

Experiment 1

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Subject Name: DBMS

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Aim

To design and implement a Library Management System database using appropriate tables, primary keys, foreign keys, and constraints, and to perform DML operations along with DCL commands such as role creation, privilege granting, and revoking to ensure database security.

Software Requirements

- Database Management System:
 - PostgreSQL
- Database Administration Tool:
 - pgAdmin

Objectives

To gain practical experience in implementing Data Definition Language (DDL), Data Manipulation Language (DML), and Data Control Language (DCL) operations in a real database environment. This will also include implementing role-based privileges to secure data.

Problem Statement

- A Library wants to develop a Library Management System database to manage information about books, members, and book issue records efficiently. The database should be designed using appropriate tables, primary keys, foreign keys, and constraints to ensure data integrity.

- The system must support basic database operations such as inserting records, updating existing data, and deleting obsolete entries. To ensure database security.
- To ensure database security, a database role named Librarian must be created. This role should be password protected and granted SELECT, INSERT, and DELETE permissions on the required tables. The system administrator (pgAdmin) should also have the ability to revoke these permissions when required using role-based access control.

Code

```
CREATE TABLE BOOK_S(  
  BOOK_ID INT PRIMARY KEY,  
  BOOK_NAME VARCHAR(20) NOT NULL,  
  AUTHOR_NAME VARCHAR(20) NOT NULL  
)
```

```
SELECT * FROM BOOK_S
```

```
ALTER TABLE BOOK_S  
ADD BOOK_COUNT INT CHECK(BOOK_COUNT>0) NOT NULL
```

```
INSERT INTO BOOK_S VALUES(101,'HARRY POTTER','DAVID',3)
```

```
CREATE TABLE LIBRARY_VISITORS(  
  USER_ID INT PRIMARY KEY,  
  NAME VARCHAR(20) NOT NULL,  
  AGE INT CHECK(AGE>=17) NOT NULL,  
  EMAIL VARCHAR(20) NOT NULL UNIQUE  
)
```

```
SELECT * FROM LIBRARY_VISITORS
```

```
INSERT INTO LIBRARY_VISITORS VALUES(501,'SUMIR  
MALHOTRA',20,'SUMIR227@GMAIL.COM')
```

```
CREATE TABLE BOOK_ISSUE(  
  BOOK_ISSUE_ID INT PRIMARY KEY,  
  USER_ID INT NOT NULL,
```

```
BOOK_ID INT NOT NULL,  
FOREIGN KEY(BOOK_ID) REFERENCES BOOK_S(BOOK_ID),  
FOREIGN KEY(USER_ID) REFERENCES LIBRARY_VISITORS(USER_ID)  
)
```

```
INSERT INTO BOOK_ISSUE VALUES(701,501,101)
```

```
SELECT * FROM BOOK_ISSUE
```

```
ALTER TABLE BOOK_ISSUE ADD ISSUE_DATE DATE
```

```
UPDATE BOOK_ISSUE SET ISSUE_DATE='2026-01-09' WHERE BOOK_ISSUE_ID=701
```

```
CREATE ROLE LIBRARIAN WITH LOGIN PASSWORD 'Sumir@12'
```

```
GRANT SELECT,INSERT,DELETE,UPDATE ON BOOK_S TO LIBRARIAN  
GRANT SELECT,INSERT,DELETE,UPDATE ON BOOK_ISSUE TO LIBRARIAN  
GRANT SELECT,INSERT,DELETE,UPDATE ON LIBRARY_VISITORS TO LIBRARIAN
```

```
REVOKE SELECT,INSERT,DELETE,UPDATE ON  
BOOK_S,BOOK_ISSUE,LIBRARY_VISITORS FROM LIBRARIAN
```

Output

Table books:

Data Output

Messages

Notifications

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SQL

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	<div>book_id</div> <div>[PK] integer</div>	<div>book_name</div> <div>character varying (20)</div>	<div>author_name</div> <div>character varying (40)</div>	<div>book_count</div> <div>integer</div>	
1	101	HARRY POTTER	DAVID	1	

Table library_visitors:

Data Output

Messages

Notifications

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SQL

	<div>user_id</div> <div>[PK] integer </div>	<div>user_name</div> <div>character varying (40) </div>	<div>age</div> <div>integer </div>	<div>email</div> <div>character varying (20) </div>	
1	501	REYANSH	19	REYANSH@GMAIL.CO...	

Table book_issue:

Data Output

Messages

Notifications

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SQL

	<div>book_issue_id</div> <div>[PK] integer</div>	<div>user_id</div> <div>integer</div>	<div>book_id</div> <div>integer</div>	<div>issue_date</div> <div>date</div>	
1	1001	501	101	2026-01-08	

Access granted to role – librarian:

```
GRANT
```

```
Query returned successfully in 44 msec.
```

Learning Outcomes

- Gained hands-on experience to work with PostgreSQL and pgAdmin
- Writing queries to create and delete tables
- Learnt to alter tables, view tables, create roles, granting and revoking access to the roles
- Primary and foreign keys implementations and roles