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New topics will be added from time to time.

```
Visit this link ( https://github.com/t-sibiraj/sql ) to get the latest version of this pdf.
```

DATABASE CONCEPTS:

 # SKIP TO SQL IF YOU ALREADY KNOW DATABASE CONCEPTS #

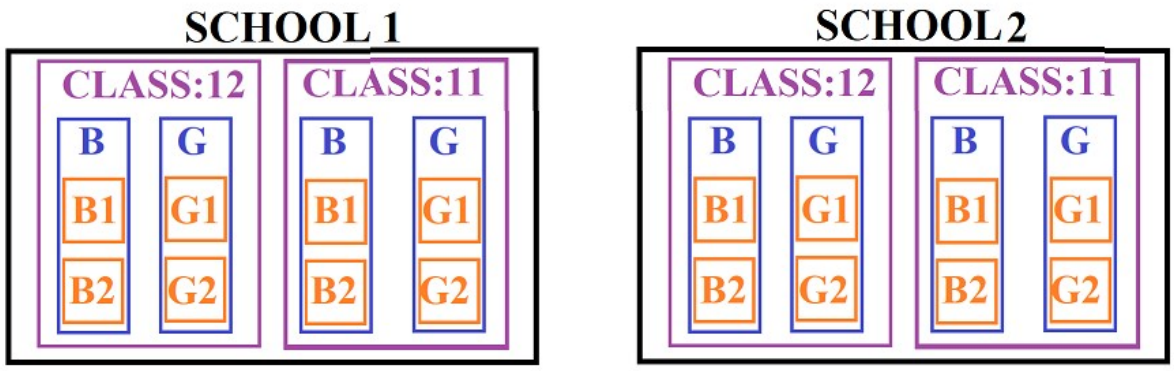
CLICK ME TO SKIP

EXTENDED READING FOR DATABASE CONCEPTS:

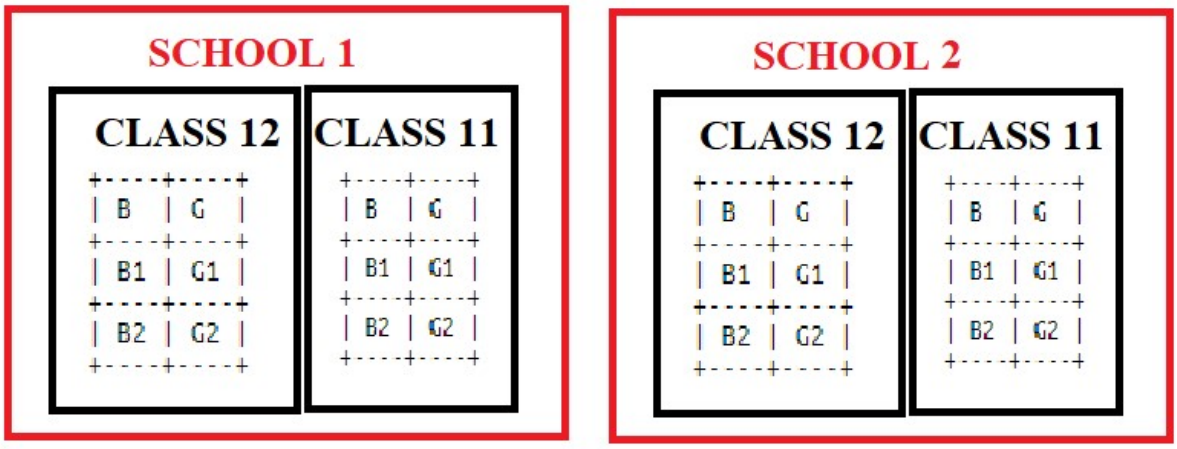
https://cbseacademic.nic.in/web_material/doc/cs/2_Computer_Science_Python_ClassXII.pdf

INTORDUCTION:

Let us consider school1 has a database. In which classes class 11 and class 12 are tables. In each class(tables) there are two columns(boys and girls). Each column has two rows(B has B1 , B2 as well as G has G1, G2)



SOURCE: t-sibiraj.github.io/learn



SOURCE: t-sibiraj.github.io/learn

```
Database: School1 and School2  (Collection of tables and databases)
Tables: Class 12 and Class 11  (Collectiion of rows and columns)

In Class 12(Table)

There are two columns B abd G. There are two records in B(B1 , B2)
There are two rows


We can have a database named *city* which could have the databases *school1* and
*school2* in it.
```

DATABASE

```
Database is a collection of related information that is organized in such a way
that it supports for easy access, modification and maintenance of data

Examples of database: Ms-Access, MySQL, PostgreSQL, SQLite, Microsoft SQL
Server, Oracle, SAP, dBASE, FoxPro, etc..
```

RELATION aka Table:

```
Relation is nothing but a table which is made up of rows and columns
```

DOMAIN:

A domain is a **set of acceptable values of a particular column**, which is based on various properties and data types.

Ad No	Name	Gender	Marital Status	SUBJECT
101	A	MALE	UNMARRIED	MATH
105	B	FEMALE	MARRIED	PHYSICS
203	C	MALE	DIVORCED	CHEMSITRY
205	D	FEMALE	WIDOW	COMPUTER SCIENCE

For example:

(i) The domain of gender column has a set of two possible values i.e, **Male or Female.**

(ii) The domain of marital status has a set of four possible values i.e, **Married, Unmarried, Widows and Divorced**

** **(iii)** The domain of subject has a **set of five possible** values i.e., **Math's,physics,chemistry,computer science and English**

TUPLE aka ROW:

```
Horizontal subset/information in a table is called tuple.
The tuple is also known as a 'record', which gives particular information of the
relation (table).

For example:

(i) In customer table, one row gives information about one customer only.

(ii) In student table, one row gives information about one student only.
```

ATTRIBUTE AKA Column:

```
Attribute is also known as Columns or column
```

Degree:

```
The number of attributes(fields)(column) in a table

Degree ---> no of columns
```

Cardinality:

```
The number of tuple(record)(rows) in a table

Cardinality ---> no of rows
```

KEY:

Key is of **four types**:

(i) Primary Key

(ii) Candidate Key

(iii) Foreign Key

(iv) Alternate Key

Primary Key:

```
A column or **set of columns that uniquely identifies a row** within a table is
called primary key.

PRIMARY KEY ---> THIS IS SERVES AS AN UNIQUE INDENTIFIER
            ---> TWO PERSON CAN HAVE SAME NAME BUT THEY CAN''T HAVE SAME
FINGERPRINT
             ---> HERE FINGERPRINT SERVES THE PURPOSE OF PRIMARY KEY
            ---> IN TABLE WE MUST HAVE A PRIMARY KEY TO UNIQUELY IDENTIFY A
RECORDS IN A TABLE

                    ╔════╦══════╦════════╗
                    ‖ id ‖ name ‖ gender ‖
                    ╠════╬══════╬════════╣
                    ‖ 2  ‖ sam  ‖ male   ‖
                    ╠════╬══════╬════════╣
                    ‖ 1  ‖ ram  ‖ female ‖
                    ╠════╬══════╬════════╣
                    ‖ 3  ‖ ram  ‖ male   ‖
                    ╚════╩══════╩════════╝
                  TABLE NAME: GENDER

IN THE TABLE GENDER WE CAN SELECT id HAS PRIMARY KEY AS IT ONLY HAS UNIQUE
RECORDS. WE CAN''T USE NAME AND GENDER AS PRIMARY KEY AS TWO PERSON CAN HAVE
SAME NAME AND TWO PERSON CAN HAVE SAME GENDER
```

Candidate Key:

```
Candidate keys are set of fields (columns with unique values) in the relation
that are eligible to act as a primary key.

Candidate key  = Collection of Primary key
```

Alternate Key:

```
Out of the candidate keys, after selecting a key as primary key, the remaining
keys are called alternate key.

Alternate Key =  Candidate key - Primary key
```

Foreign Key:

A foreign key is a field (or collection of fields) in one table that **uniquely identifies a row of another table**. In other words, a foreign key is a column or a combination of columns that is used to **establish a link between two tables.**

```
#FOREIGN KEY CONSTARINT

#FOREIGN KEY IS LIKE PRIMARY KEY. IT IS USED IN RDBMS.

#SO FAR WE HAVE ONLY SEE DBMS.

DBMS ---> Database Management System
RDBMS ---> Relational Database Management System

IN RDBMS TABLES ARE IN RELATION WITH EACH OTHER BUT IN DBMS TABLES ARE NOT IN
RELATION WITH EACH OTHER.


DBMS

DATABSSE NAME: RDBMS

╔════╦═══════╦═══════╗                    ╔════╦═══════╦═══════╗
‖ id ‖ name  ‖ age   ‖                    ‖ id ‖ name  ‖ gender ‖
╠════╬═══════╬═══════╣                    ╠════╬═══════╬═══════╣
‖ 1  ‖ ram   ‖ 10    ‖                    ‖ 2  ‖ sam   ‖ male   ‖
╠════╬═══════╬═══════╣                    ╠════╬═══════╬═══════╣
‖ 2  ‖ sam   ‖ 20    ‖                    ‖ 1  ‖ ram   ‖ female ‖
╠════╬═══════╬═══════╣                    ╠════╬═══════╬═══════╣
‖ 3  ‖ ram   ‖ 30    ‖                    ‖ 3  ‖ ram   ‖ male   ‖
╚════╩═══════╩═══════╝                    ╚════╩═══════╩═══════╝
TABLE NAME: AGE                          TABLE NAME: GENDER
```

```
AS YOU CAN SEE BOTH THE TABELS ARE RELATED TO EACH OTHER BY THE ID COLOUMN

id column in table AGE is called the primary key and id in table GENDER is
called primary key

id column is called as the foreign key as it is used to relate the two tables
AGE AND GENDER.
WE can even choose the gender column as the primary key but we can''t choose it
as foreign key as it is not present in the age table.


DATABASE DBMS:
```

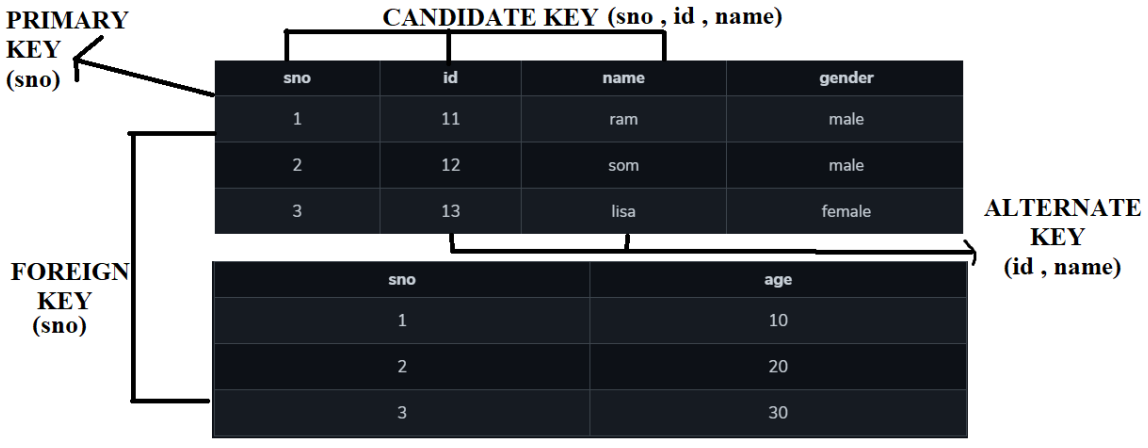
weight	name	age
40	ram	10
50	sam	male
60	ram	male

TABLE NAME: AGE

id	name	gender
2	sam	male
1	ram	female
3	ram	male

TABLE NAME: GENDER

```
TWO TABLES ARE NOT RELATED TO EACH OTHER SO IT IS CALLED AS DBMS
```



SOURCE: t-sibiraj.github.io/learn

```
degree      ---> 4(in first table)
cardianality ---> 3(in first table)
```

Resources:

```
https://powerbidocs.com/2019/12/25/sql-keys/
```

```
SUMMARY:

row    <->  cardinality <-> tuple  <->  record
column <->  degree      <-> field  <->  attribute

Primary key    =  Can use used to uniquely identify the record
Candidate key  =  Collection of Primary key
Alternate Key  =  Candidate key - Primary key
```

Advantages of SQL:

```
(i) SQL is portable

(ii) High Speed

(iii) Easy to learn

(iv)SQL is used with any DBMS system with any vendor: SSQL is used for
relational databases: SQL is widely used for relational databases.

(v)SQL acts as both programming language and interactive language:

(vi)Client/Server language:

(vii)Supports object based programming
```

SOME MYSQL SQL ELEMENTS:

(i) Literals(have fixed value):

```
numeric literal --> 53 ,64

string literal ---> "abc"

real literals ---> 17.0 ,  17.5
```

(ii) Data Types:

(I) Numeric :

(I) Number:

```
Number:

Positive numbers in the range 1 x 10-130 to 9.99...9 x 10125 with up to 38
significant digits.

Negative numbers from -1 x 10-130 to 9.99...99 x 10125 with up to 38 significant
digits.
Zero.
```

```
NUMBER(x,y)  ---> x -> total numbe of digits
                  y -> digits after decimal point

NUMBER(x) or NUMBER(x,0)  ---> Acts like integer

#NOT SUPPORTED IN MYSQL 8.0 --> NUMBER(X) , NUMBER(X,Y) , NUMBER
```

```
INTEGER(x)  ---> x here presents the number the total number of digits

INTEGER  ---> whole numbers between -2,147,483,648 and 2,147,483,647.
```

```
SMALLINT --> 5 DIGIT INTEGER
INTEGER  --> 10 DIGIT INTEGER
BIGINT   --> 19 DIGIT INTEGER
```

(II) Decimal/Float:

```
DECIMAL[ (p [, s])]

- 'p' the total number of significant decimal digits
- 's' the number of digits from the decimal point to the least significant
digit.

NOTE: IF YOU PASS AN INTEGER VALUE TO DECIMAL(X) OR DECIMAL(X,0), IT WILL BE
STORED AS INTEGER. IF YOU PASS THE SAME INTEGER TO DECIMAL(X,Y) THEN THERE WILL
BE Y ZEROES AFTER THE DECIMAL POINT.

12345  --> VALUE TO BE INSERTED

CREATE TABLE D1(id DECIMAL(5));        ---> 12345
CREATE TABLE D1(id DECIMAL(5,0));      ---> 12345
CREATE TABLE D1(id DECIMAL(5,3));      ----> 12345.000

FLOAT , FLOAT(X,Y) , FLOAT(X)  --> SIMILAR TO DECIMAL() , DECIMAL(X,Y) ,
DECIMAL(X)
```

(III) INT/INTERGER

(IV) FLOAT

(ii) CHARACTER OR STRING:

```
CHAR(10) has fixed length, right padded with spaces.
VARCHAR(10) has fixed length, right padded with NULL
VARCHAR2(10) has variable length.

the difference between VARCHAR and VARCHAR2 is that VARCHAR is an ANSI standard
and it takes up space for variables, whereas the VARCHAR2 is used only in Oracle
but makes more efficient use of space.

#NOT SUPPORTED IN MYSQL 8.0 --> VARCHAR2
```

(III) DATE AND TIME:

```
DATE: 'YYYY-MM-DD' -> '2021-01-01'

DON''T MISS THE QUOTES
```

```
DATETIME: 'YYYY-MM-DD HH:MM:SS' ---> '2021-01-01 10:10:10'

DON''T MISS THE QUOTES
```

```
TIME: HH:MM:SS ---> '11:59:10'

DON''T MISS THE QUOTES
```

```
YEAR:

-> YEAR    -> 4-digit format
-> YEAR(2) -> 2-digit format(21)   #NOT SUPPORTED IN MYSQL 8.0
-> YEAR(4) -> 4-digit format(2021) #NOT SUPPORTED IN MYSQL 8.0
```

```
TIMESTAMP: (YYYYMMDDHHMMSS) --> 20210101060510

NO NEED TO USE QUOTES.KEY IN(INPUT) AS NUMBER(INTEGER).
```

TYPES OF SQL STATEMENTS

(i)Data Definition Language (DDL) statement:

DDL statements are used to **create structure of a table, modify the existing structure of the table and remove the existing table**. Some of the DDL statements are CREATE TABLE, ALTER TABLE and DROP TABLE.

Grant and revoke privileges and roles and maintenance commands

(ii) Data Manipulation Language (DML) statement:

Data Manipulation Language (DML) statements are used to **access and manipulate data in existing tables.** The manipulation includes **inserting data into tables, deleting data from the tables, retrieving data and modifying the existing data**. The common DML statements are SELECT, UPDATE, DELETE and INSERT.

(iii) Transaction Control Language (TCL) Commands:

COMMIT, ROLLBACK, SAVEPOINT, SET TRANSACTION

(iv) Session Control Commands

(v) System Control Commands

SQL

(Structured Query Language is a standard language used for accessing databases)

(ALL THE SQL COMMANDS WHICH ARE LISTED BELOW ARE COMPITABLE WITH MySQL

MySQL :https://dev.mysql.com/doc/

SQL Server:https://docs.microsoft.com/en-us/sql/sql-server/?view=sql-server-ver15)

> - ***SQL IS CASE INSENSITIVE***

Consider

Name of the table --> records

sno	student_name	email	year	column_name
1	ram	ram@gmail.com	2004	10
2	sam	sam@yahoo.com	2003	20
3	hari	hari@outlook.com	2002	30

TABLE CREATION COMMANDS:

```
DATATYPES:

char() varchar() integer() decimal() '2001-12-30'
char   varchar   integer   decimal NUMBER()
```

```
#TO CREATE A DATABASE

SYNTAX:  CREATE DATABASE database_name;
EXAMPLE: CREATE db;

# IF WE DON'T KNOW WHEATHER A DATABSE EXISTS OR NOT --> WE CAN USE  ---> IF NOT
EXISTS

CODE: CREATE DATABASE IF NOT EXISTS db;
/* db database will be created if it not exists */
```

```
#TO CREATE A TABLE

SYNTAX:  CREATE TABLE table_name
        (column_name property, ....);

EXAMPLE: CREATE TABLE records
      (sno integer, student_name varchar(10) , email varchar(20), year
integer,column_name integer) ;

**NOTE: WE MUST USE A DATABASE BEFORE WE CREATE TABLES AND A TABLE MUST HAVE AT
LEAST ONE VISIBLE COLUMN**
```

```
#TO ADD A SINGLE RECORD

SYNTAX: INSERT INTO table_name VALUES  (item_name , .....)
NOTE: WE CAN ALSO USE VALUE INTSEAD OF VALUES AS WE ADD A SINGLE RECORDS

EXAMPLE: INSERT INTO records VALUES
        (1, 'ram', 'ram@gmail.com', 2004, 10)
```

```
#TO ADD MULTIPLE REOCRDS

SYNTAX: INSERT INTO table_name VALUES
        (row_1_item_no_1 , row_1_item_no_2 , row_1_item_no_3)
        (row_2_item_no_1 , row_2_item_no_2 , row_2_item_no_2)
                        ....
                        ....
        (row_n_item_no_1 , row_n_item_no_2 , row_n_item_no_3)

CODE: INSERT INTO records VALUES
      (2, 'sam', 'sam@yahoo.com', 2003, 20),
      (3, 'hari', 'hari@outlook.com', 2002, 30),
      (4, 'ramu', 'ramu@gmail.com', 2004, 20);


ANOTHER WAY:

SYNTAX: INSERT INTO table_name(columns) VALUES
        (row_1_item_no_1 , row_1_item_no_2 , row_1_item_no_3)
        (row_2_item_no_1 , row_2_item_no_2 , row_2_item_no_2)
                        ....
                        ....
```

```
        (row_n_item_no_1 , row_n_item_no_2 , row_n_item_no_3)

CODE: INSERT INTO records(sno,student_name,email,year,column_name) VALUES
      (2, 'sam', 'sam@yahoo.com', 2003, 20),
      (3, 'hari', 'hari@outlook.com', 2002, 30),
      (4, 'ramu', 'ramu@gmail.com', 2004, 20);
```

SELECT

```
#TO SELECT A SINGLE COLUMN

SYNTAX: SELECT column_name
        FROM table_name;

EXAMPLE: SELECT student_name
        FROM records;
OUTPUT:
        +--------------+
        | student_name |
        +--------------+
        | ram          |
        | sam          |
        | hari         |
        | ramu         |
        +--------------+
```

```
#TO SELECT MULTIPLE COLUMN

SYNTAX: SELECT column_name_1,column_name_2,column_name_3
        FROM table_name;

EXAMPLE: SELECT student_name , year;
        FROM records;

OUTPUT:
        +--------------+------+
        | student_name | year |
        +--------------+------+
        | ram          | 2004 |
        | sam          | 2003 |
        | hari         | 2002 |
        | ramu         | 2004 |
        +--------------+------+
```

```
#TO SELECT ALL THE COLUMNS FROM A TABLE:

SYNTAX: SELECT *
        FROM table_name;

EXAMPLE: SELECT *
        FROM records;
```

```
OUTPUT:
        +------+--------------+------------------+------+-------------+
        | sno  | student_name | email            | year | column_name |
        +------+--------------+------------------+------+-------------+
        |    1 | ram          | ram@gmail.com    | 2004 |          10 |
        |    2 | sam          | sam@yahoo.com    | 2003 |          20 |
        |    3 | hari         | hari@outlook.com | 2002 |          30 |
        |    4 | ramu         | ramu@gmail.com   | 2004 |          20 |
        +------+--------------+------------------+------+-------------+
```

```
#TO SELECT ALL THE VALUES FROM A COLUMN WITHOUT ANY DUPLICATES RECORDS

SYNTAX: SELECT DISTINCT column_name
        FROM table_name;

EXAMPLE: SELECT DISTINCT year
        FROM records;

OUTPUT:
        +------+
        | year |
        +------+
        | 2004 |
        | 2003 |
        | 2002 |
        +------+
```

```
#USING ARITHMETIC OPERATORS

+ , - , * , / , %

#SELF - EXPLANATORY
CODE: SELECT year , year * 100
      FROM records;

OUTPUT:
        +------+------------+
        | year | year * 100 |
        +------+------------+
        | 2004 |     200400 |
        | 2003 |     200300 |
        | 2002 |     200200 |
        | 2004 |     200400 |
        +------+------------+
================================================================================
====================

CODE: SELECT year ,  year * 10 , "TEST"
      FROM records;

OUTPUT:
        +------+-----------+------+
        | year | year * 10 | TEST |
        +------+-----------+------+
        | 2004 |     20040 | TEST |
        | 2003 |     20030 | TEST |
```

```
        | 2002 |     20020 | TEST |
        | 2004 |     20040 | TEST |
        +------+-----------+------+
================================================================================
====================

#SELF-EXPLANATORY
CODE: SELECT 7+1;

OUTPUT:
        +-----+
        | 7+1 |
        +-----+
        |   8 |
        +-----+
================================================================================
====================

CODE: SELECT 7 % 2;

OUTPUT:
        +-------+
        | 7 % 2 |
        +-------+
        |     1 |
        +-------+
```

SHOW AND DESCRIBE:

```
SYNTAX: SHOW TABLES

Shows the list of tables inside the current database

OUTPUT:
        +--------------+
        | Tables_in_db |
        +--------------+
        | records      |
        +--------------+
================================================================================
====================
SYNTAX: DESCRIBE table_name or DES table_name;

EXAMPLE: DESCRIBE records

NOTE: WE CAN ALSO USE DES INSTEAD OF DESCRIBE

OUTPUT:
        +--------------+-------------+------+-----+---------+-------+
        | Field        | Type        | Null | Key | Default | Extra |
        +--------------+-------------+------+-----+---------+-------+
        | sno          | int         | YES  |     | NULL    |       |
        | student_name | varchar(10) | YES  |     | NULL    |       |
        | email        | varchar(20) | YES  |     | NULL    |       |
```

```
        | year          | int         | YES  |     | NULL    |       |
        | column_name   | int         | YES  |     | NULL    |       |
        +---------------+-------------+------+-----+---------+-------+
```

ALIASING:

```
#USING ALIAS

SYNTAX: SELECT column_name as alias_name  /*USE OF AS IS OPTIONAL */
        FROM table_name;

EXAMPLE: SELECT year as this_will_display_instead_of_year
        FROM records;

**NOTE: Alias name does not change the actual column name. Orginal column name
remains the same**


OUTPUT:
        +-----------------------------------+
        | this_will_display_instead_of_year |
        +-----------------------------------+
        |                              2004 |
        |                              2003 |
        |                              2002 |
        |                              2004 |
        +-----------------------------------+
**NOTE: USE OF AS IS OPTIONAL. THE BELOW CODE WILL YIELD TTHE SAME RESULT AS THE
ABOVE ONEE.
ALSO THERE SHOULD BE NO SPACE IN BETWEEN IF WE USE ALIAS NAME WITHOUT QUOTES.

SELECT year as y FROM records (OR) SELECT year y FROM records (OR) SELECT year
'y' FROM records
            --------                          ----                          -
---
================================================================================
====================

#ALIASING MULTIPLE COLOUMN NAMES

SYNTAX: SELECT column_name AS new_name, another_column_name as another_new_name
        FROM table_name;

CODE: SELECT student_name as name , year as ' birth year'
      FROM records;
```

TABLE ALIASES(PREREQUSITE : JOINS)

```
#TABLE ALIASES

LIKE COLUMN ALIASES WE CAN HAVE ALIAS NAME FOR TABLES TOO

SYNTAX:  SELECT table_alias_1.coloumn_name , table_alias_2
        FROM tabel_name_1 table_alias_1 , table_name_2 table_alias_2;
```

CONSIDER THE TABLES BELOW

TABLE NAME: records

sno	student_name	email	year	column_name
1	ram	ram@gmail.com	2004	10
2	sam	sam@yahoo.com	2003	20
3	hari	hari@outlook.com	2002	30
4	ramu	ramu@gmail.com	2004	20

TABLE NAME: test_table

name	year	present
ram	2004	NULL
NULL	NULL	NULL
sam	2001	absent

TABLE NAME: test_table_3

sno	student_name	email	year_of_birth	column_name
1	ram	ram@gmail.com	2004	10
2	sam	sam@yahoo.com	2003	20
3	hari	hari@outlook.com	2002	30
4	ramu	ramu@gmail.com	2004	20

CODE:
```
SELECT a1.student_name , a2.year_of_birth
FROM records a1 , test_table_3 a2;
```

OUTPUT:

student_name	year_of_birth
ramu	2004
hari	2004
sam	2004
ram	2004
ramu	2003
hari	2003
sam	2003
ram	2003
ramu	2002
hari	2002

```
        | sam          |          2002 |
        | ram          |          2002 |
        | ramu         |          2004 |
        | hari         |          2004 |
        | sam          |          2004 |
        | ram          |          2004 |
        +--------------+---------------+

#WE CAN AVOID THE ABIVE SITUATION USING WHERE CLAUSE

CODE: SELECT a1.student_name , a2.year_of_birth
      FROM records a1 , test_table_3 a2
      WHERE a1.sno = a2.sno;

OUTPUT:
        +--------------+---------------+
        | student_name | year_of_birth |
        +--------------+---------------+
        | ram          |          2004 |
        | sam          |          2003 |
        | hari         |          2002 |
        | ramu         |          2004 |
        +--------------+---------------+

WE CAN ALSO OTHER CONDITION WITH WHERE CLAUSE
```

COMMENTS

```
#LIKE PYTHON WE CAN USE COMMENTS

/* THIS IS A COMMENT */
```

WHERE

```
#GENERAL SYNTAX

SELECT coloumn_name,
FROM table_name,
WHERE condition;

NOTE: THE FOLLOWING OPERATORS CAN BE USED IN PLACE OF CONDITION
```

RELATIONAL OPERATORS

```
#USING RELATIONAL OPERATORS


# = (EQUALITY OPERATOR LIKE == IN PYTHON)

/*  Q: DISPLAY THE RECORDS OF THE STUDENTS WHOSE NAME IS RAM  */

CODE: SELECT *
      FROM records
```

```
      WHERE student_name = 'ram';

OUTPUT:
        +------+--------------+---------------+------+-------------+
        | sno  | student_name | email         | year | column_name |
        +------+--------------+---------------+------+-------------+
        |    1 | ram          | ram@gmail.com | 2004 |          10 |
        +------+--------------+---------------+------+-------------+
================================================================================
================

# >(greater than)  , <(lesser than) , >=(greater than or equal to)  , <=(less
than or equal to)

/*  Q: DISPLAY THE RECORDS OF THE STUDENT WHOSE BIRTH YEAR IS LESS THAN OR EQUAL
TO 2003  */

CODE: SELECT *
      FROM records
      WHERE year <= 2003;

OUTPUT:

        +------+--------------+------------------+------+-------------+
        | sno  | student_name | email            | year | column_name |
        +------+--------------+------------------+------+-------------+
        |    2 | sam          | sam@yahoo.com    | 2003 |          20 |
        |    3 | hari         | hari@outlook.com | 2002 |          30 |
        +------+--------------+------------------+------+-------------+

================================================================================
================

# <> or (!== --> NOT VALID IN MYSQL 8.0)

/*  Q: DISPLAY THE RECORDS OF THE STUDENT WHOSE BIRTH YEAR IS NOT EQUAL TO 2003
*/

CODE: SELECT *
      FROM records
      WHERE year <> 2003;

OUTPUT:
        +------+--------------+------------------+------+-------------+
        | sno  | student_name | email            | year | column_name |
        +------+--------------+------------------+------+-------------+
        |    1 | ram          | ram@gmail.com    | 2004 |          10 |
        |    3 | hari         | hari@outlook.com | 2002 |          30 |
        |    4 | ramu         | ramu@gmail.com   | 2004 |          20 |
        +------+--------------+------------------+------+-------------+
```

BETWEEN

```
#BETWEEN

SYNTAX: SELECT *
        FROM table_name
        WHERE column_name BETWEEN lower_limit AND upper_limit;  #inclusive of
upper_limit and lower_limit

/*  Q: DISPLAY THE RECORDS OF THE STUDENT WHOSE BIRTH YEAR IS IN THE RANGE OF
2002 TO 2004 */


SYNTAX: SELECT *
        FROM records
        WHERE year BETWEEN 2002 AND 2004;  #includes both 18 and 22

OUTPUT:
        +------+--------------+------------------+------+-------------+
        | sno  | student_name | email            | year | column_name |
        +------+--------------+------------------+------+-------------+
        |    1 | ram          | ram@gmail.com    | 2004 |          10 |
        |    2 | sam          | sam@yahoo.com    | 2003 |          20 |
        |    3 | hari         | hari@outlook.com | 2002 |          30 |
        |    4 | ramu         | ramu@gmail.com   | 2004 |          20 |
        +------+--------------+------------------+------+-------------+
```

LIKE

```
#LIKE(only text[string] values)      ---> USING WILDCARDS(REGEX)  -->
PATTERNS(REGEX)
#'a%' ---> starting with a
#'%a' ---> ending with a
#'%a%' ---> contains a
#% --> wildcard
#a% --> pattern
```

```
/*  SELECT THE NAME OF THE STUDENT [STARTING] WITH THE LETTER R */

CODE: SELECT *
      FROM records
      WHERE student_name LIKE 'r%';

OUTPUT:
        +------+--------------+----------------+------+-------------+
        | sno  | student_name | email          | year | column_name |
        +------+--------------+----------------+------+-------------+
        |    1 | ram          | ram@gmail.com  | 2004 |          10 |
        |    4 | ramu         | ramu@gmail.com | 2004 |          20 |
        +------+--------------+----------------+------+-------------+

#** Note r% --> will select both r and R **
```

'%r%' ---> WILL SELECT ALL THE RECORS CONTAINING THE LETTER r or R -> (CAN BE START OR IN END AND CAN BE IN BETWEEN)

'%r' ---> WILL SELECT ALL THE RECORDS WHICH ENDS WITH LETTER r or R

Empty set (0.07 sec) ---> DISPLAYED WHEN IT FINDS NO MATCHING RECORDS(
SELECT * FROM records WHERE student_name LIKE 'r%';)

==========

/* Q: DISPLAY THE RECORDS THE STUDENTS IF THE LENGTH OF THE NAME OF STUDENT IS EXACTLY THREE CHARACTERS */

CODE: SELECT *
FROM records
WHERE student_name LIKE '___';

"___" ---> There are three underscore(_) inside the quotes(" ")
---> Three underscores are used to match any string with exactly three charcaters
---> Underscore here represents characters(four underscore matches any sting with exactly 4 characters)

OUTPUT:

sno	student_name	email	year	column_name
1	ram	ram@gmail.com	2004	10
2	sam	sam@yahoo.com	2003	20

==========

#DIFFERENCE BETWEEN '___' AND '___%'

'___' ---> MATCHES ANY STRING WHICH HAS EXACTLY THREE CHARACTERS

'___%' ---> MATCHES ANY STRING WHICH HAS AT LEAST THREE CHARACTERS

CODE: SELECT *
FROM records
WHERE student_name LIKE '___%';

OUTPUT:

sno	student_name	email	year	column_name
1	ram	ram@gmail.com	2004	10
2	sam	sam@yahoo.com	2003	20
3	hari	hari@outlook.com	2002	30
4	ramu	ramu@gmail.com	2004	20

IN

```
#IN (MEMBERSHIP)

/*Q:  DISPLAY THE RECORDS OF THE STUDENT IF A STUDENT IS BORN IN THE YEAR 2002
AND 2004 */

CODE: SELECT *
      FROM records
      WHERE year IN (2002,2004);

OUTPUT:
        +------+--------------+------------------+------+-------------+
        | sno  | student_name | email            | year | column_name |
        +------+--------------+------------------+------+-------------+
        |    1 | ram          | ram@gmail.com    | 2004 |          10 |
        |    3 | hari         | hari@outlook.com | 2002 |          30 |
        |    4 | ramu         | ramu@gmail.com   | 2004 |          20 |
        +------+--------------+------------------+------+-------------+
```

LOGICAL OPERATOR

```
#LOGICAL OPERATOR (AND  ,  OR)

#AND (BOTH THE STATEMENTNS MUST BE TRUE)

/*  Treat AND as * (LOGICAL MULTIPLICATION)
         True as 1
         False as 0

         True AND True ---> 1 * 1 ---> 1 ---> True
         True AND False ---> 1 * 0 ---> 0 ---> False
          False AND True ---> 0 * 1 ---> 0 ---> False
          False AND False ---> 0 * 0 ---> 0 ---> False

         Anything multiplied by zero is zero so if there

    Treat OR as + (LOGICAL ADDITION)

         True OR True ---> 1 + 1 ---> 1 ---> True   /* here 1+1 --> 1 (still
True) */
         True OR False ---> 1 + 0 ---> 1 ---> True
          False OR True ---> 0 + 1 ---> 1 ---> True
          False OR False ---> 0 + 0 ---> 1 ---> False

*/
```

```
#AND (BOTH THE STATEMENTNS MUST BE TRUE)
/* Q: DISPLAY THE REOCORDS OF THE STUDENTS IF THEIR NAME STARTS WITH R AND THEIR
BIRTH YEAR IS GREATER THAN OR EQUAL TO2003 */

CODE: SELECT *
      FROM records
```

```
      WHERE student_name LIKE 'r%'
      AND year >= 2003;

OUTPUT:
        +------+--------------+----------------+------+-------------+
        | sno  | student_name | email          | year | column_name |
        +------+--------------+----------------+------+-------------+
        |    1 | ram          | ram@gmail.com  | 2004 |          10 |
        |    4 | ramu         | ramu@gmail.com | 2004 |          20 |
        +------+--------------+----------------+------+-------------+
```

```
#OR (AT LEAST ONE OF THE STATEMENT SHOULD BE TRUE)

/* Q: DISPLAY THE REOCORDS OF THE STUDENTS IF THEIR NAME STARTS WITH R OR IF
THEIR BIRTH YEAR IS GREATER THAN OR EQUAL TO 2003 */

CODE: SELECT *
      FROM records
      WHERE student_name LIKE 'r%'
      OR year >= 2003;

OUTPUT:
        +------+--------------+----------------+------+-------------+
        | sno  | student_name | email          | year | column_name |
        +------+--------------+----------------+------+-------------+
        |    1 | ram          | ram@gmail.com  | 2004 |          10 |
        |    2 | sam          | sam@yahoo.com  | 2003 |          20 |
        |    4 | ramu         | ramu@gmail.com | 2004 |          20 |
        +------+--------------+----------------+------+-------------+
```

```
#SIMILARITY BETWEEN OR AND IN

CODE 1: SELECT *
        FROM records
        WHERE year = 2002 OR year = 2003 OR year 2004;

/* THE ABOVE QUERY CAN ASLO BE WRITTEN USING THE *IN* OPERATOR  */

CODE 2: SELECT *
        FROM records
        WHERE year IN (2002 , 2003 , 2004);
```

```
#NOT

CODE: SELECT *
      FROM records
      WHERE student_name NOT LIKE '%a'; /* SELECTS ALL THE RECORDS WHOSE NAME
DOESN'T START WITH A */

OUTPUT:
        +------+--------------+-----------------+------+-------------+
```

```
        | sno  | student_name | email             | year | column_name |
        +------+--------------+-------------------+------+-------------+
        |    1 | ram          | ram@gmail.com     | 2004 |          10 |
        |    2 | sam          | sam@yahoo.com     | 2003 |          20 |
        |    3 | hari         | hari@outlook.com  | 2002 |          30 |
        |    4 | ramu         | ramu@gmail.com    | 2004 |          20 |
        +------+--------------+-------------------+------+-------------+
================================================================================
================

CODE: SELECT *
      FROM records
      WHERE year NOT IN (2004,2002) ;  /* SELECTS ALL THE RECORDS EXCEPT 2004
AND 2002 */

OUTPUT:
        +------+--------------+---------------+------+-------------+
        | sno  | student_name | email         | year | column_name |
        +------+--------------+---------------+------+-------------+
        |    2 | sam          | sam@yahoo.com | 2003 |          20 |
        +------+--------------+---------------+------+-------------+

 ================================================================================
=================

CODE: SELECT *
      FROM records
      WHERE year NOT BETWEEN 2002 AND 2004; /* SELECTS ALL THE RECORD EXCEPT
2002 , 2003 AND 2004 */

OUTPUT:
        Empty set


# NOT LIKE . IS NOT and so on
```

ORDER BY

```
# ORDER BY

#TO ORDER THE VALUES OF A COLUMN BASED ON ANOTHER COLUMN

#NOTE : ORDER BY orders the value in ascending(ASC) order by default.

CODE: SELECT *
      FROM records
      ORDER BY year; #ASC ---> ORDER BY year ASC;

OUTPUT:
        +------+--------------+-------------------+------+-------------+
        | sno  | student_name | email             | year | column_name |
        +------+--------------+-------------------+------+-------------+
        |    3 | hari         | hari@outlook.com  | 2002 |          30 |
        |    2 | sam          | sam@yahoo.com     | 2003 |          20 |
        |    1 | ram          | ram@gmail.com     | 2004 |          10 |
        |    4 | ramu         | ramu@gmail.com    | 2004 |          20 |
        +------+--------------+-------------------+------+-------------+
```

```
================================================================================
=================


#To order an COLUMN which has only words(strings to be specific)

CODE: SELECT *
      FROM records
       ORDER BY student_name; #orders in alphabetcial order in ASC

OUTPUT:
        +------+--------------+------------------+------+-------------+
        | sno  | student_name | email            | year | column_name |
        +------+--------------+------------------+------+-------------+
        |    3 | hari         | hari@outlook.com | 2002 |          30 |
        |    1 | ram          | ram@gmail.com    | 2004 |          10 |
        |    4 | ramu         | ramu@gmail.com   | 2004 |          20 |
        |    2 | sam          | sam@yahoo.com    | 2003 |          20 |
        +------+--------------+------------------+------+-------------+

================================================================================
=================

#To order in descending order

CODE: SELECT *
      FROM records
      ORDER BY year DESC; #orders DESC

OUTPUT:
        +------+--------------+------------------+------+-------------+
        | sno  | student_name | email            | year | column_name |
        +------+--------------+------------------+------+-------------+
        |    1 | ram          | ram@gmail.com    | 2004 |          10 |
        |    4 | ramu         | ramu@gmail.com   | 2004 |          20 |
        |    2 | sam          | sam@yahoo.com    | 2003 |          20 |
        |    3 | hari         | hari@outlook.com | 2002 |          30 |
        +------+--------------+------------------+------+-------------+
```

OPERATOR PRECEDENCE:

```
INTERVAL
BINARY, COLLATE
!
- (unary minus), ~ (unary bit inversion)
^
*, /, DIV, %, MOD
-, +
<<, >>
&
|
= (comparison), <=>, >=, >, <=, <, <>, !=, IS, LIKE, REGEXP, IN, MEMBER OF
BETWEEN, CASE, WHEN, THEN, ELSE
NOT
AND, &&
XOR
```

```
OR, ||
= (assignment), :=

SOURCE: https://dev.mysql.com/doc/refman/8.0/en/operator-precedence.html
```

AGGREGATE FUNCTIONS:

```
#AGGREGRATE FUNCTIONS aka GROUP FUNCTIONS aka MULTIPLE ROW FUNCTIONS

SYNTAX: SELECT aggregate_funtion_name(coloumn_name)
        FROM table_name;

So far we have only seen only one aggregate function(DISTINCT) if I am correct.
From now on we will learn about the other aggregate functions.

MORE INFO ON AGGREGATE FUNTION CAN BE FOUND AT :
https://dev.mysql.com/doc/refman/8.0/en/aggregate-functions.html

YOU CAN ALSO USE ALIAS WITH AGGREGATE FUNTIONS
```

```
#MIN ---> RETURNS THE SMALLEST VALUE IN A COLUMN

CODE: SELECT MIN(year)
      FROM records;

OUTPUT:
        +-----------+
        | MIN(year) |
        +-----------+
        |      2002 |
        +-----------+
```

```
#AGGREGATE FUNCTIONS--> THOSE WHICH RETURN SINGLE VALUE(MIN,MAX,AVG,SUM,etc..)

#MAX ---> RETURNS THE LARGEST VALUE IN A COLUMN

CODE: SELECT MAX(year)
      FROM records;

OUTPUT:
        +-----------+
        | MAX(year) |
        +-----------+
        |      2004 |
        +-----------+
```

```
#AVG ---> TO FIND THE AVERAGE VALUE

average =  value_1 + value_2 + .... value_n
           ---------------------------------
                 no_of_values(n)
```

```
CODE: SELECT AVG(year)
      FROM records;

OUTPUT:
        +-----------+
        | AVG(year) |
        +-----------+
        | 2003.2500 |
        +-----------+

average = 2004 + 2003 + 2002 + 2004            =  8013       =  2003.2500
          ---------------------------             -----
                        4                           4
```

```
#COUNT --> TO COUNT THE NO ITEMS IN A COLUMN
#IT COUNTS ONLY NON-EMPTY( NULL TO BE SPECIFIC) VALUES  ---> IT DOESN'T TAKE
ACCOUNT OF ANY NULL VALUES



CODE: SELECT COUNT(year)
      FROM records;

OUTPUT:
        +-------------+
        | COUNT(year) |
        +-------------+
        |           4 |
        +-------------+

================================================================================
====================

#COUNT(*)

#COUNT(*) --> TO COUNT THE NUMBER OF ROWS IN A TABLE

CODE: SELECT COUNT(*)
      FROM records;

OUTPUT:
        +----------+
        | COUNT(*) |
        +----------+
        |        4 |
        +----------+
================================================================================
====================


                COUNT(coloumn_name) VS COUNT(*)

COUNT(coloumn_name)  ---> ONLY TAKES ACCOUNT OF NON NULL VALUES
COUNT(*)  ----> TAKES ACCOUNT OF NULL AND NON NULL VALUES i.e ALL VALUES


CONSIDER THE TABLE BELOW:
```

```
NAME OF THE TABLE: test_table
+------+------+---------+
| name | year | present |
+------+------+---------+
| ram  | 2004 | NULL    |
| NULL | NULL | NULL    |
| sam  | 2001 | absent  |
+------+------+---------+

CODE: SELECT COUNT(present) FROM test_table;
OUTPUT:
        +----------------+
        | COUNT(present) |
        +----------------+
        |              1 |
        +----------------+

CODE: SELECT COUNT(*) FROM test_table;
OUTPUT:
        +----------+
        | COUNT(*) |
        +----------+
        |        3 |
        +----------+
```

```
#SUM ---> RETURNS THE SUM OF ALL THE VALUES IN A COLUMN

CODE: SELECT SUM(year)
      FROM records;

OUTPUT:
        +-----------+
        | SUM(year) |
        +-----------+
        |      8013 |
        +-----------+
```

```
# MORE ON DISTINCT AND ALL

DISTINCT CAN BE USED IN COMBINATION WITH OTHER AGGREGATE FUNCTIONS

MAX( DISTINCT column_name) , MIN( DISTINCT column_name) , AVG( DISTINCT
column_name) ,
SUM( DISTINCT column_name)

WHEN DISTINCT IS USED WITH SUM ONLY DUPLICATE ENTRIES ARE NOT TAKEN INTO ACCOUNT

CODE: SELECT SUM(DISTINCT year)
      FROM records;

OUTPUT:
        +--------------------+
        | SUM(DISTINCT year) |
        +--------------------+
```

```
        |               6009 |
        +--------------------+


#ALL vs DISTINCT VS COUNT---> COSIDER ALL THE VALUES

CONSIDER THE TABLE BELOW

NAME OF THE TABLE: test_table_2

+------+------+---------+
| name | year | present |
+------+------+---------+
| ram  | 2001 | NULL    |
| sam  | 2002 | present |
| ramu | 2003 | present |
| som  | 2004 | absent  |
+------+------+---------+
COUNT(column_name) ---> counts only non NULL values
COUNT(DISTINCT , column_name) ---->  counts only  distinct non NULL values
COUNT(ALL , column_name) ---> counts only non NULL values

CODE: SELECT COUNT(present) FROM test_table_2;

OUTPUT:
        +----------------+
        | COUNT(present) |
        +----------------+
        |              3 |    ----> present , present , absent
        +----------------+

CODE: SELECT COUNT(DISTINCT present) FROM test_table_2;
OUTPUT:
        +--------------------------+
        | COUNT(DISTINCT present) |
        +--------------------------+
        |                        2 | ---> present , absent
        +--------------------------+

        ( present ,absent(duplicate present is not taken into account while
counting)

CODE: SELECT COUNT(ALL present) FROM test_table_2;
OUTPUT:
        +--------------------+
        | COUNT(ALL present) |
        +--------------------+
        |                  3 |   -->  present , present , absent
        +--------------------+
```

MY SQL FUNCTIONS

STRING FUNTIONS:

```
#CHAR()

#NOTE: NEWER VERSIONS OF MYSQL INTERPRETS THE BINARY RESULT AS HEXADECIMAL

/*  TYPE status IN MYSQL COMMAND LINE CLIENT  */

Connection id:          11
Current database:       db
Current user:           root@localhost
SSL:                    Cipher in use is TLS_AES_256_GCM_SHA384
Using delimiter:        ;
Server version:         8.0.27 MySQL Community Server - GPL
Protocol version:       10
Connection:             localhost via TCP/IP
Server characterset:    utf8mb4
Db     characterset:    utf8mb4
Client characterset:    utf8mb4
Conn.  characterset:    utf8mb4
TCP port:               3306
Binary data as:         Hexadecimal #THIS IS THE REASON WHY WE GET HEXADECIAML
VALUE
Uptime:                 23 hours 35 min 0 sec


#TO SOLVE THIS PROBLEM FOLLOW THE STEPS BELOW THERE ARE TWO WAYS:

WAY 1:
    ONE QUICK FIX TO SOLVE THIS PROBLEM IS TO USE USING ASCII
    i.e..  SELECT CHAR(65 USING ASCII);
    SYNTAX: CHAR(N,... [USING charset_name])

MORE INFO CAN BE FOUND AT:https://dev.mysql.com/doc/refman/8.0/en/string-
functions.html#function_char

WAY 2:

STEP 1: GOTO TO THE FOLDER WHERE THE BIN FOLDER OF MYSQL SEREVER WHICH WILL BE
LOCATED INSIDE MYSQL

IF YOU ARE USING WINDOWS 10 -->  C:\Windows\System32\cmd.exe ---> THIS WOULD BE
PATH OF THE BIN FOLDER(IN MOST CASES IF NOT LOCATE THE FOLDER BY YOURSELF)

STEP 2: OPEN COMMAND PROMPT AND KEY IN THE BELOW COMMAND
        mysql -u root -p --skip-binary-as-hex

STEP 3: ENTER THE PASSWORD

STEP 4: RUN THE FOLLOWING
        SELECT CHAR(65)

/* NOTE YOU NEED TO DO THIS STEP EVERY TIME BEFORE YOU USE MYSQL AND MYSQL CLI
CAN BE USED DIRECTLY FROM CMD(COMMAND PROMPT) */

MORE INFO CAN BE FOUND AT: https://bugs.mysql.com/bug.php?id=99480

CODE: SELECT CHAR(65 USING ASCII) AS "Alphabet";

OUTPUT:
```

```
        +----------+
        | Alphabet |
        +----------+
        | A        |
        +----------+

================================================================================
=====================

#CONCAT()

-> IF COLOUMN NAMES ARE USED THE RECORDS GETS CONCATENATED

CODE: SELECT CONCAT(student_name , year) as "NAME AND YEAR"
      FROM records;

OUTPUT:
        +---------------+
        | NAME AND YEAR |
        +---------------+
        | ram2004       |
        | sam2003       |
        | hari2002      |
        | ramu2004      |
        +---------------+

-> CAN ALSO BE USED TO CONCAT TWO STRINGS
================================================================================
====================

CODE: SELECT CONCAT("SIBI" , "RAJ") AS "NAME";

OUTPUT:
        +---------+
        | NAME    |
        +---------+
        | SIBIRAJ |
        +---------+
================================================================================
====================

CODE: SELECT "SI" "BI" "RAJ";

OUTPUT:
        +---------+
        | SI      |
        +---------+
        | SIBIRAJ |
        +---------+
================================================================================
=================

#LOWER()/LCASE()  ---> https://dev.mysql.com/doc/refman/8.0/en/string-
functions.html#function_lcase

CODE: SELECT LOWER("PYTHON");

OUTPUT:
```

```
        +-----------------+
        | LOWER("PYTHON") |
        +-----------------+
        | python          |
        +-----------------+
================================================================================
=================

#UPPER()/LCASE()

CODE: SELECT UPPER("python");

OUTPUT:
        +-----------------+
        | UPPER("python") |
        +-----------------+
        | PYTHON          |
        +-----------------+
================================================================================
==================

# TRIM ---> REMOVES TRAILING AND LEADING SPACES --> LIKE STRIP()
# LTRIM ---> LIKE LSTRIP()
# RTIRM ---> LIKE RSTIP()


CODE: SELECT TRIM("  AKA STRIP  ");

OUTPUT:
        +----------------------+
        | TRIM("  AKA STRIP  ") |
        +----------------------+
        | AKA STRIP            |
        +----------------------+
================================================================================
==================

#SUBSTRING()/SUBSTR()

SUBSTR(given_string,3,4) ---> SELECT 4 CHARACTERS STARING FROM THE INDEX 3

LEFT SIDE INDEX STARTS FROM 0  AND RIGHT SIDE INDEX STARTS FROM -1

CODE: SELECT SUBSTR("0123456789" , 3 , 4) AS SLICING;

OUTPUT:
        +---------+
        | SLICING |
        +---------+
        | 2345    |
        +---------+
```

NUMERIC FUNTIONS

```
#MOD() ---> RETURNS THE REMAINDER ---> LIKE % IN PYTHON ---> ** REMAINDER(INT
PART) **
```

```
CODE: SELECT MOD(7,2);

OUTPUT:
          +----------+
          | MOD(7,2) |
          +----------+
          |        1 |
          +----------+
================================================================================
=================

#POWER()

CODE: SELECT POWER(2,3);  ---> 2^3 OR 2**3

OUTPUT:
        +------------+
        | POWER(2,3) |
        +------------+
        |          8 |
        +------------+
================================================================================
==================

#ROUND() ---> TO ROUND THE EXPRESSION TO THE NUMBER OF DECIMAL POINT

MORE INFO ON ROUNDING CAN BE FOUND AT:
https://tutorax.com/blogue/en/how-to-round-decimals-rounding-numbers-
guide/#:~:text=There%20are%20certain%20rules%20to,9%20round%20the%20number%20up.

CODE: SELECT ROUND(1.26,1);
OUTPUT:
        +---------------+
        | ROUND(1.26,1) |
        +---------------+
        |           1.3 |
        +---------------+

CODE: SELECT ROUND(1.25,1);
OUTPUT:
        +---------------+
        | ROUND(1.25,1) |
        +---------------+
        |           1.3 |
        +---------------+

CODE: SELECT ROUND(1.26,1);
OUTPUT:
        +---------------+
        | ROUND(1.26,1) |
        +---------------+
        |           1.3 |
        +---------------+
================================================================================
==================

#SIGN() ---> RETURNS THE SIGN OF THE NUMBER
```

```
CODE: SELECT SIGN(-10);
OUTPUT:
        +-----------+
        | SIGN(-10) |
        +-----------+
        |        -1 |
        +-----------+

CODE: SELECT SIGN(10);
OUTPUT:
        +----------+
        | SIGN(10) |
        +----------+
        |        1 |
        +----------+
================================================================================
=================

#SQRT()

CODE: SELECT SQRT(4);

OUTPUT:
        +---------+
        | SQRT(4) |
        +---------+
        |       2 |
        +---------+
================================================================================
=================

#TRUNCATE() ---> REMOVES(TURNCATES) THE CHARACTERS UPTO TO THE GIVEN DECIMAL
PLACES

CODE: SELECT TRUNCATE(123456,3) AS "I WON'T GET TRUNCATED"; ---> ONLY TRUBCATES
DECIMAL PLACES

OUTPUT:
        +-----------------------+
        | I WON'T GET TRUNCATED |
        +-----------------------+
        |                123456 |
        +-----------------------+'

CODE: SELECT TRUNCATE(123.456 , 0) AS "MISSING:456";

OUTPUT:
        +-------------+
        | MISSING:456 |
        +-------------+
        |         123 |
        +-------------+
```

DATE AND TIME FUNTIONS

```
# CURDATE() / CURRENT_DATE() / CURRENT_DATE ---> RETURNS THE CURRENT DATE
```

```
CODE: SELECT CURDATE();
OUTPUT:
        +------------+
        | CURDATE()  |
        +------------+
        | 2022-01-08 |
        +------------+

CODE: SELECT CURDATE() + 1;
OUTPUT:
        +---------------+
        | CURDATE() + 1 |
        +---------------+
        |      20220109 | ---> 2022-01-08 + 1 ---> 20220109
        +---------------+                           ----  --
================================================================================
=================


#DATE() ---> USED TO EXTRACT YYYY-MM-DD PART

CODE: SELECT DATE('2001-01-01');
OUTPUT:
        +--------------------+
        | DATE('2001-01-01') |
        +--------------------+
        | 2001-01-01         |
        +--------------------+

CODE: SELECT DATE('2001-01-01 01:01:01');
OUTPUT:
        +----------------------------+
        | DATE('2001-01-01 01:01:01') |
        +----------------------------+
        | 2001-01-01                 |
        +----------------------------+
================================================================================
=================

#MONTH() --> USED TO EXTRACT MM PART

CODE: SELECT MONTH('2001-01-01');
OUTPUT:
        +---------------------+
        | MONTH('2001-01-01') |
        +---------------------+
        |                   1 |
        +---------------------+

 ================================================================================
==================

#YEAR() ---> SELF EXPLANATORY

CODE: SELECT YEAR('2001-01-01');
OUTPUT:
        +--------------------+
```

```
        | YEAR('2001-01-01') |
        +--------------------+
        |               2001 |
        +--------------------+
```

#NOW() ---> RETURNS US THE TIME WHEN THE FUNTION STARTED TO GET EXCECUTED

CODE: SELECT NOW();
OUTPUT:

```
        +---------------------+
        | NOW()               |
        +---------------------+
        | 2000-01-01 01:01:01 |
        +---------------------+
```

#SYSDATE() ---> RETURN US THE CURRENT DATE AND TIME

CODE: SELECT SYSDATE();
OUTPUT:

```
        +---------------------+
        | SYSDATE()           |
        +---------------------+
        | 2000-01-01 01:01:01 |
        +---------------------+
```

CODE: SELECT NOW() , SLEEP(5) , NOW();
OUTPUT:

```
        +---------------------+----------+---------------------+
        | NOW()               | SLEEP(5) | NOW()               |
        +---------------------+----------+---------------------+
        | 2000-01-01 01:01:01 |        0 | 2000-01-01 01:01:01 |  ---> SAME TIME
        +---------------------+----------+---------------------+
```

CODE: SELECT SYSDATE() , SLEEP(5) , SYSDATE();
OUTPUT:

```
        +---------------------+----------+---------------------+
        | SYSDATE()           | SLEEP(5) | SYSDATE()           |
        +---------------------+----------+---------------------+
        | 2000-01-01 01:01:01 |        0 | 2000-01-01 01:01:06 | ----> INITAL
TIME + 5 SECONDS
        +---------------------+----------+---------------------+
```

CODE: SELECT NOW() , SLEEP(5) , SYSDATE();
OUTPUT:

```
        +---------------------+----------+---------------------+
        | NOW()               | SLEEP(5) | SYSDATE()           |
        +---------------------+----------+---------------------+
        |  2000-01-01 01:01:01|        0 | 2000-01-01 01:01:06 | ---> INITAL
TIME + 5 SECONDS
        +---------------------+----------+---------------------+
```

CODE: SELECT SYSDATE() , SLEEP(5) , NOW();

```
OUTPUT:
        +---------------------+----------+---------------------+
        | SYSDATE()           | SLEEP(5) | NOW()               |
        +---------------------+----------+---------------------+
        | 2000-01-01 01:01:01|        0 | 2000-01-01 01:01:01 |  ---> SAME TIME
        +---------------------+----------+---------------------+
```

Null Handling

```
Let us consider the table given below:

NAME OF THR TABLE: records3
+------+------+---------+
| name | year | present |
+------+------+---------+
| ram  | 2001 | present |
| sam  | 2002 | present |
| ramu | 2003 | NULL    |
+------+------+---------+

To create the table above use the following commands:
USE db;  ---> (use database_name)
CREATE TABLE records3(name varchar(10) , year integer , present varchar(10));
INSERT INTO records3 VALUES('ram' , 2001 , 'present') , ('sam' , 2002 ,
'present'), ('ramu', 2003 , NULL);


NULL here in the present column means that the person is absent on that
particular day(2001-01-01).
The day we are here referring to is 2001-01-01.

#IFNULL()

Syntax: IFNULL(column_name , value_to_be_substitued)

IFNULL() ---> Used to change all the NULL value from the give column to the
given value

CODE: SELECT name , year , IFNULL(present , 'absent')
      FROM records3;

OUTPUT:
        +------+------+---------------------------+
        | name | year | IFNULL(present , 'absent') |
        +------+------+---------------------------+
        | ram  | 2001 | present                   |
        | sam  | 2002 | present                   |  ---> NULL values are
changed into absent
        | ramu | 2003 | absent                    |
        +------+------+---------------------------+

==========================================================================
====================

#USING **AS** WITH IFNULL()

CODE: SELECT name , year , IFNULL(present , ' absent') AS 'attendance'
```

```
      FROM records3;

OUTPUT:
        +------+------+------------+
        | name | year | attendance |
        +------+------+------------+
        | ram  | 2001 | present    |
        | sam  | 2002 | present    |
        | ramu | 2003 |  absent    |
        +------+------+------------+
================================================================================
====================

#FINDING NULL USING THE WHERE OPERATOR:

CODE: SELECT *
      FROM records3
      WHERE present IS NULL;  ---> SELECTS ALL THE NULL VALUE

OUTPUT:
        +------+------+---------+
        | name | year | present |
        +------+------+---------+
        | ramu | 2003 | NULL    |
        +------+------+---------+

CODE: SELECT *
      FROM records3
      WHERE present IS NOT NULL;  ---> SELF - EXPLANATORY

OUTPUT:
        +------+------+---------+
        | name | year | present |
        +------+------+---------+
        | ram  | 2001 | present |
        | sam  | 2002 | present |
        +------+------+---------+
```

MISSED NUANCES

```
/* In this section we will cover a few nuances that we have missed earlier */

SELECT year  (or) SeLeCt year    (or)  sELEcT yEar
FROM records; (or) fROm records; (or)  fROm rECROds;

ALL THE ABOVE QUERIES YIELD THE SAME RESULT ---> SQL IS CASE INSENSTIVE
================================================================================
====================

NUMBER()

NUMBER(5,3) ---> NUMBER WITH A MAXIMUM OF 5 DIGIT WITH 3 DECIMAL PLACES
================================================================================
====================

STRING VS NUMERIC FUNTIONS
```

```
THE OUTPUT OF ALL THE STRING FUNCTIONS STARTS FROM THE LEFT

THE OUTPUT OF ALL THE NUMERIC FUNTIONS STARTS FROMT THE RIGHT

        NUMERIC FUNTION                     STRING FUNCTION

        +-------------+
        | MISSING:456 |                     +-----------------+
        +-------------+                     | LOWER("PYTHON") |
        |          123|                     +-----------------+
        +-------------+                     | python          |
                                            +-----------------+

================================================================================
====================

SUBSTR(given_string , start_index ,  no_of_characters)

start_index ---> can be negative or positive (POSITIVE OR NEGATIVE NUMBERS)
no_of_character ---> must be a positive integer(NATURAL NUMBERS)

CODE: SELECT SUBSTR('0123456789' , 3 , -4);
OUTPUT:
        +-------------------------------+
        | SUBSTR('0123456789' , 3 , -4) |
        +-------------------------------+
        |                               |
        +-------------------------------+
================================================================================
====================

USING ARITHEMTIC AND RELATIONAL OPERATOR WITH DATE AND TIME FUNTIONS

CODE: SELECT YEAR('2001-01-01') + 10;
OUTPUT:
        +-------------------------+
        | YEAR('2001-01-01') + 10 |
        +-------------------------+
        |                    2011 |
        +-------------------------+
================================================================================
====================

CODE: SELECT YEAR('2001-01-01') > 10;
OUTPUT:
        +-------------------------+
        | YEAR('2001-01-01') > 10 |
        +-------------------------+
        |                       1 |  --> 1 --> True
        +-------------------------+
```

TABLE CREATION COMMANDS (CONTINUED)

DROP

```
#TO DELETE A DATABASE
```

```
SYNTAX: DROP DATABASE database_name;
EXAMPLE: DROP DATABASE db;    #---> Database db will be deleted if it exists
OUTPUT: Query OK, 0 rows affected (0.31 sec)

#TO DELETE A TABLE

SYNTAX: DROP table_name;
EXAMPLE: DROP records;  #---> Table records will be deleted if it exists
OUTPUT: Query OK, 0 rows affected (1.15 sec)

#TO DELETE A COLUMN

SYNTAX: ALTER TABLE table_name
        DROP COLUMN column_name;
EXAMPLE: ALTER TABLE records
        DROP COLUMN year;   # column  year will be deleted

#IF EXISTS

CAN BE USED TO DELTE A TABLE IF IT EXISTS

SYNTAX: DROP TABLE IF EXISTS table_name;
SYNAX: DROP TABLE IF EXISTS records; #---> Table records will be deleted if it
exists
```

CONSTRAINT

```
#CONSTRAINT

DATABASE INTERGRITY CONSTRAINTS:
(i)   Unique constraint
(ii)  Primary Key constraint
(iii) Foreign Key constraint
(iv)  Check constraint
(v)   Default Key constraint
(vi)  NOT NULL
(vii) ENUM
(vii) SET
and so on...
================================================================================
===========

#NOT NULL  ---> SHOULD BE USED WHEN YOU DON'T WANT AN COLOUMN TO ACCEPT NULL
DATA

CODE:  CREATE TABLE records4
      (sno integer,
       student_name varchar(10)
       ,email varchar(20) NOT NULL) ;
/* email column now can't accept NOT NULL values*/

CODE:   INSERT INTO records4 VALUE(1,'ram',NULL);
OUTPUT: ERROR 1048 (23000): Column 'email' cannot be null
================================================================================
===========
```

```
#UNIQUE ---> SHOULD BE USED WHEN YOU DON'T WANT A COLOUMN TO HAVE UNIQUE
RECORDS(NO DUPLICATE RECORDS)

CODE: CREATE TABLE records6
      ( sno           integer     NOT NULL UNIQUE,
        student_name  varchar(10) ,
        email         varchar(20) NOT NULL) ;

CODE: INSERT INTO records6 VALUE
     (1,'ram','ram@gmail.com');
OUTPUT: Query OK, 1 row affected

CODE: INSERT INTO records6 VALUE
    (1,'ram','ram@yahoo.com');

OUTPUT: ERROR 1062 (23000): Duplicate entry '1' for key 'records6.sno'
================================================================================
===========

#PRIMARY KEY  ---> CAN BE APPPLIED TO ONLY ONE COLOUMN AND IT DOESN'T ALLOW NULL
VALUES
               # ERROR(ERROR 1068 (42000): Multiple primary key defined) --->
PRODUCED WHEN APLIIED                  TO MULTIPLE COLUMNS

PRIMARY KEY ---> THIS IS SERVES AS AN UNIQUE INDENTIFIER
           ---> TWO PERSON CAN HAVE SAME NAME BUT THEY CAN''T HAVE SAME
FINGERPRINT
            ---> HERE FINGERPRINT SERVES THE PURPOSE OF PRIMARY KEY
           ---> IN TABLE WE MUST HAVE A PRIMARY KEY TO UNIQUELY IDENTIFY A
RECORDS IN A TABLE

AS WE KNOW PRIMARY KEY DOES NOT ALLOW NULL VALUES THE PRIMARY KEY ALSO ACTS LIKE
NOT NULL CONSTARINT

CODE: CREATE TABLE records7
     (name NOT NULL PRIMARY KEY);    ---> NOT NULL MAY OR MAY NOT BE USED WITH
PRIMARY KEY

            (OR)

CREATE TABLE records7
     (name PRIMARY KEY); #PRIMARY KEY ALSO ACTS LIKE NOT NULL
================================================================================
=================

#DEFAULT CONSTRAINT

CODE: CREATE TABLE records8(name DEFAULT 'I AM')

      INSERT INTO records8 VALUE();

  /* IN THIS CASE THE DEFAULT VALUE 'I AM' WILL BE ADDED */

     SELECT * FROM records8;

OUTPUT:
        +------+
        | name |
```

```
        +------+
        | I AM |
        +------+

NOTE: THE MAX SIZE OF DEFAULT VALUE IS 10;
# AS WE DID NOT INCLUDE ANY VALUE WHILE ADDING RECORDS THE DEFAULT VALUE 'I AM'
WAS INSERTED
================================================================================
==================

#CHECK CONSTRAINT---> CAN BE USED WHEN YOU WANT TO ALLOW CONSTRAINTS BASED ON
CERTAIN LIMIT

CODE:  CREATE TABLE records9 VALUE
      (name  varchar(10) ,
       age    integer     CHECK(age > 18) ) #IT ONLY ALLOWS VALUES GREATER THAN
18 IN THE age COLUMN


CHECK(column_1 < column_2) ---> CAN BE USED TO COMPARE TWO COLUMNS

name varchar(10)  CHECK(name in ('ram' , 'som' ,'ramu'))

BETWEEN , LOGICAL OPERATOR AND OTHER OPERATORS CAN BE USED.
================================================================================
====================

#FOREIGN KEY CONSTARINT

#FOREIGN KEY IS LIKE PRIMARY KEY. IT IS USED IN RDBMS.

#SO FAR WE HAVE ONLY SEE DBMS.

DBMS ---> Database Management System
RDBMS ---> Relational Database Management System

IN RDBMS TABLES ARE IN RELATION WITH EACH OTHER BUT IN DBMS TABLES ARE NOT IN
RELATION WITH EACH OTHER.


DBMS

DATABSSE NAME: RDBMS

╔════╦═══════╦═══════╗                  ╔════╦═══════╦═══════╗
╠ id ╠ name  ╠ age   ╣                  ╠ id ╠ name  ╠ gender ╣
╠════╬═══════╬═══════╣                  ╠════╬═══════╬═══════╣
╠ 1  ╠ ram   ╠ 10    ╣                  ╠ 2  ╠ sam   ╠ male   ╣
╠════╬═══════╬═══════╣                  ╠════╬═══════╬═══════╣
╠ 2  ╠ sam   ╠ 20    ╣                  ╠ 1  ╠ ram   ╠ female ╣
╠════╬═══════╬═══════╣                  ╠════╬═══════╬═══════╣
╠ 3  ╠ ram   ╠ 30    ╣                  ╠ 3  ╠ ram   ╠ male   ╣
╚════╩═══════╩═══════╝                  ╚════╩═══════╩═══════╝
TABLE NAME: AGE                        TABLE NAME: GENDER


AS YOU CAN SEE BOTH THE TABELS ARE RELATED TO EACH OTHER BY THE ID COLOUMN
```

id column in table AGE is called the primary key and id in table GENDER is called primary key

id column is called as the foreign key as it is used to relate the two tables AGE AND GENDER.
WE can even choose the gender column as the primary key but we can''t choose it as foreign key as it is not present in the age table.

DATABASE DBMS:

weight	name	age
40	ram	10
50	sam	male
60	ram	male

TABLE NAME: AGE

id	name	gender
2	sam	male
1	ram	female
3	ram	male

TABLE NAME: GENDER

TWO TABLES ARE NOT RELATED TO EACH OTHER SO IT IS CALLED AS DBMS

==========

#FIRST LET US CREATE A PARENT TABLE WITH A PRIMARY KEY sno

CODE: CREATE TABLE parent(sno integer NOT NULL PRIMARY KEY)

#NOW LET US CREATE A CHILD TABLE WITH A FOREIGN KEY sno AND id AS PRIMARY KEY

```
CODE: CREATE TABLE child
    (sno integer NOT NULL PRIMARY KEY,

    sno integer REFERENCES parent (sno))
    #If we skip sno MySQL will the reference the primary key of the the table parent by default
```

==========

#ON DELETE CASCADE

#FIRST LET US CREATE A PARENT TABLE WITH A PRIMARY KEY sno
CODE: CREATE TABLE parent(sno integer NOT NULL PRIMARY KEY)

#NOW LET US CREATE A CHILD TABLE WITH A FOREIGN KEY sno AND id AS PRIMARY KEY

```
CODE: CREATE TABLE child
    (sno integer NOT NULL PRIMARY KEY,

    sno integer REFERENCES parent (sno)) ON DELETE CASCADE
```

ON DELETE CASCADE:

--> To be used when you want the related rows in child table to get deleted when the row gets deleted in the parent table

```
--> For example let''s say a row you deleted a row in the parent table all the
related row which are present in the child will get deleted automatically if you
use ON DELETE CASCADE


================================================================================
====================
#ON UPDATE CASCADE

#FIRST LET US CREATE A PARENT TABLE WITH A PRIMARY KEY sno
CODE: CREATE TABLE parent(sno integer NOT NULL PRIMARY KEY)

#NOW LET US CREATE A CHILD TABLE WITH A FOREIGN KEY sno AND id AS PRIMARY KEY
CODE: CREATE TABLE child
    (sno integer NOT NULL PRIMARY KEY,

    sno integer REFERENCES parent (sno)) ON UPDATE CASCADE
                ------------------------------------------------
ON UPDATE CASCADE:

--> To be used when you want the changes in the parent table to reflect back in
the child table(only related rows get updated with the new changes)

--> For example let''s say you update a row in the parent table all the related
row which are present in the child table will get updated with the new changes
automatically if you use ON UPDATE CASCADE.
```

TABLE CONSTRAINTS

```
#TABLE CONSTRAINTS ---> CONSTRAINT APPLIED TO MULTIPLE COLUMNS

CODE: CREATE TABLE t1
    (age  integer,
     name  VARCHAR(10) NOT NULL,
     email VARCHAR(20) NOT NULL
     UNIQUE(name , email));   #UNIQUE CONTRAINT WILL BE APLLIED TO name and
email column
    FOREIGN KEY(sno) REFERENCES records(sno)
```

NAMED CONSTRAINTS

```
#ASSIGNING NAME TO CONSTRAINTS

MySQL my default assigns name to constraints in the format SYS_Cn , where n is
an integer
For eg: SYS_C123456 , SYS_C654321

But we can force change the name of the constraint

SYNTAX: CONSTRAINT the_name_you_want constraint_name;
CODE:  CREATE TABLE students (
       id INTEGER CONSTRAINT new_name PRIMARY KEY,
       NAME varchar(15)
       );
```

```
#DEFAULT NAME OF PRIMARY KEY CONSTRAINT HAS BEEN CHANGED TO new_name
#
```

TABLE CREATION FROM EXISITNG TABLE

```
#CREATING TABLE FROM EXISTSING TABLE

#METHOD 1:(INSERT AND SELECT)

#table_2 should be created earlier
#column datatype and count in records should match column datatype  in table_2
CODE: INSERT INTO table_2
      SELECT student_name FROM records; #RECORDS IN records ---> COPIED TO
TABLE_2

#METHOD 2:(AS SELECT)

CODE: CREATE TABLE T2 AS
      SELECT student_name , year FROM records;   #USE OF AS IS OPTIONAL

+--------------+------+
| student_name | year |
+--------------+------+
| ram          | 2004 |
| sam          | 2003 |
| hari         | 2002 |
| ramu         | 2004 |
+--------------+------+

THE ABOVE RECORDS WILL BE STORED IN BOTH THE CASE
```

UPDATE

```
SYNTAX: UPDATE table_name
        SET column_name = value;
```

```
#TO UPDATE ALL THE RECORDS IN A COLUMN

CODE: UPDATE records
      SET year = 2000;

TABLE:
        +------+--------------+------------------+------+-------------+
        | sno  | student_name | email            | year | column_name |
        +------+--------------+------------------+------+-------------+
        |    1 | ram          | ram@gmail.com    | 2000 |          10 |
        |    2 | sam          | sam@yahoo.com    | 2000 |          20 |
        |    3 | hari         | hari@outlook.com | 2000 |          30 |
        |    4 | ramu         | ramu@gmail.com   | 2000 |          20 |
        +------+--------------+------------------+------+-------------+
```

```
#TO UPDATE A PARTICULAR RECORD

WE CAN USE WHERE TO ACHIEVE THIS TASK

CODE: UPDATE records
      SET year = 2000
      WHERE student_name = "ram";

TABLE:
        +------+--------------+------------------+------+-------------+
        | sno  | student_name | email            | year | column_name |
        +------+--------------+------------------+------+-------------+
        |    1 | ram          | ram@gmail.com    | 2000 |          10 | #2004 TO
2000
        |    2 | sam          | sam@yahoo.com    | 2003 |          20 |
        |    3 | hari         | hari@outlook.com | 2002 |          30 |
        |    4 | ramu         | ramu@gmail.com   | 2004 |          20 |
        +------+--------------+------------------+------+-------------+

SET column_name = 2000 + value  #USING EXPRESSION
```

DELETE VS TRUNCATE (ROW OPERATION)

```
# BOTH DELETE AND TRUNCATE ARE USED TO DELETE ROWS AND ROWS , COLOUMNS
RESPECTIVELY BUT THE TABLE NAME STILL EXIST
#BUT DROP IS USED TO DELETE THE TABLE COMPLETELY [TABLE_NAME + ALL THE ROWS AND
COLUMNS] OR A PARTICULAR COLUMN
================================================================================
============

#TO DELETE ALL THE ROWS FROM A TABLE USING DELETE

SYNTAX: DELETE FROM table_name;
CODE:   DELETE FROM records;
OUTPUT: Query OK, 0 rows affected (1.57 sec)
TABLE: Empty set (0.00 sec)
#THE ABOVE CODE DELETES ALL THE ROWS AND COLUMNS BUT THE TABLE IS STILL THERE
================================================================================
================


#TO DELETE ALL THE ROWS FROM A TABLE USING TRUNCATE

SYNTAX: TRUNCATE table_name;
CODE:   TRUNCATE records;
OUTPUT: Query OK, 0 rows affected (1.12 sec)
TABLE: Empty set (0.00 sec)
#THE ABOVE CODE DELETES ALL THE ROWS AND COLUMNS BUT THE TABLE IS STILL THERE
================================================================================
================


#TO DELETE A PARTICULAR ROW FROM A TABLE USING DELETE

SYNTAX: DELETE FROM table_name
        WHERE condition
```

```
CODE: DELETE FROM records
      WHERE name = 'ram';
TABLE:
        +------+--------------+------------------+------+-------------+
        | sno  | student_name | email            | year | column_name |
        +------+--------------+------------------+------+-------------+
        |    2 | sam          | sam@yahoo.com    | 2003 |          20 |
        |    3 | hari         | hari@outlook.com | 2002 |          30 |
        |    4 | ramu         | ramu@gmail.com   | 2004 |          20 |
        +------+--------------+------------------+------+-------------+

 ================================================================================
=================

#TO DELETE A PARTICULAR ROW FROM A TABLE USING TRUNCATE

WE CAN'' DO THAT USING TRUNCATE

                                    DELETE VS TRUNCATE
```

DELETE	TRUNCATE
Can be used to remove a single or multiple rows	Can be **used** to remove all the rows
WHERE clause can be used	WHERE clause can''t be used
Slower in comparison	Faster in comparison
DML Command	DDL Command
It logs each deleted row in transaction log (OUT OF SYLLBAUS)	It doesn''t log each deleted row in transaction log (OUT OF SYLLABUS)

SOURCE: t-sibiraj.github.io/sql

ROLLBACK

```
THE FOLLOWING CONCEPT IS (/*OUT OF SYLLABUS */)

OUT OF SYLLABUS    ------      OUT OF SYLLABUS   ------  OUT OF SYLLABUS  ----
OUT OF SYLLABUS -----

#WHEN WE DO SOME CHANGES ,WE CAN UNDO THE CHANGES IF WE USE DELETE, WHICH WE
CAN'T DO WHEN WE USE TRUNCATE

commit ---> to be used to save changes
rollback --> like the undo button which we can  use to rollback the changes


CODE: mysql>DELETE FROM records
           WHERE year = 2004;

    mysql> COMMIT
    mysql> ROLLBACK
#now we can undo the last transaction. The commit acts like an checkpoint to
which we can revert back using ROLLBACK

OUT OF SYLLABUS    ------      OUT OF SYLLABUS   ------  OUT OF SYLLABUS  ----
OUT OF SYLLABUS -----
```

ALTER

```
SYNTAX: ALTER TABLE table_name
        clause_name name
```

ADD

```
#TO ADD A COLUMN

SYNTAX: ALTER TABLE table_name
        ADD column_name datatype(size) CONSTRAINT constraint_name;  size and
constraint --> optional

CODE:   ALTER TABLE records
        ADD (result integer);  #USE OF () IS OPTIONAL WHILE ADDING SINGLE COLUMN

TABLE:
        +------+-------------+------------------+------+-------------+--------+
        | sno  | student_name | email            | year | column_name | result |
        +------+-------------+------------------+------+-------------+--------+
        |    1 | ram          | ram@gmail.com    | 2004 |          10 |   NULL |
        |    2 | sam          | sam@yahoo.com    | 2003 |          20 |   NULL |
        |    3 | hari         | hari@outlook.com | 2002 |          30 |   NULL |
        |    4 | ramu         | ramu@gmail.com   | 2004 |          20 |   NULL |
        +------+-------------+------------------+------+-------------+--------+

================================================================================
================

#TO ADD MULTIPLE COLUMN

CODE: ALTER TABLE records
     ADD (maths integer , computer_science integer);

TABLE:
+------+-------------+------------------+------+-------------+--------+-------+-
-----------------+
| sno  | student_name | email            | year | column_name | result | maths |
computer_science |
+------+-------------+------------------+------+-------------+--------+-------+-
-----------------+
|    1 | ram          | ram@gmail.com    | 2004 |          10 |   NULL |  NULL |
            NULL |
|    2 | sam          | sam@yahoo.com    | 2003 |          20 |   NULL |  NULL |
            NULL |
|    3 | hari         | hari@outlook.com | 2002 |          30 |   NULL |  NULL |
            NULL |
|    4 | ramu         | ramu@gmail.com   | 2004 |          20 |   NULL |  NULL |
            NULL |
+------+-------------+------------------+------+-------------+--------+-------+-
-----------------+
================================================================================
====================


#TO ADD A COLUMN WITH A CONSTRAINT
```

```
CODE: ALTER TABLE records
      ADD (physics integer NOT NULL);

WE HAVE DELETED ALL THE COLUMNS WHICH HAS NULL VALUE BEFORE ADDING PHYSICS
COLUMN

TABLE:
        +------+--------------+------------------+------+-------------+---------
+
        | sno  | student_name | email            | year | column_name | physics
|
        +------+--------------+------------------+------+-------------+---------
+
        |    1 | ram          | ram@gmail.com    | 2004 |          10 |       0
|
        |    2 | sam          | sam@yahoo.com    | 2003 |          20 |       0
|
        |    3 | hari         | hari@outlook.com | 2002 |          30 |       0
|
        |    4 | ramu         | ramu@gmail.com   | 2004 |          20 |       0
|
        +------+--------------+------------------+------+-------------+---------
+
#0 IS ADDED BY DEFAULT AS WE HAVE ADDED NOT NULL CONSTARINT
```

CHANGE

```
SYNTAX: ALTER TABLE table_name
        CHANGE name
CHANGE:
---> Can rename a column and change its definition, or both.
```

```
#TO CHANGE THE COLUMN NAME

SYNTAX: ALTER TABLE table_name
        CHANGE old_column_name new_column_name datatype(size) CONSTRAINT
constraint_name;

CODE: ALTER TABLE records
      CHANGE physics description varchar(250);

TABLE:
        +------+--------------+------------------+------+-------------+---------
----+
        | sno  | student_name | email            | year | column_name |
description |
        +------+--------------+------------------+------+-------------+---------
----+
        |    1 | ram          | ram@gmail.com    | 2004 |          10 | 0
    |
        |    2 | sam          | sam@yahoo.com    | 2003 |          20 | 0
    |
        |    3 | hari         | hari@outlook.com | 2002 |          30 | 0
    |
```

```
        |    4 | ramu          | ramu@gmail.com    | 2004 |          20 | 0
    |
        +------+--------------+------------------+------+-------------+---------
----+
```

MODIFY

```
MODIFY:
---> Can change a column definition but not its name.

#TO CHANGE THE COLUMNS DATATYPE

SYNTAX: ALTER TABLE table_name
        MODIFY column_name datatype(size);

CODE: ALTER TABLE records
        MODIFY description varchar(50); #THE DATATYPE CHANGES FROM varchar(250)
TO varchar(50)

TABLE:
        +--------------+-------------+------+-----+---------+-------+
        | Field        | Type        | Null | Key | Default | Extra |
        +--------------+-------------+------+-----+---------+-------+
        | sno          | int         | YES  |     | NULL    |       |
        | student_name | varchar(10) | YES  |     | NULL    |       |
        | email        | varchar(20) | YES  |     | NULL    |       |
        | year         | int         | YES  |     | NULL    |       |
        | column_name  | int         | YES  |     | NULL    |       |
        | description  | varchar(50) | YES  |     | NULL    |       |
        +--------------+-------------+------+-----+---------+-------+

================================================================================
====================

#TO CHANGE THE ORDER OF THE COLUMN

SYNTAX: ALTER TABLE table_name
        MODIFY column_name datatype(size)  FIRST ...;

SYNTAX: ALTER TABLE records
        MODIFY description varchar(50) FIRST;
```

ADD

```
#TO ADD A CONSTRAINT

SYNTAX: ALTER TABLE table_name
        ADD constraint_name(column_name);

CODE:   ALTER TABLE records
        ADD PRIMARY KEY(sno);    #sno column ---> will be treated as primary key

TABLE:
        +-------------+-------------+------+-----+---------+-------+
        | Field        | Type        | Null | Key | Default | Extra |
```

```
+-------------+-------------+------+-----+---------+-------+
| description | varchar(50) | YES  |     | NULL    |       |
| sno         | int         | NO   | PRI | NULL    |       |
| student_name| varchar(10) | YES  |     | NULL    |       |
| email       | varchar(20) | YES  |     | NULL    |       |
| year        | int         | YES  |     | NULL    |       |
| column_name | int         | YES  |     | NULL    |       |
+-------------+-------------+------+-----+---------+-------+
```

DROP

```
#TO REMOVE A COLUMN

SYNTAX: ALTER TABLE table_name
        DROP column_name;

CODE: ALTER TABLE records
      DROP description; #description column ---> deleted

TABLE:
        +-----+-------------+-----------------+------+-------------+
        | sno | student_name | email           | year | column_name |
        +-----+-------------+-----------------+------+-------------+
        |   1 | ram         | ram@gmail.com   | 2004 |          10 |
        |   2 | sam         | sam@yahoo.com   | 2003 |          20 |
        |   3 | hari        | hari@outlook.com| 2002 |          30 |
        |   4 | ramu        | ramu@gmail.com  | 2004 |          20 |
        +-----+-------------+-----------------+------+-------------+
================================================================================
====================

#TO REMOVE THE PRIMARY KEY

SYNTAX: ALTER TABLE table_name
        DROP PRIMARY KEY;

CODE: ALTER TABLE records
      DROP PRIMARY KEY; #sno will no longer be primary key

TABLE:
        +-------------+-------------+------+-----+---------+-------+
        | Field       | Type        | Null | Key | Default | Extra |
        +-------------+-------------+------+-----+---------+-------+
        | sno         | int         | NO   |     | NULL    |       |
        | student_name| varchar(10) | YES  |     | NULL    |       |
        | email       | varchar(20) | YES  |     | NULL    |       |
        | year        | int         | YES  |     | NULL    |       |
        | column_name | int         | YES  |     | NULL    |       |
        +-------------+-------------+------+-----+---------+-------+
================================================================================
====================


#TO REMOVE THE FOREIGH KEY

SYNTAX: ALTER TABLE table_name
```

```
        DROP constraint_name column_name;

CODE: ALTER TABLE records
      DROP FOREIGN KEY email; #email will no longer be foreign key

================================================================================
====================


#CASCADE

CODE:  ALTER TABLE table_name
       DROP PRIMARY KEY CASCADE;

#When we use CASCADE it removes(drops) any foreign key which references the
primary key
```

GROUP BY(COMING SOON)(IMPORTANT)

```
#GROUP BY IS AN MULTIPLE ROW FUNTION LIKE AGGREGATE FUNCTION
```

JOINS

```
WE CAN ALSO ACCESS COLUMNS BY USING THE BELOW FORMAT

table_name.column_name   ----> .(dot)
alias_table_name.column_name ----> .(dot)

column_name
alias_column_name

JOIN ---> JOIN is nothing but a query which can be used to combine rows from two
or more tables
```

CARTESIAN PRODUCT

```
LET US CONSIDER THE TABLES BELOW

                        TABLE NAME: records
+-----+--------------+------------------+------+-------------+
| sno | student_name | email            | year | column_name |
+-----+--------------+------------------+------+-------------+
|   1 | ram          | ram@gmail.com    | 2004 |          10 |
|   2 | sam          | sam@yahoo.com    | 2003 |          20 |
|   3 | hari         | hari@outlook.com | 2002 |          30 |
|   4 | ramu         | ramu@gmail.com   | 2004 |          20 |
+-----+--------------+------------------+------+-------------+


                       TABLE NAME: test_table

                       +------+------+---------+
                       | name | year | present |
                       +------+------+---------+
```

```
                                    | ram   | 2004 | NULL    |
                                    | NULL  | NULL | NULL    |
                                    | sam   | 2001 | absent  |
                                    +-------+------+---------+

CARTESIAN PRODUCT IS NOTHING BUT UNSRESTRICTED JOIN

TABLE STRUCTURE OF records:                          TABLE STRUCTURE OF
test_table

records                                                 test_table
|                                                    |
|_____ sno                                           |_____ name
|                                                    |
|_____ student_name                                    |_____ year
|                                                    |
|_____ email                                         |_____ present
|
|_____ year
|
|_____ column_name

In SQL we can write the Cartesian product of records and test_table as follows

CODE: SELECT *
      FROM records, test_table

#Now the a total 15 records will be shown (5 * 3)
#Each row in records table will be multiplied with all the row from test_table
```

sno	student_name	email	year	column_name	name	year	present
1	ram	ram@gmail.com	2004	10	sam	2001	absent
1	ram	ram@gmail.com	2004	10	NULL	NULL	NULL
1	ram	ram@gmail.com	2004	10	ram	2004	NULL
2	sam	sam@yahoo.com	2003	20	sam	2001	absent
2	sam	sam@yahoo.com	2003	20	NULL	NULL	NULL
2	sam	sam@yahoo.com	2003	20	ram	2004	NULL
3	hari	hari@outlook.com	2002	30	sam	2001	absent
3	hari	hari@outlook.com	2002	30	NULL	NULL	NULL
3	hari	hari@outlook.com	2002	30	ram	2004	NULL
4	ramu	ramu@gmail.com	2004	20	sam	2001	absent
4	ramu	ramu@gmail.com	2004	20	NULL	NULL	NULL
4	ramu	ramu@gmail.com	2004	20	ram	2004	NULL

SOURCE: t-sibiraj.github.io/sql

```
AS you can see the row  1,ram,ram@gmail.com,2004 from table records
is multiplied with all the rows of the table test_table which is colour coded in
blue

A MORE SIMPLE VERSION IS GIVEN BELOW

CODE: SELECT student_name , present
     FROM records , test_table;

----> student_name [cartesian product] present
```

```
mysql> SELECT student_name , present
    ->  FROM records , test_table;
+--------------+---------+
| student_name | present |
+--------------+---------+
| ram          | absent  |
| ram          | NULL    |
| ram          | NULL    |
| sam          | absent  |
| sam          | NULL    |
| sam          | NULL    |
| hari         | absent  |
| hari         | NULL    |
| hari         | NULL    |
| ramu         | absent  |
| ramu         | NULL    |
| ramu         | NULL    |
+--------------+---------+
12 rows in set (0.00 sec)
```

SOURCE: t-sibiraj.github.io/sql

```
As you can see above row ram is multiplied with all the three rows present in the
**present column**. And the same is repeated with sam , hari and ramu row.

ram *  ( absent + NULL + NULL)
sam * (absent + NULL + NULL)
hari * (absent + NULL + NULL)
ramu * (absent + NULL + NULL)

THE ORDER WOULD HAVE BEEN CHANGED IF THE COLUMN present WAS WRITTEN BEFRORE THE
name column.
```

TABLE ALIASES

```
#TABLE ALIASES

LIKE COLUMN ALIASES WE CAN HAVE ALIAS NAME FOR TABLES TOO

SYNTAX:  SELECT table_alias_1.coloumn_name , table_alias_2
        FROM tabel_name_1 table_alias_1 , table_name_2 table_alias_2;

CONSIDER THE TABLES BELOW

                          TABLE NAME: records
              +-----+--------------+------------------+------+-------------+
              | sno | student_name | email            | year | column_name |
              +-----+--------------+------------------+------+-------------+
              |   1 | ram          | ram@gmail.com    | 2004 |          10 |
              |   2 | sam          | sam@yahoo.com    | 2003 |          20 |
              |   3 | hari         | hari@outlook.com | 2002 |          30 |
              |   4 | ramu         | ramu@gmail.com   | 2004 |          20 |
              +-----+--------------+------------------+------+-------------+


                          TABLE NAME: test_table

                          +------+------+---------+
```

```
| name | year | present |
+------+------+---------+
| ram  | 2004 | NULL    |
| NULL | NULL | NULL    |
| sam  | 2001 | absent  |
+------+------+---------+
```

TABLE NAME: test_table_3

```
+-----+--------------+------------------+---------------+-------------+
| sno | student_name | email            | year_of_birth | column_name |
+-----+--------------+------------------+---------------+-------------+
|   1 | ram          | ram@gmail.com    |          2004 |          10 |
|   2 | sam          | sam@yahoo.com    |          2003 |          20 |
|   3 | hari         | hari@outlook.com |          2002 |          30 |
|   4 | ramu         | ramu@gmail.com   |          2004 |          20 |
+-----+--------------+------------------+---------------+-------------+
```

```
CODE: SELECT a1.student_name , a2.year_of_birth
      FROM records a1 , test_table_3 a2;
```

OUTPUT:

```
+--------------+---------------+
| student_name | year_of_birth |
+--------------+---------------+
| ramu         |          2004 |
| hari         |          2004 |
| sam          |          2004 |
| ram          |          2004 |
| ramu         |          2003 |
| hari         |          2003 |
| sam          |          2003 |
| ram          |          2003 |
| ramu         |          2002 |
| hari         |          2002 |
| sam          |          2002 |
| ram          |          2002 |
| ramu         |          2004 |
| hari         |          2004 |
| sam          |          2004 |
| ram          |          2004 |
+--------------+---------------+
```

```
#WE CAN AVOID THE ABIVE SITUATION USING WHERE CLAUSE

CODE: SELECT a1.student_name , a2.year_of_birth
      FROM records a1 , test_table_3 a2
      WHERE a1.sno = a2.sno;
```

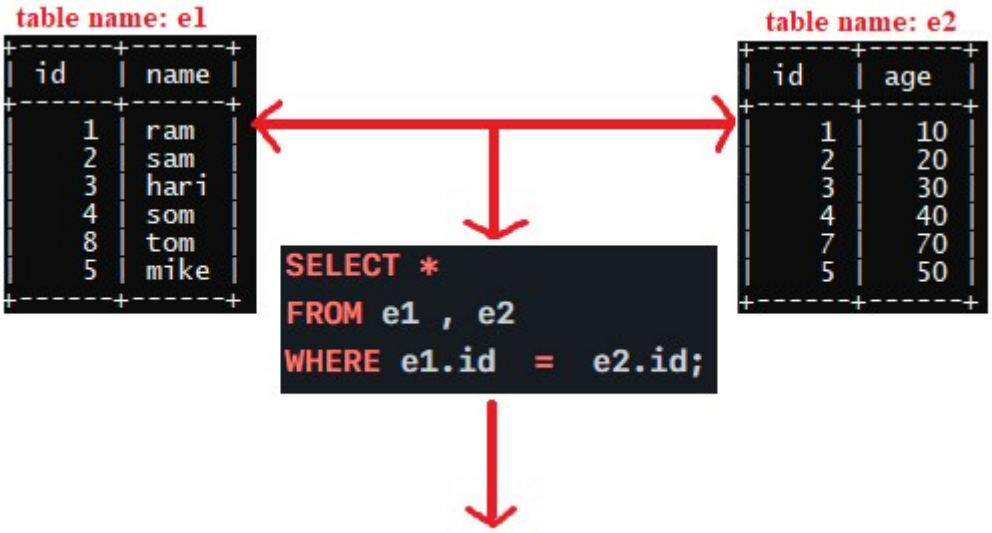
OUTPUT:

```
+--------------+---------------+
| student_name | year_of_birth |
+--------------+---------------+
| ram          |          2004 |
| sam          |          2003 |
| hari         |          2002 |
| ramu         |          2004 |
+--------------+---------------+
```

```
WE CAN ALSO OTHER CONDITION WITH WHERE CLAUSE
```

EQUI - JOIN

```
#EQUI - JOIN
--> Can be used to combine tables based on matching column values
--> Column names may or may be same
--> resultant table contains repeated columns



We can perform equi join in two ways:

WAY ONE:

SYNTAX: SELECT *
        FROM table_name_1, tabel_name_2
        WHERE table_name_1.column_name = tabel_name_2.column_name;


WAY TWO:

SYNTAX: SELECT *
        FROM table_name_1
        JOIN tabel_name_2
        ON table_name_1.column_name = tabel_name_2.column_name;

EXAMPLE:
        TABLE NAME: e1                      TABLE NAME: e2
        +------+------+                     +------+------+
        | id   | name |                     | id   | age  |
        +------+------+                     +------+------+
        |    1 | ram  |                     |    1 |   10 |
        |    2 | sam  |                     |    2 |   20 |
        |    3 | hari |                     |    3 |   30 |
        |    4 | som  |                     |    4 |   40 |
        |    8 | tom  |                     |    7 |   70 |
        |    5 | mike |                     |    5 |   50 |
        +------+------+                     +------+------+


CODE:
    SELECT *
    FROM e1 , e2
    WHERE e1.id  =  e2.id;

            (OR)
    SELECT *
    FROM e1
    JOIN e2
    ON e1.id = e2.id;

The above code selects all the records from the two tables whihc have same id
```

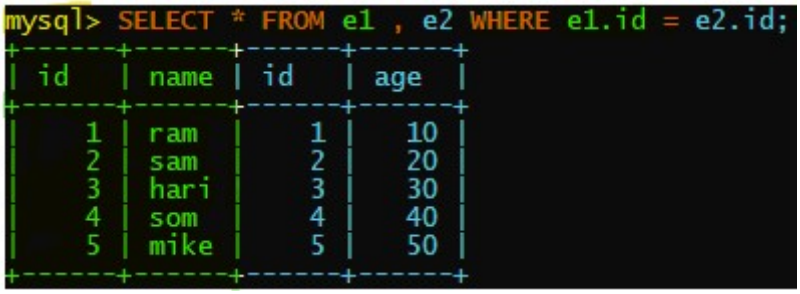


source: t-sibiraj.github.io/learn

```
Now only columns colour coded(highlighted) in green will be selected as we have used the condition e1.id = e2.id in the where clause. Those in pink won''t be selected.

the records (8 , 'tom')  and (7,70) won't be selected
```

source: t-sibiraj.github.io/learn

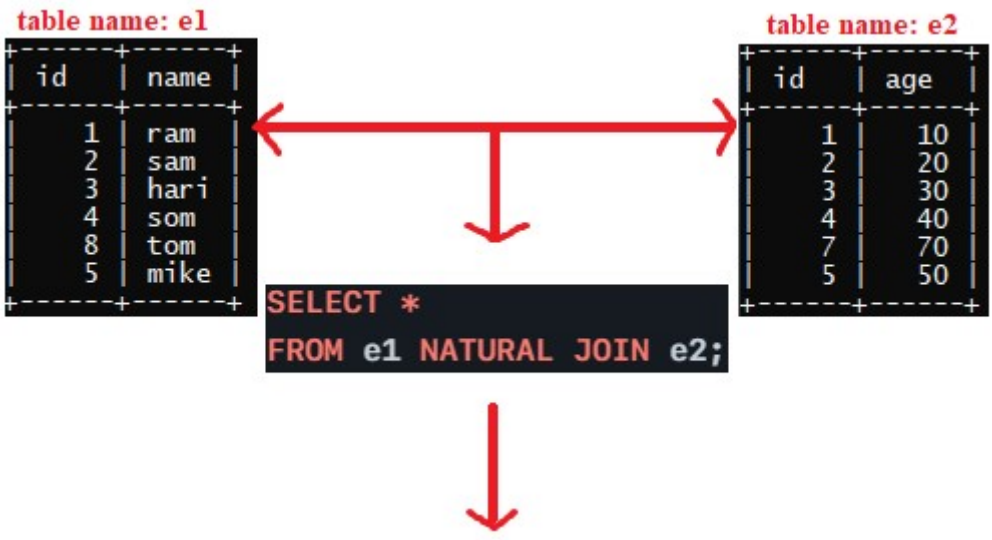
```
The resluting table will contain duplicate columns
```



source: t-sibiraj.github.io/learn

NATURAL JOIN

```
#EQUI - JOIN

---> Can be used to used to combine tables which have column columns
---> No duplicate columns are returned
---> Column name and data type should be same

SYNTAX: SELECT *
        FROM table_name_1 NATURAL JOIN table_name_2;

EXAMPLE:

        SELECT *
        FROM e1 NATURAL JOIN e2;

        TABLE NAME: e1                      TABLE NAME: e2
        +------+------+                     +------+------+
        | id   | name |                     | id   | age  |
        +------+------+                     +------+------+
        |    1 | ram  |                     |    1 |   10 |
        |    2 | sam  |                     |    2 |   20 |
        |    3 | hari |                     |    3 |   30 |
        |    4 | som  |                     |    4 |   40 |
        |    8 | tom  |                     |    7 |   70 |
        |    5 | mike |                     |    5 |   50 |
        +------+------+                     +------+------+

As we can see both the table has identical columns with same name and data.

We can perform NATURAL JOIN. The output we get when we perform NATURAL JOIN will
be similar to that of EQUI JOIN but no duplicates columns will be repeated.
```

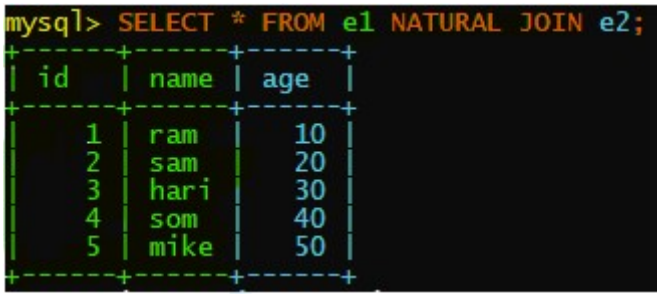


source: t-sibiraj.github.io/sql

```
As the id column is identical in both the tables we can perform natural join
Now this time id column won''t be displayed two times as we perform natural join

Those which are colour coded in green will be seldcted and thse in red won''t
get selected.
```

source: t-sibiraj.github.io/learn

```
The resulting table now conatins only unique columns
```

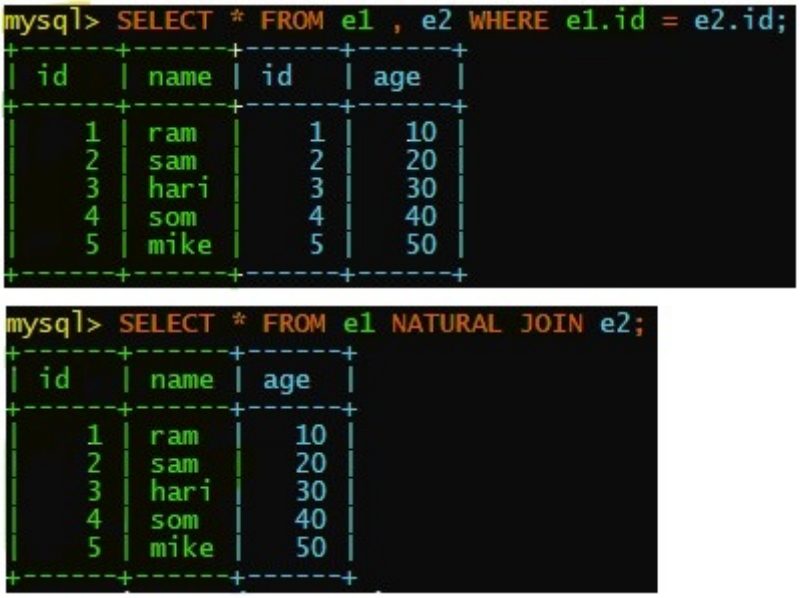


source: t-sibiraj.github.io/learn

EQUI JOIN VS NATURAL JOIN

```
EQUI JOIN:
        ---> DUPLICATE COLUMNS
        ---> COLOUMN NAME AND DATA TYPE MAY OR MAY NOT BE SAME
        ---> CAN BE APPLIED ON MULTIPLE COLUMNS
        ---> WE MUST METION COLUMN NAME

NATURAL JOIN:
        ---> UNIQUE COLUMNS
        ---> COLOUMN NAME AND DATA TYPE MUST BE SAME
        ---> CAN BE APPLIED ON MULTIPLE COLUMNS
        ---> THERE IS NO NEED TO METION COLUMN NAME

        TABLE NAME: e1                      TABLE NAME: e2
        +------+------+                     +------+------+
        | id   | name |                     | id   | age  |
        +------+------+                     +------+------+
```

```
|    1 | ram  |                    |    1 |   10 |
|    2 | sam  |                    |    2 |   20 |
|    3 | hari |                    |    3 |   30 |
|    4 | som  |                    |    4 |   40 |
|    8 | tom  |                    |    7 |   70 |
|    5 | mike |                    |    5 |   50 |
+------+------+                    +------+------+
```



source: t-sibiraj.github.io/learn

PIP

```
SIMPLE DEFINTION:

Think of ***PyPI** as a place where people upload their **python libraries and
modules**
Like a **website** where people upload **education material**

We can use the **pip** to install the **libraries** uploaded by the people on
PyPI in our computer
We can use our **browser** to download the **education material** uploaded by
others on the website in our computer

FORMAL DEFINITON:
The Python Package Index (PyPI) is a repository of software for the Python
programming language.
(source: https://pypi.org/)

repository: storage location for software packages

PIP is nothing but a package management system. It is used to download libraries
, modules created by other people  which they have uploaded to PyPI.
```

```
#STEPS TO INSTALL PYTHON LIBRARIES FROM PyPI IN WINDOWS:

1. OPEN CMD WITH ADMINISTER PRIVILLEDGE
2. TO CHECK IF PIP IS INSTALLED TYPE EITHER pip or pip3    #either should work

3. TYPE pip install name_of_the_package or pip3 install name_of_the_package


#WE NEED mysql-connector-python and pymysql libraries to work the sql from
python

4.pip install mysql-connector-python
5.pip install pymysql
```

```
#Module name aliasing

>>>import math as m    #we can use m or whatever identifier name (identifier
naming rules apply)
>>> m.floor(1.2)
1


#Importing a particular function from a module

>>>from math import floor
>>>floor(1.2)
1

#Importing every funtion from a module

>>>from math import *
>>>floor(1.2)
1
>>>ceil(1.2)
2
```

MYSQL CONNECTOR

```
#import the module

import mysql.connector as connector
```

CONNECTING TO MySQL DATABASE

```
SYNTAX:
variable_name = mysql.conncetor.connect(host="host_name",
                                        user="user_name",
                                        passwd  = "your_password",
                                        databse = name_of_the_database)
```

```
'''
host ---> It is the host name or the IP address of the database serevr. As our
database is a local database we can use localhost

user ---> the username you have on MySQL

password ---> the password which you have set

database ---> this is optional. You should key in the name of the databse
'''

#mysql.conncetor as connector
CODE: connection = connector.connect(host="localhost",  user="root", passwd  =
"root",
                                database = "db")

================================================================================
==========


#TO CHECK IF THE CONNECTION TO THE DATABASE IS SUCCESSFUL WE CAN USE
.is_connected() METHOD

SYNTAX: connection_object.is_connected() ---> True ----> Successfully Connected
                        ---> False ----> Unsuccessful Connection
CODE:
>>> connector.is_connected()
True
```

CREATING A CURSOR INSTANCE

```
#WE MUST USE CURSOR IF WE WANT TO PERFORM ROW BY ROW PROCESSING

#The output for our query get stored in the cursor we can access single or
multiple rows at a time from it .(This will get clear when we study about
fetchall(), fetchone()).

#The output for our query is called the resultset
================================================================================
============

#import mysql.conncetor as connector
#connection = connector.connect(details)

SYNTAX: cursor_object = connection_object.cursor()

CODE:   cursor = connection.cursor()
```

RECORDS TABLE:

```
+-----+--------------+------------------+------+-------------+
| sno | student_name | email            | year | column_name |
+-----+--------------+------------------+------+-------------+
|   1 | ram          | ram@gmail.com    | 2004 |          10 |
|   2 | sam          | sam@yahoo.com    | 2003 |          20 |
|   3 | hari         | hari@outlook.com | 2002 |          30 |
|   4 | ramu         | ramu@gmail.com   | 2004 |          20 |
+-----+--------------+------------------+------+-------------+
```

EXCECUTING QUERIES

```
SYNTAX: cursor_object.execute(your_sql_query)

CODE:   cursor.execute("SELECT * FROM records")

Note: -> The output that is the retrieved ,to be precise the resultset is now
stored in the cursor
      -> result set ---> output for your query

#We need the include the query within quotes and pass that string  to
cursor.execute()
```

ACCESSING STORED RESULTSET(OUTPUT) FROM THE CURSOR_OBJECT

```
#fetchall()  ---> RETURNS ALL THE ROW FROM THE RESULT SET(OUTPUT FOR YOUR QUERY)

CODE:
    print(cursor.fetchall)

OUTPUT:
       [(1, 'ram', 'ram@gmail.com', 2004, 10), (2, 'sam', 'sam@yahoo.com', 2003,
20), (3, 'hari', 'hari@outlook.com', 2002, 30), (4, 'ramu', 'ramu@gmail.com',
2004, 20)]

#resultset is in the form of a list of rows(these rows are in the form of
tuples)
#**NOTE: ONCE WE USE FETCH ALL WE NEED TO AGAIN EXECUTE THE QUERY USING
cursor.execute(query)**
================================================================================
==================

#STORING THE RESULT SET IN A VARIABLE

CODE:
     cursor.execute("SELECT * FROM records")
     resultset = cursor.fetchall()  #resultset is in the form of a list
     print(resultset)

OUTPUT:
        [(1, 'ram', 'ram@gmail.com', 2004, 10), (2, 'sam', 'sam@yahoo.com',
2003, 20), (3, 'hari', 'hari@outlook.com', 2002, 30), (4, 'ramu',
'ramu@gmail.com', 2004, 20)]
```

```
================================================================================
====================

#ACCESSING INDIVIDUAL ROWS
CODE:
    cursor.execute("SELECT * FROM records")
    row1 = cursor.fetchall()[0]
    print(row1)

OUTPUT:
        (1, 'ram', 'ram@gmail.com', 2004, 10)
================================================================================
====================

#TRAVERSING AND PRINTING ALL THE ROWS
CODE:
     cursor.execute("SELECT * FROM records")
     rows = cursor.fetchall()
     for row in rows:
        print(row)

OUTPUT:
        (1, 'ram', 'ram@gmail.com', 2004, 10)
        (2, 'sam', 'sam@yahoo.com', 2003, 20)
        (3, 'hari', 'hari@outlook.com', 2002, 30)
        (4, 'ramu', 'ramu@gmail.com', 2004, 20)
```

```
#fetchmany()   ---> Can be use to retrieve a particular number of rows

#RETRIEVE 2 RECORD FROM record TABLE
CODE:
    cursor.execute("SELECT * FROM records")
    two_record = cursor.fetchmany(2)
    print(two_record)

OUTPUT:
      [(1, 'ram', 'ram@gmail.com', 2004, 10), (2, 'sam', 'sam@yahoo.com', 2003,
20)]

#NOTE: The rows are in the form of a tuple inside a list
#WE CAN'T AGAIN FETCH THE FIRST TWO RECORDS. TO DO THAT WE SHOULD AGAIN EXECUTE
QUERY FROM FIRST
================================================================================
====================

CODE:
    cursor.execute("SELECT * FROM records")
    two_record = cursor.fetchmany(2)       #first two rows
    print(two_record)
    next_two_record = cursor.fetchmany(2)   #last two rows
    print(next_two_record)
    no_more_rows = cursor.fetchmany(2)   #As there is no more row to fetch ,
empty list is stored
    print(no_more_rows)

OUTPUT:
```

```
    [(1, 'ram', 'ram@gmail.com', 2004, 10), (2, 'sam', 'sam@yahoo.com', 2003,
20)]
    [(3, 'hari', 'hari@outlook.com', 2002, 30), (4, 'ramu', 'ramu@gmail.com',
2004, 20)]
    []
```

```
#fetchone() ---> Can be used when we want to fetch one single row

#FETCH A ROW FROM records TABLE

CODE:
    cursor.execute("SELECT * FROM records")
    only_one_row = cusor.fetchone()
    print(only_one_row)

OUTPUT:
      (1, 'ram', 'ram@gmail.com', 2004, 10)
```

rowcount()

```
#rowcount()  ---> Can be used to know how many records(rows) have been retrieved
so far
            ----> It takes account of the previous retrievals

CODE:
    cursor.execute("SELECT * FROM records")

    row1 = cursor.fetchone()
    print("Rows(records) retrieved so far",cursor.rowcount())  #1

    row2 = cursor.fetchone()
    print("Rows(records) retrieved so far",cursor.rowcount())  #2

    row3 = cursor.fetchmany(2)
    print("Rows(records) retrieved so far",cursor.rowcount())  #4


OUTPUT:
    Rows(records) retrieved so far 1
    Rows(records) retrieved so far 2
    Rows(records) retrieved so far 4

================================================================================
====================

#IF YOU RUN INTO ERROR:

DOCS:
    1. https://dev.mysql.com/doc/connector-python/en/connector-python-tutorial-
cursorbuffered.html
    2. https://dev.mysql.com/doc/connector-python/en/connector-python-api-
mysqlcursor-rowcount.html
FORUMS:
    1. https://stackoverflow.com/questions/29772337/python-mysql-connector-
unread-result-found-when-using-fetchone
```

```
    2. https://arrayoverflow.com/question/python-mysql-connector-errors-
internalerror-unread-result-found/3196
```

connection_name.close()

```
#After retreiving the records and using the database we must close the
connection

#To do that use the following command

connection.close()
```

PYMYSQL

```
WE CAN DO SAME WITH ANOTHER LIBRARY CALLED PYMYSQL

pymysql vs mysql.connector:
        ---> pymysql purely written in python and made by python
        ---> mysql.connecotr made by oracle
```

```
#import pymysql

import pymysql as pym

#TO CREATE A CONNECTION(i.e TO CONNECT TO A DATABASE)

SYNTAX: connection_name = pymysql.connect("host_name"  , "user_name"
 ,"password" ,"database")
CODE:   connection       = pym.connect(     "localhost" ,  "root"      ,"root"
  ,"db")

#TO TEST IF THE CONNECTION TO THE DATABASE WAS SUCCESSFULL
connection.is_connected()

NOTE: THE THE FOLLWOING STEPS ARE SAME LIKE mysql.connector library
#TO CREATE A CUROSR OBJECT
cursor = connection.cursor()

#TO EXCECUTE QUERIES
cursor.excecute("SELECT * FROM records")

#TO FETCH ROWS FROM RESULT SET(OUTPUT)
rows = cursor.fetchmany()

#TO DISPLAY THE ROWS(RECORDS)
for row in rows:
    print(rows)


#ROWCOUNT()
count = cursor.rowcount()
```

PARAMETERISED QUERIES

```
We provide some parameters or values from outside(by using function like
input()) to run few queries

These queries are called as parameterised queries
```

STRING FORMATTING

```
Before we learn about parameterised queries we must know what string formatting
is.

#NEW WAY TO FORMAT STRINGS

"{}".format() --> Value inside the bracket gets substituted in the set bracket
              --> The set brackets are called as placeholders

>>>details = "My name is {} and I am {} years old".format("ram" , 20)
>>>print(details)
My name is ram and I am 20 years old
#ram goes into the first set bracket and 20 into the second

>>>details = "My name is {} and I am {} years old".format(20,"ram")
>>>print(details)
My name is 20 and I am ram years old
#20 goes into the first set bracket and ram into the second
================================================================================
====================


>>>details = "My name is {0} and I am {1} years old".format("ram" , 20)
>>>print(details)
My name is ram and I am 20 years old
#ram is in zeroth index and 20 is in 1st index

>>>details = "My name is {1} and I am {0} years old".format(20,"ram")
>>>print(details)
My name is 20 and I am ram years old
'''ram is in zeroth index and 20 is in 1st index. As we have used 1st index first
, the value in the 1st index ("ram") gets substituted in the set bracket'''
================================================================================
====================


>>>details = "My name is {name} and I am {age} years old".format(age = 20,name =
"ram")
>>>print(details)
My name is ram and I am 20 years old
#now we have named the placeholder values as name and age.

================================================================================
====================


Example:
```

```
    #Write a program in python where you should get year from the user and
display the details of the that student whose year is greater than the given
year. The details of the students are stored in a database

CODE:
    import mysql.connector as connector
    connection = connector.connect(host="localhost",  user="root", passwd  =
"root", database = "db")
    cursor = connection.cursor()
    year = input("Enter the year:")
    cursor.execute("SELECT * FROM records WHERE year > {}".format(year))
    print(cursor.fetchall())
    connector.close()
OUTPUT:
    Enter the year:2003
    [(1, 'ram', 'ram@gmail.com', 2004, 10), (4, 'ramu', 'ramu@gmail.com', 2004,
20)]

#OLD WAY TO FORMAT STRINGS

#This type of formating is used in C language

%s  ---> To be used with string (can also be used with numbers)
%d  ---> To be used with integers
%f  ---> To use used with float

%char acts like {}

CODE:
    name = "ram"
    age = 20
    print("My name is %s and I am %d years old." % (name, age))

OUTPUT:
       My name is ram and I am 20 years old
```

cursor.commit()

```
#We should use cursor.commit() whenever we do some changes in the databse

#So far we have only been retrieving the records(rows) from the database

#But when we execute queries which modify the database we must use the
cursor.commit() to save changes in the database()

cursor.commit()
```

INSERTING RECORDS USING MYSQL.CONNECTOR()

```
#Creaing a cursor
import mysql.connector as connector
connection = connector.connect(host="localhost",  user="root", passwd  = "root",
database = "db")
cursor = connection.cursor()
```

```
#we should use cursor.commit()  ---> As we are changing the database(i.e
inserting records)

#inserting records

cursor.execute("INSERT INTO records Values(1, 'som', 'som@gmail.com' ,2005
,40)")
cursor.commit()
connector.close()
================================================================================
====================
                                        (OR)
================================================================================
====================

query = "INSERT INTO records Values(1, 'som', 'som@gmail.com' ,2005 ,40)"
cursor.execute(query)
cursor.commit()
connector.close()
================================================================================
====================
                                        (OR)
================================================================================
====================
#Using parameterised queries

#getting the input
sno  = int(input("Enter the sno:"))
name = input("Enter the student name:")
email = input("Enter the email:")
year = int(input("Enter the year of birth:"))
column_name = int(input("Eneter the column_name value:")

#executing query
query = "INSERT INTO records Values({} , {} , {} , {} ,
{})".format(sno,name,email,year,column_name)
cursor.execute(query)
cursor.commit()
connector.close()
#We need the include the query within quotes and pass that string  to
cursor.execute()
```

UPDATING RECORDS USING MYSQL.CONNECTOR()

```
#Creaing a curosor
import mysql.connector as connector
connection = connector.connect(host="localhost",  user="root", passwd  = "root",
database = "db")
cursor = connection.cursor()

#UPDATING RECORDS

query = '''UPDATE records SET year  = 2004
        WHERE year = 2002 '''              #year 2002 gets updated with a value
of 2004
```

```
cursor.execute(query)
cursor.commit()                                  #use commit() to save changes
connector.close()

=============================================================================
====================
                                    (OR)
=============================================================================
====================

#Using parameterised queries
year_old = int(input("Enter the year which needs to be updated:"))
year_new = int(input("Enter the new value for the year:"))

query = "UPDATE record SET year = {} WHERE year = {}".format(year_old ,
year_new)
cursor.execute(query)
cursor.commit()
connector.close()
```

DELETING RECORDS USING MYSQL.CONNECTOR()

```
#Creaing a curosor
import mysql.connector as connector
connection = connector.connect(host="localhost",  user="root", passwd  = "root",
database = "db")
cursor = connection.cursor()

#DELETING RECORDS

query = "DELETE FROM records WHERE name = 'ram' "
cursor.execute(query)
cursor.commit()
connector.close()
#We should use commit() as we are modifying the database. To save changes we
should use cursor.commit()

=============================================================================
====================
                                    (OR)
=============================================================================
====================

#using parameterised queries

name = input("Enter the name of student whose record you wish to be deleted:")
query = "DELETE FROM records WHERE name = {}".format("name")
cursor.execute(query)
cursor.commit()
connector.close()
```

SIMILARITY BETWEEN mysql.connector() and python

```
fetchall()     ---> readalines()
fetchone()     ---> readline()
fetchmany(n)    ---> read(n).split()

all the fetch method works in linear fashion

once we access the first two rows we have only access to the next rows not the
previous rows

when you open a text file and add or delete some data it''s the same like
 adding or deleting reocrds using execute

But we mush hit the save button before closing the text file to save the
changes. If we don''t do that our chnages won''t get updated in the text files.
To do the same in mysql.connector() we have the commit() method. It acts like a
save button.

connector_name.close()  ---> It is the same like closing the text file which we
have opened.
```

TABLES USED

```
records:
        +------+--------------+------------------+------+-------------+
        | sno  | student_name | email            | year | column_name |
        +------+--------------+------------------+------+-------------+
        |    1 | ram          | ram@gmail.com    | 2004 |          10 |
        |    2 | sam          | sam@yahoo.com    | 2003 |          20 |
        |    3 | hari         | hari@outlook.com | 2002 |          30 |
        |    4 | ramu         | ramu@gmail.com   | 2004 |          20 |
        +------+--------------+------------------+------+-------------+

records3:
        +------+------+---------+
        | name | year | present |
        +------+------+---------+
        | ram  | 2001 | present |
        | sam  | 2002 | present |
        | ramu | 2003 | NULL    |
        +------+------+---------+

test_table:
            +------+------+---------+
            | name | year | present |
            +------+------+---------+
            | ram  | 2004 | NULL    |
            | NULL | NULL | NULL    |
            | sam  | 2001 | absent  |
            +------+------+---------+

test_table_2:
            +------+------+---------+
            | name | year | present |
            +------+------+---------+
```

```
| ram  | 2001 | NULL    |
| sam  | 2002 | present |
| ramu | 2003 | present |
| som  | 2004 | absent  |
+------+------+---------|
```

DATABASE PORTION FOR TERM - II(2021-2)

```
(I) Database concepts: introduction to database concepts and its need

(II) Relational data model: relation, attribute, tuple, domain, degree,
cardinality, keys (candidate key,primary key, alternate key, foreign key)

(III) Structured Query Language: introduction, Data Definition Language and Data
Manipulation
Language, data type (char(n), varchar(n), int, float, date), constraints (not
null, unique, primary
key), create database, use database, show databases, drop database, show tables,
create table,
describe table, alter table (add and remove an attribute, add and remove primary
key), drop table,
insert, delete, select, operators (mathematical, relational and logical),
aliasing, distinct clause,
where clause, in, between, order by, meaning of null, is null, is not null, like,
update command,
delete command


(IV) Aggregate functions (max, min, avg, sum, count), group by, having clause,
joins : Cartesian product on two tables, equi-join and natural join

(V) Interface of python with an SQL database: connecting SQL with Python,
performing insert, update,
delete queries using cursor, display data by using fetchone(), fetchall(),
rowcount, creating
database connectivity applications
```