SPRING FRAMEWORK GURU

MySQL Data Types

- A Data Type defines the data type of a column - ie text, number, date, etc

- MySQL does support the standard ANSI SQL Data types

- Data Types are broken down into the following categories:

  - Numeric Data Types

  - Date and Time Data Types

  - String Data Types

  - Spatial Data Types

  - JSON Data Type

Numeric Data Types

Type	Bytes	Description	Min	Max(unsigned)	ANSI?
INTEGER / INT	4	Integer (no decimals), number - signed or unsigned	-2147483648	4294967295	Y
TINYINT	1	Very small Integer	-128	255	N
SMALLINT	2	Small Sized Integer	-32767	65535	Y
MEDIUMINT	3	Medium Sized Integer	-8388608	16777215	?
BIGINT	8	A large Integer - consumes more space	-2^{63}	$2^{64}-1$	Y
FLOAT	4	A floating point number, must be signed, not exact - 10, 2 (10 digits, 2 decimals)	0	24 places (number / digits)	Y
DOUBLE	8	A double precision floating point number, not exact	0	53 places	Y
DECIMAL / NUMERIC	Length + 1 or 2 bytes	Stored as a String, for fixed decimal point	0	65 places	Y

Date and Time Data Types

Type	Bytes	Description	ANSI?
DATE	3	Stores the date without a time component	Y
DATETIME	8	Stores the date with a time component. No timezone information stored	N
TIMESTAMP	4	Stores the date with time component. Converted to UTC from session timezone upon storage.	Y
TIME	3	Time - can be used for time of day, or elapsed time.	Y
YEAR	1	A year value from 1901 - 2155.	N

*** MySQL 5.6.4 and greater can optionally store fractional seconds, which can increase storage requirements of TIME, DATETIME, and TIMESTAMP.
(0 -3 bytes depending on precision)

Character Sets

- Computers are driven off of binary information - ie 1's and zeros.

- A 'bit' is binary one or zero.

- A byte is a collection of eight bits (10000111) = 70

- ASCII - American Standard Code for Information Interchange

  - One of the first 'character' sets

  - Limited to 128 characters (mostly letters, numbers, common punctuation)

- UTF-8 is highly popular used for email / web. 1 - 4 bytes long.

  - Up to 1,112,064 characters

String Data Types

Type	Bytes	Description	ANSI?
CHAR	Length	Fixed length string 0 - 255 characters. DB will pad spaces to end of string to full length. ie storing 'foo' in char(5) would be foo + space + space in database.	Y
VARCHAR	Length + 1	For storage of variable length strings up to 65,535 characters.	Y
BINARY	Length	Similar to CHAR, but contains binary strings and pads with zero byte. Stored as a binary character set, which affects sorting and comparing.	Y
VARBINARY	Length + 1	Similar to VARCHAR, but for variable length binary strings. Stored as a binary character set, which affects sorting and comparing.	Y
BLOB	Length + 2-4	Binary Large Object - stored as binary	Y
TEXT	Length + 2	Stored as non-binary strings, with character set info	N
ENUM	1 or 2 bytes	Collection of string literals. (example: colors - RED, BLUE, GREEN), column can be ONE of the values	N
SET	1 to 8 bytes	Collection of values, column may have one or more of values in SET	N

Spatial Data Types

- *"The Open Geospatial Consortium (OGC) is an international consortium of more than 250 companies, agencies, and universities participating in the development of publicly available conceptual solutions that can be useful with all kinds of applications that manage spatial data." -* MySQL Documentation

- MySQL has features to support the storage and analysis of geographic features.

  - Data types for spatial values

  - Functions for manipulating spatial values

  - Spatial indexing for improve performance

JSON Data Type

- JSON - JavaScript Object Notation

  - This is a complex, structured document containing properties and values.

- Storage for JSON data types is similar to BLOB or TEXT data types.

- MySQL will convert the JSON to an internal format for optimized storage and searching.

  - Some formatting may be lost and ordering of properties may change.

- MySQL supports searching of JSON document properties.

- MySQL allows you to update portions of a JSON document (no replace needed)

JSON Example

```json
{"widget": {
    "debug": "on",
    "window": {
        "title": "Sample Konfabulator Widget",
        "name": "main_window",
        "width": 500,
        "height": 500
    },
    "image": {
        "src": "Images/Sun.png",
        "name": "sun1",
        "hOffset": 250,
        "vOffset": 250,
        "alignment": "center"
    },
    "text": {
        "data": "Click Here",
        "size": 36,
        "style": "bold",
        "name": "text1",
        "hOffset": 250,
        "vOffset": 100,
        "alignment": "center",
        "onMouseUp": "sun1.opacity = (sun1.opacity / 100) * 90;"
    }
}}
```

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