Practical - 1

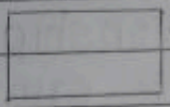
Aim :- Conceptual Designing using ER Diagrams (Identifying entities, attributes, keys and relationships between entities, cardinalities, generalization, specialization etc.)

Description :-

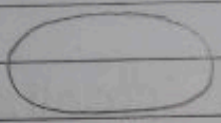
1) About ER diagram and its all notation.

(i) ER Diagram stands for Entity Relationship Diagram, also known as ERD is a diagram that displays the relationship of entity sets stored in a database.

(ii) Notations of ER diagram :-

- Entity 

An entity is a thing or an object in the real world that is distinguishable from other objects based on the values of the attributes is possess.

- Attribute 

Attributes are the units that describe the characteristics of entities.

- Relationship 

Relationship is an association between two or more entities of same and different entity set.

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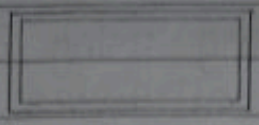
- Weak Entity 

A weak entity is an entity that depends on the existence of another entity.

- Multivalued Attribute 

If an attribute can have more than one value it is called a multi-valued attribute.

- Weak Relationship 

A weak or non-identifying relationship exists between two entities when the primary key of one of the related entities does not contain a primary key component of the other related entities.

2) Explain Generalization and Specialization.

i) Generalization :-

- Bottom-up approach in which two lower level entities combine to form a higher level entity.
- In generalization, the higher level entity can also combine with other lower level entities to make further higher level entity.

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ii) Specialization :-

- It is opposite to Generalization.
- It is a top-down approach in which one higher level entity can be broke down into two lower level entity. In specialization, a higher level entity may not have any lower-level entity sets, it's possible.

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1) Design an ER diagram for favourite team statistics.

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2) Design ER diagram for University Management System

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3) Design ER diagram for Library Management system

Practical - 2

Aim:- Perform the following:
- Viewing all databases
- Creating a database
- Viewing all Tables in a Database
- Creating Tables (With and Without Constraints)
- Inserting / Updating / Deleting Records in a Table

Description :-

1. Write Syntax which is used in queries and explain it.

SELECT [COLUMN NAMES] FROM [TABLE NAME] WHERE [CONDITION] AND [CONDITION];

Query command combine the data from the table for the specific condition.

2. Explain about Constraints.

Constraints are nothing but the rules that are to be followed while entering data into columns of the database table.

There are 6 types of Constraints :-

1) NOT NULL :- Ensures that the specified column dosen't contain a null value.

2) UNIQUE :- Provides a unique / distict values to specified columns.

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3) DEFAULT :- Provides a default value to a column if none is specified.

4) CHECK :- Checks for the pre defined conditions before inserting the data inside the table.

5) PRIMARY KEY :- It uniquely identifies a row in a table.

6) FOREIGN KEY :- Ensures referential integrity of the relationship.

Perfor on MySQL :-

Write as it is in the Pdf which is on the classroom

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Practical - 3

Aim:- Perform the following:
- Altering a Table
- Dropping / Truncating / Renaming Tables
- Backing up / Restoring a Database

Description:-
Write and explain the syntax of each query used in the practical.

1) Alternating a Table:
To change the data type of a column in a table;
Syntax: ALTER TABLE table_name
MODIFY COLUMN column_name datatype;
The ALTER TABLE statement is used to add, delete, or modify columns in an existing table and also used to add and drop various constraints on an existing table.

2) Drop Table:
DROP TABLE table_name;
Dropping a table removes the table definition from data dictionary. All rows of the table are no longer accessible. All indexes and triggers associated with a table are dropped.

3) Truncate Table:
TRUNCATE TABLE table_name;

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TRUNCATE TABLE removes all rows from a table, but the table structure and its columns, constraints, indexes and so on remain. To remove the table definition in addition to its data, use the DROP TABLE statement.

4) Rename Table:
Alter table demo rename to newdemo;
It is used to rename a table.

5) Backing up / Restoring a Database
i) Backing up a Database :-
Database backup is the process of backing up the operational state, architecture and stored data of database software.

ii) Restoring a database :-
A complete database restore involves restoring a full database backup and, optionally, a differential backup (if any), followed by restoring all subsequent log backups (in sequence.

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> create table demo(id int, name varchar(20), city varchar(15));
Query OK, 0 rows affected (0.04 sec)

> demo, desc demo;

Field	Type	NULL	KEY	Default	Extra
id	int	YES		NULL	
name	varchar(20)	YES		NULL	
city	varchar(15)	YES		NULL	

3 rows in set (0.00 sec)

> alter table demo modify column city int;
Query OK, 0 rows affected (0.11 sec)
Records: 0 Duplicates: 0 Warnings: 0

> desc demo;

Field	Type	NULL	Key	Default	Extra
id	int	YES		NULL	
name	varchar(20)	YES		NULL	
city	int	YES		NULL	

3 rows in set (0.00 sec)

> alter table demo add salary int;
Query OK, 0 rows affected (0.03 sec)
Records: 0 Duplicates: 0 Warnings: 0

> desc demo;

Field	Type	Null	Key	Default	Extra
id	int	YES		NULL	

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name	varchar(20)	YES		NULL	
city	int	YES		NULL	
salary	int	YES		NULL	

4 rows in set (0.00 sec)

> alter table demo drop column salary;
Query OK, 0 rows affected (0.11 sec)
Records: 0 Duplicates: 0 Warnings: 0

> desc demo;

Field	Type	Null	Key	Default	Extra
id	int	YES		NULL	
name	varchar(20)	YES		NULL	
city	int	YES		NULL	

3 rows in set (0.00 sec)

> drop table demo;
Query OK, 0 rows affected (0.03 sec)

> show tables;

Tables_in_demodb
demo2
dept
emp
employee

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Practical - 7

Aim :- Subqueries
- With IN clause
- With EXISTS clause

Description :-

1. What is Subquery?

→ A subquery is a query that appears inside another query statement.

2. Syntax :-

```
SELECT column_name [, column_name]
FROM table1 [table2]
WHERE column_name OPERATOR
(SELECT column_name [, column_name]
 FROM table1 [table2]
 [WHERE ])
```

3. In clause and its syntax :-

The IN command allows you to specify multiple values in a WHERE clause.

Syntax :-

```
SELECT column_name(s)
FROM table_name
WHERE column_name IN
(value1, value2, ....);
```

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4. Exists clause and its syntax :-
The Exists operator is used to test for the existance of any record in a subquery. The EXISTS operator returns TRUE if the subquery returns one or more records.
Syntax :-

```
SELECT column_name(s)
FROM table_name
WHERE EXISTS
(SELECT column_name FROM
table_name WHERE condition);
```

```
> create database demodb;
Query OK, 1 row affected (0.08 sec)

> create table employees (emp_id int(5), emp_name
varchar(20), emp_age int(5), city varchar(20),
income int(10));
Query OK, 0 rows affected, 3 warnings (0.69 sec)

> insert into employees values(101, 'Peter', 32, 'New
York', 200000);
Query OK, 1 row affected (0.21 sec)

> insert into employees values(102, 'Mark', 32,
'California', 300000);
Query OK, 1 row affected (0.06 sec)
```

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```
> insert into employees values (103, 'Donald', 40,
'Arizona', 1000000);
Query OK, 1 row affected (0.04 sec)

> insert into employees values (104, 'Obama', 35,
'Florida', 5000000);
Query OK, 1 row affected (0.08 sec)

> insert into employees values (105, 'Linklon', 32,
'Georgia', 2500000);
Query OK, 1 row affected (0.01 sec)

> insert into employees values (106, 'Adam', 35,
'California', 5000000);
Query OK, 1 row affected (0.04 sec)

> select * from employees;
+--------+----------+---------+------------+---------+
| emp_id | emp_name | emp_age | city       | income  |
+--------+----------+---------+------------+---------+
|    101 | Peter    |      32 | New York   |  200000 |
|    102 | Mark     |      32 | California |  300000 |
|    103 | Donald   |      40 | Arizona    | 1000000 |
|    104 | Obama    |      35 | Florida    | 5000000 |
|    105 | Linklon  |      32 | Georgia    | 2500000 |
|    106 | Adam     |      35 | California | 5000000 |
+--------+----------+---------+------------+---------+
6 rows in set (0.01 sec)

> SELECT emp_name, city, income FROM employees
-> WHERE emp_id IN (SELECT emp_id FROM employees);
```

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emp_name	city	income
Peter	New York	200000
Mark	California	300000
Donald	Arizona	1000000
Obama	Florida	5000000
Linklon	Georgia	2500000
Adam	California	5000000

6 rows in set (0.04 sec)

```
> SELECT * FROM employees
-> WHERE emp_id IN (SELECT emp_id FROM employees WHERE
income > 3500000);
```

emp_id	emp_name	emp_age	city	income
103	Donald	40	Arizona	1000000
104	Obama	35	Florida	5000000
106	Adam	35	California	5000000

3 rows in set (0.01 sec)

```
> SELECT emp_name, city, income FROM employees
-> WHERE income = (SELECT MAX(income) FROM employees);
```

emp_name	city	income
Obama	Florida	5000000
Adam	California	5000000

2 rows in set (0.01 sec)

```
> SELECT emp_name, city, income
-> FROM employees emp WHERE income > (
-> SELECT AVG(income) FROM employees WHERE city =
                                        emp.city);
```

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emp_name	city	income
Donald	Arizona	1000000
Obama	Florida	5000000
Kane	Alaska	450000
Adam	California	5000000

4 rows in set (0.01sec)

Practical - 8

Aim :- DCL statements
- Granting and revoking permissions
- Saving (Commit) and Undoing (rollback)

Description :-
Define and write syntax for the following:

1. grant

→ GRANT is a command used to provide access or privileges on the database objects to the users.

Syntax :-
GRANT privilege_name. ON object_name. TO
{user_name | PUBLIC | role_name}

2. revoke

→ The REVOKE command removes user access rights or privileges to the database objects.

Syntax :-
REVOKE privilege_name. ON object_name. FROM
{user_name | PUBLIC | role_name}

3. rollback

→ ROLLBACK is a transactional control language in SQL It lets a user undo those transactions that aren't saved yet in the database. For the syntax write the statement, ROLLBACK TRANSACTION, followed by the name of the transaction that you want to rollback.

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4. Commit

→ COMMIT is a transaction control language in SQL. It lets user permanently save all the changes made in the transaction of a database or table.

Syntax:-

BEGIN TRANSACTION; {a set of SQL statements};
COMMIT TRANSACTION;

Queries:

1. CREATE USER userone IDENTIFIED BY '12345678';
2. SELECT DISTINCT user from mysql.user;
3. DROP USER userone;
4. SHOW GRANTS FOR userone;
5. REVOKE ALL, GRANT OPTION FROM userone;

COMMIT & ROLLBACK

1. SAVEPOINT test;
2. COMMIT;
3. ROLLBACK TO SAVEPOINT test;

> create table demo_table (id int(5), name varchar(20));
Query OK, 0 rows affected, 1 warning (0.11 sec)

> insert into demo_table values(1, 'abc');
Query OK, 1 row affected (0.05 sec)

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```
> insert into demo_table values (2, 'pqr');
Query OK, 1 row affected (0.01 sec)

> select * from demo_table;
+----+------+
| id | name |
+----+------+
|  1 | abc  |
|  2 | pqr  |
+----+------+
2 rows in set (0.00 sec)

> set autocommit = 0;
Query OK, 0 rows affected (0.00 sec)

> select id from demo_table;
+----+
| id |
+----+
|  1 |
|  2 |
+----+
2 rows in set (0.00 sec)

> insert into demo_table values (3, 'Shruti');
Query OK, 1 row affected (0.03 sec)

> insert into demo_table values (5, 'Arun');
Query OK, 1 row affected (0.00 sec)

> commit;
Query OK, 0 rows affected (0.01 sec)

> select id from demo_table;
```

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id
1
2
3
5

4 rows in set (0.00 sec)

> insert into demo_table values (6, 'Kartik');
Query OK, 1 row affected (0.03 sec)

> rollback;
Query OK, 0 rows affected (0.01 sec)

> select id from demo_table;

id
1
2
3
5

4 rows in set (0.00 sec)

> insert into demo_table values (7, 'Hiren');
Query OK, 1 row affected (0.04 sec)

> savepoint Hiren;
Query OK, 0 rows affected (0.00 sec)

> insert into demo_table values (8, 'Nikki');
Query OK, 1 row affected (0.00 sec)

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```
> rollback to savepoint Hiren;
Query OK, 0 rows affected (0.00 sec)

> insert into demo_table values (9, 'Shivu');
Query OK, 1 row affected (0.00 sec)

> commit;
Query OK, 0 rows affected (0.02 sec)

> select * from demo_table;
+----+--------+
| id | name   |
+----+--------+
|  1 | abc    |
|  2 | pqr    |
|  3 | Shruti |
|  5 | Arun   |
|  7 | Hiren  |
|  9 | Shivu  |
+----+--------+
6 rows in set (0.00 sec)
```

Practical - 10

Aim:- Creating Indexes on data tables.

Description:-

1. What is an index?

→ Indexing is a technique for improving database performance by reducing the number of disk accesses necessary when a query is run.

2. Write and explain the syntax.

→ Explanation: An index helps in fast retreival of data from tables. It is just an index of book where you first search to look for content. All primary key columns are in the primary index of the table automatically.

Syntax:

```
CREATE [UNIQUE | FULLTEXT | SPATIAL ] INDEX
                                    index_name
USING [BTREE | HASH | RTREE]
ON table_name ( column_name [(length)] [ASC |
                                    DESC], ...)
```

Deleting Index:

```
DROP INDEX index_name ON table_name
```

Queries:-

> create table emp(eid int, ename varchar(10));
Query OK, 0 rows affected (0.11 sec)

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> create index i1 on emp(eid);
Query OK, 0 rows affected (0.09 sec)
Records: 0 Duplicates: 0 Warnings: 0

> show index from emp\G;
1. row
Table: emp
Non_unique: 1
Key_name: i1
Seq_in_name: 1
Collation: eid
Cardinality: A
Sub_part: 0
Packed: NULL
Null: NULL
Index_type: YES
Comment: BTREE
Index_comment:
Visible:
Expression: YES
1 row in set (0.03 sec)

ERROR:
No query specified

> drop index i1 on emp;
Query OK, 0 rows affected (0.06 sec)
Records: 0 Duplicates: 0 Warnings: 0

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```
> show index from emp\G;
Empty set (0.00 sec)

> create table emp2 (eid int primary key);
Query OK, 0 rows affected (0.05 sec)

> describe emp2;
+-------+------+------+-----+---------+-------+
| Field | Type | Null | Key | Default | Extra |
+-------+------+------+-----+---------+-------+
| eid   | int  | NO   | PRI | NULL    |       |
+-------+------+------+-----+---------+-------+
1 row in set (0.07 sec)

> show index from emp2\G;
*************************** 1. row ***************************
        Table: emp2
   Non_unique: 0
     Key_name: PRIMARY
  Seq_in_index: 1
  Column_name: eid
    Collation: A
  Cardinality: 0
     Sub_part: NULL
       Packed: NULL
         Null:
   Index_type: BTREE
      Comment:
Index_comment:
      Visible: YES
   Expression: NULL
1 row in set (0.01 sec)
ERROR:
No query specified
```

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