

SQL Course

Data Types

- Illustrate and describe the various data types and constants available in the SQL language.
- Describe how SQL handles missing or unknown values using the **NULL** keyword.

SQL2 Data Types

- A database is a named allocation of storage space that will contain tables, views, indexes and other database objects.
- Every table is made up of a collection columns in which data will be stored.
- All data that is stored in a given column must be of the same data type.
- The data type is therefore an attribute of the column.

The data type of a column specifies what kind of information the column will hold (characters, numbers, dates and so on), so that the system will know how the data is to be physically stored, and how it can be manipulated. The data that will be stored in these columns will vary greatly from numeric numbers to names and places to dates and times. As a result of this the database must support certain data types. The ANSI/ISO standards specify various types of data that can be stored in an SQL2 compliant database and hence be manipulated by the SQL2 language. The SQL2 data types are listed below:

SQL2 Data Types

Data Type	Description
CHAR (len) CHARACTER (len)	Fixed length character strings
VARCHAR (len) CHAR VARYING (len) CHARACTER VARYING (len)	Variable length character strings*
NCHAR (len) NATIONAL CHAR (len) NATIONAL CHARACTER (len)	Fixed length national character strings*
NCHAR VARYING (len) NATIONAL CHAR VARYING (len) NATIONAL CHARACTER VARYING (len)	Variable length national character strings*
INTEGER INT	Integer numbers
SMALLINT	Small integer numbers

BIT (len)	Fixed length bit string*
BIT VARYING (len)	Variable length bit string*
NUMERIC (precision, scale) DECIMAL (precision, scale) DEC (precision, scale)	Decimal numbers
FLOAT (precision)	Floating point numbers
REAL	Low precision floating point numbers
DOUBLE PRECISION	High precision floating point numbers
DATE	Calendar Date*
TIME (precision)	Clock time*
TIMESTAMP (precision)	Date and time*
INTERVAL	Time interval*

String

Character strings are either fixed or variable length. Columns of variable length are allowed to store character strings that vary in length from row to row, up to some maximum length. Different character sets may be used when assigning a data type to a column. The different character sets that are supported will depend on the specific product that will be used. The character set is assigned by specifying '**CHARACTER SET Kanji**' for example after the character string data type (Kanji is a Japanese character set). **NATIONAL CHARACTER** is provided as a shorthand to conform to previous Japanese SQL standards in an upwardly compatible manner.

Bit

The bit data type is used to define bit strings. A bit string is a sequence of binary digits(bits), each having the value 0 or 1. The bit data type is intended to allow for data whose structure is unknown or is not supported by SQL to be stored in SQL tables.

Date-Time

The SQL2 standard supports an elaborate specification for **DATE**, **TIME**, **TIMESTAMP** and **INTERVAL** data types, including support for time zones and time precision. Every date-time data type consists of a contiguous subset of the fields: **YEAR**, **MONTH**, **DAY**, **HOURL**, **MINUTE**, **SECOND**, **TIMEZONE_HOUR**, **TIMEZONE_MINUTE** . Each of the fields are listed in significant order with the most significant being listed first.

The ANSI/ISO SQL2 standard specifies the format of numeric and string constants, or literals, which represent specific data values. Constants are categorised as follows:

Numeric

Integer or decimal constants or exact numeric literals as they are also known are written as ordinary decimal numbers in SQL statements, with an optional leading plus or minus

sign. Floating point constants or approximate numeric literals as they are also known are specified using scientific notation.

String

The ANSI/SQL standard specifies that SQL constants for character data be enclosed in single quotes. Some implementations allow the use of double quotes but this causes problems in portability to other implementations.

Date and Time

Constant data values for dates, times and time intervals are specified as string constants.

Symbolic

In addition to user supplied constants, the SQL language includes special symbolic constants that return data values maintained by the DBMS itself. The SQL1 standard specified only one symbolic constant which was the **USER** constant. The SQL2 standard supports the following symbolic constants: **CURRENT_DATE**, **CURRENT_TIME**, **CURRENT_TIMESTAMP**, **USER**, **SESSION_USER** and **SYSTEM_USER**.

In practical real world scenarios where databases are used frequently there often arise situations where data is either not applicable, not known or doesn't apply in a particular situation. In our example database we have a table called **customers**. In this table the customers telephone number is stored. It may be the case that some customers may not have a telephone. What do we do in this situation? It would be incorrect to place a zero in lieu of a missing telephone number as the persons telephone number is not zero, it is just not known. SQL supports missing, unknown or inapplicable data explicitly, through the concept of a **NULL** value. A null value is an indicator that tells SQL and the user, that the data is missing or not applicable. This is a special value used to signify the absence of a value. It is distinct from a numeric zero or a blank character. It is a signal that the data value is missing or unknown. A **NULL** value takes up no storage space in a row. Due to its unusual nature the **NULL** value requires special consideration when it is encountered by other statements in the SQL language.