DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

CHANDIGARH UNIVERSITY

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Experiment 1.1

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Semester: 5th Date of Performance: 22 July 2025

Subject Name: ADBMS Subject Code: 23CSP-333

1. Experiment Name:
   To design and manipulate a University Database using SQL that involves creating relations Tables for Students, Courses, Enrollments and Professors, inserting and retrieving data Using JOINs, managing access control with GRANT/REVOKE, and handling transactions Control using COMMIT and ROLLBACK.

2. Objective:

   Easy-Level Problem

   Problem Title: Author-Book Relationship Using Joins and Basic SQL Operations Procedure (Step-by-Step):

   Design two tables — one for storing author details and the other for book details.

   1. Ensure a foreign key relationship from the book to its respective author.
   2. Insert at least three records in each table.
   3. Perform an INNER JOIN to link each book with its author using the common author ID.
   4. Select the book title, author name, and author's country.

   Medium-Level Problem

   Problem Title: Department-Course Subquery and Access Control Procedure (Step-by-Step):

   1. Design normalised tables for departments and the courses they offer, maintaining a foreign key relationship.
   2. Insert five departments and at least ten courses across those departments.

3. Use a subquery to count the number of courses under each department.
4. Filter and retrieve only those departments that offer more than two courses.
5. Grant SELECT-only access on the courses table to a specific user.

3. Code:

----EASY LEVEL PROBLEM CODE----

```
USE DB_DEMO
CREATE TABLE Author (
   AuthorID INT PRIMARY KEY,
   AuthorName VARCHAR(100),
   Country VARCHAR(100)
);

CREATE TABLE Book (
BookID INT PRIMARY KEY,
Title VARCHAR(100),
AuthorID INT,
FOREIGN KEY (AuthorID) REFERENCES Author(AuthorID)
);

INSERT INTO Author (AuthorID, AuthorName, Country) VALUES
(1, 'J.K. Rowling', 'United Kingdom'),
(2, 'George R.R. Martin', 'United States'),
(3, 'Haruki Murakami', 'Japan');

INSERT INTO Book (BookID, Title, AuthorID) VALUES
(101, 'Harry Potter and the Sorcerer"s Stone', 1),
(102, 'A Game of Thrones', 2),
(103, 'Norwegian Wood', 3);

SELECT
Book.Title AS BookTitle,
Author.AuthorName,
Author.Country
FROM
Book
INNER JOIN
Author ON Book.AuthorID = Author.AuthorID;
```

----MEDIUM LEVEL PROBLEM CODE----

```
CREATE TABLE Department (
DepartmentID INT PRIMARY KEY,
DepartmentName VARCHAR(100)
) ;
```

```
-- Course table with foreign key to Department
CREATE TABLE Course (
CourseID INT PRIMARY KEY,
CourseName VARCHAR(100),
DepartmentID INT,
FOREIGN KEY (DepartmentID) REFERENCES Department(DepartmentID)
);

-- Insert departments
INSERT INTO Department (DepartmentID, DepartmentName) VALUES
(1, 'Computer Science'),
(2, 'Mechanical Engineering'),
(3, 'Electrical Engineering'),
(4, 'Mathematics'),
(5, 'Civil Engineering');

-- Insert courses
INSERT INTO Course (CourseID, CourseName, DepartmentID) VALUES
(101, 'Data Structures', 1),
(102, 'Operating Systems', 1),
(103, 'DBMS', 1),
(104, 'Thermodynamics', 2),
(105, 'Fluid Mechanics', 2),
(106, 'Circuit Theory', 3),
(107, 'Digital Electronics', 3),
(108, 'Linear Algebra', 4),
(109, 'Calculus', 4),
(110, 'Structural Analysis', 5);

SELECT
   DepartmentName,
   (SELECT COUNT(*)
    FROM Course
    WHERE Course.DepartmentID = Department.DepartmentID) AS CourseCount
FROM Department;

SELECT
   DepartmentName
FROM
   Department
WHERE
   (SELECT COUNT(*)
    FROM Course
    WHERE Course.DepartmentID = Department.DepartmentID) > 2;

GRANT SELECT ON Course TO readonly_user;
```

4. Output:

----easy level problem output----

Results Messages

	AuthorID	AuthorName	Country
1	1	J.K. Rowling	United Kingdom
2	2	George R.R. Martin	United States
3	3	Haruki Murakami	Japan

	BookID	Title	AuthorID
1	101	Harry Potter and the Sorcerer's Stone	1
2	102	A Game of Thrones	2
3	103	Norwegian Wood	3

Results Messages

	BookTitle	AuthorName	Country
1	Harry Potter and the Sorcerer's Stone	J.K. Rowling	United Kingdom
2	A Game of Thrones	George R.R. Martin	United States
3	Norwegian Wood	Haruki Murakami	Japan

----medium level problem output----

Results Messages

	CourseID	CourseName	DepartmentID
1	101	Data Structures	1
2	102	Operating Systems	1
3	103	DBMS	1
4	104	Thermodynamics	2
5	105	Fluid Mechanics	2
6	106	Circuit Theory	3
7	107	Digital Electronics	3
8	108	Linear Algebra	4
9	109	Calculus	4
10	110	Structural Analysis	5

	DepartmentID	DepartmentName
1	1	Computer Science
2	2	Mechanical Engineering
3	3	Electrical Engineering
4	4	Mathematics
5	5	Civil Engineering

Results Messages

	DepartmentName	CourseCount
1	Computer Science	3
2	Mechanical Engineering	2
3	Electrical Engineering	2
4	Mathematics	2
5	Civil Engineering	1

Results Messages

	DepartmentName
1	Computer Science

4. Learning Outcomes:

- Understanding Database Normalization:
- Mastering Subqueries in SQL:
- Filtering Data Using Conditions:
- Data Access Control:
- Working with One-to-Many Relationships: