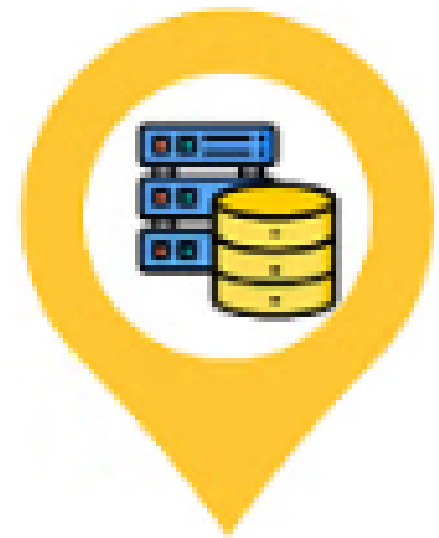# NORMALIZATION: BCNF & ITS IMPORTANCE

Case Study on University Student Database

BY: Dhatchitha Prakash

INTRODUCTION

- **Normalization eliminates redundancy and anomalies.**
- **BCNF is an advanced form of 3NF.**
- **Ensures better data integrity and efficiency.**

BCNF
Boyce-Codd
Normal
Form

TRANSITION FROM 3NF TO BCNF

- In 3NF, we reduced redundancy, but some hidden dependencies still exist.
- Example: Instructors are still tied to courses in a way that causes data duplication.
- If an instructor changes for a course, we may have to update multiple records.
- This can lead to update anomalies and inconsistencies.
- To solve this, we apply BCNF to further normalize the database.

STUDENTS TABLE

- **Stores only student details**
- **Avoids duplicate names when students take multiple courses**

StudentID	Name
1	John
2	Alice
3	Bob

COURSES TABLE

- **Each course is stored once with a unique CourseID**
- **Prevents repetition of course names**

CourseID	CourseName
CS101	Computer Science 101
CS102	Computer Science 102

INSTRUCTORS TABLE

- **Stores instructor details separately**
- **Prevents duplicate contact info across student records**

InstructorID	Instructor Name	Contact
1	Dr. Smith	123-456-7890
2	Dr. Brown	987-654-3210

COURSE_INSTRUCTOR TABLE

- **Links courses and instructors**
- **If an instructor changes, update only this table**

CourseID	InstructorID
CS101	1
CS102	2

STUDENT_COURSE TABLE

- **Tracks which students are enrolled in which courses**
- **Prevents repeating course names for each student**

StudentID	CourseID
1	CS101
2	CS101
3	CS102

WHY IS BCNF PREFERRED OVER 3NF?

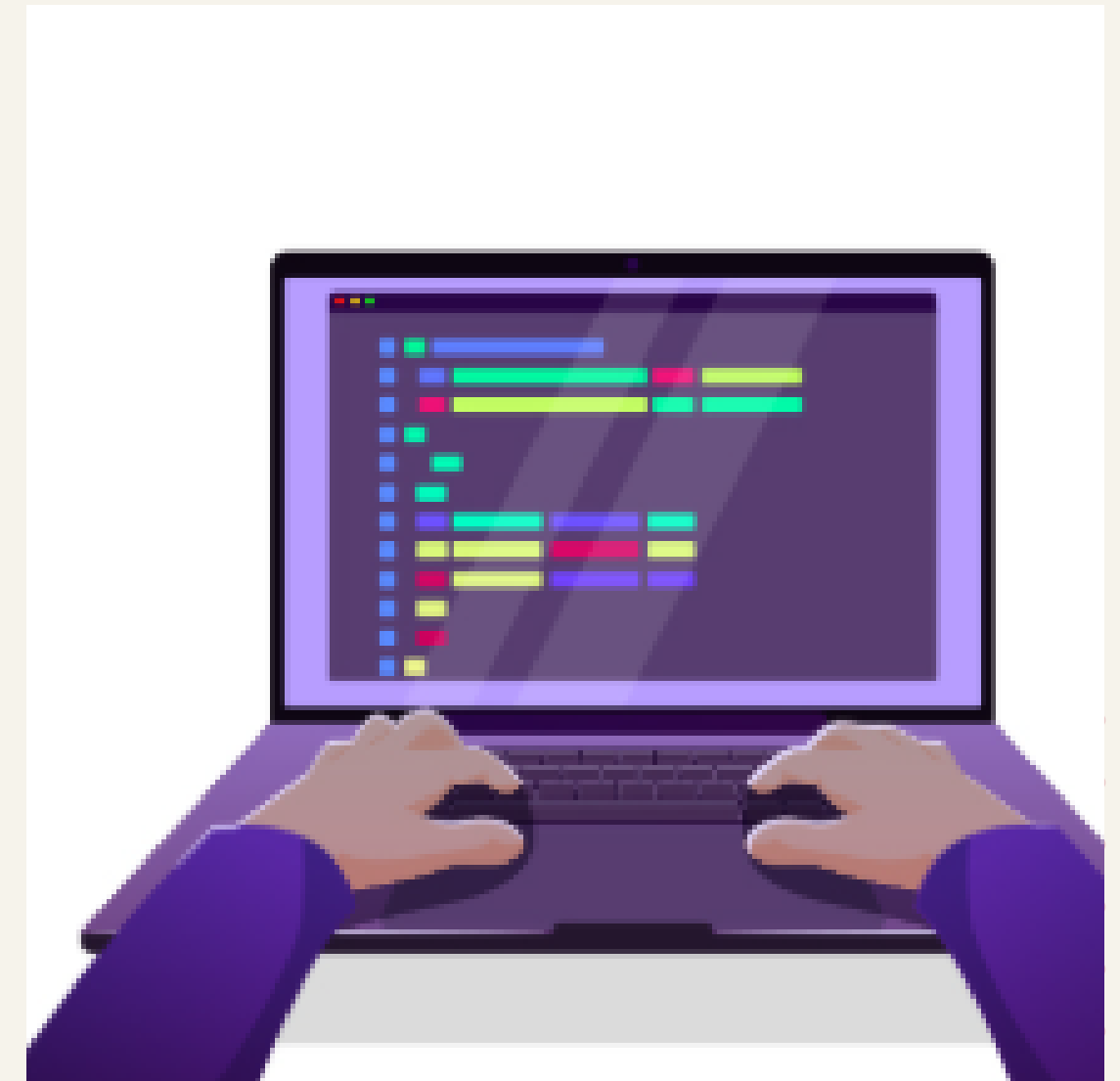**1** 3NF removes most redundancy but can still have hidden dependencies

2 BCNF ensures no unnecessary dependencies

3 Every determinant must be a candidate key

CONCLUSION

- **BCNF removes all redundancy**
- **Makes the database scalable and easier to maintain**
- **Ensures data consistency and accuracy**

Q&A

THANK YOU

BY: Dhatchitha Prakash