Experiment 1

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1. Aim:

- **To design and implement normalized relational database schemas for different real-world scenarios using SQL, establish foreign key relationships, insert relevant data, and retrieve specific information using JOINs and subqueries.**

- **Part A – Easy Level:**
  - To create tables for AUTHOR1 and BOOKS1, capturing author and book details.
  - To implement a foreign key relationship between books and their respective authors.
  - To retrieve and display book name, author name, and country using an INNER JOIN.

- **Part B – Medium Level:**
  - To create tables for DEPARTMENT and COURSE, maintaining referential integrity.
  - To populate the tables with department and course data.
  - To use a correlated subquery to count the number of courses per department.
  - To filter and display departments offering **more than two** courses.

2. Objective:

- To understand and apply the concepts of relational database design by creating normalized tables with primary and foreign key constraints.
- To insert meaningful real-world data into related tables representing entities such as authors, books, departments, and courses.
- To retrieve and manipulate data using SQL operations like INNER JOIN and correlated subqueries.
- To display relevant information by combining data from multiple tables and applying filtering conditions.
- To strengthen knowledge of referential integrity, data relationships, and query-based data analysis in SQL Server.

3. ADBMS script and output:

EASY-LEVEL PROBLEM

```
CREATE TABLE AUTHOR1 (
   AUTHOR_ID INT PRIMARY KEY,
   AUTHOR_NAME VARCHAR(100),
   COUNTRY VARCHAR(50)
);

CREATE TABLE BOOKS1 (
   BOOK_ID INT PRIMARY KEY,
   BOOK_NAME VARCHAR(100),
   AUTHOR_ID INT,
   FOREIGN KEY (AUTHOR_ID) REFERENCES AUTHOR1(AUTHOR_ID)
);

INSERT INTO AUTHOR1 (AUTHOR_ID, AUTHOR_NAME, COUNTRY) VALUES
(1, 'J.K. Rowling', 'United Kingdom'),
(2, 'Chinua Achebe', 'Nigeria'),
(3, 'Arundhati Roy', 'India'),
(4, 'Leo Tolstoy', 'Russia');

INSERT INTO BOOKS1 (BOOK_ID, BOOK_NAME, AUTHOR_ID) VALUES
(101, 'Things Fall Apart', 2),
(102, 'Harry Potter and the Sorcerers Stone', 1),
```

```
(103, 'The God of Small Things', 3);
SELECT
    B.BOOK_NAME,
    A.AUTHOR_NAME,
    A.COUNTRY
FROM
    BOOKS1 B
INNER JOIN
    AUTHOR1 A ON B.AUTHOR_ID = A.AUTHOR_ID;
```

MEDIUM LEVEL PROBLEM:

```
CREATE TABLE DEPARTMENT (
    DEPT_ID INT PRIMARY KEY,
    DEPT_NAME VARCHAR(100)
);

CREATE TABLE COURSE (
    COURSE_ID INT PRIMARY KEY,
    COURSE_NAME VARCHAR(100),
    DEPT_ID INT,
    FOREIGN KEY (DEPT_ID) REFERENCES DEPARTMENT(DEPT_ID)
);

INSERT INTO DEPARTMENT (DEPT_ID, DEPT_NAME) VALUES
```

```
(1, 'Computer Science'),
(2, 'Electronics'),
(3, 'Mathematics'),
(4, 'Communication'),
(5, 'General Studies');

INSERT INTO COURSE (COURSE_ID, COURSE_NAME, DEPT_ID) VALUES
(101, 'Operating Systems', 1),
(102, 'Computer Networks', 1),
(103, 'Competitive Programming', 1),
(104, 'Microcontroller', 2),
(105, 'Embedded Systems', 2),
(106, 'Mathematics I', 3),
(107, 'Mathematics II', 3),
(108, 'Communication Skills', 4),
(109, 'English Literature', 4),
(110, 'DAA', 1);

SELECT
   DEPT_NAME
FROM
   DEPARTMENT
WHERE
   (SELECT COUNT(*)
    FROM COURSE
```

```
WHERE COURSE.DEPT_ID = DEPARTMENT.DEPT_ID) > 2;
```

OUTPUTS:

Results | Messages

	BOOK_NAME	AUTHOR_NAME	COUNTRY
1	Things Fall Apart	Chinua Achebe	Nigeria
2	Harry Potter and the Sorcerers Stone	J.K. Rowling	United Kingdom
3	The God of Small Things	Arundhati Roy	India

Figure 1: Easy Level Problem

Results | Messages

	DEPT_NAME
1	Computer Science

Figure 2: Medium level Problem