Database Foundations

1-4
Relational Databases and Normalization
Objectives

This lesson covers the following objectives:

• Describe the features of a relational database
• Explain the rules of a relational database
• Explain the objectives of normalization
• Describe the types of normalization
Introduction to Relational Databases

- A relational database stores information in tables with rows and columns.
- A table is a collection of records.
- A row is called a record (or instance).
- A column is referred to as a field (or attribute).
Relational Database Example

Order Detail Table

<table>
<thead>
<tr>
<th>Order Detail ID</th>
<th>Order Details</th>
<th>Customer ID</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Customer Table

<table>
<thead>
<tr>
<th>Customer ID</th>
<th>Customer Name</th>
<th>Customer Address</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A relational database consists of tables that are linked by a common attribute.
Rules for Relational Databases

• Each table has a distinct name.
• Each table may contain multiple rows.
• Each table has a value to uniquely identify the rows.
• Each column in a table has a unique name.
Normalization

• Is the process of organizing the attributes and tables of a relational database to minimize redundancy.

• Helps in handling insert, update, and delete anomalies, ensuring a better performance of the database.
Objectives of Normalization

• To free the collection of tables from undesirable insertion, update, and deletion dependencies

• To reduce the need for restructuring the collection of relations, as new types of data are introduced, and thus increase the life span of application programs

• To make the relational model more informative to users

• To make the collection of tables neutral to the query statistics, where these statistics are liable to change as time goes by

As specified by E.F. Codd
Advantages of a Relational Database

- Avoids duplication of data
- Ensures consistency of the data that is stored as records
- Easier to modify data and data format
- Easier to insert and delete data
- Easier to maintain security of data
Data Integrity

• Data integrity is a very essential function of relational databases.

• Data integrity:
  – Ensures that data is accurate.
  – Ensures that data is consistent.
  – Is achieved through normalization, defined business rules, and validated data.
Quiz

Data integrity ensures the accuracy of information.

a. True
b. False
Summary

In this lesson, you should have learned how to:

• Describe the features of a relational database
• Explain the rules of a relational database
• Explain the objectives of normalization
• Describe the types of normalization