

Database Management System: Assignment 5

Total Marks : 20

July 25, 2024

Question 1

Marks: 2 MCQ

Which of the following protocol(s) is used by a web server to communicate with external applications?

- a) HTTP
- b) SMTP
- c) TCP/IP
- d) CGI

Answer: d)

Explanation:

Common Gateway Interface(CGI) is a standard interface between web and application server. (Refer Lecture-21).

So, option (d) is correct.

Question 2

Marks: 2 MCQ

In which way does an audit trail help to ensure the security of a system?

- a) It is used to make backup copies.
- b) It can be used to restore lost information.
- c) It can be used to localize the source of an error in a system.
- d) It is used to record the history of operations performed on a file.

Answer: d)

Explanation:

An audit trail is used to record the history of operations performed on a file. From it, we can come to know which user updates or accesses some sensitive data, or does a delete operation, etc. So, audit trails can be used later on if the need arises to detect security breaches.

(Refer Lecture slide 22)

So, option d) is correct.

Question 3

Marks: 2 MCQ

Suppose, there is a disk with 200 sectors per track, size of one sector is 512 bytes and one disk block unit is 4 kilobytes. What will be the access time of a single block unit if its average seek time and rotational speed is 6 ms, and 12000 RPM. respectively, assuming the data rate is 128 kilobytes per second?

- a) 42.25 ms
- b) 39.75 ms
- c) 31.25 ms
- d) 14.125 ms

Answer: b)

Explanation: There are three components of any disk access. Those are - seek time, rotational delay and transfer time.

Rotational speed = 12000 RPM. Thus, the time for one rotation is

$60 \text{ seconds} / 12000 \text{ rotations} = 5 \text{ ms}$ per rotation.

Now, average rotational delay = $\frac{1}{2} * \text{Time of one rotation in milliseconds}$.

So, average rotational delay is $1/2 * 5 \text{ ms} = 2.5 \text{ ms}$.

Seek time = average seek time = 6 ms.

One block unit is 4KB. Thus, the transfer time is $= 4 \text{ KB} / 128 \text{ KB} = 0.03125 \text{ sec} = 31.25 \text{ ms}$

Thus, the total disk access time = one seek + average rotational delay + block transfer time
 $= 6 \text{ ms} + 2.5 \text{ ms} + 31.25 \text{ ms} = 39.75 \text{ ms}$

So, option b) is correct.

Question 4

Marks: 2 MCQ

If mean time to failure(MTTF) of a disk system is 60 days and it will take 20 hours to repair the system. What is the availability of the disk system?

- a) 13.89%
- b) 75.1%
- c) 98.63%
- d) 100%

Answer: c)

Explanation:

Mean time to failures is not the average time that the system is working and then failing. It is the average time between failures.

Mean time to failures (MTTF) = total uptime / number of failures.

Mean time to repair is the average time taken to repair the system after failure.

Mean time to repair (MTTR) = total down time/number of failures.

Availability = Total uptime / (total uptime + total downtime)

= $MTTF / (MTTF + MTTR) * 100$

= $60 * 24 / (60 * 24 + 20) * 100$

= $1440 / (1440 + 20)$

= 98.63 %

So, option (c) is correct.

Question 5

Marks: 2 MCQ

Suppose there is a 256 gigabyte flash storage system, with a four kilobyte page size. What will be the size of the page address if the flash translation table is 512 megabytes long, and the table is stored as an array?

- a) 128 bits
- b) 64 bits
- c) 32 bits
- d) 16 bits

Answer: b)

Explanation: Number of pages = 256 gigabyte/4 kilobyte = $(256 * 2^{30}) / (4 * 2^{10}) = 64 * 2^{20}$

Say, require bits to address one page is = N

The flash translation table size = 512 megabytes

$N = (\text{Flash translation table size}) / (\text{Number of pages})$

$= (512 * 2^{20}) / (64 * 2^{20}) \text{ bytes} = 8 \text{ bytes} = 64 \text{ bits.}$

Hence, option b) is correct.

Question 6

Marks: 2 MCQ

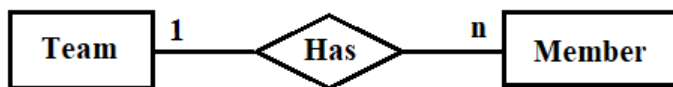
In an IoT demonstration competition, students can enroll their names as a **team member**. There can be two or more **members** in a **team** but one **member** can enroll his/her name only for one **team**. Each **team** has a unique id and name. Each **member** has a unique id and name too. Which of the following way(s) is/are correct for storing the information of **members** and **teams**?

- a) We may create one table **Team** with **Team_Id** as primary key and a table **Members** with **Mem_Id** as primary key. In the second table, column **Team_Id** will be added as a foreign key.
- b) We may create one table **Members** with **Mem_Id** as primary key and a table **Team** with **Team_Id** as primary key. In the second table, column **Mem_Id** will be added as a foreign key.
- c) No foreign key will be required only **Members** and **Team** table is enough.
- d) It is not possible to store all required information in 2 tables.

Answer: a)

Explanation: There will be a **one-to-many** relationship between **Team** and **Members**. An one-to-many relationship can be designed with two tables.

Create one table **Team** with **Team_Id** as primary key and a table **Members** with **Mem_Id** as primary key and in **Members** table add column **Team_Id** as foreign key.



Hence, option a) is correct.

Question 7

Marks: 2 MCQ

Redundant Arrays of Independent Disks use the technique of redundancy to avoid data and information loss in case of disk failure. Which of the following technique(s) is used for data duplication?

- a) Compressing
- b) Interleaving
- c) Striping
- d) Mirroring

Answer: d)

Explanation: The simplest technique to introduce redundancy is to duplicate every disk. This process is known as Mirroring.
hence, option d) is correct.

Question 8

Marks: 2 MCQ

Suppose that a disk drive has 200 tracks, numbered 0 to 199. The queue of pending requests in SSTF order is: 72, 122, 84, 175, 48, 150, 102, 181, 145.

The read-write head initially is on track 65. What is the total distance that the disk head will move to satisfy all pending requests following Shortest Seek Time First (SSTF) scheduling algorithms?

- a) 538
- b) 343
- c) 249
- d) 150

Answer: c)

Explanation: Disk head will move from 65 to: 72, 84, 102, 122, 145, 150, 175, 181, and last 48. So, the total movement will be $(181-65) + (181-48) = 116 + 133 = 249$

So, option c) is correct.

Question 9

Marks: 2 MCQ

Consider a relation `course(c_id, dno, subject, cname, dname, semester, year, building)`

`c_id` \rightarrow `cname`, `subject`

`dno` \rightarrow `dname`, `building`

`c_id`, `subject` \rightarrow `year`, `semester`

If we perform a schema refinement on `course`, which of the following set of relations will be in the refined schema?

- a) `courseDept(dno, dname, building)`
`course(c_id, subject, cname)`
`subject(subject, semester, year)`
- b) `courseDept(dno, dname, building)`
`course(c_id, dno, subject, cname, semester, year)`
- c) `courseDept(dno, dname, building)`
`course(c_id, subject, cname, semester, year)`
- d) `courseDept(dno, dname, building)`
`course(c_id, cname, semester, year)`
`subject(subject, semester, year)`

Answer: b)

Explanation: In options a), c) and d), there are no common attributes between `courseDept` and `course`, to rejoin the relations again to get the original table.

Option b) will return the original table after rejoining.

So, option b) is correct.

Question 10

Marks: 2 MSQ

Which of the following statement(s) is (are) correct?

- a) The **disk controller** acts as an interface between the computer system and the disk drive hardware.
- b) **Mean time to failure (MTTF)** is the minimum time, when a disk can run continuously without any failure.
- c) When a sector is found to be **bad**, the disk controller remaps the logical sector to a different physical sector.
- d) When a huge number of disks are connected by a high-speed network to a number of servers, is called **Network Area Storage**.

Answer: a), c)

Explanation: **Mean time to failure (MTTF)** is the **average time**, when a disk may run continuously without any failure.

When a huge number of disks are connected by a high-speed network to a number of servers, is called **Storage Area Networks**.

These two statements are incorrect.

Disk controller acts as an interface between the computer system and the disk drive hardware.

When a **sector** is found to be **bad**, the disk controller remaps the logical sector to a different physical sector.

So, these two statements are right.

Hence, options a) and c) are correct.