

SQL

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Q.1 What is Normalization and Demoralization?

Ans: Normalization:

Normalization is the method used in a database to reduce the data redundancy and data inconsistency from the table. It is the technique in which non-redundancy and consistency data are stored in the set schema. By using normalization, the number of tables is increased instead of decreased.

Denormalization:

Denormalization is also the method which is used in a database. It is used to add the redundancy to execute the query quickly. It is a technique in which data are combined to execute the query quickly. By using denormalization the number of tables is decreased which oppose to the normalization.

Normalization	Denormalization
In normalization, non-redundancy and consistency data are stored in set schema.	In denormalization, data are combined to execute the query quickly.
In normalization, Data redundancy and inconsistency is reduced.	In denormalization, redundancy is added for quick execution of queries.
Data integrity is maintained in normalization.	Data integrity is not maintained in denormalization.
In normalization, redundancy is reduced or eliminated.	In denormalization redundancy is added instead of reduction or elimination of redundancy.
Number of tables in normalization is increased.	Denormalization, Number of tables in decreased.
Normalization optimizes the uses of disk spaces.	Denormalization do not optimize the disk spaces.

Q.2 What are Views and Materialized view?

View: A view is a virtual relation that acts as an actual relation. It is not a part of logical relational model of the database system. Tuples of the view are not stored in the database system and tuples of the view are generated every time the view is accessed. Query expression of the view is stored in the databases system.

Views can be used everywhere where we can use the actual relation. Views can be used to create custom virtual relations according to the needs of a specific user. We can create as many views as we want in a databases system.

Materialized Views: When the results of a view expression are stored in a database system, they are called materialized views. SQL does not provide any standard way of defining materialized view; however, some database management system provides custom extensions to use materialized views. The process of keeping the materialized views updated is known as view maintenance.

Materialized view is useful when the view is accessed frequently, as it saves the computation time, as the result are stored in the database beforehand. Materialized view can also be helpful in case where the relation on which view is defined is very large and the resulting relation of the view is very small. Materialized view has storage cost and updating overheads associated with it.

Q.3 What is Roll up?

Ans: The ROLLUP is an extension of the GROUP BY clause. The ROLLUP option allows you to include extra rows that represent the subtotals, which are commonly referred to as super-aggregate rows, along with the grand total row. By using the ROLLUP option, you can use a single query to generate multiple grouping sets.

Q.4 What are Windows Functions?

Ans: Window functions applies aggregate and ranking functions over a particular window (set of rows). OVER clause is used with window functions to define that window. OVER clause does two things:

- Partitions rows into form set of rows. (PARTITION BY clause is used)
- Orders rows within those partitions into a particular order. (ORDER BY clause is used)

RANK (), DENSE_RANK (), ROWID (), ROWNUM (), NTILE, LEAD (), LAG ()

Q.5 Difference between Subquery and Co-related query?

Ans: Subquery

When a query is included inside another query, the Outer query is known as Main Query, and Inner query is known as Subquery.

Nested Query

In Nested Query, inner query runs first, and only once. Outer query is executed with result from Inner query. Hence, inner query is used in execution of Outer query.

Correlated Query

In Correlated Query, Outer query executes first and for every Outer query row Inner query is executed. Hence, Inner query uses values from Outer query.

Q.6 Primary key, foreign key, Surrogate key and Composite key?

Ans: Primary Key:

A primary key is used to ensure that data in the specific column is unique. A column cannot have NULL values. It is either an existing table column or a column that is specifically generated by the database according to a defined sequence.

Foreign Key:

A foreign key is a column or group of columns in a relational database table that provides a link between data in two tables. It is a column (or columns) that references a column (most often the primary key) of another table.

Surrogate key:

Surrogate key also called a synthetic primary key, is generated when a new record is inserted into a table automatically by a database that can be declared as the primary key of that table. It is the sequential number outside of the database that is made available to the user and the application or it acts as an object that is present in the database but is not visible to the user or application.

Features of Surrogate key:

It is automatically generated by the system.

It holds anonymous integer.

It contains unique value for all records of the table.

The value can never be modified by the user or application.

Surrogate key is called the fact less key as it is added just for our ease of identification of unique values and contains no relevant fact (or information) that is useful for the table.

Composite key:

A composite key is made by the combination of two or more columns in a table that can be used to uniquely identify each row in the table when the columns are combined uniqueness of a row is guaranteed, but when it is taken individually it does not guarantee uniqueness, or it can also be understood as a primary key made by the combination of two or more attributes to uniquely identify every row in a table.

Q.7 What are Constraints and Their types?

Ans: SQL Constraints are used to specify rules for the data in a table.

NOT NULL: Ensures that a column can not have a NULL value

UNIQUE: Ensures that a all values in column are different

PRIMARY KEY: A Combination of NOT NULL and UNIQUE uniquely identifies each row in a table.

FOREIGN KEY: Prevents action that would destroy links between table

CHECK: Ensures that the values in a column satisfies a specific condition

DEFAULT: Set a default value in a column if no value is specified

Q.8 Difference between Delete vs Drop vs Truncate?

Ans:

DELETE	DROP	TRUNCATE
The DELETE command is Data Manipulation Language Command.	The DROP command is Data Definition Language Command.	The TRUNCATE command is a Data Definition Language Command.
The DELETE command deletes one or more existing records from the table in the database.	The DROP Command drops the complete table from the database.	The TRUNCATE Command deletes all the rows from the existing table, leaving the row with the column names.
We can restore any deleted row or multiple rows from the database using the ROLLBACK command.	We cannot get the complete table deleted from the database using the ROLLBACK command.	We cannot restore all the deleted rows from the database using the ROLLBACK command.
The DELETE command performs slower than the DROP command and TRUNCATE	The DROP Command has faster performance than DELETE Command but not as compared to the Truncate Command	The TRUNCATE command works faster than the DROP command and DELETE
The Integrity Constraints remain the same in the DELETE command.	The Integrity Constraints get removed for the DROP command.	The Integrity Constraints will not get removed from the TRUNCATE command.

Q.9 DBMS vs RDBMS vs Data Warehouse?

Ans:

DBMS or RDBMS	DATA WAREHOUSE
It supports operational processes.	It supports analysis and performance reporting.
Capture and maintain the data.	Explore the data.
Current data.	Multiple years of history.
Data is balanced within the scope of this one system.	Data must be integrated and balanced from multiple system.
Data is updated when transaction occurs.	Data is updated on scheduled processes.
ER based.	Star/Snowflake.
Flat relational.	Multidimensional.
100 MB to GB.	100 GB to TB.
Primitive and highly detailed.	Summarized and consolidated.
Application oriented.	Subject oriented.

Q.10 Differentiate DBMS & RDBMS?

Ans: Database Management System (DBMS) is a software that is used to delete, create and maintain a database and provides controlled access to data.

RDBMS is used to **store and manage only the data that are in the form of tables.**

Q.11 Difference between GROUP BY KEY & REDUCE BY KEY?

Ans: Group By clause is applicable when **we want use aggregate functions to more than one set of rows.**
Order by clause is applicable when we want to get the data obtained by a query in the sorting order

Q.12 VARCHAR VS VARCHAR 2?

Ans: VARCHAR is **ANSI standard** while **VARCHAR 2 is Oracle standard.**

Q.13 Difference between HAVING & WHERE clause?

Ans: **HAVING** Clause is **used to filter the records from the groups** based on the given condition in the HAVING Clause. **HAVING Clause can only be used with SELECT statement.**

WHERE Clause is **used to filter the records from the table** or used while joining more than one table. It **can be used with SELECT, UPDATE, DELETE statements.**

Q.14 What is cursor?

Ans: Cursor is a Temporary Memory or Temporary Work Station. It is Allocated by Database Server at the Time of Performing DML (Data Manipulation Language) operations on Table by User. Cursors are used to store Database Tables. There are 2 types of Cursors: Implicit Cursors, and Explicit Cursors. These are explained as following below.

1. Implicit Cursors:

Implicit Cursors are also known as Default Cursors of SQL SERVER. These Cursors are allocated by SQL SERVER when the user performs DML operations.

2. Explicit Cursors:

Explicit Cursors are Created by Users whenever the user requires them. Explicit Cursors are used for Fetching data from Table in Row-By-Row Manner.

How to create Explicit Cursor:

1. Declare Cursor Object.

Syntax: DECLARE cursor_name CURSOR FOR SELECT * FROM table_name
DECLARE s1 CURSOR FOR SELECT * FROM stud_Details

2. Open Cursor Connection.

Syntax: OPEN cursor_connection

Q.15 OLTP vs OLAP

Ans: **Online Analytical Processing (OLAP):** Online Analytical Processing consists of a type of software tools that are used for data analysis for business decisions. OLAP provides an environment to get insights from the database retrieved from multiple database systems at one time.

Examples – Any type of Data warehouse system is an OLAP system. The uses of OLAP are as follows:

- Spotify analysed songs by users to come up with a personalized homepage of their songs and playlist.
- Netflix movie recommendation system.

Online transaction processing (OLTP): Online transaction processing provides transaction-oriented applications in a 3-tier architecture. OLTP administers the day-to-day transactions of an organization.

Examples: Uses of OLTP are as follows:

- ATM centre is an OLTP application.
- OLTP handles the ACID properties during data transactions via the application.
- It's also used for Online banking, Online airline ticket booking, sending a text message, add a book to the shopping cart.

Q.16 SCD type 0,1,2,3 using set operators and Joins?

Ans: When organising a Data Warehouse into Kimball-style star schemas, you relate fact records to a specific dimension record with its related attributes. But what if the information in the dimension changes. It is this decision that determines whether to make your dimension a slowly changing one. There are several different types of SCD depending on how you treat incoming change.

SCD Type 0 – **Fixed Dimension:** No changes allowed, dimension never change

Type 1 – **No History:** Update record directly, there is no record of historical values, only current state

Type 2 – **Row Versioning:** Track changes as version records with current flag & active dates and other metadata

Type 3 – **Previous Value column:** Track change to a specific attribute, add a column to show the previous value, which is updated as further changes occur

Q.17 Update table?

Ans: The **UPDATE** statement is used to modify the existing records in a table.

Syntax:

UPDATE Employee

SET E_Contact_Name = 'Umesh Rathod', City= 'Frankfurt'

WHERE Emp_ID = 1;

Q.18 What is CTE?

Ans: **Common Table Expressions (CTE)** is a temporary named result set that you can reference within a **SELECT, INSERT, UPDATE, or DELETE** statement. You can also use a CTE in a **CREATE** a view, as part of the view's **SELECT** query. In addition, you can add a CTE to the new **MERGE** statement.

Q.19 What is Trigger?

Ans: A trigger is a special type of stored procedure that automatically runs when an event occurs in the database server.

Q.20 ACID Properties?

Ans: **Atomicity:** Either all the changes are performed or None of them.

Consistency: Data is in a consistent state when a transaction starts and when it ends.

Isolation: Transaction that run Concurrently that appear to be serialized.

Durability: After a transaction successfully completes, changes to data persist and are not undone, even in the event of a system failure.

Q.21 All Joins Result?

Ans:

Table A: (8 Rows)

0

0

1

1

1

2

Null

5

Table B: (6 Rows)

0

1

Null

Null

4

6

Output:

Inner Join: 5 Rows

Left Join: 8 Rows

Right Join: 9 Rows

Full Outer Join: 12 Rows

Cross Join: 48 Rows

SQL (QUERY)

Q.1 Write a query to calculate 6th and Nth highest salary using SQL?

Ans: **SELECT** * **FROM** Employee
ORDER BY salary **DESC**
LIMIT 5,1

OR

SELECT salary **FROM** Employee
ORDER BY salary **DESC**
LIMIT 5,1

LIMIT 1,1 --- select one row after first row i.e 2nd highest salary

LIMIT 3,1 --- select one row after third row i.e 4th highest salary

Without using TOP & LIMIT Function

```
SELECT * FROM Employee e1
WHERE N-1 = (SELECT COUNT (DISTINCT salary) FROM Employee e2
WHERE e2. salary > e1. salary)
```

Q.2 Write a query to find First, last and middle record in a table?

Ans:

First Record From table

```
SELECT TOP 1 FROM Employee;
SELECT * FROM Employee
WHERE Emp_ID = (SELECT MIN(Emp_ID) FROM Employee);
```

Last record From Table

```
SELECT * FROM Employee
WHERE Emp_ID = (SELECT MAX(Emp_ID) FROM Employee);
```

Middle record From Table

```
SELECT * FROM Employee
WHERE Emp_ID = ROUND ((SELECT MAX(Emp_ID) FROM Employee)/2);
```

Q.3 Write a query to find Duplicate and delete duplicate records?

Ans:

Finding Duplicate Records

```
SELECT *, COUNT (Emp_ID)
FROM Employee
GROUPBY Empid
HAVING COUNT(Emp_ID)>1;
```

Deleting Duplicate Records

```
DELETE E1
FROM Employee E1, employee E2
WHERE E1. Email = E2. Email
AND E1. Emp_ID > E2. Emp_ID;
```

Q.4 Write a query to calculate the even and odd records from a table?

Ans:

For Even

```
SELECT * FROM Employee
WHERE MOD(Emp_ID,2) = 0;
```

For Odd

```
SELECT * FROM Employee
WHERE MOD(Emp_ID,2) = 1;
```

Q.5 How do you copy all the rows of a table using SQL query?

Ans: CREATE TABLE Emp_Detail AS SELECT * FROM Employee

```
CREATE TABLE Emp_salary AS SELECT Emp_ID, salary FROM Employee;
```

Q.6 How do you copy schema of a table or create empty table from existing table?

Ans:

```
CREATE TABLE Emp_Detail AS
SELECT * FROM Employee
WHERE 3 = 4;
```

Q.7 Write a query to retrieve the list of employees working in the same department?

Ans:

```
SELECT DISTINCT E. Emp_ID, E. Emp_name, E. Department
FROM Employee E, Employee E1
WHERE E. Department = E1. Department
AND E. Emp_ID <> E1. Emp_ID
```

Q.8 Write a query to retrieve the last 3 records from the Employee table?

Ans:

```
SELECT * FROM (SELECT * FROM Employee
ORDER BY Emp_ID DESC LIMIT 3)
Temp ORDER BY Emp_ID ASC;
SELECT * FROM temp ORDER BY Emp_ID ASC;
```

Q.9 Write a query to retrieve first four character of Employee name from Employee Table?

Ans: SELECT SUBSTRING(E_name,1,4) FROM Employee;

Q.10 Write a query to find number of Employees Whose DOB is between 01/06/1995 to 30/06/1998 and are grouped according to gender?

Ans: SELECT COUNT (*), Gender
FROM Employee WHERE DOB BETWEEN '1995/06/01' AND '1998/06/30'
GROUP BY gender;

Q.11 Write a query to fetch all records from Employee table order by department in Ascending order and salary in the descending order?

Ans: SELECT * FROM Employee
ORDER BY Department ASC, salary DESC;

Q.12 Write a query to fetch details of all Employees excluding the employees who are 'HR' & 'ADMIN'

Ans: SELECT * FROM Employee
WHERE Department
NOT IN ('HR','ADMIN');

Q.13 Write a query to fetch 50% records from the Employee table?

Ans: When ID is in Proper Sequence i.e no record deleted

SELECT * FROM Employee
WHERE Emp_ID <= (SELECT COUNT(Emp_ID)/2 FROM employee);

When ID is not in Proper sequence i.e record deleted

SET @COUNT = (SELECT COUNT(Emp_ID)/2 FROM employee);
PREPARE STMT FROM 'SELECT * FROM Employee LIMIT?';
EXECUTE STMT USING @COUNT;

Q.14 Write a query to display total salary of each Employee after adding 10% increment in the salary?

Ans: SELECT Emp_id, E_name, salary+(salary/10)
AS Total_salary FROM Employee;

Q.15 Write a query to retrieve two Minimum and Maximum salaries?

Ans: SELECT DISTINCT salary (**Minimum**)
FROM Employee E1
WHERE 2 >= (SELECT COUNT (DISTINCT salary FROM Employee E2 WHERE E1. Salary >= E2. salary))
ORDER BY E1. Salary;

SELECT DISTINCT salary (**Maximum**)

FROM Employee E1
WHERE 2 >= (SELECT COUNT (DISTINCT salary FROM Employee E2 WHERE E1. Salary <= E2. salary))
ORDER BY E1. Salary DESC;

Q.16 Write a query to fetch the Employee name and replace the space with '_'?

Ans: SELECT REPLACE (E_name,' ','_')
FROM Employee;

Q.17 Write a query to fetch the Employee gender and replace the 'M' with 'Male'?

Ans: SELECT *, REPLACE (gender,'M','Male')
FROM Employee;

Q.18 Write a query to fetch details of Employees whose EmpLname ends with an alphabet 'A' and contains five alphabets?

Ans: SELECT * FROM Employee
WHERE EmpLname LIKE '____a';