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BSCpE 3A

DBMS-2B
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Chapter 3: Database Design and Modeling

Laboratory Activity 5:

Laboratory Title: Normalization - First Normal Form (1NF)
Chapter No. and Topic: Chapter 3 - Database Design and Modeling
Discussions:
This activity demonstrates how to normalize a table to the First Normal Form (1NF).

Activity Description:
Given a sample non-normalized table, convert it to 1NF by ensuring that all columns contain atomic values.

Objectives:

- Understand how to apply 1NF to a database design.
- Convert a table into 1NF.

Materials:

- SQL client

Procedure:

1. Start by creating a sample non-normalized table:

```
sql

Copy code

CREATE TABLE UnNormalizedBooks (

  BookID INT,

  Title VARCHAR(100),

  Authors VARCHAR(100),

  Genre VARCHAR(50)

);
```

1. Insert data into the table:

```
sql
```

```
Copy code

INSERT INTO UnNormalizedBooks (BookID, Title, Authors, Genre)

VALUES

(1, 'Book A', 'Author1, Author2', 'Fiction'),

(2, 'Book B', 'Author3', 'Non-Fiction');
```

1. Convert to 1NF by creating separate rows for multiple authors:

```
sql

Copy code

CREATE TABLE Books_1NF (

  BookID INT,

  Title VARCHAR(100),

  Author VARCHAR(100),

  Genre VARCHAR(50)

);
```

1. Insert normalized data:

```
sql

Copy code

INSERT INTO Books_1NF (BookID, Title, Author, Genre)

VALUES

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

(1, 'Book A', 'Author2', 'Fiction'),

(2, 'Book B', 'Author3', 'Non-Fiction');
```

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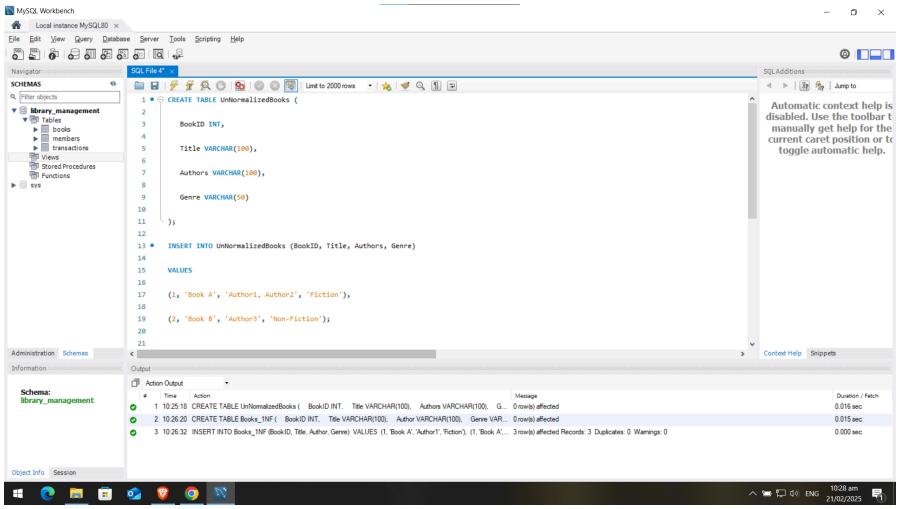
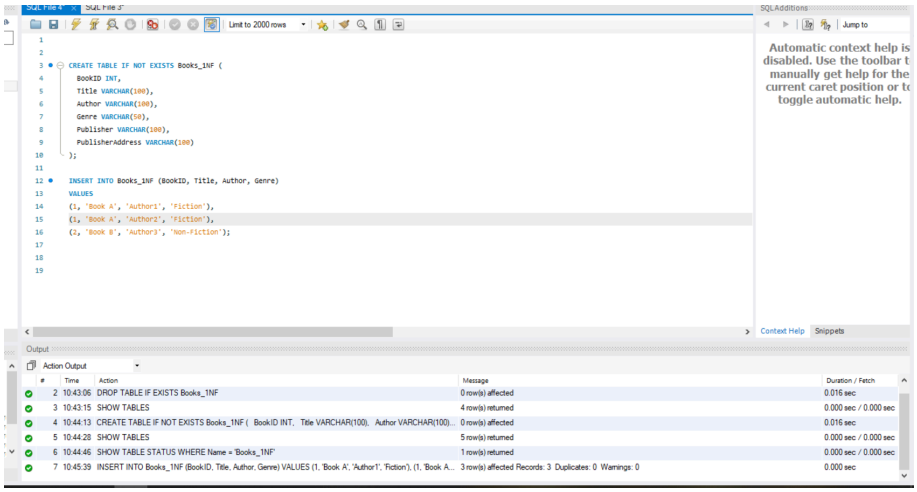
Result:





Additional Questions/Discussions:

- **How does 1NF improve data integrity?**
  - First Normal Form (1NF) improves data integrity by ensuring that each column in a table contains single, indivisible values. This prevents redundancy and inconsistencies, making the database more reliable. By eliminating repeating groups, 1NF reduces update, insertion, and deletion anomalies. It also simplifies querying, as searching or filtering data becomes more efficient when each value is stored separately.
- **What are atomic values, and why are they important?**
  - Atomic values are the smallest, indivisible pieces of data that cannot be broken down further. For example, storing multiple authors in one column (`"Author1, Author2"`) is non-atomic, while listing each author separately ensures atomicity. Atomic values are important because they keep data consistent, reduce redundancy, and improve query performance. They also make updates and modifications easier, ensuring a well-structured and efficient database.

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Conclusions:

By applying First Normal Form (1NF), we ensure that all columns in a table contain atomic values, preventing data redundancy and inconsistencies. This process eliminates repeating groups, making the database more structured and easier to manage.

Normalization in 1NF helps reduce update, insertion, and deletion anomalies, ensuring that each piece of data is stored independently and consistently. Additionally, querying and filtering become more efficient, as each value is properly organized within the table.

Overall, 1NF improves data integrity, reliability, and efficiency, forming the foundation for further normalization steps in database design.