Understanding SQL Data Types

Naveen R

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1 Introduction

SQL supports various data types to represent different kinds of information. Each data type is designed to handle specific types of values.

2 Data Types in SQL

2.1 Numeric Types

2.1.1 INT (INTEGER)

- Represents whole numbers.
- Typically used for counting or as an identifier.
- Commonly used when the range of values needed is relatively small.

```
CREATE TABLE ExampleTable (
    ID INT,
    Quantity INT
);
```

2.1.2 SMALLINT

- Similar to `INT` but with a smaller range.
- Suitable for cases where the values will be small integers.

```
CREATE TABLE ExampleTable (
    ID SMALLINT,
    Age SMALLINT
);
```

2.1.3 BIGINT

- Represents large whole numbers.
- Used when the range of values exceeds what can be accommodated by `INT`.

```
CREATE TABLE ExampleTable (
    ID BIGINT,
    Revenue BIGINT
);
```

2.1.4 DECIMAL (NUMERIC)

- Used for fixed-point or exact decimal numbers.
- Requires specifying the precision (total number of digits) and scale (number of digits to the right of the decimal point).

```
CREATE TABLE ExampleTable (
    Price DECIMAL(10, 2),
    TotalAmount DECIMAL(15, 4)
);
```

2.1.5 FLOAT and DOUBLE PRECISION

- Used for approximate numeric values (floating-point numbers).
- Suitable for scientific and engineering calculations where an exact representation is not critical.

```
CREATE TABLE ExampleTable (
    Temperature FLOAT,
    Pi DOUBLE PRECISION
);
```

2.2 Character Strings

2.2.1 CHAR(n)

- Fixed-length character string.

```
CREATE TABLE ExampleTable (
    FirstName CHAR(50),
    LastName CHAR(50)
);
```

2.2.2 VARCHAR(n)

- Variable-length character string.

```
CREATE TABLE ExampleTable (
    Address VARCHAR(255),
    Comments VARCHAR(1000)
);
```

2.2.3 TEXT

- Variable-length character string for large amounts of text.

```
CREATE TABLE ExampleTable (
    Description TEXT,
    Content TEXT
);
```

2.3 Date and Time Types

2.3.1 DATE

- Represents a date in YYYY-MM-DD format.

```
CREATE TABLE ExampleTable (
    Birthdate DATE,
    EventDate DATE
);
```

2.3.2 TIME

- Represents a time of day in HH:MI:SS format.

```
CREATE TABLE ExampleTable (
    StartTime TIME,
    EndTime TIME
);
```

2.3.3 DATETIME (TIMESTAMP)

- Represents both date and time.

```
CREATE TABLE ExampleTable (
    CreatedAt DATETIME,
    UpdatedAt TIMESTAMP
);
```

2.4 Boolean Type

2.4.1 BOOLEAN (BOOL)

- Represents true or false values.

```
CREATE TABLE ExampleTable (
    IsActive BOOLEAN,
    IsAdmin BOOL
);
```

2.5 Binary Types

2.5.1 BINARY

- Fixed-length binary data.

```
CREATE TABLE ExampleTable (
    ImageData BINARY(100),
    Signature BINARY(64)
);
```

2.5.2 VARBINARY

- Variable-length binary data.

```
CREATE TABLE ExampleTable (
    FileData VARBINARY(1024),
    BinaryContent VARBINARY(2048)
);
```

2.5.3 BLOB

- Binary large object, used for storing large binary data.

```
CREATE TABLE ExampleTable (
    Document BLOB,
    Image BLOB
);
```

2.6 Other Types

2.6.1 ENUM

- Enumeration type, a list of values.

```
CREATE TABLE ExampleTable (
    Status ENUM('Pending', 'Approved', 'Rejected'),
    Priority ENUM('High', 'Medium', 'Low')
);
```

2.6.2 SET

- Set type, a set of values.

```
CREATE TABLE ExampleTable (
    Features SET('Feature1', 'Feature2', 'Feature3'),
    Permissions SET('Read', 'Write', 'Execute')
);
```

2.6.3 JSON

- JSON data type.

```
CREATE TABLE ExampleTable (
    UserData JSON,
    Configuration JSON
);
```

2.7 Specialized Types

2.7.1 Spatial Data Types

- Used for representing spatial data, such as geographic information.

```
CREATE TABLE ExampleTable (
    Location GEOMETRY,
    Route LINESTRING
);
```

3 Conclusion

The choice of a specific data type in SQL depends on the nature of the data and its intended use. Always refer to the documentation of your specific database system for detailed information on data types and their characteristics.