

# SQL Data Integrity and Constraints Examples

This document provides SQL examples for demonstrating data integrity concepts and constraint applications.

## Data Integrity and Data Integrity Constraints

Data integrity refers to the accuracy and consistency of data stored in a database. Data integrity constraints are rules that are enforced on data to ensure its accuracy and reliability. These constraints prevent invalid data from being entered into the database.

### Domain Integrity

Domain integrity ensures that data values in a column are valid. It defines the permissible values for an attribute.

### Domain Integrity - SQL Data Types

SQL data types restrict the type of data that can be stored in a column.

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```
-- Example: Creating a table with various data types
CREATE TABLE Products (
    ProductID INT,
    ProductName VARCHAR(255),
    Price DECIMAL(10, 2),
    StockQuantity INT,
    IsActive BOOLEAN,
    DateAdded DATE
);
```

### Domain Integrity - NOT NULL and DEFAULT Constraints

NOT NULL ensures that a column cannot have a NULL value. DEFAULT provides a default value for a column if no value is specified.

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```
-- Example: Adding NOT NULL and DEFAULT constraints
CREATE TABLE Employees (
    EmployeeID INT PRIMARY KEY,
    FirstName VARCHAR(255) NOT NULL,
    LastName VARCHAR(255) NOT NULL,
    Department VARCHAR(255) DEFAULT 'General'
);
```

## Entity Integrity

Entity integrity ensures that each row in a table is uniquely identifiable. It primarily involves the use of primary keys.

### Entity Integrity - Primary Keys

A primary key uniquely identifies each record in a table.

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-- Example: Creating a table with a primary key
CREATE TABLE Customers (
    CustomerID INT PRIMARY KEY,
    CustomerName VARCHAR(255),
    City VARCHAR(255)
);
```

### Entity Integrity - Primary Keys for Group of Columns

A composite primary key uses multiple columns to uniquely identify a record.

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-- Example: Creating a table with a composite primary key
CREATE TABLE OrderItems (
    OrderID INT,
    ProductID INT,
    Quantity INT,
    PRIMARY KEY (OrderID, ProductID)
);
```

## Referential Integrity - Foreign Key Constraints

Referential integrity ensures that relationships between tables are consistent. Foreign keys are used to establish these relationships.

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-- Example: Creating a table with a foreign key
CREATE TABLE Orders (
    OrderID INT PRIMARY KEY,
    CustomerID INT,
    OrderDate DATE,
    FOREIGN KEY (CustomerID) REFERENCES Customers(CustomerID)
);
```

## User-Defined Constraints

User-defined constraints are custom rules created by users to enforce business rules that cannot be enforced by other constraints.

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-- Example: Creating a check constraint for a salary
CREATE TABLE Salary (
    EmployeeID INT PRIMARY KEY,
    Salary DECIMAL(10, 2),
    CONSTRAINT CHK_Salary CHECK (Salary >= 0)
);
```