ALRIGHT!

MYSQL TUTORIAL

SETUP AND START WORING ON LINUX

Topics

- MySql Installation
- Securing MySQL
- Testing connectivity with MySQL
- Basic necessary queries
- Creating Database
- Creating Table
- Inserting data into the table
- Reading data from Table
- Update data into a table

Step 1: Installation

```
#yum install mysql-server.x86_64
```

Start/Enable MySQL

```
#sudo systemctl status mysqld.service
#sudo systemctl start mysqld.service
#sudo systemctl enable/disable mysqld.service
```

Step 2: Changing default options

- Secure the authentication process by setting password for root

```
#sudo mysql_secure_installation
```

Step 3: Testing Connection

You can verify your installation with the mysqladmin tool

```
#mysqladmin -u root -p version
```

To connect and start using SQL Queries

```
#mysql -u root -p
```

Some Important Queries in starting

```
SHOW DATABASES;

SHOW TABLES;

USE <database_name>
```

Creating a new Database

```
CREATE DATABASE <db_name>;
```

CRUD

- CREATE
- READ
- UPDATE
- DELETE

id	name	city
101	Raju	Delhi
102	Sham	Mumbai
103	Paul	Chennai
104	Alex	Pune

Creating a new Table

```
CREATE TABLE students (
id INT,
name VARCHAR(100)
)
```

```
CREATE TABLE students (name VARCHAR(100), age INT)
```

Checking yout table

```
DESC TABLE
```

Adding data into a Table

```
INSERT INTO students(id, name)
VALUES (101, "Rahul")

INSERT INTO students VALUES (101, "Rahul")
```

Reading data from a Table

```
SELECT * FROM <table_name>

SELECT <column_name> from students
```

Modify/Update data from a Table

```
UPDATE students
   SET contact=12345
   WHERE name='Raju';
```

DELETE data from a Table

```
DELETE FROM students
   WHERE name='Raju';
```

Deleting a Database or Table

```
DROP DATABASE <db_name>;
DROP TABLE <table_name>;
```

THANKS FOR WATCHING

Databases

List All Existing Database

```
SHOW DATABASES;
```

Creating a new Database

```
CREATE DATABASE <db_name>;
```

Working with a Database

```
USE <db_name>;
```

Deleting a Database

```
DROP DATABASE <db_name>;
```

Tables

Table

A table is a collection of related data held in a table format within a database.

id	name	city
101	Raju	Delhi
102	Sham	Mumbai
103	Paul	Chennai
104	Alex	Pune

Creating a new Table

```
CREATE TABLE students (
id INT,
name VARCHAR(100)
)
```

```
CREATE TABLE students (name VARCHAR(100), age INT)
```

Checking your table

```
DESC TABLE
```

Adding data into a Table

```
INSERT INTO students(id, name)
VALUES (101, "Rahul")

INSERT INTO students VALUES (101, "Rahul")
```

Reading data from a Table

```
SELECT * FROM <table_name>

SELECT <column_name> from students
```

Modify/Update data from a Table

```
UPDATE students
   SET contact=12345
   WHERE name='Raju';
```

DELETE data from a Table

```
DELETE FROM students
   WHERE name='Raju';
```

DataTypes

DataTypes

An attribute that specifies the type of data in a column of our database - table.

id	name	city
101	Raju	Delhi
102	Sham	Mumbai
103	Paul	Chennai
104	Alex	Pune

```
CREATE TABLE students (
id INT,
name VARCHAR(100)
)
```

Most widely used are

Numeric - INT DOUBLE FLOAT DECIMAL
String - VARCHAR
Date

NOT NULL

```sql
CREATE TABLE customers
(
    id INT NOT NULL,
    name VARCHAR(100) NOT NULL
);
```

DEFAULT Value

```
CREATE TABLE employee(
   name VARCHAR(100),
   acc_type VARCHAR(50) DEFAULT 'savings'
);
```

Primary Key 

Primary Key 

- The PRIMARY KEY constraint uniquely identifies each record in a table.
- Primary keys must contain UNIQUE values, and cannot contain NULL values.
- A table can have only ONE primary key.

acc_no	name	acc_type
101	Raju	Savings
102	Sham	Savings
103	Paul	Current
104	Alex	Savings

```sql
CREATE TABLE customers
(
    acc_no INT PRIMARY KEY,
    name VARCHAR(100) NOT NULL,
    acc_type VARCHAR(50) NOT NULL DEFAULT 'Savings'
);
```

AUTO_INCREMENT

```sql
CREATE TABLE customers
(
    acc_no INT PRIMARY KEY AUTO_INCREMENT,
    name VARCHAR(100) NOT NULL,
    acc_type VARCHAR(50) NOT NULL DEFAULT 'Savings'
);
```

ALIAS

WHERE

```sql
SELECT * FROM students
WHERE
name='Raju';
```

```sql
SELECT * FROM students WHERE name='Raju';
```

```sql
UPDATE students SET contact=12345 WHERE id=104;

DELETE FROM students WHERE id=104;
```

Exercise - 1

Task

- Create a database - bank_db
- Create a table - employees
  - emp_id
  - name
  - desig
  - dept
- emp_id column should not allow duplicate and null values
  Value of emp_id column should auto increment
- name column should not contain null value
- desig column should have default value as 'Probation'

Task

- **Insert the following data**

emp_id	name	desig	dept
101	Raju	Manager	Loan
102	Sham	Cashier	Cash
103	Paul	Associate	Loan
104	Alex	Accountant	Account
105	Victor	Associate	Deposit

Task

- Display the data

emp_id	name	desig	dept
101	Raju	Manager	Loan
102	Sham	Cashier	Cash
103	Paul	Associate	Loan
104	Alex	Accountant	Account
105	Victor	Associate	Deposit

emp_id	name
101	Raju
102	Sham
103	Paul
104	Alex
105	Victor

Exercise - 2

emp_id	name	desig	dept
101	Raju	Manager	Loan
102	Sham	Cashier	Cash
103	Paul	Associate	Loan
104	Alex	Accountant	Account
105	Victor	Associate	Deposit

Task

- Display the data

emp_id	name	desig	dept
101	Raju	Manager	Loan
103	Paul	Associate	Loan

emp_id	name	desig	dept
101	Raju	Manager	Loan

emp_id	name
101	Raju

Task

- **Update the following data**

emp_id	name	desig	dept
101	Raju	Manager	Loan
102	Sham	Cashier	Cash
103	Paul	Associate	IT
104	Alex	Accountant	Account
105	Victor	Associate	Deposit

Task

- **DELETE the following data**

emp_id	name	desig	dept
101	Raju	Manager	Loan
102	Sham	Cashier	Cash
103	Paul	Associate	IT
104	Alex	Accountant	Account
105	Victor	Associate	Deposit

String Functions

CONCAT

```
CONCAT(first_col, sec_col)
CONCAT(first_word, sec_word, ...)
```

CONCAT_WS

```
CONCAT_WS('-', fname, lname)
```

SUBSTRING

```
SELECT SUBSTRING('Hey Buddy', 1, 4);
```

SUBSTRING

```
SELECT SUBSTRING('Hey Buddy', 1, 4);
                          1   4
```

Result: Hey

REPLACE

REPLACE

Hey Buddy

Hey → Hello

Hello Buddy


```
REPLACE(str, from_str, to_str)
```

```
REPLACE('Hey Buddy', 'Hey', 'Hello')
```

REVERSE

```
SELECT REVERSE('Hello World');
```

CHAR_LENGTH

```
Select CHAR_LENGTH('Hello World');
```

UPPER & LOWER

```
SELECT UPPER('Hello World');

SELECT LOWER('Hello World');
```

Other Functions

```sql
SELECT INSERT('Hello Wassup', 6, 0, 'Raju');

SELECT LEFT('Abcdefghij', 3);
SELECT RIGHT('Abcdefghij', 4);

SELECT REPEAT('o', 5);
SELECT TRIM('  Alright!  ');
```

Exercise - 3

emp_id	fname	lname	desig	dept
101	Raju	Rastogi	Manager	Loan
102	Sham	Mohan	Cashier	Cash
103	Baburao	Apte	Associate	Loan
104	Paul	Philip	Accountant	Account
105	Alex	Watt	Associate	Deposit

Task 1:

101:Raju:Manager:Loan

Task2:

101:Raju Rastogi:Manager:Loan

Task3

101:Raju:MANAGER:Loan

Task4

L101 Raju

C102 Sham

DISTINCT

```
SELECT DISTINCT fname FROM employees;
```

ORDER BY

```
SELECT * FROM employees ORDER BY fname;
```

LIKE

```
Select * FROM employees
        WHERE dept LIKE "%Acc%";
```

LIMIT

```sql
SELECT * FROM employees LIMIT 3;
```


```
ALTER TABLE employees
ADD COLUMN
salary INT NOT NULL
DEFAULT 25000;
```

GROUP BY

emp_id	fname	lname	desig	dept
101	Raju	Rastogi	Manager	Loan
102	Sham	Mohan	Cashier	Cash
103	Baburao	Apte	Associate	Loan
104	Paul	Philip	Accountant	Account
105	Alex	Watt	Associate	Deposit
106	Rick	Watt	Manager	Account
107	Leena	Jhonson	Lead	Cash
108	John	Paul	Manager	IT
109	Alex	Watt	Probation	Loan

Loan

Cash

Account

IT

Deposit

```
SELECT dept FROM employees GROUP BY dept;

SELECT dept, COUNT(fname) FROM employees GROUP
BY dept;
```

COUNT

```
SELECT COUNT(*) FROM employees;
```

MAX & MIN

```
SELECT MAX(age) FROM employees;
SELECT MIN(age) FROM employees;
```

```sql
SELECT emp_id, fname, salary FROM employees
  WHERE
salary = (SELECT MAX(salary) FROM employees);
```

SUM & AVG

```
SELECT SUM(salary) FROM employees;
SELECT AVG(salary) FROM employees;
```

Exercise - 4

DISTINCT, ORDER BY, LIKE and LIMIT

emp_id	fname	lname	desig	dept	salary
101	Raju	Rastogi	Manager	Loan	37000
102	Sham	Mohan	Cashier	Cash	32000
103	Baburao	Apte	Associate	Loan	25000
104	Paul	Philip	Accountant	Account	45000
105	Alex	Watt	Associate	Deposit	35000
106	Rick	Watt	Manager	Account	65000
107	Leena	Jhonson	Lead	Cash	25000
108	John	Paul	Manager	IT	75000
109	Alex	Watt	Probation	Loan	40000

1: Find Different type of departments in database?

2: Display records with High-low salary

3: How to see only top 3 records from a table?

4: Show records where first name start with letter 'A'

5: Show records where length of the lname is 4 characters

1

dept
Loan
Cash
Account
Deposit
IT

2

emp_id	fname	lname	desig	dept	salary
108	John	Paul	Manager	IT	75000
106	Rick	Watt	Manager	Account	65000
104	Paul	Philip	Accountant	Account	45000
109	Alex	Watt	Probation	Loan	40000
101	Raju	Rastogi	Manager	Loan	37000
105	Alex	Watt	Associate	Deposit	35000
102	Sham	Mohan	Cashier	Cash	32000
103	Baburao	Apte	Associate	Loan	25000
107	Leena	Jhonson	Lead	Cash	25000

3

emp_id	fname	lname	desig	dept	salary
101	Raju	Rastogi	Manager	Loan	37000
102	Sham	Mohan	Cashier	Cash	32000
103	Baburao	Apte	Associate	Loan	25000

4

emp_id	fname	lname	desig	dept	salary
105	Alex	Watt	Associate	Deposit	35000
109	Alex	Watt	Probation	Loan	40000

5

emp_id	fname	lname	desig	dept	salary
103	Baburao	Apte	Associate	Loan	25000
105	Alex	Watt	Associate	Deposit	35000
106	Rick	Watt	Manager	Account	65000
108	John	Paul	Manager	IT	75000
109	Alex	Watt	Probation	Loan	40000

Exercise - 5

COUNT, GROUP BY, MIN, MAX and SUM and AVG

emp_id	fname	lname	desig	dept	salary
101	Raju	Rastogi	Manager	Loan	37000
102	Sham	Mohan	Cashier	Cash	32000
103	Baburao	Apte	Associate	Loan	25000
104	Paul	Philip	Accountant	Account	45000
105	Alex	Watt	Associate	Deposit	35000
106	Rick	Watt	Manager	Account	65000
107	Leena	Jhonson	Lead	Cash	25000
108	John	Paul	Manager	IT	75000
109	Alex	Watt	Probation	Loan	40000

1: Find Total no. of employees in database?

2: Find no. of employees in each department.

3: Find lowest salary paying

4: Find highest salary paying

5: Find total salary paying in Loan department?

6: Average salary paying in each department

dept	count(emp_id)
Loan	3
Cash	2
Account	2
Deposit	1
IT	1

dept	avg(salary)
Loan	34000.0000
Cash	28500.0000
Account	55000.0000
Deposit	35000.0000
IT	75000.0000

emp_id	fname	lname	desig	dept	salary
108	John	Paul	Manager	IT	75000

DATAYPES

CHAR vs VARCHAR

DATAYPES

The CHAR and VARCHAR types are similar, but differ in the way they are stored and retrieved.

DATAYPES

VARCHAR(50)

The length can be specified as a value from 0 to 65,535.

DATAYPES

CHAR is fixed length

CHAR(5) --> Only 5 character allowed

The length can be any value from 0 to 255.

DATAYPES

When CHAR values are stored, they are right-padded with spaces to the specified length.

When CHAR values are retrieved, trailing spaces are removed unless the PAD_CHAR_TO_FULL_LENGTH SQL mode is enabled.

CHAR(4)

If you try to insert value 'AB'
MySQL will store the value as 'AB '

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

CHAR can be used in case of fixed length values like
Country code: US, IN, AU

DATAYPES

DECIMAL

DATAYPES

So far we have only used and seen INT Datatype...

DATAYPES

What will happen when we store values like 15.35?

DATAYPES

DECIMAL(6,3)

The maximum number of digits for DECIMAL is 65

DATAYPES

Digits after decimal

```
DECIMAL(5,2)
```

Total digit

MySQL®

DATAYPES

Example: 155.38

119.12 ✅

28.15 ✅

1150.15 ❌

DATAYPES

FLOAT, DOUBLE

DATAYPES

FLOAT, DOUBLE

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

MySQL

DATAYPES

FLOAT, DOUBLE

Float - upto ~7 digits, takes 4 bytes of memory
Double - upto ~15 digits, takes 8 bytes of memory

If accuracy is not too important or if speed is the highest priority, the `DOUBLE` type may be good enough.

DATAYPES

DATE, TIME, DATETIME

DATAYPES

DATE, TIME, DATETIME

DATE

yyyy-mm-dd format

DATAYPES

DATE, TIME, DATETIME

TIME

HH:MM:SS format

DATAYPES

DATE, TIME, DATETIME

DATETIME

'yyyy-mm-dd HH:MM:SS' format

DATE TIME Functions

CURDATE, CURTIME, NOW

DATE TIME Functions

CURDATE() - yyyy-mm-dd

CURTIME() - hh:mm:ss

NOW() - yyyy-mm-dd hh:mm:ss

DATE TIME Functions

DAYNAME,
DAYOFMONTH,DAYOFWEEK

```
mysql> SELECT DAYNAME('2007-02-03');
        -> 'Saturday'
```

```
mysql> SELECT DAYOFMONTH('2007-02-03');
        -> 3
```

```
mysql> SELECT DAYOFWEEK('2007-02-03');
        -> 7
```

```
mysql> SELECT MONTHNAME('2008-02-03');
        -> 'February'
```

```
mysql> SELECT HOUR('10:05:03');
        -> 10
mysql> SELECT HOUR('272:59:59');
        -> 272
```

DATE Formatting

DATE Formatting

Suppose we need to get date in a given format like

- Tue Mar 28th
- 21st Tue at 21:20:28
- 2023/04/18

MySQL

DATE Formatting

DATE_FORMAT()

```
DATE_FORMAT(now(), '%D %a at %T')
```

Result: 21st Tue at 21:20:28

```
DATE_FORMAT(now(), '%m/%d/%y')
```

Result: 04/16/23

MySQL

DATE Formatting

DATE_FORMAT()

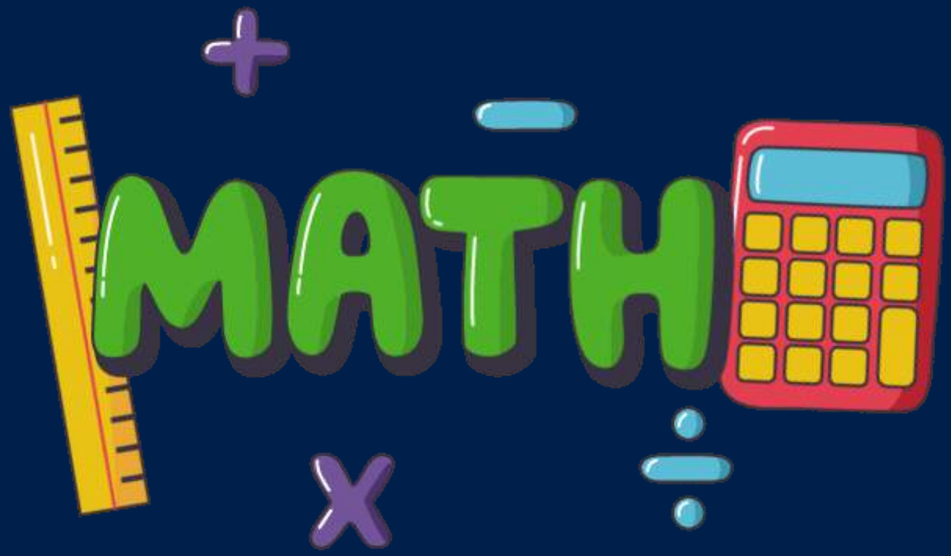
```
DATE_FORMAT(now(), '%H:%i')
```

Result: 20:34

```
DATE_FORMAT(dob, '%r')
```

Result: 08:35:48 PM

DATE MAth


MATH

```
DATEDIFF(expr1, expr2)

DATE_ADD(date, INTERVAL expr unit)
DATE_SUB(date, INTERVAL expr unit)
```

```
DATE_ADD('2023-05-01',INTERVAL 1 DAY)
DATE_ADD('2023-05-01',INTERVAL 1 YEAR)

DATE_SUB('2023-05-01',INTERVAL 1 MONTH)
```

```
TIMEDIFF(expr1, expr2)

TIMEDIFF('20:00:00', '18:00:00')
```

DEFAULT &
ON UPDATE TIMESTAMP

00:00:00:28

```
CREATE TABLE blogs (

  text VARCHAR(150),
  created_at DATETIME default CURRENT_TIMESTAMP,
  updated_at DATETIME ON UPDATE CURRENT_TIMESTAMP

);
```

Exercise - 6

Exercise - 6

- Print the current time (HH:MM:SS)
- Print the current date (yyyy-mm-dd)
- Print current day of the week (Monday, Tuesday...)
- What is the use case of CHAR datatype?
- Which datatype can be used to store value 123.456?
- Display date in format
  - dd:mm:yyyy
  - April 22nd at 22:00:00

Exercise - 6 Solution

Exercise - 6

- Print the current time (HH:MM:SS)
- Print the current date (yyyy-mm-dd)
- Print current day of the week (Monday, Tuesday...)
- What is the use case of CHAR datatype?
- Which datatype can be used to store value 123.456?
- Display date in format
  - dd:mm:yyyy
  - April 22nd at 22:00:00

Exercise - 6

- SELECT CURTIME();
- SELECT CURDATE();
- SELECT DAYNAME(NOW());
- What is the use case of CHAR datatype?
- Which datatype can be used to store value 123.456?
- Display date in format
  - dd:mm:yyyy - date_format(now(), '%d:%m:%Y')
  - April 22nd at 22:00:00 - date_format(now(), '%M %D at %T')

MySQL®

Operators

MySQL®

Relational Operators

Find employees whose salary is more than 65000

We have relational operators

Operators	Meaning
<	Less than
>	Greater than
<=	Less than or equal to
>=	Greater than or equal to
==	Equal to
!=	Not equal to

```
SELECT * FROM employees
WHERE salary > 65000;
```

Logical Operators

AND

OR

Condition 1 **AND** Condition 2

When both the conditions are true

salary=25000 **AND** dept=Loan

103	Baburao	Apte	Associate	Loan	25000

Condition 1 **OR** Condition 2

When either of the condition is true

salary=65000 **OR** desig='Lead'

IN, NOT IN

Find employees From following department

- Account
- Cash
- Loan

```
SELECT * FROM employees
WHERE dept = 'Account'
OR dept = 'Cash'
OR dept = 'Loan';
```

```
SELECT * FROM employees
WHERE dept IN ('Account', 'Cash', 'Loan');
```

BETWEEN

Find employees whose salary is more than 40000 and Less than 65000

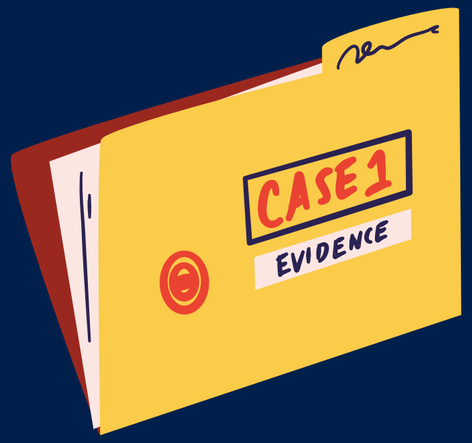
>40000

<65000

```
SELECT * FROM employees
WHERE
salary >=40000 AND salary <=65000;
```

```
SELECT * FROM employees
WHERE
salary BETWEEN 40000 AND 65000;
```

MySQL®



CASE

emp_id	fname	lname	desig	dept	salary
101	Raju	Rastogi	Manager	Loan	37000
102	Sham	Mohan	Cashier	Cash	32000
103	Baburao	Apte	Associate	Loan	25000
104	Paul	Philip	Accountant	Account	45000
105	Alex	Watt	Associate	Deposit	35000
106	Rick	Watt	Manager	Account	65000
107	Leena	Jhonson	Lead	Cash	25000
108	John	Paul	Manager	IT	75000
109	Alex	Watt	Probation	Loan	40000

fname	salary	Salary Category
Raju	37000	Low Salary
Sham	32000	Low Salary
Baburao	25000	Low Salary
Paul	45000	Low Salary
Alex	35000	Low Salary
Rick	65000	Higher Salary
Leena	25000	Low Salary
John	75000	Higher Salary
Alex	40000	Low Salary

```sql
SELECT
  fname,
  salary,
  CASE
    WHEN salary >= 50000 THEN 'Higher Salary'
    ELSE 'Low Salary'
  END AS 'Salary Category'
FROM
  employees;
```

```sql
SELECT
  fname,
  salary,
  CASE
    WHEN salary >= 50000 THEN 'Higher Salary'
    WHEN salary >= 40000
    AND salary < 50000 THEN 'Mid Salary'
    ELSE 'Low Salary'
  END AS 'Salary Category'
FROM
  employees;
```

IS NULL

IS NULL

```
SELECT * FROM employees
WHERE fname IS NULL;
```

NOT LIKE

IS NULL

```
SELECT * FROM employees
WHERE fname NOT LIKE 'A%';
```

Exercise - 7

emp_id	fname	lname	desig	dept	salary
101	Raju	Rastogi	Manager	Loan	37000
102	Sham	Mohan	Cashier	Cash	32000
103	Baburao	Apte	Associate	Loan	25000
104	Paul	Philip	Accountant	Account	45000
105	Alex	Watt	Associate	Deposit	35000
106	Rick	Watt	Manager	Account	65000
107	Leena	Jhonson	Lead	Cash	25000
108	John	Paul	Manager	IT	75000
109	Alex	Watt	Probation	Loan	40000

- Find employees whose salary are between 30000 to 40000
- Find employees whose first name start with 'R' or 'S'
- Find employee whose salary=25000 and department should be 'Cash'
- Find employees from following designation
  - Manager, Lead and Associate

fname	salary	sal in dollars
Raju	37000	462.5000
Sham	32000	400.0000
Baburao	25000	312.5000
Paul	45000	562.5000
Alex	35000	437.5000
Rick	65000	812.5000
Leena	25000	312.5000
John	75000	937.5000
Alex	40000	500.0000

Exercise - 7

Solution

```
mysql> select * from employees
    -> where desig in ('Manager', 'Lead', 'Associate');
+--------+---------+---------+-----------+---------+--------+
| emp_id | fname   | lname   | desig     | dept    | salary |
+--------+---------+---------+-----------+---------+--------+
|    101 | Raju    | Rastogi | Manager   | Loan    |  37000 |
|    103 | Baburao | Apte    | Associate | Loan    |  25000 |
|    105 | Alex    | Watt    | Associate | Deposit |  35000 |
|    106 | Rick    | Watt    | Manager   | Account |  65000 |
|    107 | Leena   | Jhonson | Lead      | Cash    |  25000 |
|    108 | John    | Paul    | Manager   | IT      |  75000 |
+--------+---------+---------+-----------+---------+--------+
```

```sql
SELECT
  fname,
  salary,
  CASE
    WHEN salary != 0 THEN salary/80
  END AS 'Salary In Dollars'
FROM
  employees;
```

CONSTRAINT

UNIQUE

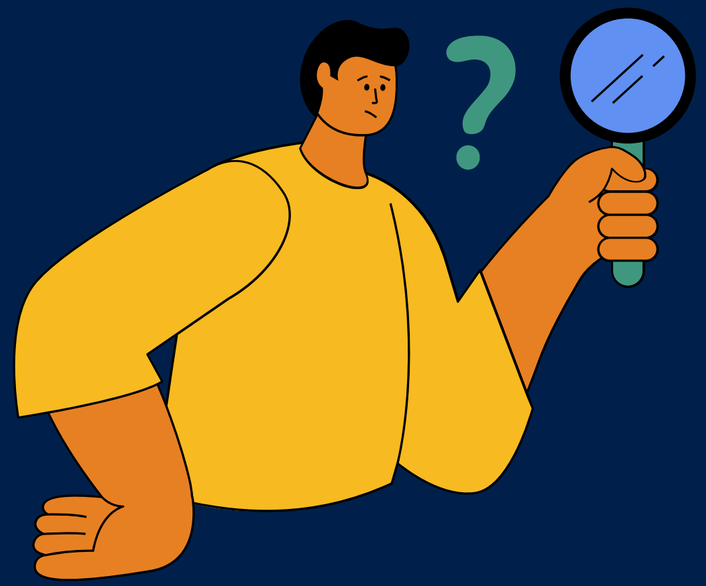
What if we need to store the phone numbers in a column.

```sql
CREATE TABLE contacts(
    name VARCHAR(50),
    mob VARCHAR(15) UNIQUE
);
```

CONSTRAINT

CHECK

We want to make sure phone no. is atleast 10 digits...



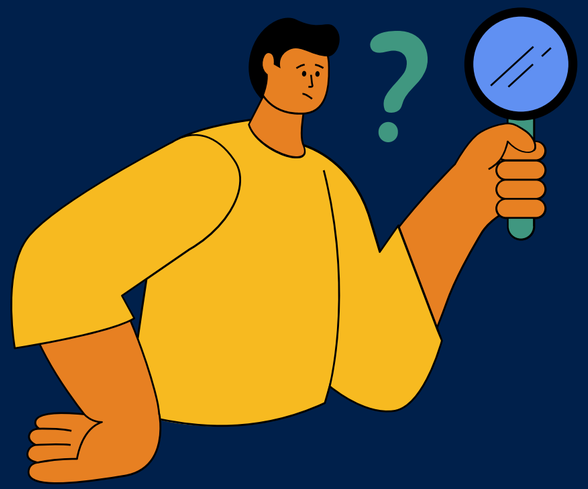
```sql
CREATE TABLE contacts(
    name VARCHAR(50),
    mob VARCHAR(15) UNIQUE CHECK (LENGTH(mob) >= 10)
);
```

NAMED CONSTRAINT

```sql
CREATE TABLE contacts(
    name VARCHAR(50),
    mob VARCHAR(15) UNIQUE,
    CONSTRAINT mob_no_less_than_10digits CHECK (LENGTH(mob) >= 10)
);
```

ALTERING Tables

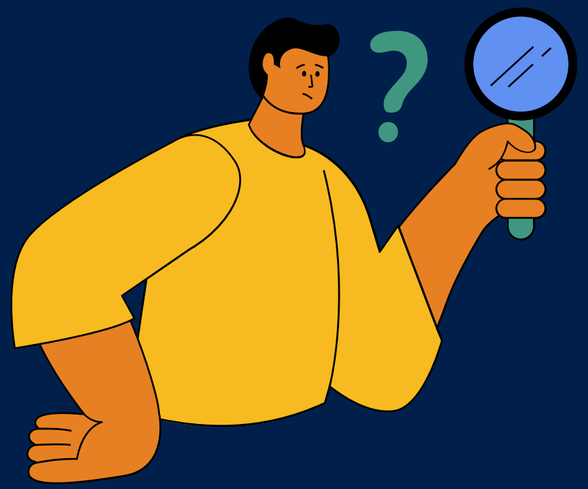
How to add or remove a column?



```sql
ALTER TABLE contacts
ADD COLUMN city VARCHAR(50);
```

```
ALTER TABLE contacts
DROP COLUMN city;
```

How to rename a column or table name?



How to rename a column?

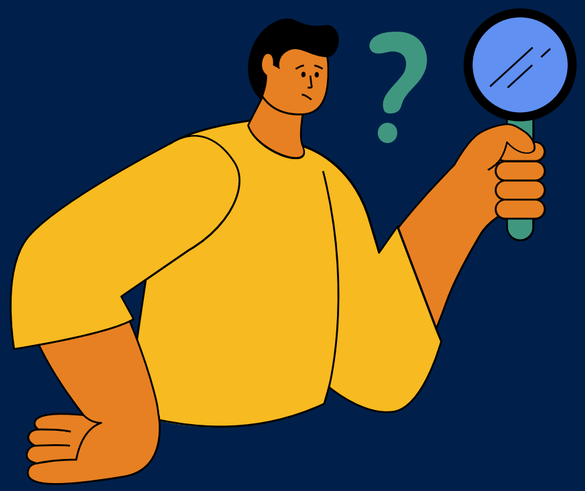
```
ALTER TABLE contacts
RENAME COLUMN name TO full_name;
```

How to rename a table name?

```
ALTER TABLE contacts
RENAME TO mycontacts;
```

```
RENAME TABLE contacts TO mycontacts;
```

How to modify a column?



Ex: Changing datatype
or adding Default values etc

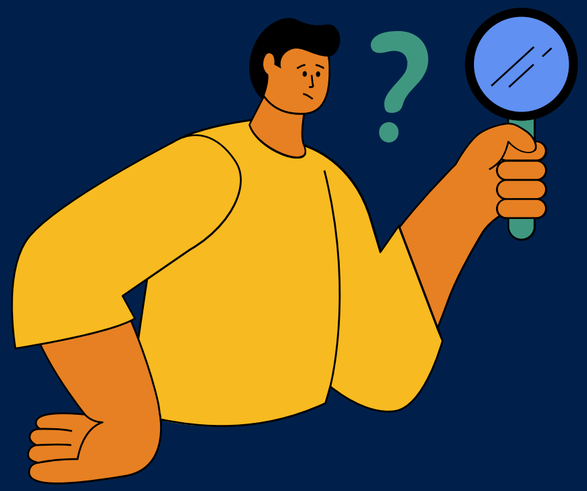
How to add DEFAULT value to a column?

```
ALTER TABLE contacts
MODIFY mob VARCHAR(15) DEFAULT 'unknown';
```

How to change column name and set NOT NULL?

```sql
ALTER TABLE contacts
CHANGE name emp_name VARCHAR(50) NOT NULL;
```

How to Add or Drop Constraints?



How to Check Existing Constraints?

```
SELECT
      CONSTRAINT_TYPE,CONSTRAINT_NAME
FROM INFORMATION_SCHEMA.TABLE_CONSTRAINTS
WHERE TABLE_NAME='contacts';
```

```
ALTER TABLE contacts
DROP CONSTRAINT mob_no_less_than_10digits;
```

```
ALTER TABLE contacts
ADD CONSTRAINT mob_not_null CHECK (mob != null);
```

Relationship

RElATIONSHIP

Simple data and table...

emp_id	fname	lname	desig	dept	salary
101	Raju	Rastogi	Manager	Loan	37000
102	Sham	Mohan	Cashier	Cash	32000
103	Baburao	Apte	Associate	Loan	25000
104	Paul	Philip	Accountant	Account	45000
105	Alex	Watt	Associate	Deposit	35000
106	Rick	Watt	Manager	Account	65000
107	Leena	Jhonson	Lead	Cash	25000
108	John	Paul	Manager	IT	75000
109	Alex	Watt	Probation	Loan	40000

Real World

Data is not that simple...

Employees

Salary

Attendance

Employees

offices

requests

task

Types of Relationship

- One to One
- One to Many
- Many to Many

1:1

Employees

emp_id	name	dept
101	Raju	IT
102	Sham	Finance

Employee Details

emp_id	addr	City	phone	title
101	CP	Delhi	909090909	Manager
102	Bhandup	Mumbai	902020200	Accountant

1:MANY

Employees

emp_id	name	dept
101	Raju	IT
102	Sham	Finance

Employee Task

emp_id	task_no	task_detail
101	TS-1	Opening account for Ram
102	TS-2	Closing account for Neru
101	TS-3	Loan senction

Many : Many

Books

Authors

Book A

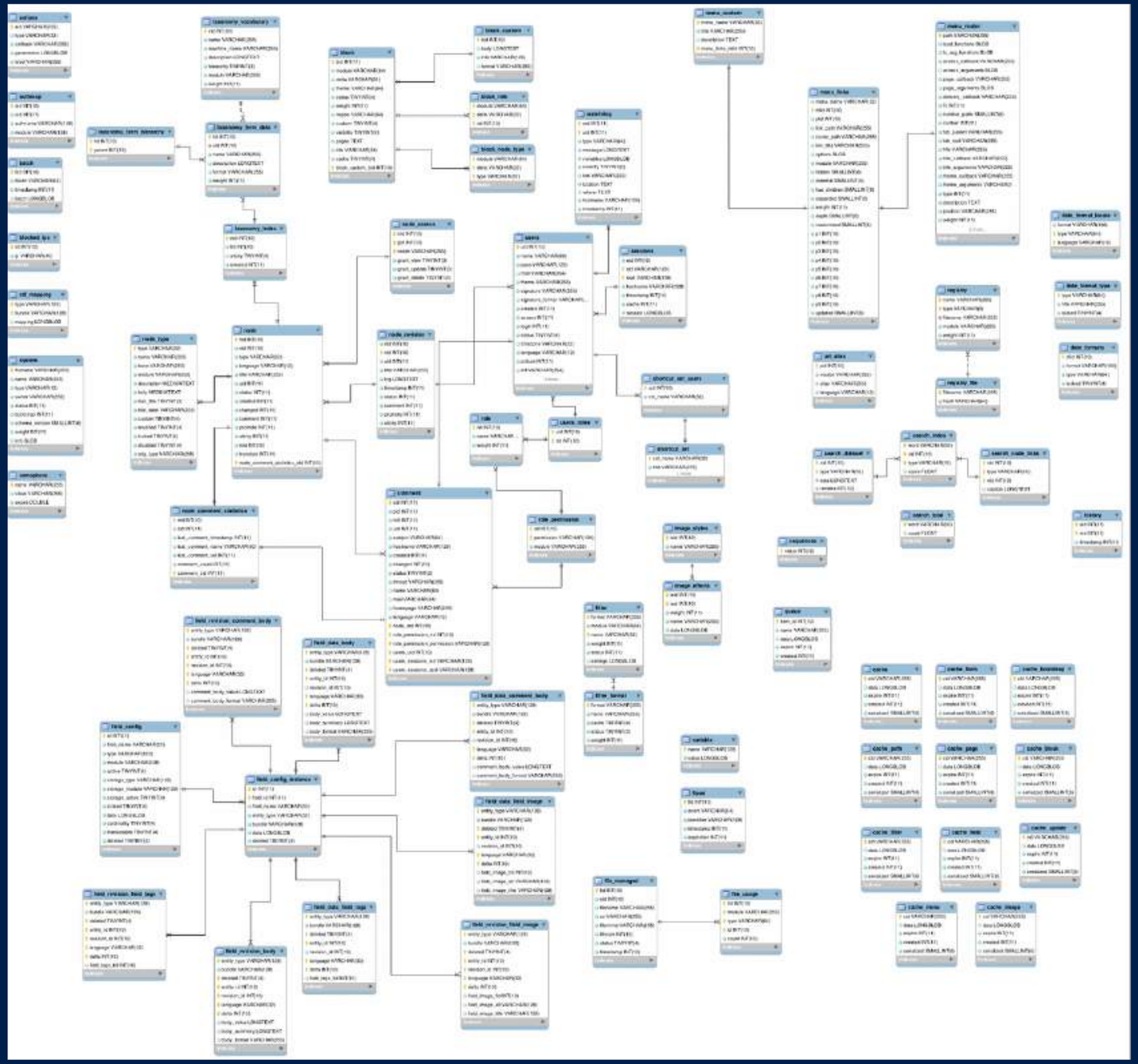
Author A

Author B

Book B

Book C

Book D



Let's Understand a Use-Case of 1:Many


STORE

Suppose we need to store the following data

- customer name
- customer email
- order date
- order price

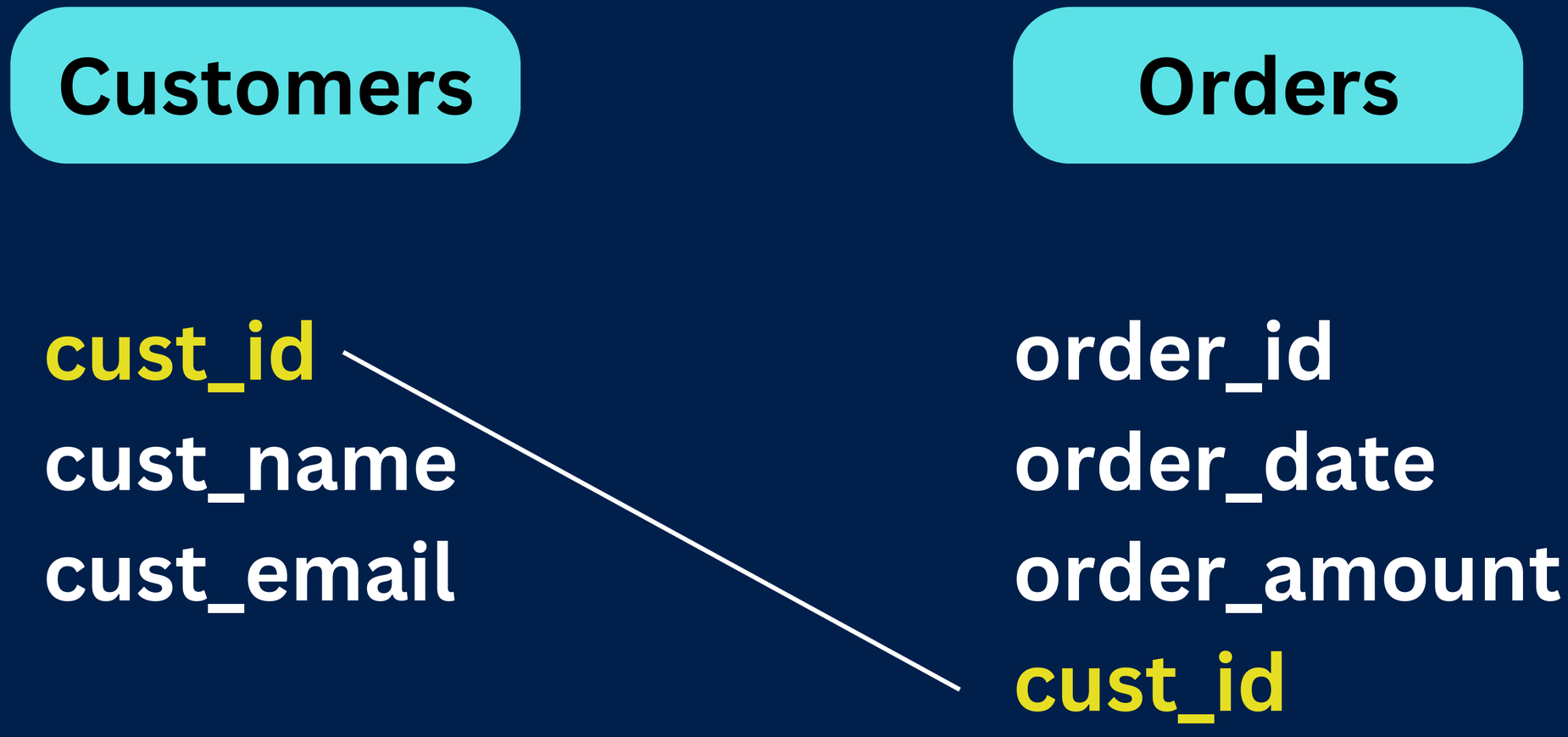
cust_name	email	order_daate	amount
Raju	raju@email.com	2023-05-15	200
Sham	sham@email.com	2023-04-28	500
Raju	raju@email.com	2023-05-14	1000
Baburao	babu@email.com	NULL	NULL
Sham	sham@email.com	2023-03-15	800

Customers

cust_id
cust_name
cust_email

Orders

order_id
order_date
order_amount


Customers
cust_id
cust_name
cust_email
Orders
order_id
order_date
order_amount
cust_id

Customers

cust_id	name	email
101	Raju	raju@email.com
102	Sham	sham@email.com
103	Baburao	babu@email.com

Orders

order_id	date	amount	cust_id
ord-1	2023-05-15	200	**101**
ord-2	2023-04-28	500	**102**
ord-3	2023-05-14	1000	**101**

Foreign Key

Customers

cust_id	name	email
101	Raju	raju@email.com
102	Sham	sham@email.com
103	Baburao	babu@email.com

Orders

order_id	date	amount	cust_id
ord-1	2023-05-15	200	**101**
ord-2	2023-04-28	500	**102**
ord-3	2023-05-14	1000	**101**

Primary Key

Customers

cust_id	name	email
101	Raju	raju@email.com
102	Sham	sham@email.com
103	Baburao	babu@email.com

Primary Key

Foreign Key

Orders

order_id	date	amount	cust_id
ord-1	2023-05-15	200	**101**
ord-2	2023-04-28	500	**102**
ord-3	2023-05-14	1000	**101**

Let's work practically with Foreign Key..

```sql
CREATE table customers(
  cust_id INT AUTO_INCREMENT PRIMARY KEY,
  name VARCHAR(50),
  email VARCHAR(50)
);
```

```sql
CREATE TABLE orders(
  ord_id INT AUTO_INCREMENT PRIMARY KEY,
  date DATE,
  amount DECIMAL(10, 2),
  cust_id INT,
  FOREIGN KEY (cust_id) REFERENCES customers(cust_id)
);
```

JOINS

JOIN operation is used to combine rows from two or more tables based on a related column between them.

Primary Key

Customers

cust_id	name	email
101	Raju	raju@email.com
102	Sham	sham@email.com
103	Baburao	babu@email.com

Primary Key

Foreign Key

Orders

order_id	date	amount	cust_id
ord-1	2023-05-15	200	**101**
ord-2	2023-04-28	500	**102**
ord-3	2023-05-14	1000	**101**

Types of Join

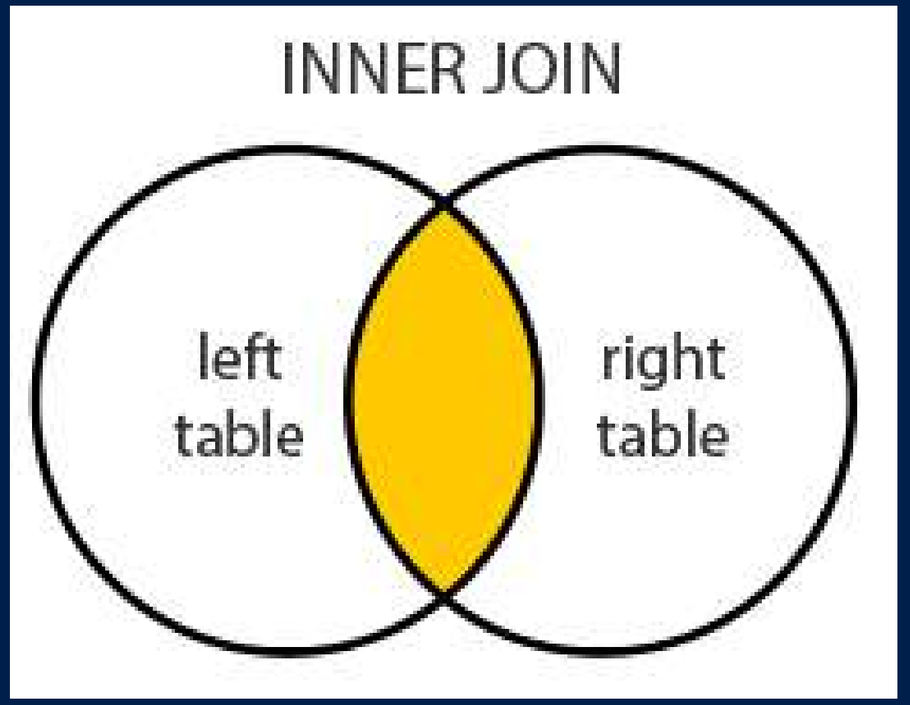
- Cross Join
- Inner Join
- Left Join
- Right Join

Cross Join

Every row from one table is combined with every row from another table.

Inner Join

Returns only the rows where there is a match between the specified columns in both the left (or first) and right (or second) tables.


INNER JOIN
left
table
right
table

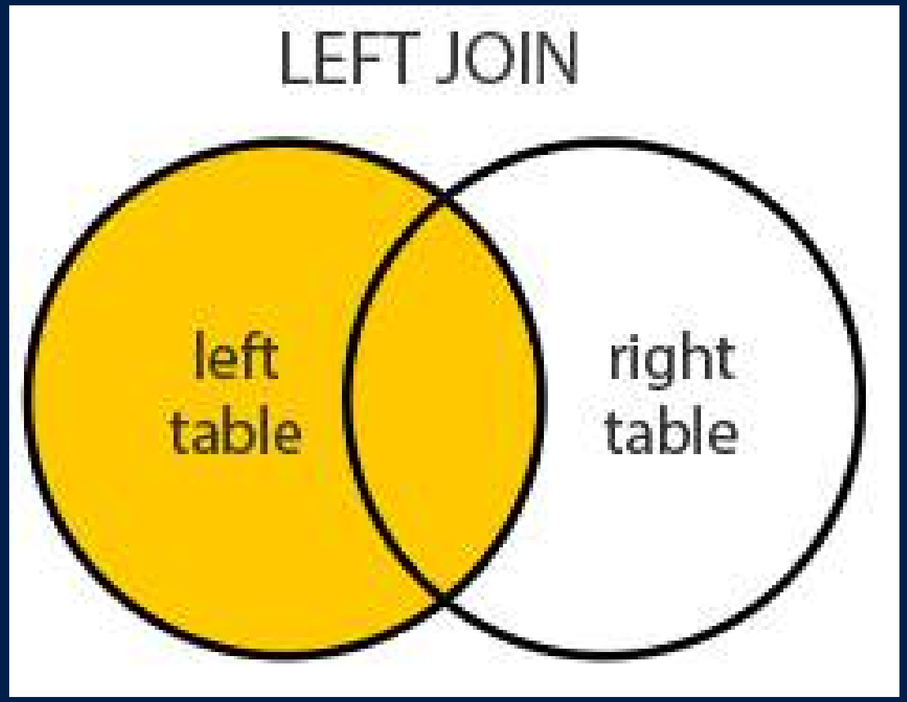
```sql
SELECT * FROM customers
 INNER JOIN orders
ON orders.cust_id=customers.cust_id;
```

Inner Join with Group By

```
SELECT name FROM customers
    INNER JOIN orders
    ON orders.cust_id=customers.cust_id
GROUP BY name;
```

Left Join

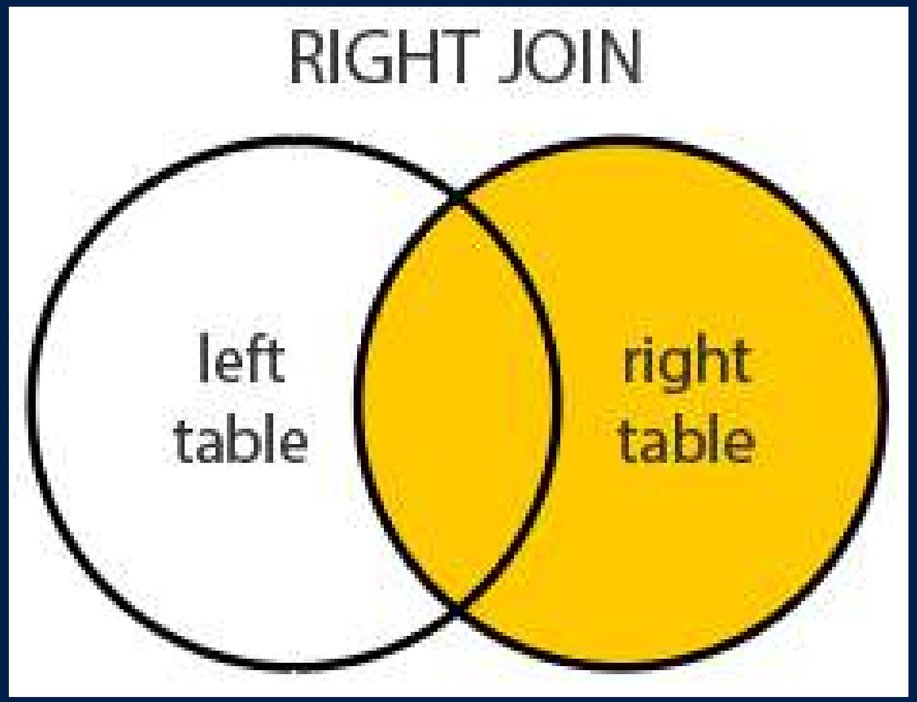
Returns all rows from the left (or first) table and the matching rows from the right (or second) table.


LEFT JOIN
left
table
right
table

```sql
SELECT * FROM customers
    LEFT JOIN orders
    ON orders.cust_id=customers.cust_id;
```

Right Join

Returns all rows from the right (or second) table and the matching rows from the left (or first) table.


RIGHT JOIN
left
table
right
table

```sql
SELECT * FROM customers
    RIGHT JOIN orders
    ON orders.cust_id=customers.cust_id;
```

CASCADE ON DELETE

Primary Key

Customers

cust_id	name	email
101	Raju	raju@email.com
102	Sham	sham@email.com
103	Baburao	babu@email.com

Primary Key

Foreign Key

Orders

order_id	date	amount	cust_id
ord-1	2023-05-15	200	**101**
ord-2	2023-04-28	500	**102**
ord-3	2023-05-14	1000	**101**

```sql
CREATE TABLE orders(
    ord_id INT AUTO_INCREMENT PRIMARY KEY,
    date DATE,
    amount DECIMAL(10, 2),
    cust_id INT,
    FOREIGN KEY (cust_id) REFERENCES customers(cust_id) ON DELETE CASCADE
)
```

Exercise - 8

Authors

author_id
author_name

Books

book_id
title
ratings
au_id

```sql
INSERT INTO authors (author_name)
VALUES ('Raju'), ('Sham'), ('Baburao'), ('Paul')

INSERT INTO books (title, ratings, au_id)
VALUES
    ('Story of Raju', 5, 1),
    ('Story of Baburao', 4, 3),
    ('Raju - The Great Man', 2, 1),
    ('Love story by Sham', 1, 2)
```

director_name	movie_title	ratings
Raju	Story of Raju	5
Raju	Raju - The Great Man	2
Sham	Love story by Sham	1
Baburao	Story of Baburao	4

Raju	Story of Raju	5
Raju	Raju – The Great Man	2
Sham	Love story by Sham	1
Baburao	Story of Baburao	4
Paul	NULL	NULL

Raju	Story of Raju	5
Raju	Raju - The Great Man	2
Sham	Love story by Sham	1
Baburao	Story of Baburao	4
Paul	Not Found	0

author_name	ratings	remark
Raju	5	Good
Raju	2	Average
Sham	1	Average
Baburao	4	Good

Exercise - 8

Solution

Many : Many

Let's Understand a Use-Case of Many : Many

Students

Courses

Student A

Course A

Course B

Course C

Course A

Student A

Student B

Student C

students

- id
- student_name

courses

- id
- course_name
- fees

students

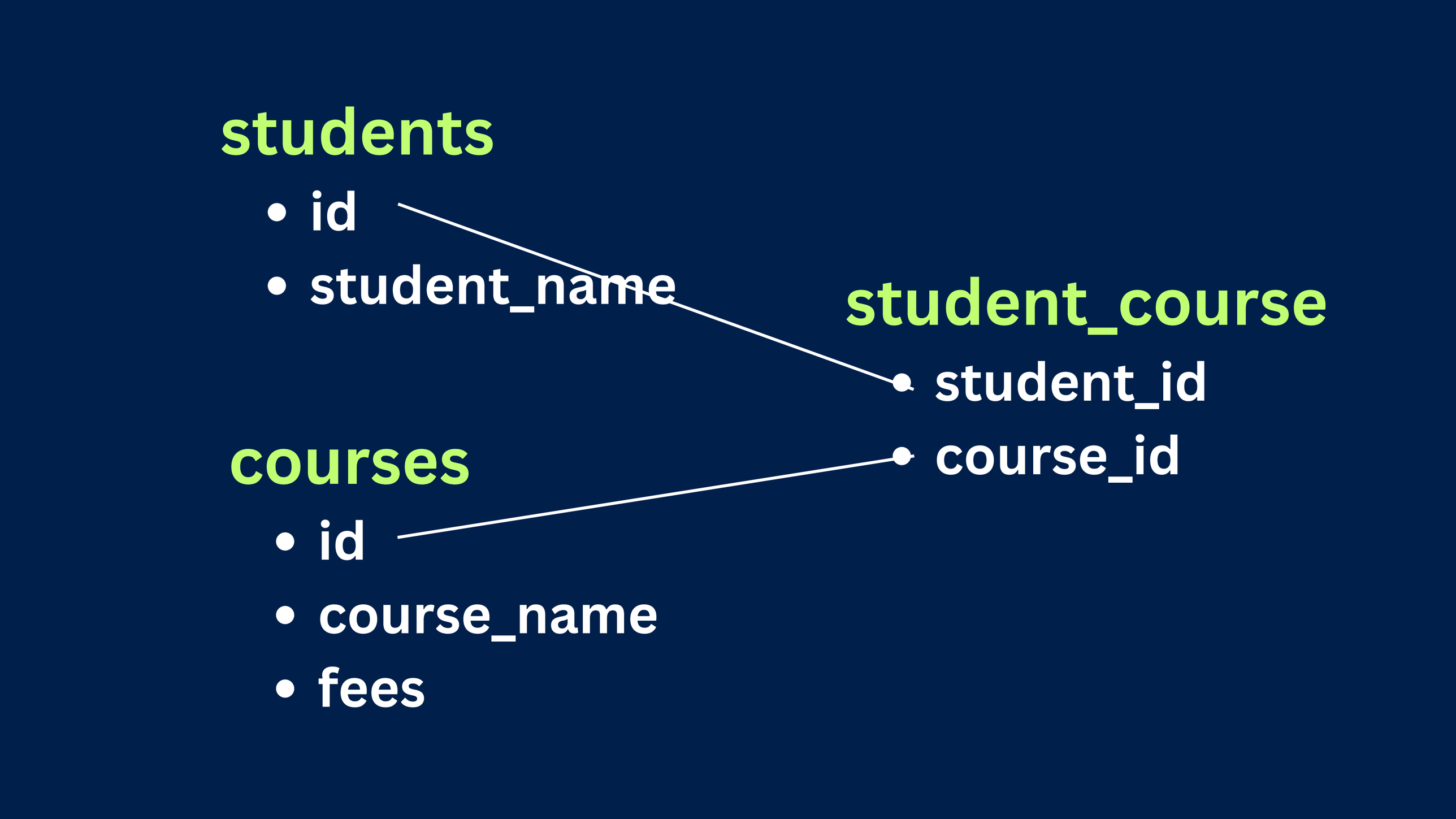
- id
- student_name

courses

- id
- course_name
- fees

student_course

- student_id
- course_id


students
id
student_name
courses
id
course_name
fees
student_course
student_id
course_id

```sql
# Joins with Many to Many relationship
SELECT student_name, course_name FROM students
JOIN
    student_course ON student_course.student_id=students.id
JOIN
    courses ON student_course.course_id=courses.id;
```

Exercise - 9

Solution

Print No. of students for each course.

PD	1
Java	2
Linux	2
SQL	1
Python	1

Print No. of courses taken by each students

Raju	3
Sham	2
Paul	1
Alex	1

Total FEES Paid by Each Student

Raju	18000
Sham	15000
Paul	4000
Alex	6000

VIEWS

```sql
CREATE VIEW inst_info AS
SELECT student_name, course_name, fees FROM students
JOIN
    student_course ON student_course.student_id=students.id
JOIN
    courses ON student_course.course_id=courses.id;
```

HAVING Clause

```
SELECT student_name, SUM(fees) FROM inst_info
    GROUP BY student_name HAVING SUM(fees)>10000;
```

GROUP BY ROLLUP

```sql
SELECT student_name, SUM(fees) FROM inst_info
    GROUP BY student_name WITH ROLLUP;
```

STORED Routine

STORED Routine

An SQL statement or a set of SQL Statement that can be stored on database server which can be call no. of times.

Types of STORED Routine

- STORED Procedure
- User defined Functions

STORED Procedure

STORED PROCEDURE

These are routines that contain a series of SQL statements and procedural logic.

Often used for performing actions like data modification, transaction control, and executing sequences of statements.

```sql
#We can drop if exist already
DROP PROCEDURE IF EXISTS p_name;

#Temp changing delimiter
DELIMITER $$

CREATE PROCEDURE p_name()
BEGIN
    SELECT * FROM employees
    LIMIT 10;
END$$

#Again changing Delimiter
DELIMITER ;
```

```
DELIMITER $$

CREATE procedure get_empid(IN p_fname VARCHAR(50))
BEGIN
    Select emp_id from employees
    where fname=p_fname;
END$$

DELIMITER ;
```

```
DELIMITER $$

CREATE procedure get_sum(IN p_fname VARCHAR(50), OUT p_sum DECIMAL(10,2))
BEGIN
    Select SUM(salary) INTO p_sum from employees;
END$$

DELIMITER ;
```

USER DEFINED FUNCTIONS

```
DELIMITER $$

CREATE FUNCTION get_sum(p_fname VARCHAR(50)) RETURNS VARCHAR(50)
DETERMINISTIC NO SQL READS SQL DATA

BEGIN
    DECLARE v_max INT;
    DECLARE v_name VARCHAR(50);

    Select MAX(salary) INTO v_max from employees;
    Select fname into v_name from employees
        where salary=v_max;

    return v_name;
END$$

DELIMITER ;
```

WINDOW FUNCTIONS

Introduced in version 8.0.

Window functions, also known as analytic functions allow you to perform calculations across a set of rows related to the current row.

Defined by an OVER() clause.

- ROW_NUMBER()
- RANK()
- DENSE_RANK()
- LAG()
- LEAD()