What is database ?

=> database is a collection of data . Database allows to store and manage large amount of data efficiently .

We can managed Database by using database management system .

It allows authorize user only to access that data .

We have many database management systems like Relational database management system , non relational database management system .

what is DBMS ?

=> DBMS stands for database management system . It is a software system that provides tools and utilities to manage and organise data in database .

There are various type of DBMS including Relational database management system , non relational database managemnt system

What is relational database management system ?

=> RDBMS stands for relational database management system . It is type of database management system that stores data in a structured manner . It is based on relational data model . means we can establish relationship between tables using keys and constraint .

In RDBMS Data is stored in tables made up of rows and columns.

It uses SQL structure query language to interact with databses.

Example mySQL , oracle, postgresql.

What is non relatioal database management system ?

=> it is type of database management system that stores data in unstructured format .it is based on non relational data model .

In non relational database system we stores data in various format like key-value pair , document oriented , column oriented.

It uses there own language to interact with the database.

Examples mongodb uses MQL

Relational database	**Non-relational database**
Relational database management system is type of database mangement system that stores data in structured format	Whereas non relational database management system is type of database management system that stores data in unstructured format or semistructured formt.
Relational database based on the relational data model	Wheras non relational database based on non relational data model.
Relational database stores data in tables made up of rows and columns	Whereas non relational database stores data invarious format like key-value pairs .
Relational database has fixed schema structure	Wheras non relational database has flexible schema structure
Relational database uses structured query language to interact with database	Whereas non relational uses there own language
Examples mysql , postgresql , oracle	Examples mongodb

What is difference between SQL and NOSQL?

=>

SQL database	**NOSQL databse**
Sql stands for structured query language . It is programming language used to interct with the relational database management system. It follows relational data model .	**Nosql stands for not only sql . It does not follow traditional relational data model.**
SQL database has fixed scema structure	**NoSql databse allows flexible scema structure.**
Sql databases stores structured data ie. Data strored in tables made up of rows and column	**Nosql database stores unstructure data. ie data stored in key value pairs.**
Example mysql ,oracle , postgresql	**Example mongodb**

Differenece between relational database and NoSql database or SQL and NoSql?

=> relational database :

1] relational database are based on relational data model means we can esatblish relations between data.

2] RDBMS store data into tables made up of rows and columns . rows also called as records and columns are called fields .

3] RDBMs has fixed schema structured .

5] it uses SQL structured query language to interact with databases .

6] example mysql , oracle , postgresql

NoSql :

1] Whereas NoSQL is based on non relation data model .

2] NoSQL stores data in various formats like key-value pairs .

3] Whereas Nosql allows flexible schema structre

4] Use there own language to interact with database .

5] Example mongo db

What is noql ?

=> Nosql stands for not only sql . it is a non relational database management system . That stores data in unstructurd format . nosql database is based on non relational data model.

it can store data in various format like key-value pairs , document oriented ,
Column orientd data .
It allows flexible scema structure.
Nosql includes databases like mongodb , amazone dynamodb.

What is mySql ?
=> mySql is a open source relational database management system that stores data in structured format. mySql database are based on the relational data model .
Mysql stores data in a tables made up of rows and columns .
Rows are also called record and columns are called field.
mySql has fixed schema structure.
It uses structured query language to interact with database .

What is sql ?
=> sql stands for structured query language . It is a programming language used to manage relational database management system.
With the help of sql we can work with relational databases like mySql , oracle , postgresql .

What is key ?
=> key is a field in table which used to identify each records in table uniqly . It can be single column or combination of multiple column used to uniqly identify rows . it also helps to establish reltionship between multiple tables.

What is primary key ?
=> primary key is a field in a table that uniquly identifies each record in the table.
We used primary key to ensure uniqeness in a table .
Primary key field should not be null and it must be uniq. And its value should rarely be changed.

For example : in a table employees , I can put empID field as primary key .so this field would be unique for each employee and using it we easily get individual employee record.

What is composit key?
=> composit key is a primary key composed of multiple columns used to identify records uniqly.
For example : in our table we have two persons with same name suppose “shubham” but they live in different place. Hence we require both name column and address column to identify uniqly. That is composit key.

What is a foreign key and how is it used in a database?
=> Foreign key is used to esatblish relationship between two tables .
It links one table to another table based on common column. Foreign key in one table refers to point primary key in another table .
Foreign key can only have values present in primary key. it can be null and contains duplicates.
It could have name other than primary key.

For example, consider two tables, orders and customers. The orders table has a column called customer_id that references the primary key column cust_id in the customers table.

By creating a foreign key constraint between the two tables, we can ensure that every customer_id value in the orders table exists in the id column of the customers table.

```
1.  CREATE TABLE orders
2.  (
3.  O_Id int NOT NULL,
4.  Order_No  int NOT NULL,
5.  S_Id int,
6.  PRIMAY KEY (O_Id),
7.  FOREIGN KEY (S_Id) REFERENCES Persons (S_Id)
8.  )
```

Why do you need forign key ?

=> by using forign key we only able to insert values that exists in the primary key in parent table . this helps in referential intigrity.

If I try to insert new record in forign key which is not present in primary key , database will throw an error.

What is UNIQUE key ?

=> unique key is field in table which uniquely identifies each record in table . it is like a primary key but it can accept one null value , it cannot have duplicates .

What is Alternate Keys ?

=> Every table can have multiple options for primary key , but only one column set as primary key . all the keys which are not primary keys are called the alternate keys .

What is candidate keys ?

=> candidate key is a set of one or more fields that can identify a record uniquly in a table. It is subset of super keys .There can be multiple candidate keys in one table .

What is super key ?

=> A super keys is a set of one or more than one key that can be used to identify a record uniqly in a table . primary key , unique key alternate key , candiadte keys are a subset of super keys.

What is transitive functional dependency ?

=> transitive functional dependency means , if we change any non- key attribute it will affect other non key attribute . (guru99.com/database-normalization.html)

What is normalisation ?

=> normalization is database design technique to organize data in a database In such way that it will reduce data dependency and data dublications.
Normalization rules divides larger table into smaller tables and links them using relationship.

There are several levels of normalisation each have its own rule :
1st NF : each table must have primary key , and each table cell contains single value only.
2nd NF : it must be in 1st NF that is it should have primary key and each record only depends on primary key.
3rd NF : it must be in 2nd NF and if any non key attribute depends on another non key it must be removed .
4th NF : it must be in 3rd NF and **each non-key attribute depends on the candidate key**,

What is stored procedure ?
=> A stored procedure is a precompiled program that we can stored in a database and we can call it many times .
By using stored procedure we imporve the performance of database by reducing amount of processing.
We can use same stored procedure again and again so , it will improve prductivity.
We can create store procedure by using CREATE PROCEDURE command .
And we can also pass parameters to a stored procedure .

For example :

```
DELIMITER //
CREATE PROCEDURE add_customer (
  IN name VARCHAR(255),
  IN email VARCHAR(255),
  IN phone VARCHAR(20)
)
BEGIN
  INSERT INTO customers (name, email, phone)
  VALUES (name, email, phone);
END //
DELIMITER ;


CALL add_customer('John Smith', 'john@example.com', '555-1234');
```

What is a trigger?
=> Trigger is a special type of stored procedure which is automatically executed In response to specific event .
Event may be inserting data into tabels ,
Updating data or deleting data in a table can automatically execute trigger .

Actually by using triggers we do not have to wait to run the scheduled tasks because triggers are invoked automatically 'befor' or 'after' a modification is done to the data in the table.
We can create trigger by using create trigger command and using AFTER or BEFORE :

For example :

```
CREATE TRIGGER update_customer_balance AFTER INSERT ON orders
FOR EACH ROW
BEGIN
  UPDATE customers SET total_balance = total_balance + NEW.order_total
  WHERE customer_id = NEW.customer_id;
END;
```

What is an Index ?
=>index is field in a table which helps to quickly identify records that match certain conditions. We can create index on one or more column of a table . and database system uses that index to quickly find records that match conditions rather than scanning entire table .
We create index by using create index command .

[For example I have customer table and in that I have columns like customer_id , first_name , last_name , email , and to improve query performance to search in email column I use index like]

```
CREATE INDEX email_idx ON customers (email);
```

And to search :

```
SELECT * FROM customers WHERE email LIKE '%@example.com';
```

It will find all email ends with @example.com

What is a join ?
=> Join combines data from two or more tables into a single result set based on a common column between them .

We have different types of sql joins :
Inner join : this joins returns only the rows that have matching values in both tables.
Left Outer join : returns all the rows from left table and only matching rows from right table if no matching rows are in right table it returns null.
Reight outer join : returns all the rows from right table and only matching rows from left table if there is no match in left table it returns null.
Full outer join : returns all rows from both tables if there is no match in one of the table the result set contains null .
Cross join : returns all possible combinations of rows from both tables

What is a view and why would you use one?
=> A view is a virtual table in a database . a view does not store any data on its own but it provides a way to access data in a simplified way .
It provids layer of abstraction to the underlying data .

For example : suppose I have two tables customers and orders

```
CREATE VIEW order_details AS
SELECT customers.customer_name, orders.order_date
FROM customers
JOIN orders ON customers.customer_id = orders.customer_id;


SELECT * FROM order_details;
```

What is transactions ?
=> transaction is a logical unit of work . It includes one or more database operations .
That together treated as single , atomic operation . transactions ensures that either all the operation within the transaction are completed or none of them are done .

Transaction has main four properties :

Automicity : meaning that either all the database operations within the transaction are completed successfully, or none of them are completed. If any one operation within the transaction fails, the entire transaction is rolled back and all changes made to the database are undone, leaving the database in its original state.

Consistncy :ensures that the database is in a consistent state both before and after the transaction.

Isolation : meaning that the changes made by one transaction are invisible to other transactions until the first transaction is completed

Durability : Once a transaction is committed, its changes are permanent and cannot be undone even in the case of a system failure or power outage.

What is batch ?
=> Batch is collection of SQL statement that are treated as single unit of work . it may contain transactions or may not contain .
Batch is used to execute series of SQL statement that are related to each other .

explain sql functions ?

=> SQL functions are built in operations that perform specific tasks on data . they are used to manipulate , compute and retrive data from the database .
Sql functions can be categorise into several types :
Scalar functions : perform calculation on single (each) value in row and return single value as the result.

UCASE() : converts value of a field to uppercase
LCASE() : converts value of a field to lowecase.
MID() : extract text from text field
LEN() : returns length of value in text field
ROUND() : the function is used to round off
NOW() : returns current date and time
FORMT() :

Aggregate functions : perform calculation on set of values and returns single value as result .

SUM() : returns the sum of groups of values
COUNT() : returns the number of rows
AVG() : returns avrage value after calculating values from numeric columns
MAX() : returns maximum value from the column
MIN() : returns minimum value from the column
FIRST() : returns first value from the column
LAST() : returns last value from column .

What is use of temporary table ?
=> temporary table is the type of table that is created and exists only for the duration of a database session or connection . and they are automatically dropped when session or connction ends.
We can create temporary table in two ways :

```
CREATE TEMPORARY TABLE temp_table (
  id INT,
  name VARCHAR(50)
);
```

Or we can copy from another table :

```
SELECT * INTO TEMPORARY TABLE temp_table FROM my_table ;
```

(it will copy all data from my_table into temp_table .)

For sql

```
SELECT * INTO #temp_table FROM my_table ;
```

Mysql and Mongodb :

mySql :
Is a relational database model system
Data is stored in table format
Uses SQL language to interact with database

It has fixed schema structure

It used for storing structure data

Mongodb :

Is non relational database management system
Data is stored in JSON format (javascript object notation)
Data stored in collections with no fixed structure
Uses own language MQL(mongodb query language) to interact with database

It use for storing unstructure data.

What are scalar and Aggregate function in Sql ?
=> Functions like MIN , MAX , AVG , SUM , COUNT these all the aggregate functions .

And
Fnctions like length , extract are scalar function.

What does Coalesce function do in SQL ?
=>Coalesce function will replace all the null value with default value called zero .

What are the Constraints ?

=> Constraints are used to put restriction to table and column . we have constraints like Primary key , foreign key , unique ,
Primary key cannot accept duplicates & null values
Foreign key is reference of primary key which can accept duplicates and null values .
Unique key is simler like a primary key , but it accepts null values ,

How many primary key and unique key can be in a table ?
=> there can be as many as unique key (& foreign key)in a table , but there can be only one primary key in the table .primary key can be combination of two colums .

How SQL is related to DBMS ?
=> SQL stands for structured query language which is programming language used to interact with relational database management system . with the help of SQL we can work with the database management systems like MySQL , Oracle , postgreSQL
So ,overall SQL which is progrmming language used to interact relational database .

What all things we can do using SQL ?
=> SQL can execute queries against an database
SQL can retrive data from database ,
SQL can Update data from database,
SQL can insert data into database
SQL can delete adata from databse
SQL can CREATE a DATABASE , tables in databases ,stored procedure in databse ,

suppose i create one table employee in mysql and have column like name which is varchar(20) and other columns are id and phone no , address . i inserted some 100 records in that table .after inserting 100 records i want to change name varchar(20) to varchar(30) how to change it ? and if i change it what will happen to previous data which i inserted will it affect ?
=> To change the data type of the column we use ALTER command .

ALTER TABLE employee MODIFY column name VARCHAR(30);

When we modify the datatype of column , It can potentially affect the existing data.

If we increasing the length of column there should be no data loss or truncation of existing data. However if we decrease length of column any data that exceeds new length limit would be truncated .

How to change name of column emailID to email ?
=> ALTER TABLE employee RENAME COLUMN emailID TO email;

How to change name of cloumn ?
=> to change name of column we use ALTER command .
Suppose I want to change emailID to ID in employee table :

ALTER TABLE employee CHANGE emailID ID VARCHAR(30);

for executing SQL cammands which tool is necessary ?
=> we can use mysql command line client , or graphical user interace .

If you want to delete record what are different commands we can use ?
=> we can use DELETE , TRUNCATE or DROP commands to delete records from the table .

DELETE : is a DML command , which is used to delete specific records .if we use delete command without WHERE clause it will delete all the rows from the table.
Like
DELETE FROM employee ;
And if we want to delete specific records we use WHERE clause like
DELETE FROM employee WHERE empID = 10;

TRUNCATE command is DDL command which is used to delete all records from the table . its syntax like
TRUNCATE TABLE employee;

DROP command is DDL command which is used to delete an entire table alongwith the structure of the table . its synatx like :
DROP TABLE employee;

What are command under Transaction control language ?
=> Stands for Transactional control language , are used to manage transactions within a database It includes commands like COMMIT , ROLLBACK , SAVEPOINT .

What is use of COMMIT , ROLLBACK & SAVEPOINT ?

=>
COMMIT : commit command is used to save the changes made to the database since the start of the transaction . and once COMMIT done , changes become permanent and we cannot do ROLLBACK.

For example :
START TRANSACTION;
INSERT INTO table_name (column1, column2, column3) VALUES (value1, value2, value3);
COMMIT;

ROLLBACK : rollback command is used to undo the changes made to the database since start of the current transactions .

For example :
START TRANSACTION;
UPDATE table_name SET column1 = new_value WHERE condition;

ROLLBACK;

SAVEPOINT : SAVEPOINT command is used to mark a point within a transaction to which we can later ROLLBACK . By using SAVEPOINT we can undo part of a transaction without rolling back to entire transaction .

For example :
START TRANSACTION;
UPDATE table_name SET column1 = new_value WHERE condition1;
SAVEPOINT my_savepoint;
UPDATE table_name SET column1 = new_value WHERE condition2;
UPDATE table_name SET column1 = new_value WHERE condition3;
ROLLBACK TO my_savepoint;
COMMIT;

after creating table i gave ROLLBACK command what will hapen table will be there or removed ?
=> no ROLLBACK command will not work on mysql DDL commands .

Explian concept of Implicit commit and Explicit commit ?
=> in some SQL system , an implicit commit occurs automatically after each statement is executed . this means that changes made by the statmentare permanently saved to the database .een if COMMIT statement is explicitly not issued .
Explicit Commit is a statement that is used to permanantly save changes ,made during transacttion .

START TRANSACTION
CREATE TABLE (

```
Id Integer primary key ,
Name varchar(25) Not Null ,
Address varchar(255)
);
ROLLBACK;
```

Tell me difference between CHAR and VARCHAR ?

=> basically CHAR datatype is used to store fixed length character string. Means if I insert character which is less than the specified length then database will padds the character with spaces to fill column to its max length.

For example if I insert “hello” in CHAR(10) datatype column then database will store “hello “ with 4 extra space.

Whereas VARCHAR datatype is used to store variable length character string .means it only takes as much space as actual character required .

For example if I insert “hello” in VARCHAR(10) column then database stores only “hello” without any extra space.

Difference between Natural Join and Cross Join ?

=> Natural Join : combines two or more tables based on theire common column with same name and same data type . resulting table includes common column once .

For example : if I have two tables , table 1 and table 2 and both contains id column with same data type . and If I use natural join on table1 and table 2 then in result set id column will appear only once and other column of table 1 and table 2.

Cross join : combines all possible combinassion of rows from two or more tables. Actually it returns cartessian product of two tables .(cartesian product means every row of the first table is combined with each row of secound column ,so resulting number of rows will be rows(table 1) * rows(table 2) .

For example :

Difference between NOW() and CURRENT_Date() ?

=> NOW() function returns current date and time

Whereas CURRENT_DATE() function returns only current date.

What is Scema in SQL ?

=> Scema represents structure of the database and define how the data is organised and stored in database .

How to insert null values?

=> by using NULL keword we can insert null value

```
INSERT INTO employee(id , name , salary) VALUES( 1 , ‘shubh’ , 10000 );
```

How to create temporary table ?

=> we can create tamporary table by using CREATE TEMPORARY TABLE command

For example :
CREATE TEMPORARY TABLE employee
(id INT PRIMARY KEY ,
Name VARCHAR(10) ,
Salary DECIMAL(10 , 2)
);

What is DECIMAL(10,2) ?
=> means value can have 10 digits overall and 2 digit to the right of the decimal point.

which constraint ensures entity inegrity ?
=> The primary key constraint ensures entity integrity in a relational database.
An entity is represent as table in database and primary key is column or combinatio of column that uniqly identifies each record in table .
By defining primary key constraint it ensures that the entity represent by table is well defined and there is no duplicate rows.

How many max value a function can return ?
=> In MySQL, a function can return at most one value

How many max value stored procedure can return ?
=> In MySQL, a stored procedure can return multiple values using output parameters,

who plays important role in conceptual data model?
=> In the development of a conceptual data model, the business stakeholders and subject matter experts play a critical role.

at which data model devloper plays important role ?
=> In the development of a logical data model

how long temporary table can exist?
=> In MySQL, a temporary table can exist for the duration of a single database session or connection. When the session or connection ends, the temporary table is automatically dropped.

name data engine used by mysql ?
=> MySQL uses the InnoDB storage engine as the default data engine for its relational database management system.

name data engine important for mysql cluster?
=> For a MySQL Cluster, the NDB (Network DataBase) storage engine is the most important and widely used data engine.

What is the condition as per first form of normalisation?
=>

How can you call a procedure ?
=>

what feature of mysql used for combining two tables , is not support by mongodb?
=> The feature of MySQL that is used for combining two tables and is not supported by MongoDB is SQL JOIN.