

Database theory  
Normalization

# Normalization Anomalies

- **Update anomalies –**
  - If data items are scattered and are not linked to each other properly, then it could lead to strange situations. For example, when we try to update one data item having its copies scattered over several places, a few instances get updated properly while a few others are left with old values. Such instances leave the database in an inconsistent state.

# Normalization Anomalies

- **Deletion anomalies –**
  - We tried to delete a record, but parts of it was left undeleted because of unawareness, the data is also saved somewhere else.
- **Insert anomalies –**
  - We tried to insert data in a record that does not exist at all.

# Normalization

- First Normal Form (1NF)
  - All the attributes in a relation must have atomic domains. The values in an atomic domain are indivisible units.

Course	Content
Programming	Java, c++
Web	HTML, PHP, ASP



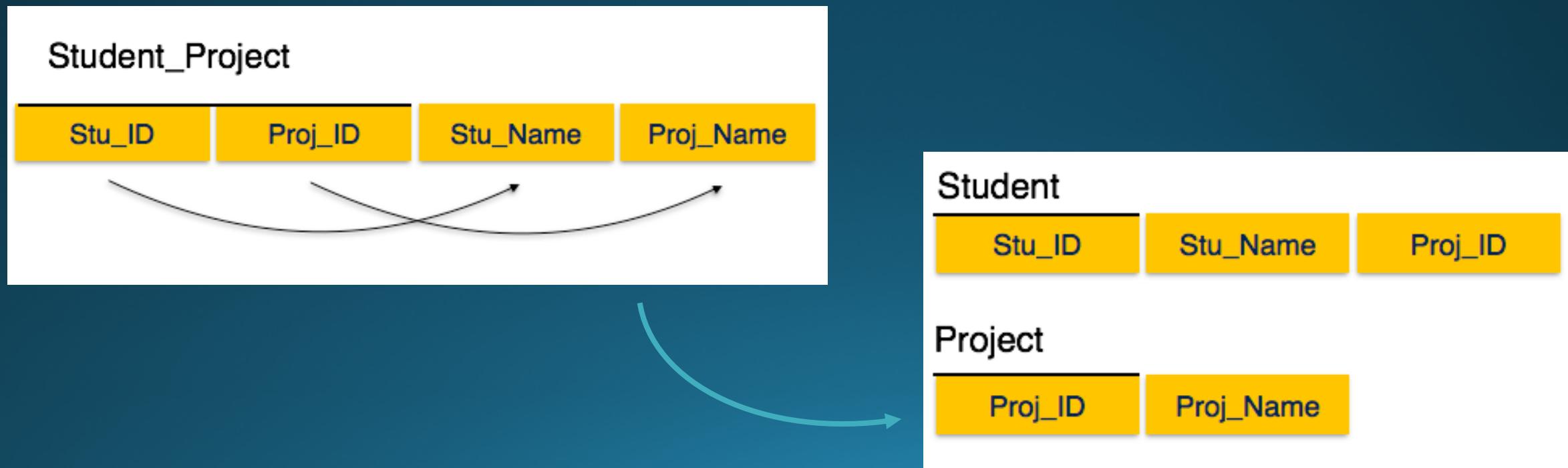
Course	Content
Programming	Java
Programming	c++
Web	HTML
Web	PHP
Web	ASP

# Normalization

- Second Normal Form (2NF)
  - For a relation to be in Second Normal Form, it must be in First Normal form and the following must satisfy –
    - **Prime attribute** –
      - An attribute, which is a part of the prime-key, is known as a prime attribute.
    - **Non-prime attribute** –
      - An attribute, which is not a part of the prime-key, is said to be a non-prime attribute.

# Normalization

- Second Normal Form (2NF)
  - Every non-prime attribute should be fully functionally dependent on prime key attribute. That is, if  $X \rightarrow A$  holds, then there should not be any proper subset  $Y$  of  $X$ , for which  $Y \rightarrow A$  also holds true.



# Normalization

- Third Normal Form (3NF)
  - For a relation to be in Third Normal Form, it must be in Second Normal form and the following must satisfy –
    - No non-prime attribute is transitively dependent on prime key attribute.
    - For any non-trivial functional dependency,  $X \rightarrow A$ , then either –
      - $X$  is a super key or,
      - $A$  is prime attribute.

# Normalization

- Third Normal Form (3NF)

Student_Detail			
Stu_ID	Stu_Name	City	Zip



Student_Detail			
Stu_ID	Stu_Name	Zip	City
ZipCodes			
Zip			City

**THIS.....  
IS.....  
EMPTY!!!!**

