EMMAN ACE MENION **DBMS-2B**
BSCpE 3A **SCORE:_____**

Laboratory Activity 7:

Laboratory Title: Normalization - Third Normal Form (3NF)
Chapter No. and Topic: Chapter 3 - Database Design and Modeling
Discussions:
This activity will guide students through converting a table to the Third Normal Form (3NF) by removing transitive dependencies.

Activity Description:
Normalize a table in 2NF to 3NF by eliminating transitive dependencies.

Objectives:

- Achieve 3NF by eliminating transitive dependencies.

Materials:

- SQL client

Procedure:

1. Start with a 2NF table:

```
sql

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CREATE TABLE Books_2NF (

  BookID INT,

  Title VARCHAR(100),

  Author VARCHAR(100),

  Genre VARCHAR(50),

  PublisherID INT,

  PublisherName VARCHAR(100),

  PublisherAddress VARCHAR(100)

);
```

1. Insert data:

```sql
Copy code

INSERT INTO Books_2NF (BookID, Title, Author, Genre, PublisherID,

PublisherName, PublisherAddress)

VALUES

(1, 'Book A', 'Author1', 'Fiction', 1, 'Publisher1', 'Address1'),

(2, 'Book B', 'Author2', 'Non-Fiction', 1, 'Publisher1', 'Address1');
```

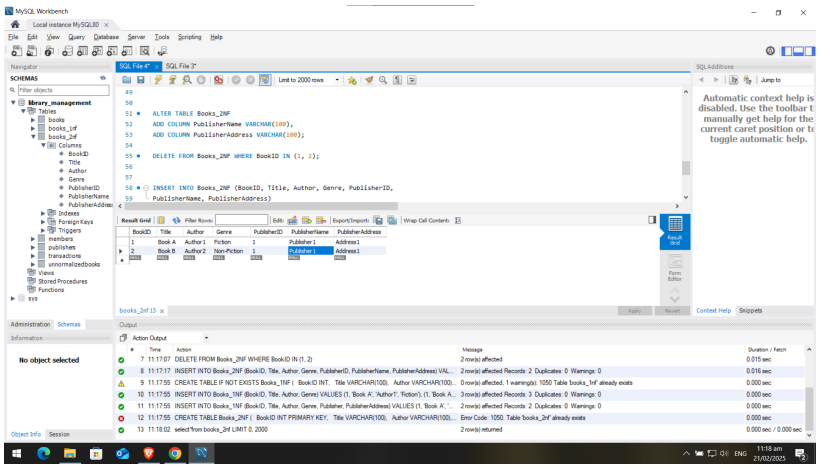
1. Separate publisher details into a new table and link with `PublisherID`:

```sql
Copy code

CREATE TABLE Publishers_3NF (

  PublisherID INT PRIMARY KEY,

  PublisherName VARCHAR(100),

  PublisherAddress VARCHAR(100)

);
```

1. Remove `PublisherName` and `PublisherAddress` from `Books_2NF` and adjust the table to use only `PublisherID`.

Result:

The table is now in 3NF, with no transitive dependencies



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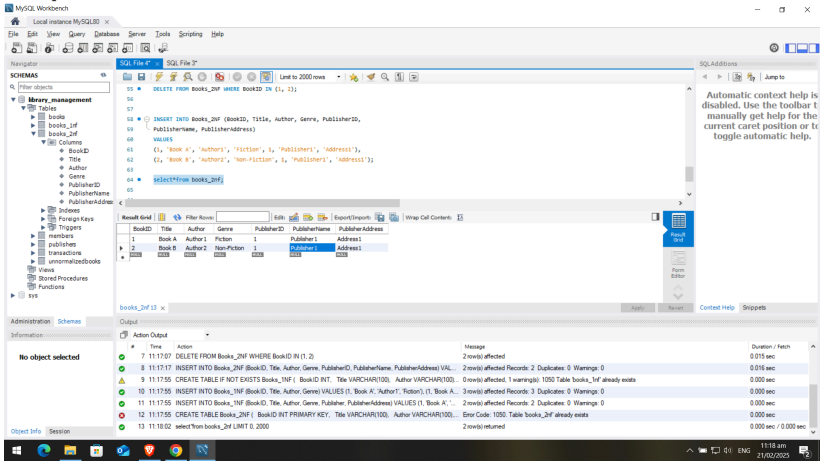

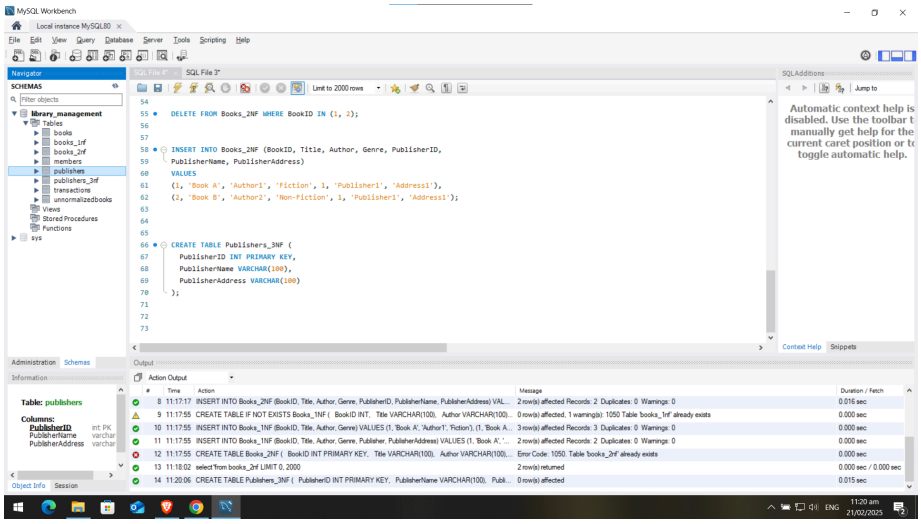

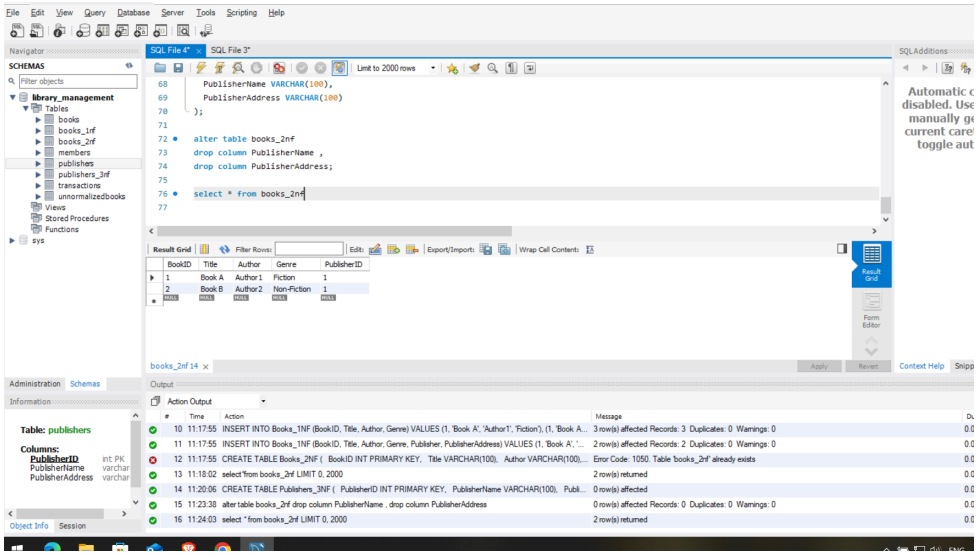

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Additional Questions/Discussions:

- **What are transitive dependencies, and why should they be eliminated?**
- A **transitive dependency** occurs when a **non-key attribute depends on another non-key attribute**, rather than directly on the **primary key**. This creates redundancy and can lead to update anomalies.
- To eliminate transitive dependencies and achieve **Third Normal Form (3NF)**, we move `PublisherName` and `PublisherAddress` to a separate `Publishers_3NF` table and link them to `Books_2NF` using `PublisherID`. This improves database efficiency and consistency.

- **How does 3NF improve data integrity?**
- Third Normal Form (3NF) improves **data integrity** by ensuring that **all non-key attributes depend only on the primary key**. This eliminates **redundancy** and prevents **insertion, update, and deletion anomalies**.
- By removing transitive dependencies, 3NF keeps data structured, reduces storage requirements, and makes updates easier. For example, if a publisher's address changes, updating it in the `Publishers_3NF` table automatically applies to all books linked to that publisher, preventing inconsistencies.

Conclusions:

By converting a table from 2NF to 3NF, we remove transitive dependencies, ensuring that every non-key column depends directly on the primary key. This reduces redundancy, improves data integrity, and enhances database efficiency.

3NF makes updates more manageable, avoids duplicate data, and ensures a well-structured relational database, leading to better performance and easier maintenance.