destination: MAC-DG

Introduction to Data Center

Q1. To build a data center in Hong Kong, is it possible to get dual power supply from two power companies?

- a. yes **
- b. no
- c. not sure

Q2. How reliable is the electricity supply in Hong Kong?

- a. 99.9%
- b. 99.999% ** (downtime ~5.256 minutes per year)
- c. 100%
- d. not sure

Answers of Q1 & Q2 are obtained from <http://www.datacentre.gov.hk>

Q3. Consider a data center in Hong Kong. The data center has an UPS that can power up all equipment for at most 1 hour. Do you think this is enough?

- a. yes **
- b. no
- c. not sure

Q4. Get some images of raised floor from Google images.

Q5. What vendors are providing certifications related to data center?

Cisco, HP, Red Hat, EMC, ...

Introduction to Data Center - CDC Storage

Mean Time To Failure MTTF

Q1. Suppose that a disk has probability F of failing in a given year, and it takes H hours to replace a disk. What is the probability of data loss?

- a. F **
- b. FH
- c. H
- d. I don't know

Q2. Suppose that a disk has probability F of failing in a given year, and it takes H hours to replace a disk. If we use mirrored disks, what is the probability of data loss, as a function of F and H ?

- a. $2F/8760$
- b. $2H/8760$
- c. $2F*2H/8760$ **
- d. My answer is different from all of the above
- e. Too difficult to me!

To compute the mean time to failure, we can compute the probability that the system fails in a given year. The MTTF will be the inverse of that probability. Note that there are 8760 hours in a year.

The system fails if the second disk fails while the first is being repaired. The probability of a failure of one of the two disks in a year is $2F$. The probability that the second disk will fail during the H hours that the other is being prepared is $FH/8760$. Thus, the probability of a failure in any year is $2F*2H/8760$.

Q3. Suppose that a disk has probability F of failing in a given year, and it takes H hours to replace a disk. If we use a RAID level 4 or 5 scheme, with N disks, what is the probability of data loss?

- a. $NF*2H/8760$
- b. $N(N-1)F/8760$
- c. $N(N-1)F*2H/8760$ **
- d. My answer is different from all of the above
- e. Too difficult to me!

The system fails if any of the other $N-1$ disks fails while the first is being repaired. The probability of a failure of one of the N disks in a year is NF . The probability that a second disk will fail during the H hours that the other is being prepared is $(N-1)FH/8760$. Thus, the probability of a failure in any year is $N(N-1)F*2H/8760$.