

2. Understanding Relational Databases

Key Components of a Relational Database

- ◆ **Relation:** A table with rows and columns. It is important to note that the examples shown in this lesson may only display a sample of the rows, and in reality, a relation can contain thousands of rows of data.
- ◆ **Record:** Each row in a table is referred to as a record or tuple. Every row in a table must be unique.
- ◆ **Attribute:** Each column in a table represents an attribute.
- ◆ **Primary Key:** One or more attributes are used as a constraint to uniquely identify each row in a table. The primary key ensures the uniqueness of each record.

The diagram shows a table with four columns: CustomerID, FirstName, LastName, and Birthdate. Four rows are displayed. Annotations with red arrows and boxes identify key components: 'Column (attribute)' points to the 'FirstName' header; 'Table (relation)' points to the entire table; 'Row (tuple)' points to the second row; 'Primary key' points to the 'CustomerID' column; and 'Data value' points to the 'Green' value in the 'LastName' column of the fourth row.

| CustomerID | FirstName | LastName | Birthdate |
|------------|-----------|-----------------|--------------------|
| XY001 | John | Doe | April 18, 1929 |
| BR092 | Mary | Green | March 4, 1980 |
| PD500 | Francesca | de la Gillebert | September 12, 1959 |
| WI308 | John | Green | March 4, 1980 |

Relationships between Tables

It is crucial to understand the difference between the terms "relation" and "relationship" in the context of relational databases. A relation refers to a table, while a relationship describes the connection between two separate tables.

- ◆ Each table in a database must be related to one another.
- ◆ Foreign keys are used to capture the inter-table relationships.
- ◆ In a one-to-many relationship, the foreign key is always located at the "many" end of the relationship.

- ◆ The values in the foreign key column must exist as primary key values in the related table, ensuring referential integrity.

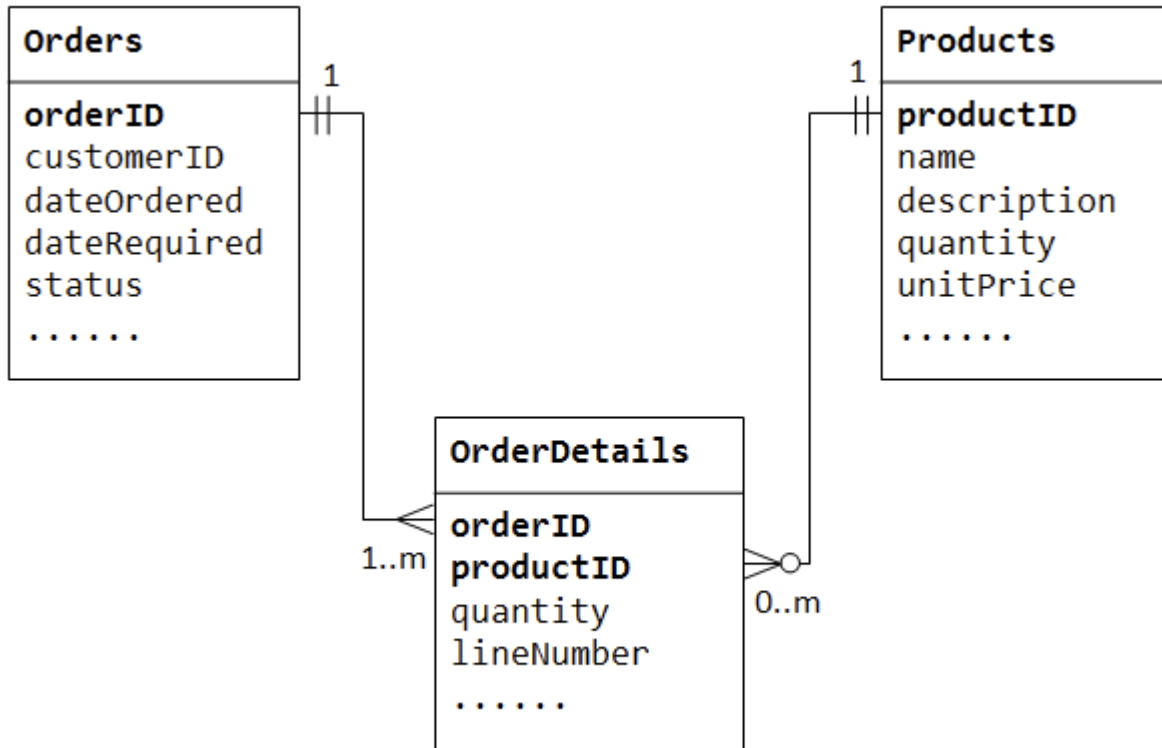


Table and Column Naming Conventions

- ◆ Each table in a relational database must have a unique name.
- ◆ Within a table, each column must have a unique name.

Choosing Primary Keys

When designing a relational database, it is important to choose appropriate primary keys. Using attributes like first name and last name as primary keys is generally not recommended, as they may not be unique. Instead, consider using surrogate keys, such as a unique identifier (e.g., `tutor_id`), to ensure the uniqueness of each record.

Database Management Systems (DBMS)

To work with relational databases, we typically install a Database Management System (DBMS). A DBMS is an application that provides an interface between the user or application and the physical storage of the data. It offers various features and functionalities, including:

- ◆ **SQL (Structured Query Language) Interpreter**: A DBMS incorporates an SQL interpreter that interprets and executes SQL code, allowing users to interact with the database and retrieve results.

There are different types of DBMSs available, each suited for different database sizes and requirements, ranging from corporate-size databases to smaller-scale databases.

See Also

[3. Introduction to Information Systems and Data Modelling](#)