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BSCpE – 3A

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

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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

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CREATE TABLE Books_1NF (

   BookID INT,

   Title VARCHAR(100),

   Author VARCHAR(100),

   Genre VARCHAR(50)

);
```
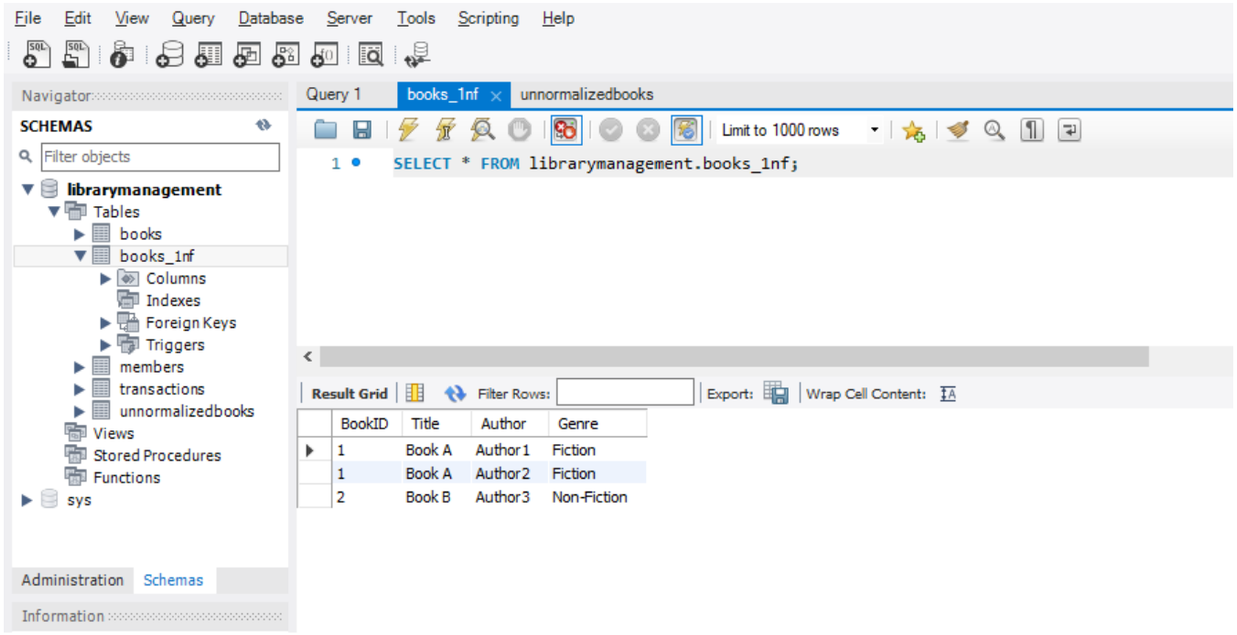
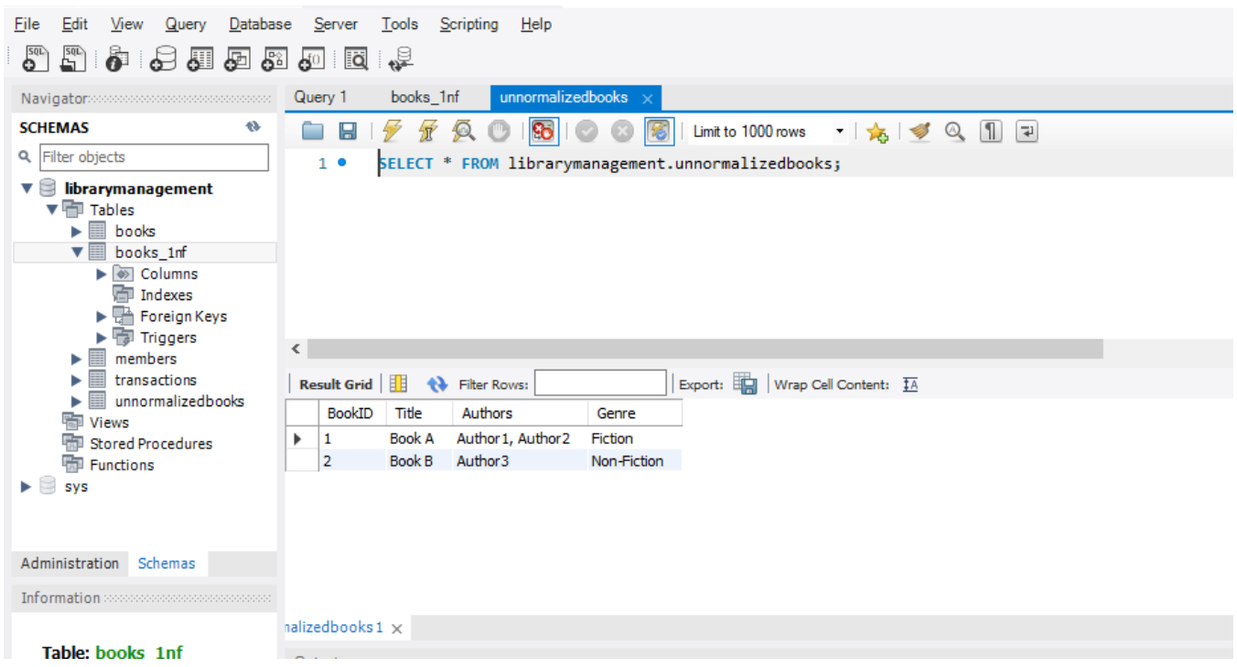

1. Insert normalized data:

```
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');
```

Result:
The table is now in 1NF with atomic values for each column.





Additional Questions/Discussions:

- How does 1NF improve data integrity?

1NF (First Normal Form) improves data integrity by ensuring that each column in a table contains only atomic (indivisible) values, and each row is unique. This eliminates duplicate data and prevents issues like repeating groups or arrays within a column. By structuring data in this way, 1NF helps avoid inconsistencies, simplifies updates, and ensures that data is easier to query and maintain, leading to more reliable and accurate information.

- What are atomic values, and why are they important?

Atomic values are indivisible pieces of data that cannot be broken down further. For example, a single phone number or a person's full name is an atomic value, whereas a list of phone numbers or an address with multiple components is not. They are important because they ensure data is stored in its simplest and most consistent form, making it easier to search, update, and maintain. Atomic values prevent redundancy and ambiguity, helping to maintain data integrity and reducing errors in databases.

Conclusions:

In conclusion, normalizing a table to First Normal Form (1NF) involves ensuring that each column contains only atomic, indivisible values and that each row is unique. This process eliminates duplicate data and repeating groups, making the table more structured and efficient. By organizing data in 1NF, we enhance data integrity, simplify updates, and improve overall data consistency, which lays the foundation for further normalization and better database design.