PDEU

PANDIT DEENDAYAL ENERGY UNIVERSITY

Formerly Pandit Deendayal Petroleum University (PDPU)

Laboratory Manual 24CS202P:
Database Management Systems Laboratory

DEPARTMENT of COMPUTER Sc. & ENGINEERING

SCHOOL OF TECHNOLOGY

Name of Student:

Roll No:

Branch:

Sem./Year:

Academic

Year:

PANDIT DEENDAYAL ENERGY UNIVERSITY

Raisan, Gandhinagar – 380 007, Gujarat, India

Department of Computer Science & Engineering

Certificate

This is to certify that

Mr./Ms. _____ Roll no._____

Exam No. _____ of 4th Semester Degree course in Computer Science and Engineering has satisfactorily completed his/her term work in Database Management System Lab (24CS202P) subject during the semester from_____ to _____ at School of Technology, PDEU.

Date of Submission:

Signature:

Faculty In-charge Head of Department

Index

Name:

Roll No:

Exam No:

Sr. No.	Experiment Title	Pages		Date of Completion	Marks (out of 10)	Sign.
		From	To			
1	Dataset Creation and Updating using File Handling Program					
2	DDL (Data Definition Language) commands					
3	DML commands with constraints					
4	DDL (Data Definition Language) commands with Data Constraints					
5	DCL Commands in SQL: Transaction control commands, Commit, Rollback, Save point					
6	Use of Inbuilt functions and relational algebra operation					
7	Nested SQL Queries or Subqueries					
8	Group by & having clause, and Joins in SQL					
9	Implementation of Embedded SQL, PL SQL Concepts.					
10	Implementation of Cursors, Stored Procedures, Stored Function, Triggers.					

Experiment 1:

TITLE: Dataset Creation and Updating using File Handling Program.

Objective: How to store and retrieve dataset in table format using file handling programming.

Aim:

To create and update a dataset using a file handling program and import it into MySQL database.

Theory:

File handling allows us to read and write data into files. We can use Python/Java/C/C++ to create and update text or CSV files, which can then be imported into a MySQL table using the `LOAD DATA INFILE` command.

SQL Code:

```
LOAD DATA INFILE 'data.csv'
INTO TABLE student
FIELDS TERMINATED BY ','
LINES TERMINATED BY '\n'
IGNORE 1 ROWS;
```

Output:

The expected output confirms successful execution of SQL commands and matches the theoretical concept.

Result:

Successfully executed as per the aim of the experiment.

Exercise

Design a program (using C, C++, Java or Python) that performs Create, Read, Update, Delete record using file handling. The file store information about students in the following format:

Roll Number (unique identifier), Name, Age, and Department

All data should be stored in a text file (students.txt) where each record is stored on a new line. The initial dataset can be downloaded from Kaggle or other sources for any other records like Employee Dataset, HR Analytics Employee Dataset etc.

Tasks to be carried out in LAB

1. **Create a Record:**

   Add a new student record to the file. Ensure that the roll number is unique (no duplicates).
2. **Read Records:**

   Display all student records stored in the file in a tabular format. Allow searching for a record by roll number.
3. **Update a Record:**

Update the details of a student by their roll number. Ensure the updated data is saved in the file.

4. **Delete a Record:**

Delete a student record using their roll number. Ensure the file reflects the changes after deletion.

5. **Exit Program:**

Provide an option to exit the program.

Menu:

1. Add a Student Record
2. View All Records
3. Search a Record by Roll Number
4. Update a Record
5. Delete a Record
6. Exit

Enter your choice:

Experiment 2

TITLE: DDL (Data Definition Language) commands

Objective: To understand the concept of designing issues related to the database with creating, populating the tables.

Aim:

To use various DDL commands like CREATE, ALTER, and DROP.

Theory:

DDL commands are used to define the database structure or schema. They do not manipulate data but affect table definitions and structures.

SQL Code:

```
CREATE TABLE employee (
  id INT PRIMARY KEY,
  name VARCHAR(50),
  salary DECIMAL(10, 2)
);

ALTER TABLE employee ADD department VARCHAR(30);

DROP TABLE employee;
```

Output:

The expected output confirms successful execution of SQL commands and matches the theoretical concept.

Result:

Successfully executed as per the aim of the experiment.

Exercise

1. **Create the tables described below:**

Table name: CLIENT_MASTER

Description: used to store client information.

Column name	data type	Size
CLIENTNO	Varchar	6
NAME	Varchar	20
ADDRESS 1	Varchar	30

ADDRESS 2	Varchar	30
CITY	Varchar	15
PINCODE	Integer	
STATE	Varchar	15
BALDUE	decimal	10,2

Table Name: PRODUCT_MASTER

Description: used to store product information

Column name	**data type**	**Size**
PRODUCTNO	Varchar	6
DESCRIPTION	Varchar	15
PROFITPERCENT	Decimal	4,2
UNIT MEASURE	Varchar	10
QTYONHAND	Integer	
REORDERL VL	Integer	
SELLPRICE	Decimal	8,2
COSTPRICE	Decimal	8,2

Table Name: SALESMAN_MASTER

Description: Used to store salesman information working for the company.

Column name	**data type**	**Size**
SALESMANNO	Varchar	6
SALESMANNAME	Varchar	20
ADDRESS 1	Varchar	30

ADDRESS 2	Varchar	30
CITY	Varchar	20
PINCODE	Integer	
STATE	Varchar	20
SALAMT	Real	
TGTTOGET	Decimal	
YTDSALES	Double	6,2
REMARKS	Varchar	60

2. **Insert the following data into their respective tables:**

a) Data for **CLIENT_MASTER table**:

Client no	Name	city	Pincode	state	BalDue
C00001	Ivan bayross	Mumbai	400054	Maharashtra	15000
C00002	Mamta muzumdar	Madras	780001	Tamil nadu	0
C00003	Chhaya bankar	Mumbai	400057	Maharashtra	5000
C00004	Ashwini joshi	Bangalore	560001	Karnataka	0
C00005	Hansel colaco	Mumbai	400060	Maharashtra	2000
C00006	Deepak sharma	Mangalore	560050	Karnataka	0

b) Data for PRODUCT_**MASTER** table:

ProductNo	Description	Profit percent	Unit measure	Qtyonhand	RecorderLvl	SellPrice	CostPrice
P00001	T-Shirt	5	Piece	200	50	350	250

P0345	Shirts	6	Piece	150	50	500	350
P06734	Cotton jeans	5	Piece	100	20	600	450
P07865	Jeans	5	Piece	100	20	750	500
P07868	Trousers	2	Piece	150	50	850	550
P07885	Pull Overs	2.5	Piece	80	30	700	450
P07965	Denim jeans	4	Piece	100	40	350	250
P07975	Lycra tops	5	Piece	70	30	300	175
P08865	Skirts	5	Piece	75	30	450	300

c) Data for **SALESMAN_MASTER** table:

SalesmanNo	**Name**	**Address1**	**Address2**	**City**	**PinCode**	**State**
S00001	Aman	A/14	Worli	Mumbai	400002	Maharashtra
S00002	Omkar	65	Nariman	Mumbai	400001	Maharashtra
S00003	Raj	P-7	Bandra	Mumbai	400032	Maharashtra
S00004	Ashish	A/5	Juhu	Mumbai	400044	Maharashtr(a

SalesmanNo	**SalAmt**	**TgtToGet**	**YtdSales**	**Remarks**
S00001	3000	100	50	Good
S00002	3000	200	100	Good
S00003	3000	200	100	Good
S00004	3500	200	150	Good

****

Experiment 3

Title: DML commands with constraints

Objective: - To understand the concept of different DML commands.

Aim:

To perform DML operations with constraints like NOT NULL, UNIQUE, CHECK.

Theory:

DML allows manipulation of data within tables. Constraints enforce data integrity.

SQL Code:

```
CREATE TABLE student (
  id INT PRIMARY KEY,
  name VARCHAR(50) NOT NULL,
  age INT CHECK (age >= 18),
  email VARCHAR(50) UNIQUE
);

INSERT INTO student VALUES (1, 'John', 20, 'john@example.com');
```

Output:

The expected output confirms successful execution of SQL commands and matches the theoretical concept.

Result:

Successfully executed as per the aim of the experiment.

Exercise

Exercise on retrieving records from a table.

a. Find out the names of all the clients.
b. Retrieve the entire contents of the Client_Master table.
c. Retrieve the list of names,city and the state of all the clients.
d. List the various products available from the Product_Master table.
e. List all the clients who are located in Mumbai.
f. Find the names of salesman who have a salary equal to Rs.3000.

1. Exercise on updating records in a table
    a. Change the city of ClientNo ‘C00005’ to ‘Bangalore’.
    b. Change the BalDue of ClientNo ‘C00001’ to Rs.1000.
    c. Change the cost price of ‘Trousers’ to rs.950.00.
    d. Change the city of the salesman to Pune.

2. Exercise on deleting records in a table
    a. Delete all salesman from the Salesman_Master whose salaries are equal to Rs.3500.
3. b. Delete all products from Product_Master where the quantity on hand is equal to 100.
    c. Delete from Client_Master where the column state holds the value ‘Tamil Nadu’.
4. Exercise on altering the table structure
    a. Add a column called ‘Telephone’ of data type integer to the Client_Master table.
    b. Change the size of SellPrice column in Product _Master to 10, 2.
5. Exercise on deleting the table structure along with the data
    a. Destroy the table Client_Master along with its data.
6. Exercise on renaming the table
    a. Change the name of the Salesman_Master to sman_mast.

****

EXPERIMENT-4

TITLE: DDL (Data Definition Language) commands with Data Constraints

Objective: To understand the concept of data constraints that is enforced on data being stored in the table. Focus on Primary Key and the Foreign Key

Aim:

To define tables using constraints such as PRIMARY KEY, FOREIGN KEY, etc.

Theory:

Constraints are used to maintain accuracy and integrity of data.

SQL Code:

```
CREATE TABLE department (
  dept_id INT PRIMARY KEY,
  dept_name VARCHAR(30)
);

CREATE TABLE employee (
  emp_id INT PRIMARY KEY,
  emp_name VARCHAR(50),
  dept_id INT,
  FOREIGN KEY (dept_id) REFERENCES department(dept_id)
);
```

Output:

The expected output confirms successful execution of SQL commands and matches the theoretical concept.

Result:

Successfully executed as per the aim of the experiment.

Exercise

Create the tables described below:

Table name: CLIENT_MASTER_1

Description: used to store client information.

Column name	data type	Size	Constraints
CLIENTNO	Varchar	6	Primary key / first letter must start with 'C'
NAME	Varchar	20	Not Null
ADDRESS 1	Varchar	30	

ADDRESS 2	Varchar	30	
CITY	Varchar	15	
PINCODE	Integer	8	
STATE	Varchar	15	
BALDUE	Decimal	10,2	

Table Name: PRODUCT_MASTER_1

Description: used to store product information

Column name	data type	Size	Attributes
PRODUCTNO	Varchar	6	Primary Key/ first letter must start with 'P'
DESCRIPTION	Varchar	15	Not Null
PROFITPERCENT	Decimal	4,2	Not Null
UNIT MEASURE	Varchar	10	Not Null
QTYONHAND	Integer	8	Not Null
REORDERL VL	Integer	8	Not Null
SELLPRICE	Decimal	8,2	Not Null
COSTPRICE	Decimal	8,2	Not Null

Table Name: SALESMAN_MASTER _1

Description: used to store salesman information working for the company.

Column name	data type	Size	Attributes
SALESMANNO	Varchar	6	Primary Key/ first letter must start with 'S'
SALESMANNAME	Varchar	20	Not Null
ADDRESS 1	Varchar	30	Not Null

ADDRESS 2	Varchar	30	
CITY	Varchar	20	
PINCODE	Integer	8	
STATE	Varchar	20	
SALAMT	Real	8,2	Not Null , Cannot be 0
TGTTOGET	Decimal	6,2	Not Null , Cannot be 0
YTDSALES	Double	6,2	Not Null
REMARKS	Varchar	60	

3. **Reinsert the data in these two tables based upon Lab 2.**
4. **Display the contents of each table.**

EXPERIMENT-5

TITLE: DDL (Data Definition Language) commands with Data Constraints

Objective: To understand the concept of data constraints that are enforced on data being stored in the table. Focus on Primary Key, The Foreign Key and constraints.

Review this diagram

Aim:

To implement Data Control Language commands like GRANT and REVOKE.

Theory:

DCL deals with rights, permissions, and other controls of the database system.

SQL Code:

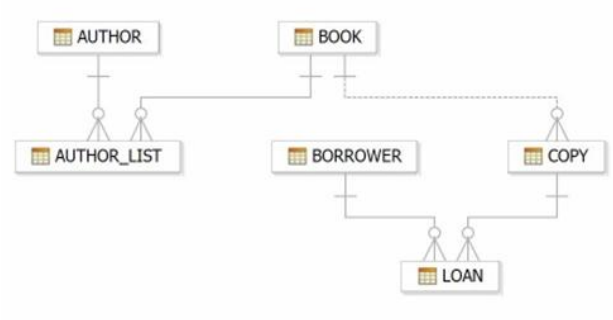
```
GRANT SELECT, INSERT ON employee TO 'user1'@'localhost';
REVOKE INSERT ON employee FROM 'user1'@'localhost';
```

Output:

The expected output confirms successful execution of SQL commands and matches the theoretical concept.

Result:

Successfully executed as per the aim of the experiment.



Exercise

1. Create table AUTHOR = {Author_ID , Lastname, Firstname, Email, City, Country}

Where:

Author_ID – text data type, 5 characters, primary key

Lastname – text data type, 15 characters, not null

Firstname – text data type, 15 characters, not null

Email – text data type, 40 characters,

City – text data type, 15 characters,

Country – text data type, 15 characters,

2. Create Table BOOK={ Book_ID, Book_Title, Copies)

Where:

Book_ID – text data type, 5 characters Primary Key Start with Character **B**

Book_Title - Text data Type Not Null

Copies- No.of copies Data Type int always greater the 2

3. Create table AUTHOR_LIST = {Author_ID , Book_ID , Role}

Where:

Author_ID – text data type, 5 characters, referenced by Author_ID from AUTHOR table

Book_ID – text data type, 5 characters

Role – text data type, 15 characters

and primary key is Author_ID, Book_ID

4. Add four records in each tables AUTHOR, BOOK, BOOK_LIST.

5. Alter structure of table AUTHOR_LIST add the field Publisher data type of 30 Character.

EXPERIMENT- 6

Title: Use of Inbuilt functions and relational algebra operation and Transaction control commands, Commit, Rollback, save point

Objective: To understand the use of inbuilt function and relational algebra with SQL query.

Aim:

To demonstrate use of Relational algebra, COMMIT, ROLLBACK, and SAVEPOINT.

Theory:

Transaction control commands manage changes made by DML statements.

SQL Code:

```
START TRANSACTION;
INSERT INTO employee VALUES (101, 'Alice', 'HR');
SAVEPOINT sp1;
INSERT INTO employee VALUES (102, 'Bob', 'IT');
ROLLBACK TO sp1;
COMMIT;
```

Output:

The expected output confirms successful execution of SQL commands and matches the theoretical concept.

Result:

Successfully executed as per the aim of the experiment.

Exercise

1. Consider the following table structure and attempt.

Supplier-(scode,sname,scity,turnover)

Part-(pcode,weigh,color,cost,sellingprice)

Supplier_Part-(scode,pcode,qty)

a) Create tables

b) Populate the table.

2. Write appropriate SQL Statement for the following:

1. Get the supplier number and part number in ascending order of supplier number.
2. Get the details of supplier who operate from Bombay with turnover 50.
3. Get the total number of supplier.
4. Get the part number weighing between 25 and 35.
5. Get the supplier number whose turnover is null.
6. Get the part number that cost 20, 30 or 40 rupees.

7. Get the total quantity of part 2 that is supplied.
8. Get the name of supplier who supply part 2.
9. Get the part number whose cost is greater than the average cost.
10. Get the supplier number and turnover in descending order of turnover.

EXPERIMENT-7:

Use of Inbuilt functions and relational algebra operation Contd…

Objective: To understand the use of inbuilt function and relational algebra with SQL query.

Aim:

To use MySQL inbuilt functions and understand relational algebra equivalents.

Theory:

MySQL provides aggregate functions like SUM(), AVG(), COUNT() etc., which map to relational algebra operations like projection and selection.

SQL Code:

```
SELECT AVG(salary) FROM employee;
SELECT * FROM employee WHERE department = 'IT';
```

Output:

The expected output confirms successful execution of SQL commands and matches the theoretical concept.

Result:

Successfully executed as per the aim of the experiment.

EXPERIMENT- 8

TITLE: Nested SQL Queries or Subqueries

Objective: To understand the use **SQL Subquery**

Aim:

To implement nested queries (subqueries) in SQL.

Theory:

A subquery is a query within another query, used for complex filtering or calculations.

SQL Code:

```
SELECT name FROM employee
WHERE salary > (SELECT AVG(salary) FROM employee);
```

Output:

The expected output confirms successful execution of SQL commands and matches the theoretical concept.

Result:

Successfully executed as per the aim of the experiment.

Exercise

1.Create the following two tables (EMP and DEPT)

EMP TABLE

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7369	SMITH	CLERK	7902	17-DEC-80	500	800	20
7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30
7521	WARD	SALESMAN	7698	22-FEB-81	1250	500	30
7566	JONES	MANAGER	7839	02-APR-81	2975		20
7654	MARTIN	SALESMAN	7698	28-SEP-81	1250	1400	30
7698	BLAKE	MANAGER	7839	01-MAY-81	2850		30
7782	CLARK	MANAGER	7839	09-JUN-81	2450		10

7788	SCOTT	ANALYST	7566	09-DEC-82	3000	20
7839	KING	PRESIDENT		17-NOV-81	5000	10
7844	TURNER	SALESMAN	7698	08-SEP-81	1500	0 30
7876	ADAMS	CLERK	7788	12-JAN-83	1100	20
7900	JAMES	CLERK	7698	03-DEC-81	950	30
7902	FORD	ANALYST	7566	03-DEC-81	3000	20
7934	MILLER	CLERK	7782	23-JAN-82	1300	10

DEPT TABLE

DEPTNO	DNAME	LOC
---	---	---
10	ACCOUNTING	NEW YORK
20	RESEARCH	DALLAS
30	SALES	CHICAGO
40	OPERATIONS	BOSTON

Write the Nested Queries for the following queries.

1. List the details of the emps whose Salaries more than the employee BLAKE.
2. List the emps whose Jobs are same as ALLEN.
3. List the Emps whose Sal is same as FORD or SMITH in desc order of Names.
4. List the emps Whose Jobs are same as MILLER or Sal is more than ALLEN.
5. Find the highest paid employee of sales department.
6. List the employees who are senior to most recently hired employee working under king.

   List the employees who are senior to most recently hired employee working under king.
   select * from emp where hiredate < (select max(hiredate) from emp where mgr in (select empno from emp where ename = 'KING')) ;
7. List the names of the emps who are getting the highest sal dept wise.

   select e.ename,e.deptno from emp e where e.sal in
   (select max(sal) from emp group by deptno) ;
8. List the emps whose sal is equal to the average of max and minimum

   select * from emp where sal =(select (max(sal)+min(sal))/2 from emp);
9. List the emps who joined in the company on the same date.

select * from emp e where hiredate in (select hiredate from emp where e.empno <> empno);

10. Find out the emps who joined in the company before their Managers.

    select * from emp e where hiredate < (select hiredate from emp where empno = e.mgr)

****

EXPERIMENT-9

TITLE: Group by & having clause and Join in SQL

Objective: To understand the use of group by and having clause.

To use GROUP BY, HAVING clauses and SQL JOIN operations.

Theory:

GROUP BY is used to group rows with same values. HAVING is used to filter aggregated data. JOIN is used to combine rows from two or more tables.

SQL Code:

```
SELECT dept_id, COUNT(*)
FROM employee
GROUP BY dept_id
HAVING COUNT(*) > 1;

SELECT e.emp_name, d.dept_name
FROM employee e
JOIN department d ON e.dept_id = d.dept_id;
```

Output:

The expected output confirms successful execution of SQL commands and matches the theoretical concept.

Result:

Successfully executed as per the aim of the experiment.

Exercise

Write the SQL Queries for the following queries (use EMP and DEPT table of Exp 8).

1. List the Deptno where there are no emps.
2. List the No.of emp's and Avg salary within each department for each job.
3. Find the maximum average salary drawn for each job except for 'President'.
4. List the department details where at least two emps are working.
5. List the no. of emps in each department where the no. is more than 3.

6. List the names of the emps who are getting the highest sal dept wise.
7. List the Deptno and their average salaries for dept with the average salary less than the averages for all departments.
8. In addition refer Experiment 7 & 8 and execute the same questions by using join.

EXPERIMENT-10

TITLE: Joins in SQL

OBJECTIVE: SQL joins are used to query data from two or more tables, based on a relationship between certain columns in these tables.

Aim:

To demonstrate the use of Embedded SQL, PL/SQL blocks including Cursors, Procedures, Functions, and Triggers.

Theory:

PL/SQL is Oracle's procedural extension to SQL. Cursors allow row-by-row processing, triggers respond to database events, and procedures/functions encapsulate reusable logic.

SQL Code:

```
DELIMITER //

CREATE PROCEDURE GetEmployee()
BEGIN
  SELECT * FROM employee;
END//

CREATE TRIGGER before_insert_employee
BEFORE INSERT ON employee
FOR EACH ROW
BEGIN
  SET NEW.salary = IFNULL(NEW.salary, 10000);
END//
DELIMITER ;
```

Output:

The expected output confirms successful execution of SQL commands and matches the theoretical concept.Result:

Successfully executed as per the aim of the experiment.