PRACTICAL NO. - 01

AIM: Draw ER diagram and convert entities and relation ships to relation table for a given scenerio.

SOFTWARE REQUIREMENT : pgAdmin tool.

THEORY: An ER model is a design or blueprint of a database that can later be implemented as a database. The main components of ER model are : entity set and relationship set. An ER describes the structure of a database with the help of a diagram, which is known as Entity Relationship Diagram.

ER Diagram :
An ER diagram shows the relationship among entity sets. An entity set is a similar entities group and these entity is a table or attribute of a table in database, so by showing relationship among tables and their attributes, ER diagram shows the complete logical structure of a database.

Uses of ER Diagram -
- Help us to define terms related to entity relationship modelling.
- Provides a preview of how all our tables should connect what fields are going to be on each table.
- Helps to describe entities, attributes, relationships.
- They help to build database quickly
- Used by database designers as a blueprint for implementing data in specific software applications.

The geometric shapes and their meanings in an ER diagram are as follows -

Rectangle - Entity sets
Ellipses - Attributes
Diamonds - Relationship set
Lines - Link entities to attributes and entities to relationship sets
Double Rectangle - Weak entity sets
Double Lines - Total participation of an entity in relationship sets
Dashed Ellipses - Derived Attributes
Double Ellipses - Multivalued Attributes

ER Diagram has 3 main components = Entity, Attribute, Relationship.

- Entity: An entity is an object or component of data, represented as a rectangle in ER diagram.
  - Strong entity :- Always has a primary key
  - Weak entity :- Doesn't have enough attributes to build a primary key.

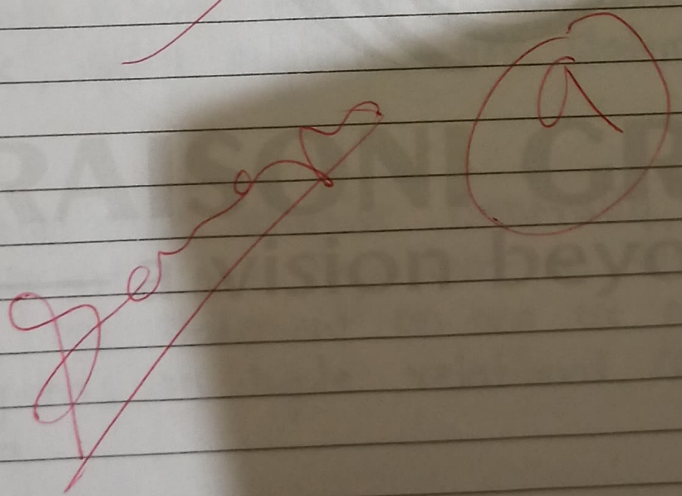
- Attribute: An attribute describes the property of an entity, represented as an oval in ER diagram.
  - Key attribute :- Uniquely identify an entity from entity set.
  - Composite attribute :- Combination of other attributes
  - Multivalued attribute :- Attribute that can hold multiple values
  - Derived attribute :- Attribute whose value is dynamic and derived from another attribute.

- Relationship: Represented by diamond shape, it shows the relationship among entities.

Cardinality : Numerical attributes of relationship between two entities or entity sets.

* One to One - single instance of an entity is associated with a single instance of another entity.
* One to Many - Single instance of an entity associated with more than one instance of another entity.
* Many to One - More than one instances of an entity associated with a single instance of another.
* Many to Many - When more than one instances of an entity is associated with more than one instances of another entity.

- CONCLUSION: Thus, I have successfully drawn the ER diagram and converted entities and relationships to relation table for a given scenario.



PRACTICAL NO.- 02

- **AIM:** To perform following SQL activity
  a) Creating a database
  b) Creating Tables (with and without constraints)
  c) Inserting Record in table.

SOFTWARE REQUIREMENT : Pg Admin Tool.

THEORY: SQL

- SQL stands for structured Query Language. It is used for storing and managing data in relational database management system.
- It is a standard language for relational database system. It enables a user to create, read, update and delete relational databases and tables.
- All the RDBMS like MySQL, ORacle, MSAccess use SQL as their standard database language.
- SQL allows users to query the database in a number of ways, using english-like statements.

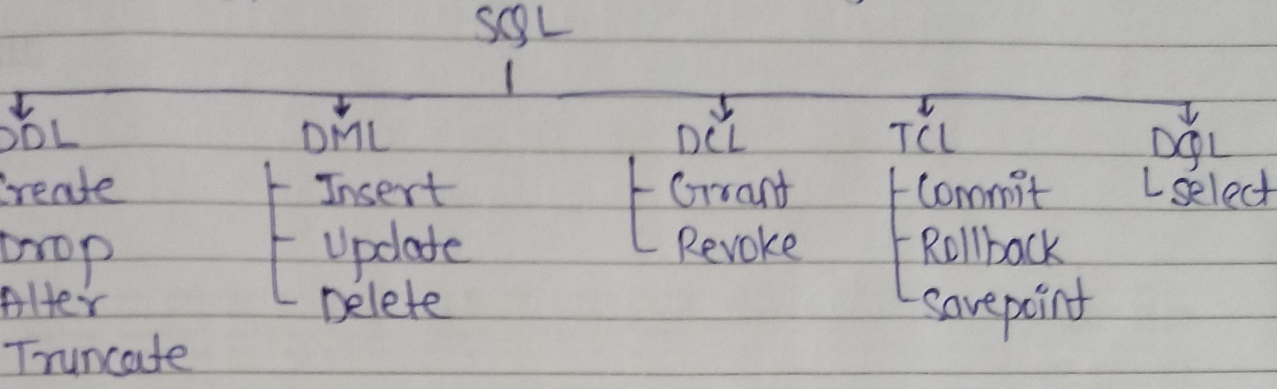
Rules

- SQL is not case sensitive. Generally, written in uppercase.
- SQL statements are dependent on text lines. We can use a single SQL statement on one or multiple text line.
- SQL depends on tuple relational calculus and relational algebra.

SQL Commands

- SQL commands are instructions. It is used to communicate with database. It is also used to perform specific tasks, functions and queries of data.
- SQL can perform various tasks like create a table, add data to tables, drop the tables, modify table, set permission for users.

Types of Commands in SQL



DDL [Data Definition Language]

- Changes the structure of table like creating, deleting, altering, etc.
- All commands are auto-committed that means it permanently saves all the changes in a database.

Create - creates a table.
Syntax: CREATE TABLE TABLE_NAME (COLUMN_NAME DATABASE [,...]);

drop - Deletes both structure & record stored in table.
Syntax: DROP TABLE TABLE_NAME;

alter - alter the structure of database
Syntax: to add new column
ALTER TABLE table-name ADD column-name COLUMN-definition;
to modify existing column
ALTER TABLE table_name MODIFY(COLUMN-definitions...);

truncate - delete all rows from table and free the space containing the table
Syntax: TRUNCATE TABLE table_name;

DML [Data Manipulation Language]

↳ Modify the database
↳ Not auto-committed, they can be rollback.

Insert - insert statements in SQL query. It is used to add data into rows of a table.

Syntax : INSERT INTO table_name
(col 1, col 2, ... col N)
VALUES (value 1, value 2, ..., value N);

or

INSERT INTO table_name
VALUES (value 1, value 2, ..., value N);

update - update or modify the value of a column

Syntax: UPDATE table_name SET [column_name 1, = value 1,
... column_name N = value N] [where condition]

delete - Used to remove one or more row from a table

Syntax : DELETE FROM TABLE_name [where condition];

DCL [Data Control Language]

↳ Used to grant and take back authority from any database user.
↳ Acts as permission authority.

grant - Gives user access privileges to a database.

Syntax: GRANT SELECT, UPDATE ON MY_TABLE TO some_user,
ANOTHER_USER;

revoke - Takes back permission from user.

Syntax : REVOKE SELECT, UPDATE ON MY_TABLE FROM USERS,
USER2;

PRACTICAL NO. - 03

- **AIM:** To perform the following - Viewing all database, Viewing all Tables in a database, Updating / Deleting Records in a Table.

- **SOFTWARE REQUIRED:** PgAdmin.

- **THEORY:** For updating and deleting records we use DML i.e. Data Manipulation Language.

DML (Data Manipulation Language)

The majority of SQL statements are categorized as DML (Data manipulation language), which includes SQL that deal with modifying data in a database. It's the section of SQL statement that controls who has access to database and data.

DML statements and DCL statements are grouped together. Because the DML command isn't auto-committed. It won't be able to saved all the database changes permanently. There is a they be rolled back.

DML commands that are used are:

1) Insert into Command.
This command can be used to insert data into a row of a table.

Syntax:

```
Insert into Name_of_table
values (1_value, 2_value, 3_value, --, N_value)
```

OR

```
Insert Into Name_of_table (1-column, 2-column...N-column)
values (1-value, 2-value, ---N-value).
```

2.) UPDATE Command.

This statement in SQL is used to update the data is present in an existing table of a database. The update statement can be used to update single or multiple columns on basis of our specific needs.

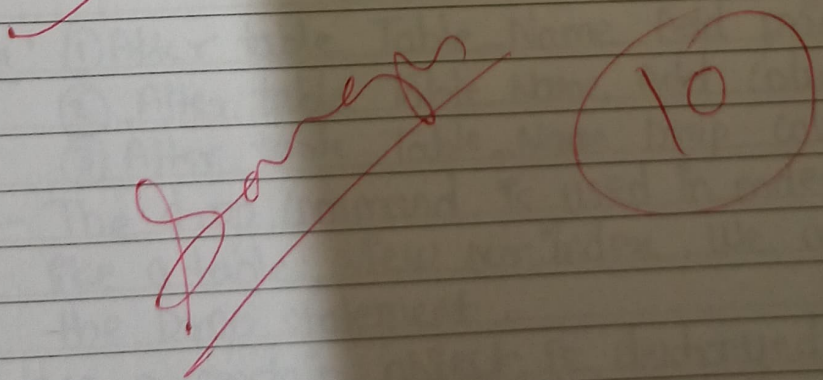
Syntax: Update name_of_table
set column = 'value'.
where condition.

3.) DELETE Command

The delete statement can be used in SQL to delete various records from a given table. On basis of the condition that has been set in where clause, one can delete single or multiple records.

Syntax: Delete from name_of_table
where condition;

- CONCLUSION: Hence we have understood & implemented the view, insert, update & delete records in the database.



PRACTICAL No. - 04

- **AIM:** To perform the following SQL query on database: Altering a table, dropping / truncating / renaming tables, backing up / restoring a database.
- **SOFTWARE REQUIRED:** PgAdmin.
- **THEORY:** DDL is used as an abbreviation for Data Definition Language.

DDL refers to a computer language that is ~~simi~~ primarily used for creating as well as modifying the structure of database objects present in a database.
All commands are auto-committed that means it permanently saves all changes in a database.

Create, Truncate, Drop, Alter are commonly used in Data Definition language in SQL Query.

1. **Alter** - The alter command modifies only existing table in a database.

The alter command can add up an additional column, drop the existing columns and even change the data types of various columns in a database table.

Syntax: (1) Alter table Table_Name Add primary key
(2) Alter table Table_Name Add column_name datatype.
(3) Alter table Table_Name Drop column_name.

2. **Drop** - The drop command is used in order to delete objects like a table, view our index. We cannot roll back the Drop statement.

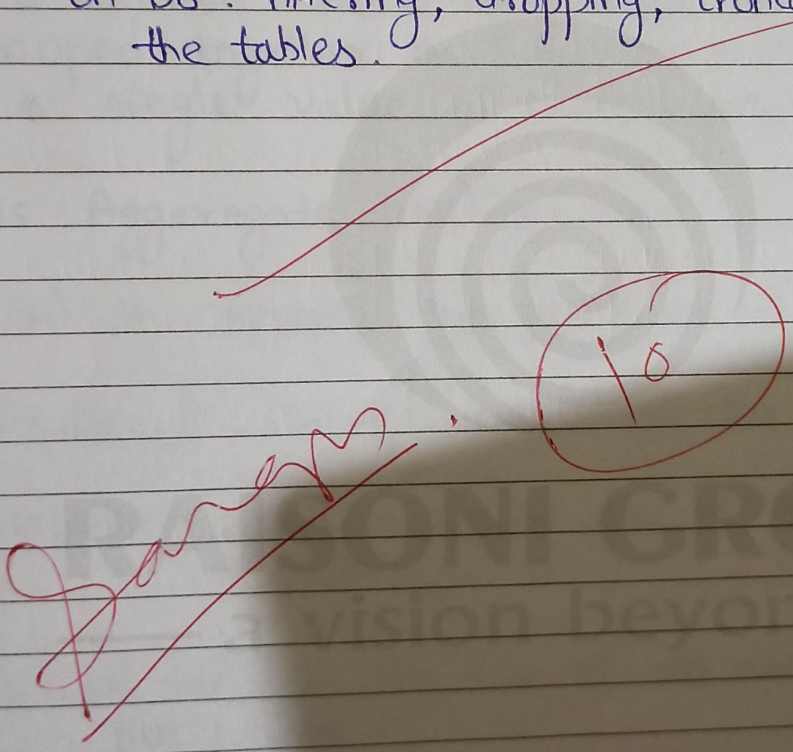
This once a certain object is destroyed, there would be no way at all to recover it.

Syntax: Drop table Table_Name;

(3.) Truncate - The truncate statement is mainly used to remove all the records from a table quickly. However, unlike the drop statement that destroys a table completely, the truncate statement preserves the full structure so as to be reused later.

Syntax: Truncate table Table_Name,

- CONCLUSION: Thus, I have successfully performed DDL queries on DB: Altering, dropping, truncating, renaming, the tables.



PRACTICAL NO.- 05

- **AIM:** For a given set of relation schemas, create table & perform the following simple queries.
  Simple queries with aggregate functions : Queries with aggregate functions, Queries (group by, having clause), Queries involving Date function, String & Math functions.
- **SOFTWARE REQUIRED:** PgAdmin.
- **THEORY:** In Database Management an aggregate function is a function where the values of multiple rows is grouped together as input or certain criteria to form a single value of more significant meaning.

Various Aggeregate functions are :

1. Count (*): It returns the total no. of records.

   count (salary) : Return number of Non Null values over the salary.
   count (Distinct salary) : Return no. of distinct non null values.

2. Sum () : It returns the sum of all non null values of the column.

3. Avg () : It returns the average of the values as sum by total count.

4. Min() : Returns the minimum.

5. Max() : Returns the Maximum.

Group by Clause:
Group by statement groups the rows that have the same value into summary rows. It is often used with aggregate function. (count(),

Syntax:
```
select column_name
from table_name
where condition
Group by column_name
```

Order by Clause:
It is used to display the output in a particular order & used to increase the readability of the output.

Syntax:
```
select col1, col2...
from table_name
Order by col ASC/DESC;
```

Having clause:
Having clause is used to filter the groups produced by the group by clause.
Here non-aggregate columns can be used.

Syntax:
```
select column_name
from table_name
group by column_name
having condition
```

String function:
They are used to perform operation on input string & return an output string.

1. CONCAT_WS (Adds two or more strings together with a separator).
2. UPPER (Converts a string to upper case).

Math function:
Math function are very important in SQL to implement different Mathematical queries.

1. ABS (Returns the absolute value of a number)
2. CEILING (Returns the smallest integer value that is >= a number)
3. ROUND (Rounds a number to a specified no. of decimal places)

Date functions:
In SQL, date are complicated with newbies, thus date functions helps in various scenarios.

1. DATEDIFF (Returns the difference between two dates)
2. GETDATE (Returns current database system date & time)
3. DATEADD (Adds a time / Date interval to a date and then returns the date).

- CONCLUSION: Implemented the queries with aggregate function queries involving group by, having clause, date function, string function & math function.

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PRACTICAL NO.- 06

- **AIM:** To perform SQL Query that demonstrate Join queries- Inner Join, Outer Join, left join and Right join.

- **SOFTWARE REQUIRED:** PgAdmin.

- **THEORY:** A Join statement is used to combine data or rows from one (self-join) or more tables based on common field between them. These common fields are generally the Primary key of first table and foreign key of other tables.

There are 4 basic types of joins supported by Postgre SQL:

(i) **Inner Join:** The postgre SQL inner join is used to return all rows from various tables where the join condition is fulfilled.

Syntax:
```
select column
from table1
inner join table2
On table1.column = table2.column;
```

(ii) **Left Join:** The left join returns a complete set of rows from the left table with matching rows if available from right table.
If there is no match, the right side will have null values.

Syntax:
```
select column.
from table1
left join table2
On table1.column = table2.column;
```

(iii) Right Join: It returns a complete set of rows from right table with matching rows if available from left table.
If there is no match, the left side will have NULL values.

Syntax: select column.
from table1
right join table2.
On table1.column = table2.column.

(iv) Full Outer Join: The full Outer join returns a result set that contains all rows from both left and right tables with matching rows from both sides where available.

If there's no match, the missing side contains null values.

Syntax: Select column.
from table1
full Outer join table2
On table1.column = table2.column

- CONCLUSION: Thus, I have successfully performed the various join Queries like left, right, inner and full Outer join.

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PRACTICAL NO.- 07

RAISONI GROUP
a vision beyond

- AIM: To perform SQL Query that demonstrate following: Search condition, Summary Query, Sub-Queries - with IN clause, with EXIST clause.

- SOFTWARE REQUIRED: PgAdmin.

- THEORY: Search Condition: It is a single predicate or several predicate connected by logical operators AND or OR. A predicate is an operation on expression that evaluates to TRUE, FALSE or UNKNOWN. If a predicate evalutes to TRUE for a row, the row qualifies for further processing.

- Summary Queries: A summary query as opposed to a simple Query, is used to extract aggregate of data items for a group of records rather than a detailed set of records.

- Sub Queries: A sub Query or Inner Query or Nested Query is a query within another SQL query and embedded within the WHERE clause.

A sub query is used to return data that will be used in main query as a condition to further restrict the data to be retrieved.

Subqueries can be used with the SELECT, INSERT, UPDATE and DELETE statements along with the operations.

like =, <, >, >=, <=, IN, BETWEEN, etc.

Few Rules:

- Subquery must be enclosed within parenthesis.
- A subquery can have only one column in SELECT clause, unless multiple columns are main query for subquery to compare its selected column.
- The subqueries that return more than one row can be only be used with multiple value operators such as the IN operator.
- A subquery cannot be immediately enclosed in a set function.

- ~~CON~~ Syntax:

```
select column
from table1
where column OPERATOR
(select column_name, from table2, where
 condition).
```

- CONCLUSION: Hence, we have successfully performed SQL query that demostrates search condition, summary and sub-queries.

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PRACTICAL NO. - 08

RAISONI GROUP
a vision beyond

- AIM: To perform SQL query for extracting data from more than one table using SQL concept.

- SOFTWARE REQUIRED: PgAdmin.

- THEORY: Multiple joins can be described as a query containing join of same or different types used more than once, thus giving them ability to combine multiple tables.

The join operator is used multiple times to join multiple tables in SQL, as for each table one join is added In SQL, joining multiple tables means you can join n number of tables, but to join n number of tables, the join required are n-1, that is for 3 tables 2 joins are required.

Joining syntax:

```
select columnname1, columnname2.
from table1
join table 2
 on table1.column = table2.column
join table 3.
 on table1.column = table3.column.
```

- Joining SQL tables without a Junction table.

We simply have to add the same two join as before. We just have to keep in mind that the join should.

be written in correct order. While joining, we can't use columns from not-yet introduced tables.

There are mainly 4 types of Join operations

(i) Inner Join.
(ii) Left Join
(iii) Right Join.
(iv) Full Outer Join.

- DISTINCT keyword.

The real problem in SQL is that select attribute list is not a superkey for result set.
Any time that this happens, we can eliminate the duplicate rows by including the DISTINCT keyword in the select clause. While making this revision we'll also list the names in alphabetical order.

- CONCLUSION: Thus, I have successfully extracted data from more than one table using SQL concept.

9

PRACTICAL NO. - 09

- AIM: To perform SQL query to understand the concepts: Transaction, Roll back, commit & check point.

- SOFTWARE REQUIRED: Pg Admin

- THEORY: By default Postgre SQL commits each SQL statement as soon as it is submitted. To prevent the transaction from committing immediately. we have to issue a command begin; to not to commit immediately.

Transactions are units or sequences of work accomplished in a logical order, whether in a manual fashion by a user or automatically by some sort of a database program.

Properties of Transaction:

1) Atomicity: ensures that all operations within work unit are completed successfully.
2) Consistency: ensures that the database properly changes states upon a successfully committed transaction.
3) Isolation: enables transaction to operate independently of and transparent to each other.
4) Durability: ensures that results or effect of a committed transaction persists in case of a system failure.

- Transaction Control.

Transactional control statement are only used with DML command such as - insert, update & delete only.

RAISONI GROUP
a vision beyond

The following command used to control transaction.

- Commit : to save changes. (commit;)
- Roll back : to roll back the changes (rollback;)

- Savepoint : It creates points within the groups of transaction in which to rollback. A savepoint is a point in a transaction in which you can roll the transaction back to a certain point without rolling back the entire transaction.

Syntax: Save point savepoint-name;

- Release Savepoint : This command is used to remove a Savepoint that we have created.

Syntax: Release savepoint savepoint-name;

- CONCLUSION: Thus, we have successfully performed SQL query for transaction (rollback, commit & checkpoint)