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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:

sql

1. Start with a 2NF table:

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Copy code
                                                                                                                                                                                                                                                                                  Title VARCHAR(100),
CREATE TABLE Books 2NF (
                                                                                                                                                                                                                                                                                   Author VARCHAR(100),
                 BookID INT,
                                                                                                                                                                                                                                                                                   PublisherID INT,
                 Title VARCHAR(100),
                 Author VARCHAR (100),
                                                                                                                                                                                                   No object selected
                  Genre VARCHAR (50),
                                                                                                                                                                                                                                                         PublisherID INT,
                                                                                                                                                                                                                                                                  | 39 | 141418 | DROP TABLE Tibraymanagement 'ipoks_2nt' | 0 row(s) affected | 14:14-24 | DROP TABLE Tibraymanagement 'ipoblishers' | 0 row(s) affected | 14:14-45 | CREATE TABLE Books_2NF( | BookID INT, Title VARCHAR(100), Author VARCHA... | 0 row(s) affected | 14:14-45 | CREATE TABLE Books_2NF( | BookID INT, Title VARCHAR(100), Author VARCHA... | 0 row(s) affected | 14:14-15 | CREATE TABLE Books_2NF( | BookID INT, Title VARCHAR(100), Author VARCHA... | 0 row(s) affected | 14:14-15 | CREATE TABLE Books_2NF( | BookID INT, Title VARCHAR(100), Author VARCHA... | 0 row(s) affected | 14:14-15 | CREATE TABLE Books_2NF( | BookID INT, Title VARCHAR(100), Author VARCHA... | 0 row(s) affected | 14:14-15 | CREATE TABLE Books_2NF( | BookID INT, Title VARCHAR(100), Author VARCHA... | 0 row(s) affected | 14:14-15 | CREATE TABLE Books_2NF( | BookID INT, Title VARCHAR(100), Author VARCHA... | 0 row(s) affected | 14:14-15 | CREATE TABLE Books_2NF( | BookID INT, Title VARCHAR(100), Author VARCHA... | 0 row(s) affected | 14:14-15 | CREATE TABLE Books_2NF( | BookID INT, Title VARCHAR(100), Author VARCHA... | 0 row(s) affected | 14:14-15 | CREATE TABLE Books_2NF( | BookID INT, Title VARCHAR(100), Author VARCHA... | 0 row(s) affected | 14:14-15 | CREATE TABLE Books_2NF( | BookID INT, Title VARCHAR(100), Author VARCHA... | 0 row(s) affected | 14:14-15 | CREATE TABLE Books_2NF( | BookID INT, Title VARCHAR(100), Author VARCHA... | 0 row(s) affected | 14:14-15 | CREATE TABLE Books_2NF( | BookID INT, Title VARCHAR(100), Author VARCHA... | 0 row(s) affected | 14:14-15 | CREATE TABLE Books_2NF( | BookID INT, Title VARCHAR(100), Author VARCHA... | 0 row(s) affected | 14:14-15 | CREATE TABLE Books_2NF( | Books_
                  PublisherName VARCHAR (100),
                  PublisherAddress VARCHAR (100)
);
               1. Insert data:
sql
Copy code
                               INSERT INTO Books 2NF (BookID, Title, Author, Genre,
                               PublisherID,
                               PublisherName, PublisherAddress)
                              VALUES
```

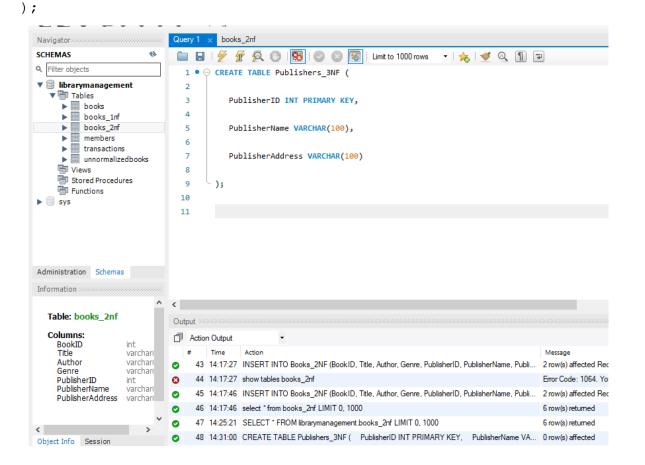
```
(1, 'Book A', 'Author1', 'Fiction', 1, 'Publisher1',
   'Address1'),
   (2, 'Book B', 'Author2', 'Non-Fiction', 1, 'Publisher1',
   'Address1');
Navigator:
SCHEMAS
                       43
                            □ □ □ | F F Q □ | B | □ □ □ | Limit to 1000 rows
Q Filter objects
                              1 • ⊖ INSERT INTO Books_2NF (BookID, Title, Author, Genre, PublisherID,
    librarymanagement
                                   PublisherName, PublisherAddress)
   ▼ 📅 Tables
                                    VALUES
     ▶ ■ books
                                    (1, 'Book A', 'Author1', 'Fiction', 1, 'Publisher1', 'Address1'),
     ▶ books_1nf
                                    (2, 'Book B', 'Author2', 'Non-Fiction', 1, 'Publisher1', 'Address1');
     ▶ books_2nf
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                                            Author 1
                              2
                                  Book B Author2 Non-Fiction 1
                                                                      Publisher 1
                                                                                 Address1
Administration Schemas
```

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

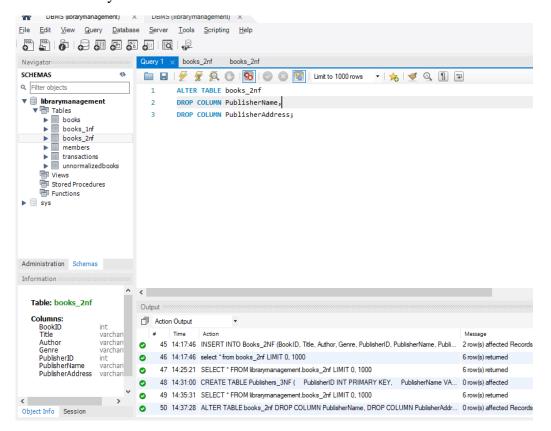
books 2nf7 x

```
copy code
CREATE TABLE Publishers_3NF (
   PublisherID INT PRIMARY KEY,
   PublisherName VARCHAR(100),
   PublisherAddress VARCHAR(100)
```

Information ::::::



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.

Additional Questions/Discussions:

• What are transitive dependencies, and why should they be eliminated?

Transitive dependencies occur when a non-key attribute depends on another non-key attribute through a third attribute. They should be eliminated to avoid redundancy and ensure that all non-key attributes depend only on the primary key, improving data consistency and integrity.

• How does 3NF improve data integrity?

3NF improves data integrity by removing transitive dependencies, ensuring that non-key attributes depend only on the primary key. This reduces redundancy and the potential for anomalies during updates, inserts, or deletes, leading to more consistent and reliable data.

Conclusions:

In conclusion, a crucial stage in database normalization is Third Normal Form (3NF). It deals with transitive dependencies and improves data integrity through effective information organization. 3NF ensures that non-key properties only depend on the primary key, removing redundancy and helping to create a well-organized and normalized relational database model.