What is a checkpoint in DBMS?

The Checkpoint is a type of mechanism where all the previous logs are removed from the system and permanently stored in the storage disk.

There are two ways which can help the DBMS in recovering and maintaining the ACID properties, and they are- maintaining the log of each transaction and maintaining shadow pages. So, when it comes to log based recovery system, checkpoints come into existence. Checkpoints are those points to which the database engine can recover after a crash as a specified minimal point from where the transaction log record can be used to recover all the committed data up to the point of the crash.

### What are the unary operations in Relational Algebra?

PROJECTION and SELECTION are the unary operations in relational algebra. Unary operations are those operations which use single operands. Unary operations are SELECTION, PROJECTION, and RENAME.

As in SELECTION relational operators are used for example - =,<=,>=, etc.

### How many types of database languages are?

There are four types of database languages:

* **Data Definition Language (DDL)** e.g., CREATE, ALTER, DROP, TRUNCATE, RENAME, etc. All these commands are used for updating the data that?s why they are known as Data Definition Language.
* **Data Manipulation Language (DML)** e.g., SELECT, UPDATE, INSERT, DELETE, etc. These commands are used for the manipulation of already updated data that's why they are the part of Data Manipulation Language.
* **DATA Control Language (DCL)** e.g., GRANT and REVOKE. These commands are used for giving and removing the user access on the database. So, they are the part of Data Control Language.
* **Transaction Control Language (TCL)** e.g., COMMIT, ROLLBACK, and SAVEPOINT. These are the commands used for managing transactions in the database. TCL is used for managing the changes made by DML.

### What is the Relationship?

The Relationship is defined as an association among two or more entities. There are three type of relationships in DBMS-

**One-To-One**: Here one record of any object can be related to one record of another object.

**One-To-Many (many-to-one)**: Here one record of any object can be related to many records of other object and vice versa.

**Many-to-many**: Here more than one records of an object can be related to n number of records of another object.

### What is data abstraction in DBMS?

Data abstraction in DBMS is a process of hiding irrelevant details from users. Because database systems are made of complex data structures so, it makes accessible the user interaction with the database.

 What is Relational Algebra?

Relational Algebra is a Procedural Query Language which contains a set of operations that take one or two relations as input and produce a new relationship. Relational algebra is the basic set of operations for the relational model. The decisive point of relational algebra is that it is similar to the algebra which operates on the number.

There are few fundamental operations of relational algebra:

* select
* project
* set difference
* union
* rename,etc.

What is Relational Calculus?

Relational Calculus is a Non-procedural Query Language which uses mathematical predicate calculus instead of algebra. Relational calculus doesn't work on mathematics fundamentals such as algebra, differential, integration, etc. That's why it is also known as predicate calculus.

There is two type of relational calculus:

* Tuple relational calculus
* Domain relational calculus

What is normalization?

Normalization is a process of analysing the given relation schemas according to their functional dependencies. It is used to minimize redundancy and also used to minimize insertion, deletion and update distractions. Normalization is considered as an essential process as it is used to avoid data redundancy, insertion anomaly, updation anomaly, deletion anomaly.

There most commonly used normal forms are:

* First Normal Form(1NF)
* Second Normal Form(2NF)
* Third Normal Form(3NF)
* Boyce & Codd Normal Form(BCNF)

### What is functional Dependency?

Functional Dependency is the starting point of normalization. It exists when a relation between two attributes allow you to determine the corresponding attribute's value uniquely. The functional dependency is also known as database dependency and defines as the relationship which occurs when one attribute in a relation uniquely determines another attribute. It is written as A->B which means B is functionally dependent on A.

### Describe the types of keys?

**There are following types of keys:**

**Primary key**: The Primary key is an attribute in a table that can uniquely identify each record in a table. It is compulsory for every table.

**Candidate key**: The Candidate key is an attribute or set of an attribute which can uniquely identify a tuple. The Primary key can be selected from these attributes.

**Super key**: The Super key is a set of attributes which can uniquely identify a tuple. Super key is a superset of the candidate key.

**Foreign key**: The Foreign key is a primary key from one table, which has a relationship with another table. It acts as a cross-reference between tables.

### What is the difference between a shared lock and exclusive lock?

**Shared lock**: Shared lock is required for reading a data item. In the shared lock, many transactions may hold a lock on the same data item. When more than one transaction is allowed to read the data items then that is known as the shared lock.

**Exclusive lock**: When any transaction is about to perform the write operation, then the lock on the data item is an exclusive lock. Because, if we allow more than one transaction then that will lead to the inconsistency in the database.

What is the difference between a DELETE command and TRUNCATE command?

**DELETE command**: DELETE command is used to delete rows from a table based on the condition that we provide in a WHERE clause.

* DELETE command delete only those rows which are specified with the WHERE clause.
* DELETE command can be rolled back.
* DELETE command maintain a log, that's why it is slow.
* DELETE use row lock while performing DELETE function.

**TRUNCATE command**: TRUNCATE command is used to remove all rows (complete data) from a table. It is similar to the DELETE command with no WHERE clause.

* The TRUNCATE command removes all the rows from the table.
* The TRUNCATE command cannot be rolled back.
* The TRUNCATE command doesn't maintain a log. That's why it is fast.
* TRUNCATE use table log while performing the TRUNCATE function.

### Explain ACID properties

ACID properties are some basic rules, which has to be satisfied by every transaction to preserve the integrity. These properties and rules are:

**ATOMICITY:** Atomicity is more generally known as ?all or nothing rule.' Which implies all are considered as one unit, and they either run to completion or not executed at all.

**CONSISTENCY:** This property refers to the uniformity of the data. Consistency implies that the database is consistent before and after the transaction.

**ISOLATION:** This property states that the number of the transaction can be executed concurrently without leading to the inconsistency of the database state.

**DURABILITY:** This property ensures that once the transaction is committed it will be stored in the non-volatile memory and system crash can also not affect it anymore.

**hat are the different type of normalization?**

In database design, we start with one single table, with all possible columns. A lot of redundant data would be present since it’s a single table. **The process of removing the redundant data, by splitting up the table in a well defined fashion is called normalization.**

**1. First Normal Form (1NF)**

A relation is said to be in first normal form if and only if all underlying domains contain atomic values only. After 1NF, we can still have redundant data.

**2. Second Normal Form (2NF)**

A relation is said to be in 2NF if and only if it is in 1NF and every non key attribute is fully dependent on the primary key. After 2NF, we can still have redundant data.

**3. Third Normal Form (3NF)**

A relation is said to be in 3NF, if and only if it is in 2NF and every non key attribute is non-transitively dependent on the primary key.

 What is BCNF?

**BCMF** stands for **Boyce-Codd Normal Form**. It is an advanced version of 3NF, so it is also referred to as 3.5NF. BCNF is stricter than 3NF.

A table complies with BCNF if it satisfies the following conditions:

* It is in 3NF.
* For every functional dependency X->Y, X should be the super key of the table. It merely means that X cannot be a non-prime attribute if Y is a prime attribute.

 What is Join?

The Join operation is one of the most useful activities in relational algebra. It is most commonly used way to combine information from two or more relations. A Join is always performed on the basis of the same or related column. Most complex queries of SQL involve JOIN command.

There are following types of join:

* Inner joins: Inner join is of 3 categories. They are:
  + Theta join
  + Natural join
  + Equ join
* Outer joins: Outer join have three types. They are:
  + Left outer join
  + Right outer join
  + Full outer join
* **What is RDBMS ?**
* Relational Database Management system (RDBMS) is a database management system (DBMS) that is based on the relational model. Data from relational database can be accessed or reassembled in many different ways without having to reorganize the database tables. Data from relational database can be accessed using an API , Structured Query Language (SQL).

What is a Composite Primary Key ?

A Composite primary key is a set of columns whose values uniquely identify every row in a table. What it means is that, a table which contains composite primary key will be indexed based on the columns specified in the primary key. This key will be referred in Foreign Key tables.

For example - if the combined effect of columns, "Employee\_ID" and "Employee Name" in a table is required to uniquely identify a row, its called a Composite Primary Key. In this case, both the columns will be represented as primary key.

What is a view?

The views are virtual tables. Unlike tables that contain data, views simply contain queries that dynamically retrieve data when used.

What is a Unique Key ?

Unique key is same as primary with the difference being the existence of null. Unique key field allows one value as NULL value.