Zafra kazmi

Db lab-10

56030

Normalization in DBMS (INF, 2NF, 3NF)

Task-1

Consider the following table "StudentCourse"

StudentID	StudentName	CourseID	CourseName	InstructorID	InstructorName	InstructorPhone	Grade
101	John Doe	CSE101	Data Structures	I01	Dr. Smith	555-1234	A
101	John Doe	CSE102	Databases	I02	Dr. Allen	555-5678	B+
102	Jane Roe	CSE101	Data Structures	I01	Dr. Smith	555-1234	B
103	Mark Smith	CSE103	Networking	I03	Dr. White	555-4321	A-
103	Mark Smith	CSE101	Data Structures	I01	Dr. Smith	555-1234	B

Submission:

- Submit a report containing the original table, and the tables in 1NF, 2NF, and 3NF.
- Provide explanations for each step of the normalization process.

Solution:

First Normal Form (1NF)

Primary key: StudentID & CourseID

StudentID	StudentName	CourseID	CourseName	InstructorID	InstructorName	InstructorPhone	Grade
101	John Doe	CSE101	Data Structures	I01	Dr. Smith	555-1234	A
101	John Doe	CSE102	Databases	I02	Dr. Allen	555-5678	B+
102	Jane Roe	CSE101	Data Structures	I01	Dr. Smith	555-1234	B
103	Mark Smith	CSE103	Networking	I03	Dr. White	555-4321	A-
103	Mark Smith	CSE101	Data Structures	I01	Dr. Smith	555-1234	B

Second Normal Form (2NF)

StudentName depend on StudentID-> partial dependency

CourseName, StudentID, InstructorName, InstructorPhone Depend on Course Id-> partial dependency

Solution:
Splits into tables

1. **Students Table**:

P.k: StudentID

StudentID	StudentName
101	John Doe
102	Jane Roe
103	Mark Smith

2. **Courses Table**:

P.k: CourseID

CourseID	CourseName	InstructorID
CSE101	Data Structures	I01
CSE102	Databases	I02
CSE103	Networking	I03

3. **Instructors Table**:

P.k: InstructorID

InstructorID	InstructorName	InstructorPhone
I01	Dr. Smith	555-1234
I02	Dr. Allen	555-5678
I03	Dr. White	555-4321

4. **Enrollments Table**:

P.k: CourseID

StudentID	CourseID	Grade
101	CSE101	A
101	CSE102	B+
102	CSE101	B
103	CSE103	A-
103	CSE101	B

Third Normal Form (3NF)

3NF Solution:

We break down the **Instructors Table** into two tables:

1. **Instructors Table**

InstructorID	InstructorName
I01	Dr. Smith
I02	Dr. Allen
I03	Dr. White

2. **InstructorPhone Table**

InstructorID	InstructorPhone
I01	555-1234
I02	555-5678
I03	555-4321

Final Tables in 3NF:

1. **Students Table**:

StudentID	StudentName
101	John Doe
102	Jane Roe
103	Mark Smith

2. **Courses Table**:

CourseID	CourseName
CSE101	Data Structures
CSE102	Databases
CSE103	Networking

3. **Instructors Table**:

InstructorID	InstructorName
I01	Dr. Smith
I02	Dr. Allen
I03	Dr. White

4. **InstructorPhone Table**:

InstructorID	InstructorPhone
I01	555-1234
I02	555-5678
I03	555-4321