Good evening everyone 

class start at 8:10

# datatypes

- Integer
- Decimal
- String
- boolean
- date and time
- enum
- BLOB



1) TINYINT

storage : 1 byte ( 8 bits)

range :

| | signed ( default) | unsigned |
|---|---|---|
| | -128 to 127 | 0 to 255 |
| | 127 - (-128) + 1 = 256 | 255 - 0 + 1 = 256 |
| | $-2^{n-1}$ to $2^{n-1} - 1$ | 0 to $2^{n} - 1$ |
| | n → no of bits. | 0 to $2^{8} - 1$ |
| | $-2^{7}$ to $2^{7} - 1$ | 0 to 255 |
| | -128 to 127 | |

2) SMALLINT

Storage : 2 bytes (16 bits)

| range | signed | unsigned |
|---|---|---|
| | $-2^{15}$ to $2^{15}-1$ | 0 to $2^{16}-1$ |
| | -32K to 32K | 0 to 65K |

3) MEDIUMINT

Storage : 3 bytes (24)

| range : | signed | unsigned. |
|---|---|---|
| | $-2^{23}$ to $2^{23}-1$ | 0 to $2^{24}-1$ |
| | -8.3m to 8.3m | (0 to 16.7m) |



4) INT

Storage : 4 byte (32 bits)

| range : | signed | unsigned |
|---|---|---|
| | $-2^{31}$ to $2^{31}-1$ | 0 to $2^{32}-1$ |
| | $-2.1 \times 10^9$ to $2.1 \times 10^9$ | 0 to |

it is the most common data type used for integer data type.

5) **BIGINT**

storage : 8 byte ( 64 bits)

range :

| signed | unsigned |
| --- | --- |
| $-2^{63}$ to $2^{63}-1$ | 0 to $2^{64}-1$ |

Age : → Big int →

↓

120

wasted storage space

it may impact query performance.

→ **transaction**

small int 1,00,000

if the data exceeds the capacity of datatype

it may required alterd table structure.

- it lead to downtime and data inconsistency.

- when we choose data types, we have to consider current requirents and future needs.

## Decimal number data types

1) **DECIMAL**

- it represents the numbers that have both integer and fractional part.
- storing decimal values in fixed precision and scale.

→ max length is 64

DECIMAL( P, S ) P = 6, S = 2

3294.37

Precision : total number of digits including both integer and fractional part.

Scale : number after decimal point

DECIMAL ( 8, 3)

3894 2 . 536 ✓

389 . 52 ✓

3257 . 234 | 5678 ✓ truncate

27364784 74 . 879

DECIMAL( 8, 5)

if total number after decimal is greater than scale, in that case round off will happen

$4.003 \simeq 4.0 \Rightarrow 4 \times 10^{8}$

8

$4.003 \times 10^{-} \Rightarrow 4003000$

**float**

storage 4 bytes

- it stores approximate values
- round off is possible.

$-3.4 \times 10^{38}$ to $3.4 \times 10^{38}$

**double** :

storage 8 bytes

- it stores approximate values

$-1.7 \times 10^{308} \times 1.7 \times 10^{308}$



break till 9:20

String

1) char(x) → fixed length of string.

mobile number

↳ range [1, 255]

char(5)

↳ "abcde" ✓

↳ "ab" "ab___" ✓

↳ "abcdefgh" → error

→ truncate string (abcde)

if string length is smaller than x.

it pads remaining space with trailing spaces.

if string length is greater than x.

it may give you error or truncate string if depend on database behaviour.

mobile number, Aadhar card, account number

2) varchar(x)

it stores variable length string.

range [0, 65535]

- x → maximum number of characters allowed.

eg: → email id, name,

| varchar(5) | storage |
|---|---|
| "ab" ✓ | 1 + 2 = 3 bytes |
| "abcd" ✓ | 1 + 4 = 5 bytes |
| "abcde" ✓ | 1 + 5 = 6 bytes |

"abc... zxy" (250) "abcc... dd" (25930)

storage 1 + 250 2 + 25930

it stored the actual length of the string and one or two bytes for stored length of the string.

varchar(5)

"abcdefghi" → error (default)
→ truncate (abcde)
→ same (abcdefghi)

its depends on your configuration or setting of your data base.
it depends on your database.

**Text**

| | | |
|---|---|---|
| TINYTEXT | (255 bytes) | small description |
| TEXT | (64 KB) | article |
| MEDIUM TEXT | (16 MB) | considering store in file system instead of dBms. |
| LONG TEXT | (4 GB) | |

**BOOLEAN**

It can store only two values true/false.

It can also represent as TINYINT(1) → 0 (false), 1 (true)

**ENUM:** A enum is defined with a list of allowed values

[abc, xyz, def]

pqrs]

abb

| | categories |
|---|---|
| | abc |
| | def |
| | ~~xyz~~ → abb |
| | abc |
| | ~~xyz~~ → abb |
| | def |

| id | cat_ |
|---|---|
| 1 | abc |
| 2 | ~~xyz~~ → abb |
| 3 | def |
| 4. | pqrs |

| categories |
|---|
| 1 |
| 2 |
| 3 |
| 2 |
| 1 |
| 3 |

## Date and time

date → stored only. date

. storage → 3 byte YYYY|MM|DD

time → stored only time

Storage → 3 byte HH|MM|SS

unix epoch

**timestamp:** seconds passed since 01|01|1970

it stored date and time.

storage - 4 byte (before MySQL 5.6.4)

2038 → exceed the limit



## BLOB (Binary large objects)

eg:- image, audio, video

TINY BLOB (256 KB)

BLOB (64KB)

MEDIUM BLOB (16 MB)

LONG BLOB (4GB)