HABIB UNIVERSITY

Database Systems

CS/CE 355/373 Fall 2023

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Data Anomalies Solution

For the given relation schemas, identify one situation each for where insertion, deletion and modification anomalies may occur, and what is the straightforward solution for it?

- CustOrder (OrderID, OrderDate, TotalAmount, CustomerName, CustomerEmail)
- SupplierProduct (SupplierID, SupplierName, Address, ProductID, ProductName, Price)
- SalesInvoice (ProductID, ProductName, Price, InvoiceID, InvoiceDate, Customer)
- StudentCourse (StudentID, StudentName, CourseID, CourseTitle, Semester, Year)

ONE TENTATIVE SOLUTION:

- CustOrder (OrderID, OrderDate, TotalAmount, CustomerName, CustomerEmail)
    - **Insertion Anomaly:** If a customer has not placed any orders yet, there will be no record for that customer in the "Orders" relation. This can lead to an insertion anomaly, as we cannot insert a new customer without placing an order for them, which is not true to design, as a customer can register first without placing any orders
    - **Deletion Anomaly:** If we delete a record of a customer who has placed only one order, we will lose all information about that customer. This can lead to a deletion anomaly, as we may unintentionally delete important customer data while deleting a single order.
    - **Modification Anomaly:** If a customer changes their contact information, we need to update multiple records in the "Orders" relation to reflect the changes. This can lead to a modification anomaly, as we may forget to update some records or update them incorrectly, resulting in inconsistent data.

- SupplierProduct (SupplierID, SupplierName, Address, ProductID, ProductName, Price)
    - **Insertion Anomaly:** If a supplier has not supplied any products yet, there will be no record for that supplier in the relation. This can lead to an insertion anomaly, as we cannot insert a new supplier without supplying them with a product.
    - **Deletion Anomaly:** If we delete a record of a product that is the only supplied by one supplier, we will lose all information about that supplier. This can lead to a deletion anomaly, as we may unintentionally delete important supplier data while deleting a single product.
    - **Modification Anomaly:** If a supplier's contact information changes, we need to update multiple records in the relation to reflect the changes. This can lead to an modification anomaly, as we may forget to update some records or update them incorrectly, resulting in inconsistent data.

- SalesInvoice (ProductID, ProductName, Price, InvoiceID, InvoiceDate, Customer)
    - **Insertion Anomaly:** If a salesperson has not made any sales yet, there will be no record for that salesperson in the relation. This can lead to an insertion anomaly, as we cannot insert a new salesperson without any sales.
    - **Deletion Anomaly:** If we delete a record of a sale done by only one salesperson, we will lose all information about that salesperson. This can lead to a deletion anomaly, as we may unintentionally delete important salesperson data while deleting a single sale.
    - **Modification Anomaly:** If the price of a product changes, we need to update multiple records in the relation to reflect the changes. This can lead to a modification anomaly, as we may forget to update some records or update them incorrectly, resulting in inconsistent data.

- StudentCourse (StudentID, StudentName, CourseID, CourseTitle, Semester, Year)
    - **Insertion Anomaly:** If a student has not enrolled in any courses yet, there will be no record for that student in the relation. This can lead to an insertion anomaly, as we cannot insert a new student without enrolling them in a course.
    - **Deletion Anomaly:** A student has enrolled in only one course. If we delete a record of a course, we will lose all information about that student. This can lead to a deletion anomaly, as we may unintentionally delete important student data while deleting a single course enrollment.
    - **Modification Anomaly:** If a course ID is updated by the department, we need to update multiple records in the relation to reflect the changes. This can lead to a modification anomaly, as we may forget to update some records or update them incorrectly, resulting in inconsistent data.