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NORMALIZATION

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INTRODUCTION

- Normalization is the process of organizing data in a database to reduce redundancy and improve data integrity.
- It divides large table into smaller tables and create relationship between them to minimize duplicate data .

- OBJECTIVE :
- To achieve storage efficiency ,ensure data accuracy.
- To reduce chances of data anomalies(insertion , update and deletion anomalies).

- An **anomaly** is an inconsistency or error that arises when performing operations like updating, inserting, or deleting data in a database.

Non-normalized table

EmployeeID	EmployeeName	Department	Project
101	John	HR	Payroll
102	Mike	IT	System
101	John	HR	System
103	Sarah	IT	Payroll

Normalization of the Previous table

EmployeeID	Employee
101	John
102	Mike
103	Sarah

DepartmentID	Department
1	HR
2	IT

ProjectID	Project
1	Payroll
2	System

EmployeeID	DepartmentID	ProjectID
101	1	1
102	2	2
101	1	2
103	2	1

❖ Explanation of the normalization process

- There is a table where all the data - employeeID , employeename, department and project-is combined together .In larger table ,I t will get messy and confusing.
- So, we break the given table into different smaller tables with each table having unique and related data like employee table , department table and project table .It makes table organized and easy to update and edit.
- We create relationship between this tables by using foreign keys and primary key.
- Now, each peace of record is stored once , Instead of repeating the same data across multiple records.

- Primary key : It ensures that each record can be uniquely identified.
- Foreign key : It creates a link between two tables.

•**Avoids Data Inconsistency:** Prevents discrepancies by maintaining single data copies.

❑ Purpose of Normalization

- Reduces redundancy:
  - Eliminates Duplicate Data: Ensures data is stored only once, reducing storage requirements.

- Improve data integrity :
  - Maintains Data Accuracy: Ensures data remains accurate and consistent.
  - Enforces Data Integrity Constraints: Uses primary keys, foreign keys, and unique constraints to maintain data relationships.

- Reduces complexity :Simplifies database design for easier management and navigation.
- Enhance query processing : Enhances query performance by structuring data efficiently.

Avoiding data Anomalies

- Insertion anomaly :

Definition: An insertion anomaly occurs when certain data cannot be inserted into the database without the presence of other data.

Example : A new department is created, but there are no employees in it yet.

- Update anomaly :

Definition: editing in one place must be updated everywhere.

Example: updating student's course information in multiple rows.

- Deletion anomaly :

Definition: A deletion anomaly occurs when the deletion of certain data results in the loss of additional, unintended data.

Example : deleting employee's contact records removes the employee's whole data.

Conclusion

- Normalization is essential for data integrity, efficiency, and reliability.
- It transforms disorganized data into a organized form.
- Just like organizing your workspace boosts productivity, normalizing data elevates database performance.

THANK YOU