THIRD QUIZ ANSWERS

COSC 6360

October 1, 2018

WHITE QUIZ

First question

- A system of physical clocks consists of two clocks, namely, one that is fast and gains two minutes every hour and another that slow and loses two minutes every hour.

- Assuming that the clocks are managed by Lamport's physical clock protocol, what will be the time marked by each clock at 3 pm given that:
  - □ Both clocks indicated the correct time at noon;
  - □ The processor on which the fast clock resides received at 1pm a message from the other processor;
  - □ No other messages were exchanged between the two processors; and
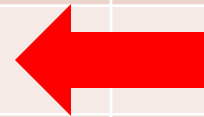 - □ Message transmission delays are negligible.

First question

Time	Fast clock	Slow clock
12 pm	12 pm	12 pm
1 pm		
2 pm		
3 pm		

First question

Time	Fast clock	Slow clock
12 pm	12 pm	12 pm
1 pm	1:02 pm	12:58 pm
2 pm		
3 pm		

Message does not affect the fast clock

First question

Time	Fast clock	Slow clock
12 pm	12 pm	12 pm
1 pm	1:02 pm	12:58 pm
2 pm	2:04 pm	1:56 pm
3 pm	**3:06 pm**	**2:54 pm**

Second question

- Under which conditions can distributed systems be both highly available and fully consistent?

Second question

- Under which conditions can distributed systems be both highly available and fully consistent?

  □ *In the absence of network partitions.*

Third question

- What does Raft do to minimize the likelihood that leader elections end with a split vote?

Third question

- What does Raft do to minimize the likelihood that leader elections end with a split vote?

  - *Raft uses randomized election timeouts to increase the chances that a single follower will detect the loss of the leader before the others.*

Fourth question

- What is the purpose of the SSH *server key*?

Fourth question

- What is the purpose of the SSH ***server key***?

  - *The server key was introduced to make decrypting recorded historic traffic impossible when the host key becomes compromised*
    - *As it is changed every hour, the intruder can only decrypt one hour of traffic.*

Fifth question

- Why is the BitTorrent **chunk selection policy** poorly suited to streaming applications?

Fifth question

- Why is the BitTorrent **chunk selection policy** poorly suited to streaming applications

  - ☐ *The BitTorrent chunk selection policy makes downloaders select the rarest chunks without regard to any timing constraints.*

Sixth question

- Consider a RAID-5 array that has four data blocks, namely, d_0, d_1, d_2, and d_3, and one parity block q per stripe.

  - ☐ What fraction of disk space is occupied by parity information?

  - ☐ _____ *percent*

Sixth question

- Consider a RAID-5 array that has four data blocks, namely, d_0, d_1, d_2, and d_3, and one parity block q per stripe.

  - ☐ What fraction of disk space is occupied by parity information?

    - **20 *percent***

Sixth question

- Consider a RAID-5 array that has four data blocks, namely, d_0, d_1, d_2, and d_3, and one parity block q per stripe.

  - ☐ Assuming that block d_1 suddenly becomes unavailable, how could you reconstruct its contents?

    - ■ $d_1 = $ _____

Sixth question

- Consider a RAID-5 array that has four data blocks, namely, d_0, d_1, d_2, and d_3, and one parity block q per stripe.

  - Assuming that block d_1 suddenly becomes unavailable, how could you reconstruct its contents?

    - ***d_1 = d_0 XOR d_2 XOR d_3 XOR q***

Seventh question

- Over the last ten years, many corporations have replaced their RAID level 5 disk arrays by RAID level 6 arrays even when handling double disk failures was not considered a major issue.

- Can you explain this paradox?

Seventh question

- Over the last ten years, many corporations have replaced their RAID level 5 disk arrays by RAID level 6 arrays even when handling double disk failures was not considered a major issue.

- Can you explain this paradox?

  ☐ *Because RAID level 5 fails to protect data in the presence of a single disk failure and one or   irrecoverable reads errors—"bad blocks"—on the other disks.*

OTHER QUIZ

First question

- A system of physical clocks consists of two clocks, namely, one that is fast and gains five minutes every hour and another that slow and loses five minutes every hour.

- Assuming that the clocks are managed by Lamport's physical clock protocol, what will be the time marked by each clock at 4 pm given that:

- Both clocks indicated the correct time at noon;

- The processor on which the fast clock resides received at 2 pm a message from the other processor;

- No other messages were exchanged between the two processors; and

- Message transmission delays are negligible

First question

Time	Fast clock	Slow clock
12 pm	12 pm	12 pm
1 pm		
2 pm		
3 pm		
4 pm		

First question

Time	Fast clock	Slow clock
12 pm	12 pm	12 pm
1 pm	1:05 pm	12:55 pm
2 pm		
3 pm		
4 pm		

First question

Time	Fast clock	Slow clock
12 pm	12 pm	12 pm
1 pm	1:05 pm	12:55 pm
2 pm	2:10 pm	1:50 pm
3 pm		
4 pm		

Message does not affect the fast clock

First question

Time	Fast clock	Slow clock
12 pm	12 pm	12 pm
1 pm	1:05 pm	12:55 pm
2 pm	2:10 pm	1:50 pm
3 pm	3:15 pm	2:45 pm
4 pm	**4:20 pm**	**3:40 pm**

Second question

- What is the major disadvantage of ***asynchronous distributed systems***?

Second question

- What is the major disadvantage of **asynchronous distributed systems**?

  - *We cannot guarantee that any asynchronous distributed system will operate correctly in the presence of any fault.*

Third question

- According to Ungaro and Ousterhout, when do the followers of a leader know that can safely commit log update?

Third question

- According to Ungaro and Ousterhout, when do the followers of a leader know that can safely commit log update?

- *Once they have received from their leader an heartbeat or an AppendEntries message containing a value greater than or equal to the index of that log update.*

Fourth question

- Assume that an intruder has compromised both the **host key** and **server key** of a SSH-protected server.

- How much of the previous traffic will the intruder be able to decode?

Fourth question

■ Assume that an intruder has compromised both the **host key** and **server key** of a SSH-protected server.

■ How much of the previous traffic will the intruder be able to decode?

□ *One hour of traffic because the server key changes every hour.*

Fifth question

- Why is the BitTorrent **_chunk selection policy_** poorly suited to streaming applications?

Fifth question

- Why is the BitTorrent **chunk selection policy** poorly suited to streaming applications?

  - *The BitTorrent chunk selection policy makes downloaders select the rarest chunks without regard to any timing constraints.*

Sixth question

- Consider a RAID-5 array that has four data blocks, namely, d_0, d_1, d_2, and d_3, and one parity block p per stripe.
  - How many disk drives does the array have?

    - ____ **drives**

Sixth question

- Consider a RAID-5 array that has four data blocks, namely, d_0, d_1, d_2, and d_3, and one parity block q per stripe.

  - ☐ How many disk drives does the array have?

    - *Five* **drives**

Sixth question

- Consider a RAID-5 array that has four data blocks, namely, d_0, d_1, d_2, and d_3, and one parity block p per stripe.

  - Assuming that block d_3 suddenly becomes unavailable, how could you reconstruct its contents?

    - $d_3 = $ _____

Sixth question

- Consider a RAID-5 array that has four data blocks, namely, d_0, d_1, d_2, and d_3, and one parity block p per stripe.

  - Assuming that block d_3 suddenly becomes unavailable, how could you reconstruct its contents?

    - **$d_3 = d_0$ XOR d_1 XOR d_2 XOR p**

Seventh question

- Over the last ten years, many corporations have replaced their RAID level 5 disk arrays by RAID level 6 arrays even when handling double disk failures was not considered a major issue.

- Can you explain this paradox?

Seventh question

- Over the last ten years, many corporations have replaced their RAID level 5 disk arrays by RAID level 6 arrays even when handling double disk failures was not considered a major issue.

- Can you explain this paradox?

  - *Because RAID level 5 fails to protect data in the presence of a single disk failure and one or   irrecoverable reads errors—"bad blocks"—on the other disks.*