INTRODUCTION TO DBMS

1. What is SQL, and why is it essential in database management?

- SQL is Structured Query Language.
- SQL is a standard language for storing, manipulating and retrieving data in databases.
- SQL allows you to access and manipulate the databases.
- Ex: MySQL, SQL Server,orcle.
- It is standard language for relational database system. It a user to create , read , update , and delete relational database and table.

2. Explain the difference between DBMS and RDBMS.

RDBMS	DBMS
Data stored is in table format	Data stored is in the file format
Data in the form of a table are linked together	No connection between data
Support distributed database	No support for distributed database
Data is stored in a large amount	Data stored is a small quantity
RDBMS supports multiple users	DBMS supports a single user
The software and hardware requirements are higher	The software and hardware requirements are low
Example: Oracle, SQL Server.	Example: XML, Microsoft Access.

3. Describe the role of SQL in managing relational databases.

A relational database stores information in tabular form, with rows and columns representing different data attributes and the various relationships between the data values.

Its main roles include:-

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1. **Data Definition**: Creating, modifying, and deleting database structures like tables, indexes, and schemas using commands like CREATE, ALTER, and DROP.
2. **Data Manipulation**: Inserting, updating, deleting, and retrieving data from tables using commands like INSERT, UPDATE, DELETE, and SELECT.
3. **Data Control**: Managing access and permissions for users to ensure security and privacy with commands like GRANT, REVOKE, and DENY.
4. **Data Querying**: Extracting specific information from the database, filtering and sorting data using SELECT queries with conditions, joins, and aggregations.
5. **Data Integrity**: Enforcing rules (like primary keys, foreign keys, and constraints) to maintain data accuracy and consistency.

4. What are the key features of SQL?

1. **DDL (Data Definition Language)**: Used to create, modify, or delete database structures (e.g., tables).
2. **DML (Data Manipulation Language)**: Used to insert, update, or delete data in the database.
3. **Query Language**: Allows querying data, filtering, sorting, grouping, and joining tables.
4. **Transaction Control**: Enables grouping operations into transactions, which can be rolled back if needed.
5. **Data Integrity**: Ensures data accuracy with constraints and referential integrity.
6. **User Access Control**: Manages user permissions to control who can perform actions in the database.
7. **Portability**: SQL is standardized, making it easy to use across different database systems with minimal changes.

1. What are the basic components of SQL syntax?

- **KEY WORD:**SELECT, INSERT, UPDATE, DELETE, FROM, WHERE, GROUP BY, ORDER BY, and JOIN
- **Clauses**: SELECT , FROM , WHERE, ORDER BY.

- **Expressions**: AGE>18 , PRICE *5.
- **Aggregate function** : count() , max() , min() , sum() , avg().
- **Operators**: **Comparison operators**: =, !=, <, >, <=, >=.
    - **Logical operators**: AND, OR, NOT.
    - **Arithmetic operators**: +, -, *, /, %.
- **Data Types**: INT, VARCHAR, DATE, DECIMAL, BOOLEAN.
- **Comments**: Single-line comments start with -- or #, and multi-line comments are enclosed in /*...*/.
- **Identifiers**: employees, salary, department_id.

2. Write the general structure of an SQL SELECT statement.

- SELECT * FROM TABLE_NAME;
    - ALL RECORD FOR TABLE DISPALY
- SELECT ID,NAME FROM TABLE_NAME;
    - TABLE FOR ALL RECORD CHOICE USER RECORD DISPLAY
- SELECT DISTINCT * FROM TABLE_NAME;
    - SAME RECORD FOR TABLE SKIP AND DISPALY
- SELECT DISTINCT ID,NAME FROM TABLE_NAME;
    - TABLE FOR SAME RECORD SKIP CHOICE USER RECORD DISPLAY

3. Explain the role of clauses in SQL statements.

- **CLAUSES :** clauses is use filter table data
- Mainly three clauses in sql. Order by , group by and having clauses.
- **GROUP BY :** GROUP OF DATA IN COLUM.

- **HAVING :** FILTER GROUP DATA ON CONDITION.
- **ORDER BY :** DATA ASSENDING AND DESENDING.

1. **What are constraints in SQL? List and explain the different types of constraints.**

- **Constraints** : constraints is used to specify the rule of data in table. multiple constraints in sql.
- **Not null**: table value is not emty.
- **Unique:** table value is not dublicate.
- **Primary key :** table value is not emty and dublicate.
- **Foreign key:** two table are link and garneted relationship
- **Unique auto increment :** table are automatic value garneted
- **Check :** used to limit the value range.
- **Default :**used to default value when not insert value.

2. **How do PRIMARY KEY and FOREIGN KEY constraints differ?**

- **PRIMARY KEY :**The primary key is not null and unique identifier within the table.
  Only one primary key in table.
- **FOREIGN KEY :**foreign key is reference one table to primary key to another.
  Multiple foreign key in table.

3. **What is the role of NOT NULL and UNIQUE constraints?**

- **Not null:** Role of not null constraint create table and insert the record a not null value in table.

- **Unique :** role of unique constraint create table and insert the record a unique value in table.

1.Define the SQL Data Definition Language (DDL).

- DDL quary effect of table structure in sql.
- Describe DDL create, alter, drop,truncate database object.
- **Create :**create database ,table , view , procedure , trigger.
  create table table name();
- **Alter :**it is used to filter the column in table
  alter table table name add column column name datatype;
  alter table table name drop column column name;
  alter table table name modify column column name datatype;
- **drop:** it is used to delete table structure and record.
  drop table table name;
- **truncate :** it is used to delete all record and display the table structure.
  truncate table table name;

2. Explain the CREATE command and its syntax.

- Create command used database, table, view,procedure,trigger create in sql.
- **Create database:** Crete database database name;
- **Create table :** create table table name(
  - Id int ,
  - Name text ,
  - Salary int
  -);
- **Create view :** create view view name as column name from table name condition;
  - Select * from view name;
- **Create procedure :**

- **Without argument:**

```
Create procedure procedurename ()
Begin
        Insert into tablename value (insert value);
End

Call procedurename;
```

- **With argument:**

```
Create procedure procedurename (parameter datatype)
Begin
        Insert into tablename value (paramater);
End
Call procedurename(argument);
```

- **Create trigger :** create trigger t1 after insert on tablename for each row

```
Begin
        Insert into tablename (columnname) values(new.tablename)
end
```

3.What is the purpose of specifying data types and constraints during table creation?

- **Data type:** data type id type of data to store the column.
- Datatype is a guideline for sql to understand what type of data is expected inside of each column , and what type data stored in column.
- **Int:** declare the positive value.
- **Float:** declare decimal value.
- **Varchar:** declare string value and declare size.
- **Text:** declare string value and not declare size.

- **Date:** declare date atomatically YYYY-MM-DD.
- **Datetime:** declare date and time YYY-MM-DD and hh-mm-ss.
- **Time:** declare time hh-mm-ss.

- **Constraints:** constraints is used to specify the rule of data in table.
- **Not null**: table value is not emty.
- **Unique:** table value is not dublicate.
- **Primary key :** table value is not emty and dublicate.
- **Foreign key:** two table are link and garneted relationship
- **Unique auto increment :** table are automatic value garneted
- **Check :** used to limit the value range.
- **Default :**used to default value when not insert value.

1. **What is the use of the ALTER command in SQL?**
   - it is used to filter the column in table
   - Alter table command in sql use add , drop , modify column name within table.

2. **How can you add, modify, and drop columns from a table using ALTER?**
   - Add column : alter table tablename add column columnname datatype.
   - Drop column: alter table tablename drop column columnname.
   - Modify column: alter table tablename modify column columnname datatype.

1. **What is the function of the DROP command in SQL?**
   - it is used to delete table structure and record. drop command used permanently delete for database and table and cannot rollback record.

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2. **What are the implications of dropping a table from a database?**

   Drop table: Drop table tablename.

1. **Define the INSERT, UPDATE, and DELETE commands in SQL.**

- Insert , update , delete are DML commands. DML is data manipulation language. and DML command filter the table record in sql.

- Insert command insert the value in table.
  - Insert: insert into tablename values .
- Update command update or modify the value in table.
  - Update: update tablename set condition where condition.
- Delete command delete the value in table.
  - Delete: delete from tablename where condition.

2. **What is the importance of the WHERE clause in UPDATE and DELETE operations?**
   - Where clause is used to filter the record.
   - Update and delete operation execute a specify the condition the use where clause importance.

1. **What is the SELECT statement, and how is it used to query data?**
   - Select command is DQL(data query language).
   - Select stetment is return a result set of row from table.
   - Select * from tablename where condition;
2. **Explain the use of the ORDER BY and WHERE clauses in SQL queries**.
   - Order by is use multiple data are assending or desendinding order.
   - Where clauses is use filter the record in table.
   - Select * from tablename where codition order by columnname.
   - Select * from tablename where codition order by columnname desc.

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1.What is the purpose of GRANT and REVOKE in SQL?

- Grant and revoke command is type of DCL. DCL(data controlling language) grant command is use permitting the user and revoke command is use permitting removing the user.

1. What is the purpose of the COMMIT and ROLLBACK commands in SQL?

- Commit command purpose in sql a save change parmenatly in table, and rollback command purpose in sql a one time undo effect in table.

2. Explain how transactions are managed in SQL databases.

- Transaction managed in sql database:
- Transaction managed used to TCL(transaction control language) command.
- TCL command is only used DML command insert , update , delete.
- Begin transaction : start a transaction.
- Commit : save change parmenatly in table.
- Rollback : one time undo effect in table.
- Save point : save point within transaction are rollback.

1. Explain the concept of JOIN in SQL. What is the difference between INNER JOIN, LEFT JOIN, RIGHT JOIN, and FULL OUTER JOIN?

- The concept of join in sql to combine the table one to more in database.
- And ganret the relationship two or more table.
- **Inner join :** return record that matching value in both table.
- **Left join :** return all record that left table and matching value in right table.
- **Right join :** return all record the right table and matching value in left table.
- **Full join :** return all record in both table.

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2. How are joins used to combine data from multiple tables?

- **Inner join :** select tablename.columnname from tablename inner join table name on tablename.columnname= tablename.columnname;
- **Left join :** select tablename.columnname from tablename inner join table name on tablename.columnname= tablename.columnname;
- **Right join :** select tablename.columnname from tablename inner join table name on tablename.columnname= tablename.columnname;
- **Full join :** select tablename.columnname from tablename inner join table name on tablename.columnname= tablename.columnname;

1. What is the GROUP BY clause in SQL? How is it used with aggregate functions?

- Rows of items in table the collect into groups is group by clause and group by is use the aggregate function.
- Group by clause that groups all the same column value.
- Group by statement used sql select statement.

- Aggregate function : max(), min(), count(), sum() , avg() etc..
- Ex : max(columnname).
- Select columnname , aggregate function from tablename group by columnname.

2. Explain the difference between GROUP BY and ORDER BY.

Group by	Order by

Group by is Row of item in table the collect into group.	Order by is multiple data assending and desending order.
Group by is use the function	Order by is not use function
Effect in data	Change the display
Fuction Ex: select company , count(name) from book group by company;	Sorting and arrange data Ex: select * from book order by name desc;

1.What is a stored procedure in SQL, and how does it differ from a standard SQL query?

- SQL procedure is function but it never return any value, procedure is parform the argument(parameter) and with out argument.
- Standard sql query is differ from procedure a Procedure is parform the block of code and call the procedure.
- Procedure is parforam only DML command insert , update , delete.

Ex:

- **Without argument:**

```
Create procedure procedurename ()
Begin
    Insert into tablename value (insert value);
End

Call procedurename;
```

- **With argument:**

```
Create procedure procedurename (parameter datatype)
Begin
    Insert into tablename value (paramater);
End
```

Call procedurename(argument);

2.Explain the advantages of using stored procedures.

- **Better the parfomance :** create procedure and multi time call value a better parfomance.
- **Reusability :** one time create procedure and multiple DML command insert , update , delete command reuse.
- **Security :** procedure is high security and privacy data in sql.
- **Maintainability :** maintaining a procedure on server to easily maintain the procedure.

1.What is a view in SQL, and how is it different from a table?

- View in sql virtual table created by solve querying data from one or more table in database.
- View is solve query table save in database .

vIew	Table
A virtual table.	A actual table.
View table depended original table	Table is independed.
Syntex: create view viewname as select * from tablename where condition; Select * from viewname	Syntex: create table tablename(columnname datatype);

1.Explain the advantages of using views in SQL databases.

- **Consistency :-**Seamless to make changes to any underlying table structure.
- Using a view in SQL to return data from the tables allow you to hide WHERE clause or columns
- YOU many write simplified select statements against views , there by handling complicated joins and queries.
- **Security :-** each user can be given permission to access the database only through a small set of views that contain.

1. What is a trigger in SQL? Describe its types and when they are used.

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

Trigger use DML events are INSERT, UPDATE, or DELETE statements on a table.

1) AfterTriggers :- activated after data is inserted / updated / deleted.
2)Before Triggers :- activated Before data is inserted / updated / deleted.

After Triggers :- 1) After insert, 2) After Update , 3) After Delete.

Before Triggers :- 1)Before insert , 2) Before Update , 3) Before delete.

2. Explain the difference between INSERT, UPDATE, and DELETE triggers.

ANS :-

1) INSERT Trigger :- Insert trigger is used to inserted the new data of the affected rows when an insert statement has been executed.

Syntax :-

DELIMITER $$

create TRIGGER tri_candidate AFTER/BEFORE INSERT on candidate for EACH ROW

```
BEGIN
insert into test(id, name, action_performed)VALUES(new.id,new.cname, 'Record inserted');
end
```

2) UPDATE Trigger :- update trigger is used to updated or modify data of the affected rows when an update statement has been executed.

Syntax :-

```
DELIMITER $$

create TRIGGER tri_candidate  AFTER/BEFORE UPDATE on candidate FOR EACH ROW

BEGIN

insert into test(id, name, action_performed)VALUES(new.id,new.cname, 'Record inserted');
end
```

3) DELETE Trigger :- DELETE trigger is used to delete old data of the affected rows when an DELETE statement has been executed.

Syntax :-

```
DELIMITER $$

create TRIGGER tri_candidate  AFTER/BEFORE UPDATE on candidate FOR EACH ROW

BEGIN

insert into test(id, name, action_performed)VALUES(old .id, old.cname, 'Record inserted');

end
```

1.What is PL/SQL, and how does it extend SQL's capabilities?

- PL/SQL stands for (procedural Language / Structured Query Lanuage) is a block-structured language developed by oracle.
- PL/SQL is a combination of SQL along with the procedural features and programming languages.
- PL/SQL mainly used to create an application.

2.List and explain the benefits of using PL/SQL.

List the benefits of Using PL/SQL :-

- Object-oriented programming
- Portability
- High performance
- Manageability
- security

- **High performance**: PL/SQL can send large blocks of statements to a database at once, which reduces network traffic and improves performance.
- **Portability**: PL/SQL applications can be used on multiple systems.
- **Security**: PL/SQL has built-in security features.
- **Object-oriented programming**: PL/SQL supports object-oriented programming.
- **Manageability**: PL/SQL features that make it easy to manage.

1.What are control structures in PL/SQL? Explain the IF-THEN and LOOP control structures.

- Control structures in programming are used to control the flow of execution in a program.
  - Conditional statement , looping statement , Sequential statement are control structures.

1) IF – THEN Conditional statement :-

The only one statements is executed only if the condition is TRUE.

Syntax:-

If condition then

```
-- do something
End if;
```

Example :-

```
Declare
Num1 number=10;
Num2 number=20;
BEGIN
If num1<num2 then
Dbms_output.put_line('num1 is small');
End if;
```

2)LOOP statement in PL/SQl :-

- The loop statement is a PL/SQL that allows you to repeatedly execute a block of code use looping statement.
- In SQL two types of LOOP :-
  1) For Loop
  2) While Loop

Syntax :-

```
LOOP
        --code block
        IF condition THEN
        EXIT;
        END IF;
END LOOP;
```

2.How do control structures in PL/SQL help in writing complex queries?

In SQl , write Complex queries to Control Structure in PL/SQL use to three Statement .

1) Conditional Statements
2) Iteration Loop statements
3) Sequential statement

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1) Condtional statements :-

It includes various conditional statements that allow developers to execute different blocks of code based on specific conditions.

1. **IF THEN**
2. **IF THEN ELSE**
3. **NESTED-IF-THEN**
4. **IF THEN ELSIF-THEN-ELSE Ladder**

2) Iteration Loop statements:-

The loop statement is a PL/SQL that allows you to repeatedly execute a block of code use looping statement.

In SQL two types of LOOP :-

1) For Loop
2) While Loop

Syntax :-

```
LOOP
    --code block
    IF condition THEN
    EXIT;
    END IF;
END LOOP;
```

3) Sequential statement :-

1) GO TO statement :- The GOTO statement performs unconditional branching to another executable statement in the same execution section of a PL/SQL block.

Syntax :- GOTO label_name;

2) NULL statement:- Usually when you write a statement in a program, you want it to do something.

Syntax :- NULL;

1.What is a cursor in PL/SQL? Explain the difference between implicit and explicit cursors.

- Cursor is a pointer to the query. (points to query)

There are two types of Cursors.
1) Implicit Cursor
2) Explicit Cursor
Implicit Cursor is created & used when it executes SELECT INTO, INSERT, UPDATE ..and all tasks on the cursor is performed transparently by Oracle. (Open, Close, Fetch etc.). It also throws NO_DATA_FOUND and TOO_MANY_ROWS as Oracle handles implicit cursor in the standard way.

Explicit cursor is the one which is declared by us in PL/SQL block's declaration section.
We need to control the cycle of the cursor Open, close, fetch from the cursor. Explicit Cursor need to be declared.

2. When would you use an explicit cursor over an implicit one?

Use an explicit cursor when you need more control over how you handle data. It is helpful for the complex tasks where you want to move through the data in a specific way or do the special operations on the each item.

1. Explain the concept of SAVEPOINT in transaction management. How do ROLLBACK and COMMIT interact with savepoints?

SAVEPOINT:- It is used to roll the transaction back to a certain point without rolling back the entire transaction.

Syntax:- SAVEPOINT SAVEPOINT_NA ME;

- Savepoints name released when the transaction is committed or rolled back.
- The commit and rollback statement releases all savepoint name established within the transactions.

Syntax :- ROLLBACK to SAVEPOINT_name ;

2. When is it useful to use savepoints in a database transaction?

- savepoint is used to stored in large transaction to manages transactions in nesting processes.
- Savepoints are useful for complex transaction that require undoing only part of the transaction.