SQL INTERVIEW QUESTIONS & Answers by Jeevan Raj

1. What is Database [DB]

Ans:- Database is a container where data can be collected systematically Managing and Manipulation of those data are easy.

Ex:- An online telephone directory uses a database to store their data,

Like :- Name, Address, Phone Number and other contact details

Ex:- An Online Library who has millions of books in order to maintain their data they use database.

2. What is a Database Management System [DBMS]

Ans:- Database Management System is basically a software, where you can store, retrieve, define and manage your data in a database.

- Note:- What does data retrieval means?
  - In Databases, Data Retrieval is the process of identifying and extracting data from a database based on a query provided by the user or applicant.

3. Types of Database Management System

There are Mainly 4 types of Database Management System

1. Hierarchical Database
2. Network Database
3. Relational Database
4. Object-oriented Database

4. What is Hierarchical Database

1. Hierarchical Database :- (ex:- XML data storage has root node enclosing one or more child node)

- In a hierarchical database data is structured in a tree-like manner.
  Those data are stored in hierarchically (Top-down) order and
  Also they are represented by Parent child relationship

- In hierarchical database Parent can have many children, but in the case of children, have only one parent

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5. What is Network Database

1. Network Database:- (ex:- Integrated data store)

- The concept of network database model allows all the child to have multiple parents and also it helps to solve the more complex model
  It uses many to many relationship

6. What is Relational Database

1. Relational Database:-

- Relational Database are Mostly used DBMS, because of its flexibility and easy to implement nature.
- The model is worked on Normalizing data in the database
- Relational model stores the data in fixed structure and manipulated them using SQL

- **Note:-** Normalizing data:- Normalizing is the process of organizing the data in order to reduce data redundancy and improve data integrity.

7. What is Object Oriented Database

1. Object Oriented Database:-

In Object Oriented Database data are stored in the form of objects.

It Maintains a structure which is known as class and display the data within that.

8. Property of RDBMS

Some of the Properties of RDBMS are :-

1. Values are Atomic in RDBMS (Multiple operations can be grouped into a single entity)
2. Each column can have common name
3. Integrity constraints helps to maintain the data consistency for multiple tables
4. Each row is Different
5. Columns are Different

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9. Difference between DBMS and RDBMS

DBMS	RDBMS
1. Data stored in the form of file format	**1.** Data stored in Table format
2. Individual Access of Data Element	**2.** Multiple Data Element are accessible together
3. No connection between data	**3.** Data is stored in the form of table are linked together
4. Data stored in small quantity	**4.** Data stored in large amount
5. DBMS Supports a single user	**5.** RDBMS Supports multiple users
6. There is low security while handling data	**6.** It features multiple layers security while handling data [ACID]
7. DBMS does not offer any support for Normalization	**7.** RDBMS do support multiple normalization operation.

10. Difference between SQL and MySQL

Parameter	SQL	MySQL
Definition	SQL is a structured query language, It is useful to manage relational Database	MySQL is an RDBMS to store, retrieve, modify and administrate a database using SQL
Complexity	You need to learn the SQL language to use it effectively	It is readily available through download and installation
Type	SQL is a Query Language	MySQL is database software, It uses SQL Language to query the database
Purpose	To Query and Operate database system	Allows data handling, storing, modifying, deleting in a tabular format.

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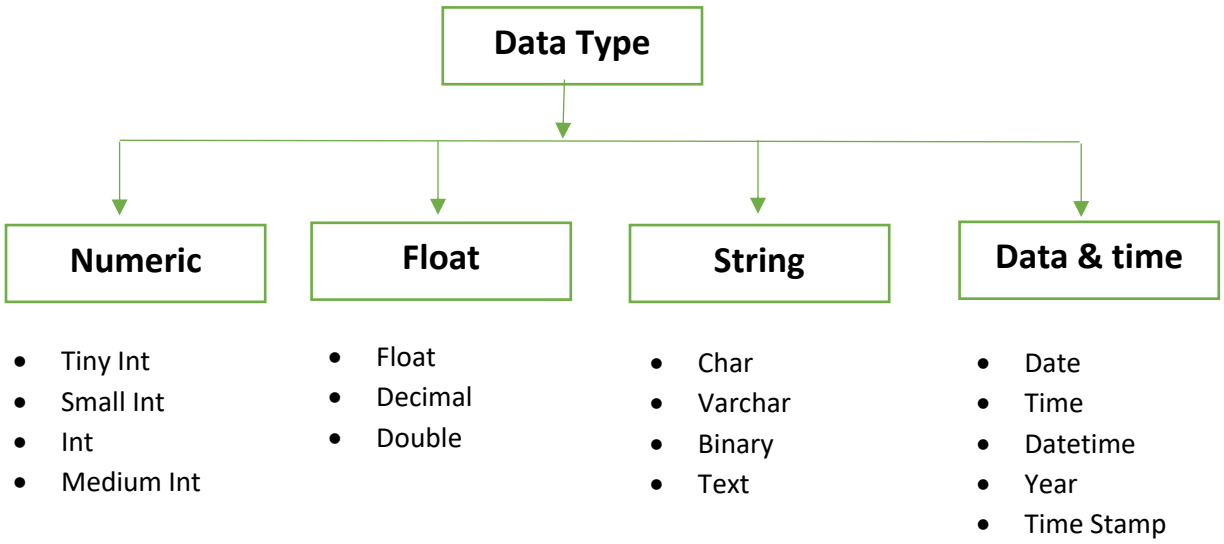
11. Different Type of Datatype in MySQL



12. Type of Commands in MySQL in detail

SQL commands are the instructions used to communicate with a database to perform tasks, functions, and queries with data.

Type of Commands in MySQL are :-

1. DDL [Data Definition Language]
2. DML [Data Manipulation Language]
3. DQL [Data Query Language]
4. DCL [Data Control Language]
5. TCL [Transaction Control Language]

DDL :

- DDL is a SQL Commands to define the database schema.

- It is used to create or modify the structure of database object in the DB

1. Create
2. Drop
3. Alter
4. Truncate
5. Rename

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DML :

- DML used to Manipulate the data present in the database

1. Insert
2. Update
3. Delete

DQL :

- DQL is used to fetch data from database

1. Select

DCL :

- DCL is used to give privileges (permission) to the user to perform any operation in the database

1. Grant
2. Revoke

TCL :

- If it is a banking sector the money is debited from one account and credited to the other account

- To manage changes made to data in a table by DML Statement

1. Commit
2. Save point
3. Rollback

13. <u>What is Normalization</u>

Normalization is the process of organizing the data to avoid data duplication and redundancy by adding more table.

14. <u>What is Denormalization</u>

Denormalization is the opposite of Normalization.

Where as denormalization is a technique used to access the data from higher to lower form of the database. Where the redundant data is added to speedup complex queries by joining the multiple table

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15. Type of Normalization in detail

We have 4 types of Normalization

1. First Normal Form [1NF]
2. Second Normal Form [2NF]
3. Third Normal Form [3NF]
4. Boyce Codd Normal Form [BCNF]

First Normal Form [1NF] :-

Each table cell should have a single value. So, Basically all the records must be unique

Second Normal Form [2NF] :-

To use Second Normal Form it should satisfy 1st Normal Form and Should also have single column Primary Key.

Third Normal Form [3NF] :-

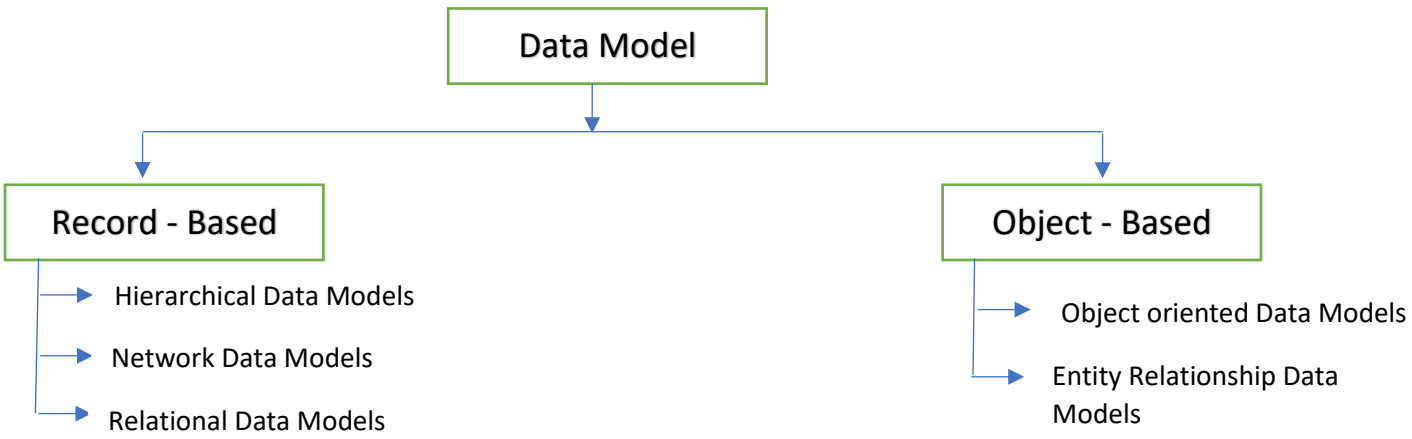
To use Third Normal Form It should satisfy 2nd Normal Form and Must Not have any transitive functional dependency [Every Attribute should be dependent on Primary key because there should no partial dependency of the data]

Boyce Codd Normal Form [BCNF] :-

If your Database is in 3rd Normal Form, Then there would be some scenarios where anomalies would be present. If you have more than one candidate key then BCNF comes into picture, Where you divide your table further, So that there would be only one candidate key present.

16. What is Data Model

Data Model is a Blueprint of Business Model, It helps to organize the elements of data & Systematically defines how they are related to each other according to the business process.



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17. What is Entity-Relationship Data Model

Entity Relation data Model is based on the Notion of real-word Entities and relationship between them.

Note:- **Notion:-** Notion is an all in one relationship, Where you can write, Plan, Collaborate and get organized

Entity :- An Entity is an easily recognizable living or non-living real word object

Ex:- Student, Customer, Product.

Relationship :- Relationship is an association between two entities.

Ex:- A Customer Buys a Product

18. What is Schemas and explain type of Schemas

A database Schema is a skeleton structure that represents the logical view of the database.

It defines its entities and relationship between them.

-- The Database Schema is categorized into 2 types

1. Physical Schema

2. Logical Schema

Physical Schema :- Physical Schema represents actual storage of the data

Logical Schema :- Logical Schema represents the logical constraints, That need to be applied to the data stored

It may define Integrity constraints, Views and Table.

19. What is the difference Between Where Clause and Having Clause

Where Clause	Having Clause
• Where clause is used to filter the records based on specified condition	Having clause used to filter the records from group based on specified condition

• Where clause cannot have aggregate function • Where clause is implemented on rows • Where clause are executed before group by and after from clause	Having clause can operate on aggregate function ex:-[sum, count, min, max, avg] Having clause is implemented on columns Having clause are executed after group by clause

20. What is Difference Between Drop, Delete and Truncate

The difference between drop, delete, and Truncate are:-

Delete :-

- Delete is a DML command
- It is used to delete one or more records from a table.
- It is comparatively slower than the truncate command.
- We can use Rollback Command to restore the data Because it does not Auto commit.

Drop :-

- Drop is a DDL Command
- It is used to remove entire data, The view of the table does not exist, Integrity constraints will be removed.
- We cannot use Rollback command to restore the data Because it is Auto commit

Truncate :-

- Truncate Removes all the records without removing structure of the table.
- The view of the table exist, Integrity constraints will not be removed
- We cannot use rollback command to restore the data because it is Auto Commit
- Truncate command works faster than Delete Command

21. What are Constraints and Explain the Type of Constraints

- Constraints are Basically a set of Rules or Regulation which we must fallow when we are entering the data in a table
- Every table has Attributes (columns) and constraints.
- There are Specified while creating the table are can be specified by using alter command

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Type of Constraints used in SQL:-

- Not Null ----- Ensures that a column cannot have a Null Values
- Unique ---- Ensure all the values in the columns should be unique (different)
- Primary Key – Unique + Not Null [The table should have one primary key but . may have many not null or unique constraints]
- Foreign Key – To Maintain integrity of the data and to make the relationship
- Check – Enter the data with some condition ex:- [Age => check (Age>=18)]
- Default - If you have not entered Anything it will Default take the value Provided
- Auto increment – Automatically it increases the values by 1
- Index – Used to create and retrieve data from the database very quickly

22. <u>What are Joins and Explain different type of Joins</u>

Joins are used to combine rows from two or more tables, based on a related column between them.

Type of Joins in MySQL are:-

- **Inner Join :** Returns records that have matching values in both tables
- **Left Join :** Returns all records from the left table, and the matching records from the right table
- **Right Join :** Returns all records from the right table, and the matching records from the left table
- **Cross Join :** Returns all records from both table

23. <u>What are Keys and Explain the type of DBMS Keys in detail</u>

<u>Keys:-</u> DBMS Keys are one of the most important concept in RDBMS, It is used to uniquely identify the records in a table. And It is used to make the relationship between two table.

<u>Why we need DBMS Keys :-</u>

- For Identifying any row of data in a table uniquely
- We can ensure integrity of data is maintained.
- Establish relationship between tables and identifying relationship between table.

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Types of DBMS Keys are:-

1. Super Key
2. Candidate Key
3. Primary Key
4. Foreign Key
5. Composite and Compound Key
6. Alternate Key
7. Surrogate Key

Super Key:-

An Attribute or a set of Attribute that can be used to identify row of data in a table

Ex:- S.ID, Reg ID, Emial ID, S.ID+Reg ID, S.ID+Email ID, Reg ID + Email ID, S.ID+Reg ID+ Email ID

Candidate Key:-

Candidate key is nothing but minimal subset of super key.

In a table we can have multiple candidate key, An candidate key can have null value

Ex:- S.ID, Reg ID, Email ID

Primary Key:-

The Most Appropriate Candidate key is Primary Key, Will Pick any one of the Attribute from the candidate key as a Primary Key.

Alternate Key:-

Alternate key is nothing but in a candidate key that is not considered as Primary key

Foreign Key:-

- It is an Attribute in a table which is used to define its relationship with another table
- Foreign Key is nothing but you are taking reference from other table, where in the reference table, reference attribute should be unique.
- The table containing a foreign key is a child table, The table that has reference to is a Parent table

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Composite Key:-

- Any key with more than one attribute is called composite key
  Ex:- (SID, Reg ID), (Reg ID, Email ID), (Email ID, SID),(SID, Reg ID, Email Id)

Compound Key:-

If a composite key has at-least one attribute which is a foreign key then it is called as compound key

Ex:- In the above example if we have composite key (Reg ID, Branch code) then it will be known as compound key because Branch code Attribute is a Foreign key.

Surrogate Key:-

Sometimes a table has no attribute that can uniquely identify the row in the table

In this situation when there is no Natural Primary Key than will create an attribute that act as an primary key that is known as Surrogate key

This key do not adds any meaning to the data but serves the sole purpose of identifying rows uniquely in the table.

24. What are Views in MySQL

View is a virtual table that do not store any data of their own but display the data stored in other tables.

You will not have to create complex queries involving joins repeatedly

Views helps in data security. You can use view to show only authorized information to the user and hide the sensitive information

25. What is Index in MySQL and type of Index

1. Index is just like indexes in a book
2. Index will tell exact page no (location) of that page
3. Index is used to optimize the performance of Database by minimizing the number of disk access required when a query is processed.

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Mainly we have 2 types of index.

1. Clustered Index

2. Non Clustered Index

Clustered Index	Non-Clustered Index
1. Clustered Index is used for easy retrieval of the data from the database and is faster 2. One Table can only have one clustered index 3. Clustered index alters the way, The records are stored in database, As it sorts the rows by columns	1. Non-Clustered Index is used for easy retrieval of data from the database and is slower 2. One table can have many non-clustered index 3. Non-clustered index does not alter the way records are stored, but it create separate object with in a table.

26. What do you mean by Data Integrity

Data Integrity basically defines the Accuracy and Consistency of the data

27. What is ACID Property

ACID Property Ensures the Data Integrity is Maintained

A – Atomicity

C – Consistency

I – Isolation

D – Durability

Atomicity :- If one Part of any Transaction fails, Then Entire Transaction Fails and the Data Base is left unchanged.

Consistency :- Data must meet all the validation rules [consistency should be maintained before & after Transaction]

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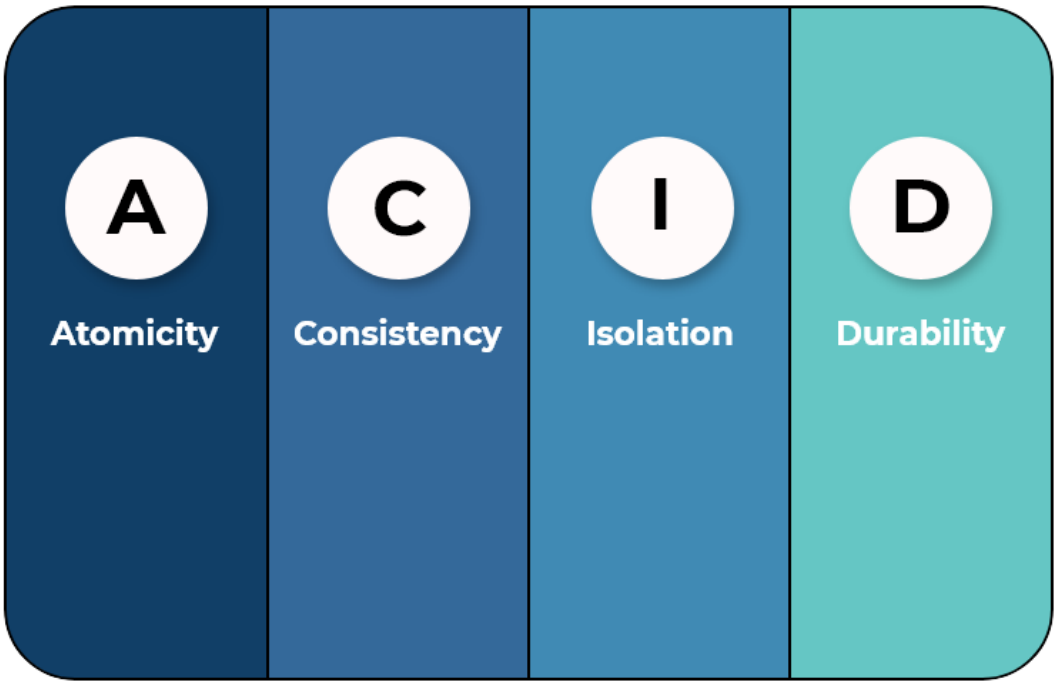
Isolation :- Concurrency Control [Multiple Transaction occur independently without Interference]

Durability:- If the Transaction has been committed it will occur what ever may come between like crash or system failure

ACID Properties

Transactions system in the database has 4 basic properties which are called as ACID properties. These properties play crucial understanding with the transactions happening in the database. They are used to maintain the consistency in the database during transactions.

Properties of transactions are:



1. Atomicity: The entire transactions takes place at once or doesn't happen at all. The transactions cannot perform partially. For other users, the transaction is only visible when it is completely executed.
   E.g. A wants to transfer money (Rs. 500) to B. Call it a Transaction. Atomicity guarantees that A's balance will get deducted by Rs. 500, and B's balance will get credited by Rs. 500. So both this credit and deduction happen to be a single step.

Just imagine the case if it was not atomic e.g. A's money got deducted and then Transaction failed, and B was never credited.

2. Consistency: The database must be consistent before & after the transactions. This property is satisfied when each data transaction moves the database from a consistent state to a consistent state.
   Using the same example as above, say before Transaction, A's Balance was Rs. 1000 and B's Balance was Rs. 2000.
   After Transaction (of Rs. 500 from A → B), we expect A's balance=500Rs and B's balance=Rs.2500
   If we think about it, both these states are valid. It must not happen that A's balance got updated to Rs. 500 but B's balance is other than Rs. 2500.
   So here, the sum of their balance can be thought of as a state, and it should remain consistent, before and after Transaction.

3. Isolation: Multiple transactions occur independently without interference.
   To take an example, say there are 2 concurrent transactions going on:
   A → B and A → C transfer of Rs. 500 in each transaction.
   There can be multiple scenarios where concurrency might cause problems like T1 to read A's balance as 1000, and also meanwhile T2 read A's balance as 1000. Both deducted 500 to send to B and C respectively. This causes the problem as now both will update A's balance as 500.
   Since A's balance is now Rs. 500, it contradicts Consistency, as A's expected balance should be 0 after these 2 transactions.

4. Durability: After a transaction completes successfully, the changes it has made to the database persist, even if there are system failures.
   E.g. A had Rs. 1000, and it transferred Rs. 500 to B. Now every next time we query A's balance, we should get the latest value, and must not lose these details.

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28. What is Subquery in SQL and type of Subquery

A Subquery is basically a query inside another query, where a query is defined to retrieve data or information from the database

Subquery are always executed first and the result of the subquery is passed on to the main query

The Different type of Subquery are:-

1. Correlated Subquery
2. Non-Correlated Subquery

Correlated Subquery :- Relationship between the same table.

This query is not considered as an dependent query as it refers to another table & refers the column in a table.

Non Correlated Subquery:- Relationship between the different table, (Where outer query is of different table and inner query is of different table)

This query is considered as an independent query, where the output of subquery is substituted in the main query.

29. What is the Main difference between 'BETWEEN' and 'IN' Condition operator

Between:- Used to display rows based on a range of values in a row.

Ex:- Select * from students where roll_no between 10 and 50;

IN :- Used to check for values considered in a specific set of values.

Ex:- Select * from students where roll_no IN (8, 15, 25);

30. What is the need of Group function in SQL

Group function work on the set of rows & returns one result per group,

Some of the commonly used group function are :-

1. Avg

2. Count
3. Max
4. Min
5. Sum

31. What is the Need of Merge Statement

- Merge Statement Allows conditional updates or insertion of data into a table
- It performs an update if a row exists or an Insert if the row does not exist.

32. What is Trigger explain with real world Example

Trigger are the SQL Codes that are Automatically Executed in response to the certain events on a particular table.

Trigger are used to maintain the integrity of the data.

Problem without Trigger.

As I am a Marketing Executive in a company, When a new customer data enter into a company database, I have to send the welcome Email to the customer, If it is one or two mail I would have sent manually but what if the count is 1000 or millions, It will be a repetitive job & the efficiency may drop, So I am going to create a trigger where trigger will automatically send a welcome email to the new customer once a data enter into the database. This will increase the Efficiency.

33. What is Windows Function

Windows Function or Analytic Function which uses values from one or multiple rows to return a value for each row. Windows functions have an OVER Clause

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34. What is CTE [Common Table Expression]

CTE is a Temporary named result set, that can reference within a select, Insert, Update or Delete Statement.

The With Clause can include one or more CTE's Separated by commas.

CTE Enables user to more easily write & maintain complex queries via increased readability & simplification

35. What Stored Procedure

A Stored Procedure is a prepared SQL code that you can save, So the code can be reused over and over again.

Ex:- So if you have an SQL Query that you write over & over again, Save it as a stored procedure & then just call it to execute it.