Laboratory Manual

For

Database Management System

(IT 410)

B.Tech (IT)

SEM IV

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Sample Experiment

1 AIM : Introduction to Data Definition Language.

Problem Statement: An Organization has a database which maintains the records for the customer which places the order(s) through the salesmen. There can be more than one customer who placed the order(s) through a single salesman or there can be a single customer which places the order(s) through multiple salesmen. Create the database for this problem statement.

2 TOOLS/APPARATUS: POSTGRESQL(13.3) or higher version

3 STANDARD PROCEDURES:

3.1 Analyzing the Problem:

According to the above problem statement, name the relation by identifying the noun and the associating relation (Relationship set) by identifying the verb. Here, Customers and Salesmen are nouns so they are considered as Entity and Order is a verb so it is considered as Relationship.

After assigning the name of the relation, identify the attributes for each of the relations. Also identify the primary key for each of the relations. Then draw an ER diagram.

3.2 Designing the Solution: ER diagram
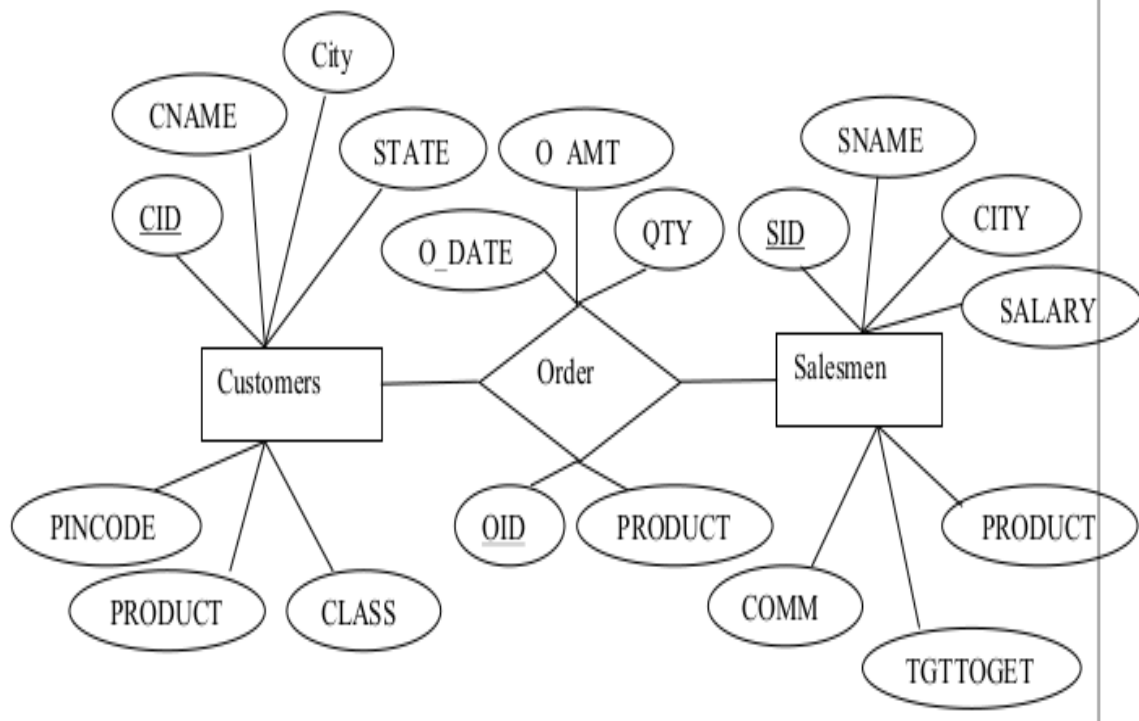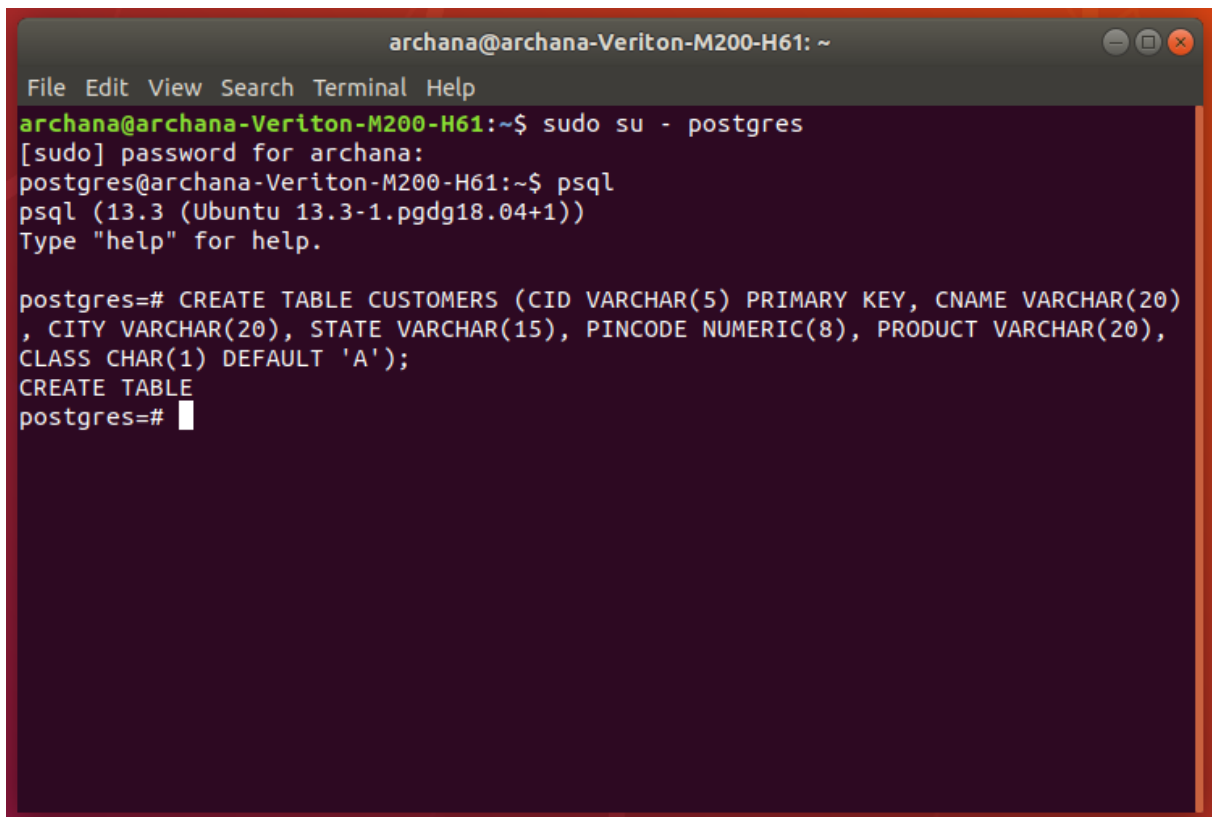
3.3 Implementing theSolution

3.3.1 Writing Source Code

CREATE TABLE CUSTOMERS

CREATE TABLE CUSTOMERS (CID VARCHAR(5) PRIMARY KEY, CNAME VARCHAR(20), CITY VARCHAR(20), STATE VARCHAR(15), PINCODE NUMERIC(8), PRODUCT VARCHAR(20), CLASS CHAR(1) DEFAULT 'A');

CREATE TABLE SALESMEN

CREATE TABLE SALESMEN (SID VARCHAR(5) PRIMARY KEY, SNAME VARCHAR(20), CITY VARCHAR(15), SALARY NUMERIC(5,2), PRODUCT VARCHAR(20), TGTTOGET NUMERIC(5,2), COMM NUMERIC(5,2));

CREATE TABLE ORDER

CREATE TABLE ORDER(OID VARCHAR(5) PRIMARY KEY, CID VARCHAR(5), SID VARCHAR(5), PRODUCT VARCHAR(20), QTY NUMERIC(5), ODATE DATE , O_AMT NUMERIC(8,2), FOREIGN KEY(CID) REFERENCES CUSTOMERS(CID), FOREIGN KEY(SID) REFERENCES SALESMEN(SID), CHECK (O_AMT >=0));

3.3.2 Compilation /Running and Debugging theSolution

Figure 1

To see the table structure, type the command \d <Table Name>;
Figure 2

```
archana@archana-Veriton-M200-H61: ~

File  Edit  View  Search  Terminal  Help
archana@archana-Veriton-M200-H61:~$ sudo su - postgres
[sudo] password for archana:
postgres@archana-Veriton-M200-H61:~$ psql
psql (13.3 (Ubuntu 13.3-1.pgdg18.04+1))
Type "help" for help.

postgres=# \d CUSTOMERS
                   Table "public.customers"
 Column  |         Type          | Collation | Nullable |   Default
---------+-----------------------+-----------+----------+--------------
 cid     | character varying(5)  |           | not null |
 cname   | character varying(20) |           |          |
 city    | character varying(20) |           |          |
 state   | character varying(15) |           |          |
 pincode | numeric(8,0)          |           |          |
 product | character varying(20) |           |          |
 class   | character(1)          |           |          | 'A'::bpchar
Indexes:
    "customers_pkey1" PRIMARY KEY, btree (cid)

postgres=#
```
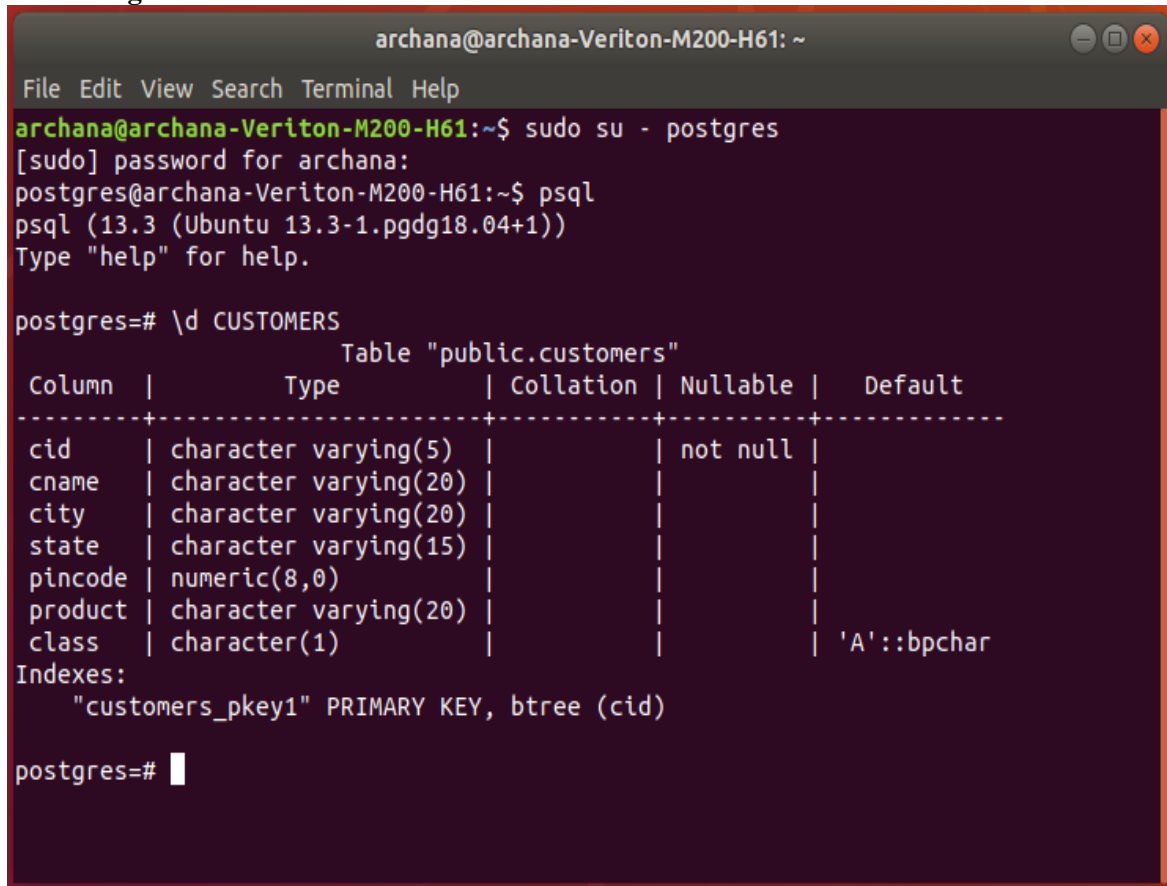
3.4 Testing the Solution
> OUTPUT IS: CREATE TABLE.
To see the table structure use \d command, it gives a schema of the table.
3.5 Conclusion
Output is generated as shown in Figure 1.
To see the table structure, refer to Figure 2.

Required Software/ SoftwareTool
POSTGRESQL
 Editor (Notepad)
COMMON PROCEDURE
Step 1: Identify the relation for the data which is required to solve your query.
Step 2: Perform relational algebra queries as taught in the class.
Step 3: Find the appropriate command to set the result.
Step 4: Execute the query.
Step 5: To implement a procedure write the code in the editor (Notepad), copy from notepad to POSTGRESQL SHELL to compile your function. To execute your procedure write the command "exec procedurename ();" If procedurename contains an argument then provide the argument at runtime.

EXPERIMENT - 1

Aim: Introduction to POSTGRESQL, an exercise on data types in POSTGRESQL & Data Definition Language commands.

● Create the following tables: [If already exists, DROP the existing table]

1) SALESMEN

Table Structure:

Field	Type	Constraint
SID	VARCHAR (5)	P.K.
SNAME	VARCHAR (20)	Not Null
CITY	VARCHAR (15)	Not Null
SALARY	NUMERIC (5, 2)	
PRODUCT	VARCHAR (20)	
TGTTOGET	NUMERIC (5,2)	
COMM	NUMERIC (5,2)	

2) CUSTOMERS

Table Structure:

Field	Type	Constraint
CID	VARCHAR(5)	P.K.
CNAME	VARCHAR(20)	Not
Null CITY	VARCHAR(15)	NotNull
STATE	VARCHAR(15)	
PINCODE	NUMERIC(8)	
PRODUCT	VARCHAR(20)	
CLASS	CHAR(1)	Default value 'A'

3) ORDERS

Table Structure:

Field	Type	Constraint
OID	VARCHAR (5)	P.K.
CID	VARCHAR (5)	F.K. (CUSTOMERS)
SID	VARCHAR (5)	F.K. (SALESPEOPLE)
PRODUCT	VARCHAR (20)	
QTY	NUMERIC (5)	
ODATE	DATE	Not Null
O_AMT	NUMERIC (8, 2)	Minimum zero

EXPERIMENT – 2

Aim: Exercise on Data Manipulation Language and transaction control commands.
● Insert the following records : (Enter required data in empty columns)

Table 1 SALESMEN

SID	SNAME	CITY	SALARY	PRODUCT	TGTTOGET	COMM
S101	Ajay Patel	Ahmedabad				1200
S102	Chintan Shah	Baroda				1500
S103	Vinay Mehra	Pune				1200
S104	Jay Pandey	Surat				800
S105	Jimit Dave	Mumbai				300
S106	Manan Gandhi	Ahmedabad				1200

Table 2 CUSTOMERS

CID	CNAME	CITY	STATE	PINCODE	PRODUCT	CLASS
C301	Nirav Patel	Nadiad				B
C302	Kiran Dave	Delhi				A
C303	Sapan Shah	Bangalore				B
C304	Saurabh Mehta	Baroda				C
C305	Smriti Mishra	Ahmedabad				B
C306	Harshal Pandya	Mumbai				A
C307	Sunil Gandhi	Baroda				B
C308	Bimal Thakkar	Surat				C

Table 3 ORDERS

OID	CID	SID	PRODUCT	QUANTITY	ODATE	O_AMT
O501	C302	S102			02-JAN-22	700000
O502	C301	S105			21-JAN-22	10000
O503	C308	S103			10-FEB-22	250000
O504	C306	S104			14-FEB-22	400000
O505	C306	S102			29-MAR-22	100000
O506	C303	S101			15-APR-22	90000.50
O507	C304	S105			24-JUN-22	7500.75
O508	C306	S101			27-SEP-22	900000
O509	C302	S102			21-DEC-22	205000
O510	C307	S102			30-DEC-22	27800
O511	C303	S104			31-DEC-22	15000

- Solve the following queries:
  - Display all the information about each salesman with appropriate headings.
  - List all the salesmen who live outside Baroda.
  - Display class 'A' customers with their id and name.
  - Add a new field as country in salesmen and customers table.
  - Change the name of the city where the customer name is Sunil Gandhi.
  - List the information of all the customers who are located in Surat.
  - List the name of all the salesmen whose salary is greater than 2000.
  - Change the order amount for the order id O501 to O531.
  - Display order id and order date from orders table whose sales id is S102.

EXPERIMENT – 3

Aim: Exercise on Types of Data Constraints.

- Add primary key and Foreign Key to the existing tables using alter table command.
- Create cust table which contains cno having pk, cname and occupation where data values inserted for cno must start with the capital letter C and cname should be in upper case. Insert the correct values as well as display the error message for incorrect values.
- Find out the name of all the salesmen having 'a' as the second letter in their names.
- List all the information of customers whose state contains null value.
- List all the information of customers in descending order according to their name.

EXPERIMENT – 4

Aim: Exercise on Joins (single-table or multi-table)

- Display customer no, name, city and order amount.
- Display salesman details with their order details.
- Display customer information of salesman S102 and S105.
- List the salesmen details along with customer names associated with them.

EXPERIMENT – 5

Aim: Exercise on group-by clause and date arithmetic.

- Display order information with salesman name, given on date before
  10th of any month.
- Display minimum order amount of each salesman.
- Display total order amount for each salesman.
- Find the customer city of the customer with the minimum order amount.

EXPERIMENT – 6

Aim: Exercise on different functions (aggregate, math and string)

- Count the total number of orders.
- Count the number of salesmen whose commission is greater than 500.
- Find the average order amount of each salesman.
- Find out the orders whose order amount is more than 12000 and also find the new order amount as original order amount *5.
- Determine the minimum and maximum salary of the salesman and rename the title as "min_sal" and "max_sal" respectively.
- Show the use of right and left justify string function.
- Show use of floor and ceiling function.

EXPERIMENT – 7

Aim: Exercise on different types of subqueries.

- Display customer name with highest customer number.
- Display customer name whose salesman is staying in Ahmedabad.
- Display order for which order taken earliest.

EXPERIMENT – 8

Aim: Introduction to PL/SQL, Control Structures, Procedures and Functions, view.

- Create a view which shows the details of the salesman with his salary. (Salesman Name, salary)
- Write a program to find factorial from the given number.
- Hint: Take the number in one procedure and pass it to the function which calculates the factorial of a given number and returns the factorial to the calling procedure.

EXPERIMENT – 9

Aim: Introduction to triggers and cursors.

- Write a trigger for overdraft facility.
- Write a cursor for calculating income tax for the given employee table.

    Emp (eid, ename, salary, incometax)

EXPERIMENT – 10

Aim: Introduction to NoSQL.

- Create table given in Experiment 1 using NoSQL(MongoDB)
- Insert the data in tables as given in Experiment 2.
- Create queries given in Experiment 2 and 3 using NoSQL.

EXPERIMENT - 11 (Term Project)

Aim: Mini Project on designing and implementing a database management system.

Contents of PROJECT REPORT

- ProjectTitle
- Certificate
- Acknowledgement
- System Overview
    -- Current system
    -- Objectives of the proposed system
- Advantages Of The Proposed system (overcurrent)
- E.R.Diagram
    -- Entities
    -- Relationships
    --Mapping Constraints

- Database Schema/TableDefinition
    -- Table Name
    -- Field Name
    -- Datatype
    -- Field size
    -- Constraint (e.g. auto generated, primary key, foreign key)
    -- Validation (e.g. not null, default value)
- Implementation
- Output
- Future Enhancements Of The System
- Bibliography

Note: From the 3rdlab reporting will be started for their project.

EXPERIMENT – 12

Aim: Create a table called Area which contains two attributes radius and area.

● Write a program which will calculate the area of a circle for a different radius. Take the value of radius from the user, calculate it and then insert those values in the Area table through the program.

EXPERIMENT – 13

Aim: Create user defined Exceptions.

● Write a program in which the ACCT table records the current balance for an account, which is updated whenever any deposits or withdrawals take place. If the withdrawal attempted more than the current balance held in account, a user-defined exception is raised displaying appropriate error messages otherwise performing the appropriate task.

References

Reference books:

- Database System Concepts
  - Henry F.Korth and A.Silberschatz. 9th Ed. McGraw-Hill1991.
- An Introduction to Database Systems
  - C. J.Date
  - A.Kannan
  - S.Swamynathan
- Fundamentals of Database Systems
  - Elmasri
  - Navathe
- SQL, PL/SQL The programming language of Oracle
  - Ivan Bayross, BPB Publications

Reference Link:

- http://en.wikipedia.org/wiki/Database

- www.w3schools.com/sql

- https://www.postgresql.org