Notes on Booleans

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September 16th, 2024

Contents

1 Booleans

- **Definition**: Used to store truth values.
- **Type Name**: BOOLEAN.
- **Values**: TRUE, FALSE, UNKNOWN.
- **Null Value**: Equivalent to UNKNOWN.
- **Special Case in Some Languages**:
  - MySQL uses a tinyInt value of 0 or 1 for Boolean values.
  - 1 = true.
  - 0 = false.

2 Character Data Types

- **Definition**: Character string (string) types are used to represent text.
- **Strings**:
  - Ordered sequences of zero or more characters.
  - Length can be fixed or varying.
  - Case sensitive.
  - In SQL statements, strings are surrounded by single quotes.
  - The length of a string is an integer between 0 and the specified length.
- **CHAR**:
  - Also called CHARACTER.
  - Requires a specified width (number of characters).
  - Example: CHAR(50) allows a character string of up to 50 characters.
  - Excess characters are truncated from the right.
  - Fixed-length strings are sorted and manipulated faster than variable-length strings.
- **VARCHAR**:
  - Varying character type requires a specified width.
  - Uses only as much storage space as required by the object, up to the set amount.
  - Example: VARCHAR(50).
- **When to Use String or Numeric**:

  - Consider if arithmetic calculations will be performed on the values.
  - Example: US Postal codes (all digits, fixed length) are best stored as characters.
  - Example: Telephone numbers (all digits, fixed length) are best stored as characters.

3 Datatypes

- **Definition**: Indicates the type of data that can be stored in a field.
- **Column Data Type**: Each column has a single data type.
- **Sort Order**:
  - The data type affects the column's sort order.
  - Example: Values 10, 1, 2 are sorted as 1, 2, 10 for integers.
  - For strings, they are sorted as 1, 10, 2 (lexicographical ordering).
- **Categories of Data**:
  - Numeric
  - Character
  - Temporal (date and time)

4 Large Objects

- **CLOB and BLOB**:
  - When the character column is larger than the maximum VARCHAR (255), a large-object character type is required.
  - **CLOB** (Character Large Object): Used to store large amounts of character data.
  - **BLOB** (Binary Large Object): Used to store binary data such as images, sound, and video.
  - Note: MySQL implements TEXT instead of CLOB.

5 Numeric Data Types

- **Types**:
  - **Exact**:
    * INTEGER: Holds both positive and negative whole numbers. Range: -2,147,483,648 to 2,147,483,647.

    - SMALLINT: Smaller range of integers. Range: -31,768 to 31,767.
    - BIGINT: Larger range than INTEGER. Range: -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807.
    - MEDIUMINT (MySQL): Range: -8,388,608 to 8,388,608.
    - TINYINT (MySQL and SQL): Range: -128 to 127.
    - DECIMAL/NUMERIC: Made up of precision (total number of digits) and scale (digits to the right of the decimal point). Example: NUMERIC(5,2) can store 123.89.
  - **Approximate**:
    - FLOAT: Used for floating point numbers. Example: FLOAT(size, d) where size is the total number of digits and d is the number of digits to the right of the decimal point.

- **Considerations**:
  - Exact types ensure the value retrieved is exactly the same as stored.
  - Approximate types may retrieve a value very close to the original.
  - Calculations involving only integers are faster than those involving decimal and floating point numbers.

6 Temporal Data Types

- **DATE**:
  - Used to store date values from the Common Era calendar (standard 365-day Gregorian calendar).
  - Components: Year, Month, Day.
  - Input formats vary across database systems.
  - Recommended format: YYYY-MM-DD (recognized by all database systems).
- **TIME**:
  - Used to store time values.
  - Differences exist between input format, storage format, and display format.
  - Used for recurring clock times and durations.
  - Based on the 24-hour clock (military time).
  - Format: hh:mm:ss (colons separate the parts of time).
  - In MS ACCESS, surround datetime literals with # (e.g., #2006-03-17#).
- **Time Stamp**:
  - Consists of both a date and time component.
  - Used when an event has a specific date and time.