

SQL Server Data Types

SQL Server data types grouped by their categories:

1. Numeric Data Types

- 1) bit: Integer that can take a value of 1, 0, or NULL.
- 2) tinyint: Integer data from 0 to 255.
- 3) smallint: Integer data from -32,768 to 32,767.
- 4) int: Integer data from -2,147,483,648 to 2,147,483,647.
- 5) bigint: Integer data from -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807.
- 6) decimal(p,s) or numeric(p,s): Fixed precision and scale numbers.
p = precision (total number of digits), s = scale (number of digits to the right of the decimal point).
- 7) smallmoney: Monetary data from -214,748.3648 to 214,748.3647.
- 8) money: Monetary data from -922,337,203,685,477.5808 to 922,337,203,685,477.5807.
- 9) float(n): Floating point number with a binary precision of n (from 1 to 53).
- 10) real: Floating point number, equivalent to float(24).

2. Date and Time Data Types

- 1) date: Date values from January 1, 0001, to December 31, 9999.
- 2) time: Time values ranging from 00:00:00.00000000 to 23:59:59.99999999.
- 3) datetime: Date and time from January 1, 1753, to December 31, 9999, with an accuracy of 3.33 milliseconds.
- 4) smalldatetime: Date and time from January 1, 1900, to June 6, 2079, with an accuracy of 1 minute.
- 5) datetime2: Date and time from January 1, 0001, to December 31, 9999, with an accuracy of 100 nanoseconds.
- 6) datetimeoffset: Date and time including a time zone offset, ranging from January 1, 0001, to December 31, 9999.
- 7) timestamp (or rowversion): Automatically generated binary number unique within a database.

3. Character Strings Data Types

- 1) char(n): Fixed-length non-Unicode string, where n defines the length (1 to 8,000 characters).
- 2) varchar(n): Variable-length non-Unicode string, where n defines the maximum length (1 to 8,000 characters).
- 3) varchar(max): Variable-length non-Unicode string that can store up to $2^{31}-1$ characters.
- 4) text: Variable-length non-Unicode data with a maximum length of $2^{31}-1$ characters (deprecated).

4. Unicode Strings Data Types

- 1) `nchar(n)`: Fixed-length Unicode string, where `n` defines the length (1 to 4,000 characters).
- 2) `nvarchar(n)`: Variable-length Unicode string, where `n` defines the maximum length (1 to 4,000 characters).
- 3) `nvarchar(max)`: Variable-length Unicode string that can store up to $2^{31}-1$ characters.
- 4) `ntext`: Variable-length Unicode data with a maximum length of $2^{31}-1$ characters (deprecated).

5. Binary Data Types

- 1) `binary(n)`: Fixed-length binary data with a length of `n` bytes (1 to 8,000 bytes).
- 2) `varbinary(n)`: Variable-length binary data with a maximum length of `n` bytes (1 to 8,000 bytes).
- 3) `varbinary(max)`: Variable-length binary data with a maximum storage size of $2^{31}-1$ bytes.
- 4) `image`: Variable-length binary data with a maximum length of $2^{31}-1$ bytes (deprecated).

6. Other Data Types

- 5) `uniqueidentifier`: Stores globally unique identifiers (GUIDs).
- 6) `xml`: Stores XML data.
- 7) `cursor`: A reference to a cursor for database operations.
- 8) `table`: A special data type that stores a result set for later processing.
- 9) `sql_variant`: Stores values of various SQL Server-supported data types.

These are the major SQL Server data types, categorized for better understanding.

Some data types like `text`, `ntext`, and `image` are deprecated and should be avoided in favor of newer types like `varchar(max)` and `varbinary(max)`.