# L23 : Database Optimization

## 1-Tut : MCQ - 1

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A transaction can proceed only after the concurrency control manager _____ the lock to the transaction.

### Options

This problem has only one correct answer

Acquires
Allocates
Grants
none

Correct Answer : C

### Solution Description

Explanation: A transaction can proceed only after the concurrency control manager grants the lock to the transaction.

## 2-Tut : MCQ - 2

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Which of the following concurrency control protocols ensure both conflict serializability and free from deadlock?

### Options

This problem has only one correct answer

a. Timestamp ordering
b. 2 Phase locking
c. Both (a) and (b)
d. None

Correct Answer : A

### Solution Description

2-phase locking is a concurrency control method that ensures conflict serializability. The protocol utilizes locks, applied by a transaction to data, which may block other transactions from accessing the same data during the transaction's life. The timestamp-based concurrency control algorithm is a non-lock concurrency control method. This method also ensures conflict serializability.

We know that deadlock is a situation where the transactions try to access lock on already locked data items. So, 2 phase locking may lead to deadlock states that can result in the mutual blocking of two or more transactions.

But in timestamp, each transaction is allocated with the time slot. Hence it can't enter a deadlock. So Timestamp ordering ensures both the conflict serializability and is free from deadlocks

## 3-Tut : MCQ - 3

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Concurrency control in RDBMS is important for which of the following reasons ?

## Options

This problem has only one correct answer

To ensure data integrity when updates occur to the database in a single -user environment.
To ensure data integrity when reads occur to the database in a single-user environment.
To ensure data integrity when updates occur to the database in a multi-user environment.
To ensure data integrity when reads occur to the database in a multi-user environment.

Correct Answer : C

## Solution Description

Concurrency control is the management procedure that controls concurrent execution of the multiple operations done by multiple users at the same time on the same database. We need concurrency control to manage these concurrent executions of the operations and help maintain consistency in the database

## 4-Tut : MCQ - 4

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Consider the transactions:

| T1 | T2 | T3 |
|---|---|---|
| Read(X) | Read(Z) | Read(X) |
| Write(Y) | Write(W) | Write(P) |
| Write(Z) | Read(X) | |

Which of these is are in conflict?

## Options

This problem has only one correct answer

T1 and T2, T1 and T3
T1, T2 and T3
T1 and T3, T2 and T3
T1 and T2

Correct Answer : D

## Solution Description

Explanantion: Two operations are said to be conflicting if all conditions satisfy:
1. They belong to different transactions
2. They operate on the same data item
3. At Least one of them is a write operation

We can see that T1 is reading X and writing on Y and Z . Similarly T2 is reading Z and X plus writing on X. We can notice that both the transactions have Z in common, which can lead to conflict. While X is also common for both the transactions, it would not lead to conflict as both T1 and T2 are only performing read on it

## 5-Tut : MCQ - 5

Send Feedback

Which of the following Concurrency controls is prone to deadlocks.

## Options

This problem has only one correct answer

Timestamp Based Concurrency Control
Lock Based Concurrency Control
Both
None

Correct Answer : B

## Solution Description

Explaination: Deadlock, a situation where the transactions try to access lock on already locked data items. Whereas in timestamp, each transaction is allocated with the time slot. Hence it can't enter a deadlock.

## 6-Tut : MCQ - 6

Send Feedback

Which of the following is not an advantage of database clustering?

## Options

This problem has only one correct answer

Load Balancing
Data Redundancy
Increased Availability
Decreased Availability

Correct Answer : D

## Solution Description

Clustering is the process of combining more than one server or instance holding the same database. We can say a cluster is a set of replicated servers.
Clustering helps us with a lot of features like

1. **Data Redundancy**: Clustering databases helps with data redundancy, as we store the same data at multiple servers. The redundancy that clustering offers is required and is quite certain due to the synchronization.

2. **Load Balancing**: Clustering of databases also helps the servers with the load balancing i.e., if there's only one server and there are a lot of requests coming in to access the database then it may become difficult for a server to handle all the requests. Clustering helps to reduce load balancing.

3. **Increased Availability**: An availability of a database is defined as the time when we can access the database. Now as we have clusters of servers available, even if one of the databases is going through a transaction, now the other servers can be used to access the database with the help of a load balancer. Also, even if a server fails, the database will be available. Hence, due to clustering, the databases have high availability.

## 7-Tut : MCQ - 7

Send Feedback

Database uses _____ to support deployments with very large data sets by dividing the data over multiple servers.

## Options

This problem has only one correct answer

Replication
Sharding
Both
None

Correct Answer : B

## Solution Description

Sharding is a method of partitioning and storing a single logical set of data in multiple databases which is stored on multiple servers. It is an extension of horizontal partitioning. Databases use sharding to support deployments with very large data sets by dividing the data over multiple servers.

## 8-Tut : MCQ - 8

Send Feedback

Partitioning of the database is usually committed when:

## Options

This problem has only one correct answer

Dealing with huge dataset, which one server alone cannot handle
The requests to database access are taking longer time to be accepted i.e. long response time
Both above
None of the Above

Correct Answer : C

## Solution Description

Partitioning is a technique that is used to divide stored database objects into separate servers. Due to this, there is an increase in performance as well as the increase in controllability of the data. We can manage huge chunks of data optimally. Partitioning is committed when we are dealing with a huge dataset or the request are taking more time than expected.

## 9-Tut : MCQ - 9

Send Feedback

Some of the columns of a relation are at different sites in which of the following techniques?

## Options

This problem has only one correct answer

Data Replication
Horizontal Partitioning
Vertical Partitioning
Horizontal and Vertical Partitioning

Correct Answer : C

## Solution Description

To partition the data they are two techniques:

1. Vertical Partitioning: In this, we partition the given data vertically i.e column-wise. So, if we are provided with table students with attributes student id, name, courseid, address, we can store this data by distributing it among servers where we store studentid, name is one server, courseid in another and address in the third one.

2. Horizontal Partitioning: In this, we partition the given data horizontally i.e. row-wise. So, have chunks of a certain size of data stored at different servers.

## 10-Tut : MCQ - 10

Send Feedback

A distributed database is which of the following?

## Options

This problem has only one correct answer

A loose collection of file that is spread to multiple locations and is interconnected by a network.
A loose collection of file that is limited to one location.
A single logical database that is limited to one location.
A single logical database that is spread to multiple locations and is interconnected by a network

Correct Answer : D

## Solution Description

A distributed database is not limited to at least one system, it covers different sites, i.e, on multiple computers or over a network of computers. A distributed database system is found on various sites that don't share physical components. This might be required when a specific database must be accessed by various users globally. It must be managed in such a way that for the users it's like one single database.

## 11-Tut : MCQ - 11

Send Feedback

Which of the following is true about the process of sharding?

## Options

This problem has only one correct answer

a. RDBMS locking method
b. Extension of Horizontal Partition
c. Technique for partitioning the data
d. both b and c

Correct Answer : d

## Solution Description

Sharding is a method of partitioning and storing a single logical set of data in multiple databases which is stored on multiple servers. It is an extension of Horizontal partitioning. The smaller chunks of the data that are created after shrading are called Shards.