

MySQL DataTypes

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DATE TYPE	SPEC	DATA TYPE	SPEC
CHAR	String (0 - 255)	INT	Integer (-2147483648 to 2147483647)
VARCHAR	String (0 - 255)	BIGINT	Integer (-9223372036854775808 to 9223372036854775807)
TINYTEXT	String (0 - 255)	FLOAT	Decimal (precise to 23 digits)
TEXT	String (0 - 65535)	DOUBLE	Decimal (24 to 53 digits)
BLOB	String (0 - 65535)	DECIMAL	"DOUBLE" stored as string
MEDIUMTEXT	String (0 - 16777215)	DATE	YYYY-MM-DD
MEDIUMBLOB	String (0 - 16777215)	DATETIME	YYYY-MM-DD HH:MM:SS
LONGTEXT	String (0 - 4294967295)	TIMESTAMP	YYYYMMDDHHMMSS
LONGBLOB	String (0 - 4294967295)	TIME	HH:MM:SS
TINYINT	Integer (-128 to 127)	ENUM	One of preset options
SMALLINT	Integer (-32768 to 32767)	SET	Selection of preset options
			Integer (-8388608 to 8388607)

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Numerical Datatype

INTEGER NUMBERS

FLOATING- POINT (REAL) NUMBER

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	(Bytes)	(Signed/Unsigned)	(Signed/Unsigned)
TINYINT	1	-128	127
		0	255
SMALLINT	2	-32768	32767
		0	65535
MEDIUMINT	3	-8388608	8388607
		0	16777215
INT	4	-2147483648	2147483647
		0	4294967295
BIGINT	8	-9223372036854775808	9223372036854775807

INTEGER/ INT
numbers

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Fixed-Point Types (Exact Value) - DECIMAL, NUMERIC

- The DECIMAL and NUMERIC types store exact numeric data values. These types are used when it is important to preserve exact precision.
- In a DECIMAL column declaration, the precision and scale can be (and usually is) specified; for example:


```
column_name DECIMAL(P,D);
```

 - P is the precision that represents the number of significant digits. The range of P is 1 to 65.
 - D is the scale that represents the number of digits after the decimal point. The range of D is 0 and 30. MySQL requires that D is less than or equal to (\leq) P.

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MySQL DECIMAL storage

Leftover Digits	Bytes
0	0
1-2	1
3-4	2
5-6	3
7-9	4

- MySQL assigns the storage for integer and fractional parts separately.
- MySQL uses binary format to store the DECIMAL values. It packs 9 digits into 4 bytes.
- For each part, it takes 4 bytes to store each multiple of 9 digits. The storage required for leftover digits is illustrated in the following table:

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Floating-Point Types (Approximate Value) - FLOAT, DOUBLE

The FLOAT and DOUBLE types represent approximate numeric data values.

MySQL uses four bytes for single-precision values and eight bytes for double-precision values.

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CHAR

The CHAR data type is a fixed-length character type in MySQL.

We often declare the CHAR type with a length that specifies the maximum number of characters that we want to store.

The length of the CHAR data type can be any value from 0 to 255.

When you store a CHAR value, MySQL pads its value with spaces to the length that you declared.

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VARCHAR

MySQL VARCHAR is the variable-length string whose length can be up to 65,535.

MySQL stores a VARCHAR value as a 1-byte or 2-byte length prefix plus actual data.

The length prefix specifies the number of bytes in the value. If a column requires less than 255 bytes, the length prefix is 1 byte. In case the column requires more than 255 bytes, the length prefix is two length bytes.

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Value	CHAR (4)	Storage Required	VARCHAR (4)	Storage Required
''	' '	4 bytes	''	1 byte
'ab'	'ab '	4 bytes	'ab'	3 bytes
'abcd'	'abcd'	4 bytes	'abcd'	5 bytes
'abcdefg'h'	'abcd'	4 bytes	'abcd'	5 bytes

CHAR vs. VARCHAR

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BOOLEAN

- MySQL does not have built-in Boolean type. However, it uses TINYINT(1) instead.
- To make it more convenient, MySQL provides BOOLEAN or BOOL as the synonym of TINYINT(1).

```
CREATE TABLE tasks (
    id INT PRIMARY KEY AUTO_INCREMENT,
    title VARCHAR(255) NOT NULL,
    completed BOOLEAN
);
```

Field	Type	Null	Key	Default	Extra
completed	tinyint(1)	YES			NULL

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DATE

- MySQL uses yyyy-mm-dd format for storing a date value.
- This format is fixed and it is not possible to change it.
- MySQL uses 3 bytes to store a DATE value.
- The DATE values range from 1000-01-01 to 9999-12-31.
- When strict mode is disabled, MySQL converts any invalid date e.g., 2015-02-30 to the zero date value 0000-00-0
 - Year values in the range 00-69 are converted to 2000-2069.
 - Year values in the range 70-99 are converted to 1970 – 1999.

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TIME

- MySQL uses the 'HH:MM:SS' format for querying and displaying a time value that represents a time of day, which is within 24 hours.
- To represent a time interval between two events, MySQL uses the 'HHH:MM:SS' format, which is larger than 24 hours.
 - column_name TIME;
 - start_at TIME;
 - column_name TIME(N);
 - N is an integer that represents the fractional part, which is up to 6 digits.
 - begin_at TIME(3);

Fractional Second Precision	Storage (BYTES)
0	0
1, 2	1
3, 4	2
5, 6	3

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TIMESTAMP

- The MySQL TIMESTAMP is a temporal **data type** that holds the combination of **date** and **time**.
- The **format** of a TIMESTAMP column is **YYYY-MM-DD HH:MM:SS** which is fixed at 19 characters.
- The TIMESTAMP value has a range from '1970-01-01 00:00:01' UTC to '2038-01-19 03:14:07' UTC.
- When you **insert** a TIMESTAMP value into a table, MySQL converts it from your connection's time zone to UTC for storage.
- When you **query** a TIMESTAMP value, MySQL converts the UTC value back to your connection's time zone. Notice that this conversion does not take place for other temporal data types such as DATETIME.

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