



Apex Institute of Technology

Computer Science & Engineering

Worksheet 1

Name: Trimann Kaur

UID: 24BAI70511

Branch: B.E. CSE (AIML)

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**Subject Name: Database
Management System**

Subject Code: 24CSH-298

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.

OBJECTIVES:

1. To implement Data Definition Language (DDL) commands for creating, altering, and deleting database tables with appropriate constraints.
2. To apply Data Manipulation Language (DML) commands to insert, update, retrieve, and manage records while maintaining data integrity.
3. To understand Data Control Language (DCL) by creating user roles and managing database security through granting and revoking privileges.

SOFTWARE REQUIREMENTS:

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

PRACTICAL/EXPERIMENT STEPS:

1. A table named BOOKS was created to store book details such as Book ID, Book Name, and Author Name. Book_ID is set as the primary key.
2. The table BOOKS was modified using ALTER command to add a new column BOOK_COUNT with a check constraint to ensure that the BOOK_COUNT is greater than 0 and is not null.
3. Records were inserted into the BOOKS table using INSERT commands and verified using SELECT queries.



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4. A new table LIBRARY_VISITORS was created with attributes USER_ID, NAME, AGE and EMAIL. USER_ID is set as the primary key and data is inserted in the table using INSERT command.
5. A new table BOOK_ISSUE was created to maintain book issue records, implementing FOREIGN KEY relationships between BOOKS and LIBRARY_VISITORS tables. USER_ID from LIBRARY_VISITORS table and BOOK_ID from BOOKS are set as the foreign key.
6. The ALTER table command is used to add ISSUE_DATE for issued books. UPDATE command is used to update the previous records of the table.
7. A new user role named LIBRARIAN was created, and permissions were granted using GRANT.
8. Permissions were later revoked using the REVOKE command to understand access control.
9. TRUNCATE and DROP commands were executed to observe the difference between removing records and deleting tables.

PROCEDURE:

1. Open PostgreSQL and create a new database.
2. Execute the following command to create a table BOOKS.

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

3. Alter the table to add another attribute BOOK_COUNT with a constraint.

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

4. Insert data into the table.

```
INSERT INTO BOOKS VALUES(101, 'Harry Potter', 'Rowling', 3)  
INSERT INTO BOOKS VALUES(102, 'The Alchemist', 'Paulo', 5);
```

5. Create a new table LIBRARY_VISITORS using CREATE command

```
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  
)
```

6. Insert data into this table.

```
INSERT INTO LIBRARY_VISITORS(USER_ID, NAME, AGE, EMAIL)  
VALUES(501, 'vansh', 19, 'vansh@gmail.com')
```

```
INSERT INTO LIBRARY_VISITORS(USER_ID, NAME, AGE, EMAIL)  
VALUES(502, 'ansh', 19, 'ansh@gmail.com')
```



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7. Create a new table BOOK_ISSUE using the following command, and insert data into it.

```
CREATE TABLE BOOK_ISSUE(  
  BOOK_ISSUE_ID INT PRIMARY KEY,  
  BOOK_ID INT NOT NULL,  
  USER_ID INT NOT NULL,  
  FOREIGN KEY(USER_ID) REFERENCES LIBRARY_VISITORS(USER_ID),  
  FOREIGN KEY(BOOK_ID) REFERENCES BOOKS(BOOK_ID)  
)
```

```
INSERT INTO BOOK_ISSUE VALUES(10001, 101, 501)
```

8. Use the ALTER and UPDATE command as follows to update the previous records.

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

```
UPDATE BOOK_ISSUE  
SET ISSUE_DATE='2026-01-08'  
WHERE BOOK_ID=101
```

9. Execute the following command to create a new role of LIBRARIAN.

```
CREATE ROLE LIBRARIAN  
WITH LOGIN PASSWORD '12345678'
```

10. Use GRANT command to grant access to the LIBRARIAN.

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

11. Demonstrate the use of REVOKE using the following command.

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

12. Use TRUNCATE to delete all records in the table, and DROP to delete the table.

```
TRUNCATE TABLE BOOK_ISSUE
```

```
DROP TABLE BOOK_ISSUE
```

I/O ANALYSIS:

- Create table BOOKS.



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

book_id	book_name	author_name
[PK] integer	character varying (20)	character varying (20)

- Alter and insert into table BOOKS.

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

```
INSERT INTO BOOKS VALUES(101, 'Harry Potter', 'Rowling', 3)  
INSERT INTO BOOKS VALUES(102, 'The Alchemist', 'Paulo', 5);
```

	book_id	book_name	author_name	book_count
	[PK] integer	character varying (20)	character varying (20)	integer
1	101	Harry Potter	Rowling	3
2	102	The Alchemist	Paulo	5

- Create table LIBRARY_VISITORS.

```
CREATE TABLE BOOK_ISSUE(  
  BOOK_ISSUE_ID INT PRIMARY KEY,  
  BOOK_ID INT NOT NULL,  
  USER_ID INT NOT NULL,  
  FOREIGN KEY(USER_ID) REFERENCES LIBRARY_VISITORS(USER_ID),  
  FOREIGN KEY(BOOK_ID) REFERENCES BOOKS(BOOK_ID)  
)
```

user_id	name	age	email
[PK] integer	character varying (20)	integer	character varying (20)

- Insert into LIBRARY_VISITORS.

```
INSERT INTO LIBRARY_VISITORS(USER_ID, NAME, AGE, EMAIL)  
VALUES(501, 'vansh', 19, 'vansh@gmail.com')
```

```
INSERT INTO LIBRARY_VISITORS(USER_ID, NAME, AGE, EMAIL)  
VALUES(502, 'ansh', 19, 'ansh@gmail.com')
```

	user_id	name	age	email
	[PK] integer	character varying (20)	integer	character varying (20)
1	501	vansh	19	vansh@gmail.com
2	502	ansh	19	ansh@gmail.com

- Create table BOOK_ISSUE with foreign key. Alter and update it.

	book_issue_id	book_id	user_id
	[PK] integer	integer	integer
1	10001	101	501

- Alter table BOOK_ISSUE.

	book_issue_id	book_id	user_id	issue_date
	[PK] integer	integer	integer	date
1	10001	101	501	[null]

- Update BOOK_ISSUE.



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	book_issue_id [PK] integer	book_id integer	user_id integer	issue_date date
1	10001	101	501	2026-01-08

- Creating a new role, and granting access.

```
GRANT
```

```
Query returned successfully in 116 msec.
```

- Revoke access.

```
REVOKE
```

```
Query returned successfully in 84 msec.
```

```
ERROR: permission denied for table books
```

```
SQL state: 42501
```

- Truncate table BOOK_ISSUE.

book_issue_id [PK] integer	book_id integer	user_id integer	issue_date date
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- Drop table BOOK_ISSUE.

```
ERROR: relation "book_issue" does not exist
```

LEARNING OUTCOMES:

1. Understanding of creating and managing database structures using DDL commands.
2. Inserting, updating, and retrieving data using DML queries while maintaining data integrity.
3. Knowledge of controlling database access by creating roles and applying DCL commands.