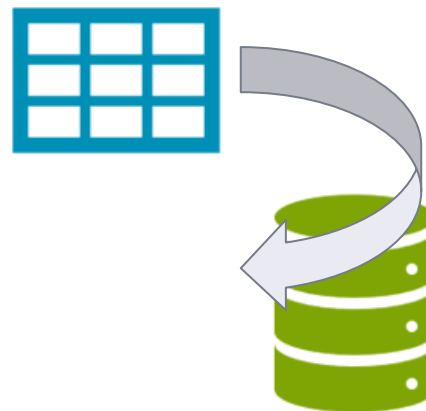# SQL
Session 1

Did you complete the pre-class activity?

Table of Contents

▶ What is a database?

▶ What is in a database?

▶ Structured Query Language (SQL)

▶ SQL Language Elements

"The beginning of wisdom is the definition of terms."

Socrates (470 – 399 B.C.)

1 What is a database?

Could you define what the database is?

Pear Deck

Pear Deck Interactive Slide
Do not remove this bar

What is a database?

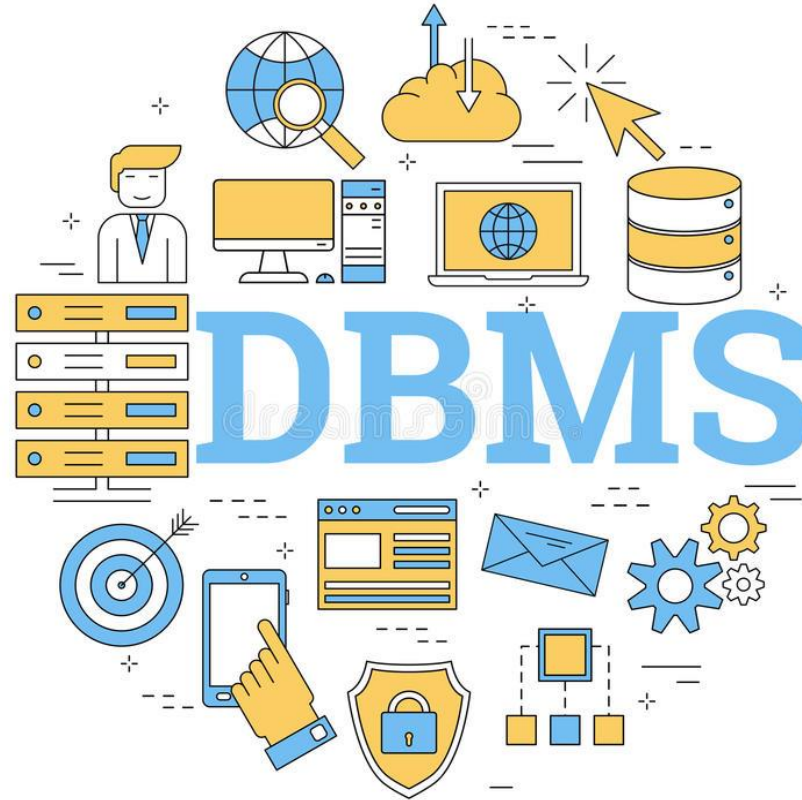"A database is an organized collection of data stored in a computer system."
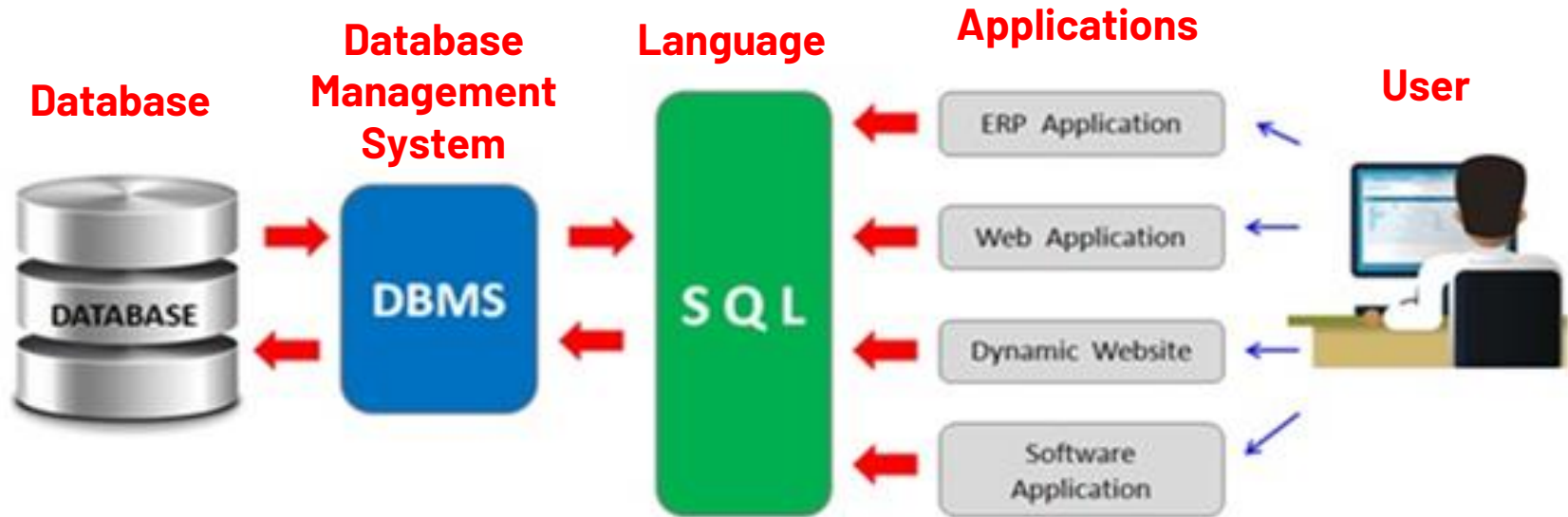
How are databases used in the real-world?

Database Management System

Database Management System

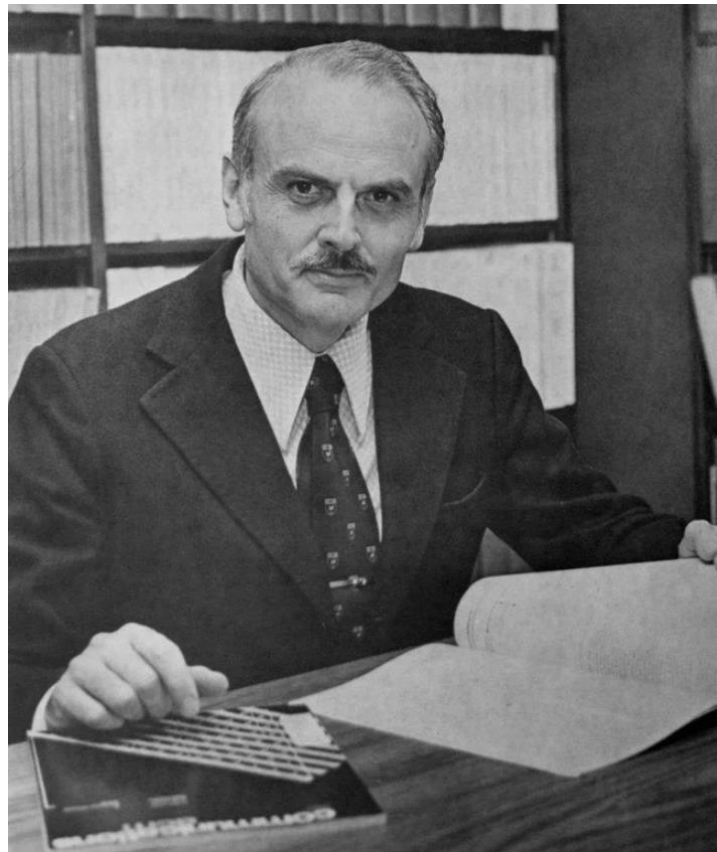# 3 Structured Query Language (SQL)

Types of Database Management System

Edgar Frank "Ted" Codd
(19 August 1923 – 18 April 2003)

English computer scientist

While working for IBM, invented the relational model for database management.
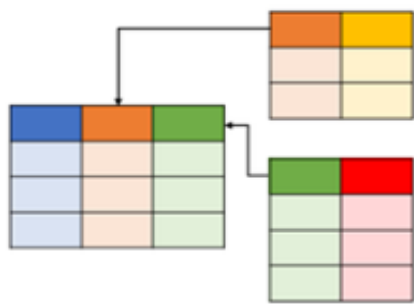
Types of Database Management System

- **Relational Database – SQL**
- Non-Relational Database – NoSQL

SQL DATABASES

SELECT * FROM Customers_tbl WHERE
Last_Name='Smith':

Cust_No	Last_Name	First_Name
560779	Smith	Juan
207228	Smith	George
173996	Smith	Ben
477610	Smith	Conrad

Relational

Relational Database

Types of Database Management System

SQL DATABASES
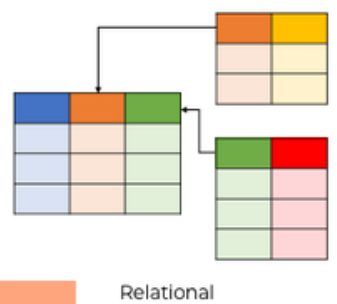
Relational

SELECT * FROM Customers_tbl WHERE Last_Name='Smith';

Cust_No	Last_Name	First_Name
560779	Smith	Juan
207228	Smith	George
173996	Smith	Ben
477610	Smith	Conrad

NoSQL DATABASES

Column

Graph

Key-Value

Document
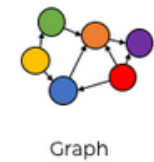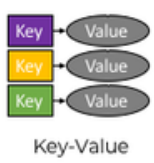
Get customer.firstname,customer.lastname,customer.productID.* where Last_Name='Whitelock'

Key	Value
746133	Firstname: **George** Lastname: **Whitelock** productID: **2012: 5**
135225	Firstname: **Luke** Lastname: **Whitelock** productID: **1285: 1** 1077: 5
884256	Firstname: **Sam** Lastname: **Whitelock** productID: **1442: 2**

Types of Database Management System

Relational Database

Non-Relational Database

Which DBMS?
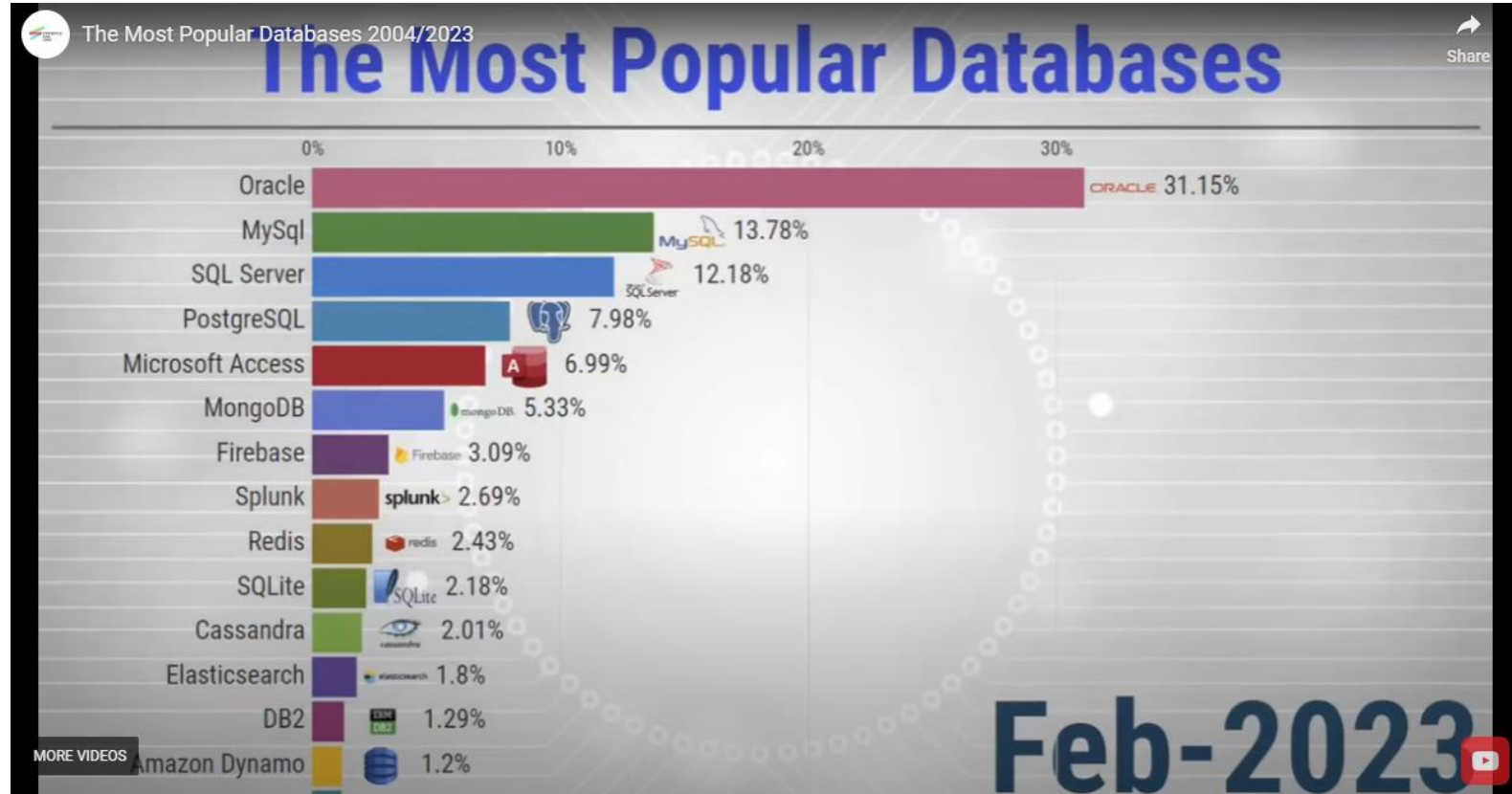
Which DBMS?

Rank			DBMS	Database Model	Score		
Mar 2023	Feb 2023	Mar 2022			Mar 2023	Feb 2023	Mar 2022
1.	1.	1.	Oracle ➕	Relational, Multi-model ℹ	1261.29	+13.77	+9.97
2.	2.	2.	MySQL ➕	Relational, Multi-model ℹ	1182.79	-12.66	-15.45
3.	3.	3.	Microsoft SQL Server ➕	Relational, Multi-model ℹ	922.01	-7.08	-11.77
4.	4.	4.	PostgreSQL ➕	Relational, Multi-model ℹ	613.83	-2.67	-3.10
5.	5.	5.	IBM Db2	Relational, Multi-model ℹ	142.92	-0.04	-19.22
6.	6.	⬆ 7.	SQLite ➕	Relational	133.82	+1.15	+1.64
7.	7.	⬇ 6.	Microsoft Access	Relational	132.06	+1.03	-3.37
8.	8.	⬆ 9.	Snowflake ➕	Relational	114.40	-1.26	+28.17
9.	9.	⬇ 8.	MariaDB ➕	Relational, Multi-model ℹ	96.84	+0.03	-11.47
10.	10.	10.	Microsoft Azure SQL Database	Relational, Multi-model ℹ	77.44	-1.31	-7.23
11.	11.	11.	Hive	Relational	70.91	-1.21	-10.31
12.	12.	12.	Teradata	Relational, Multi-model ℹ	63.74	+0.71	-5.11
13.	13.		Databricks	Multi-model ℹ	60.86	+0.52	
14.	⬆ 15.	⬆ 16.	Google BigQuery ➕	Relational	53.44	+0.99	+6.78
15.	⬇ 14.	⬇ 14.	FileMaker	Relational	51.15	-1.66	-1.81
16.	16.	⬇ 13.	SAP HANA ➕	Relational, Multi-model ℹ	50.84	+1.17	-5.17

Which DBMS will we use in the lesson?

"SQLite is a C-language library that implements a small, fast, self-contained, serverless, high-reliability, full-featured, SQL database engine. SQLite is the **most used database engine** in the world. SQLite is built into **all mobile phones** and **most computers** and comes bundled inside countless other applications that people use every day."

What is in a database?

Basic structure of a database

Database

Tables

Anatomy of a Table

Column

Column headers

Row | data | data | data | data | data

- A column is also called field or attribute.
- A row is also called record.
- A table is called relation.

What is in a database?

Basic structure of a database

Tables
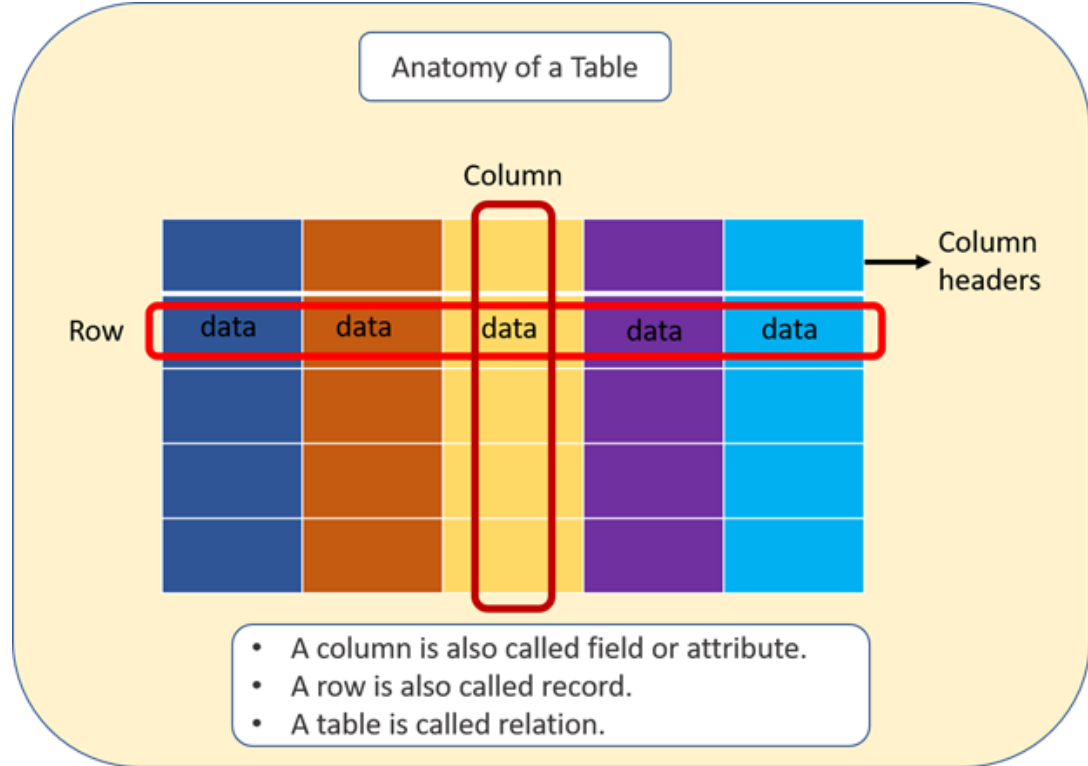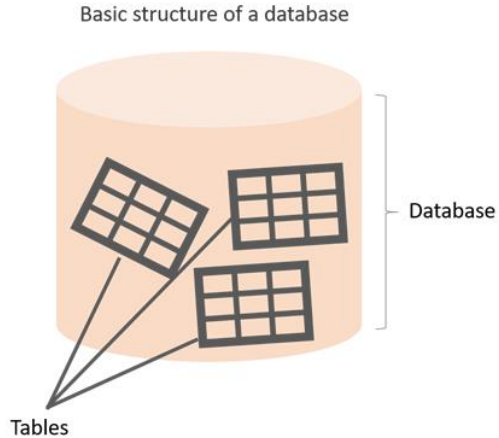
Database
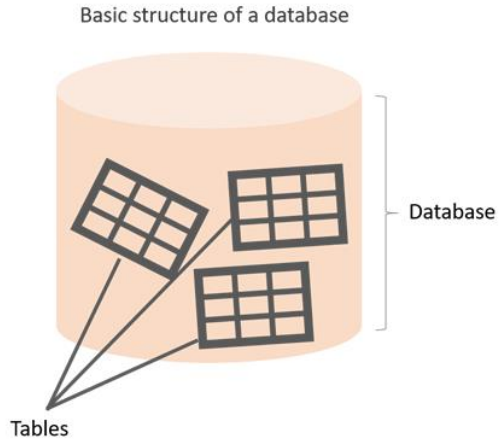
emp_id	first_name	last_name	salary	job_title	gender	hire_date
26650	Elvis	Ritter	86000	Sales Manager	Male	11/24/2017
70950	Rodney	Weaver	87000	Project Manager	Male	12/20/2018
97927	Billie	Lanning	67000	Web Developer	Female	6/25/2018
67323	Lisa	Wiener	75000	Business Analyst	Female	8/9/2018
17679	Robert	Gilmore	110000	Operations Director	Male	9/4/2018
76589	Jason	Christian	99000	Project Manager	Male	1/21/2019
51821	Linda	Foster	95000	Data Scientist	Female	4/29/2019
71329	Gayle	Meyer	77000	HR Manager	Female	6/28/2019
49714	Hugo	Forester	55000	IT Support Specialist	Male	11/22/2019
30840	David	Barrow	85000	Data Scientist	Male	12/2/2019

employee table

Structured Query Language (SQL)

What can you do with SQL?

Retrieve data

CRUD
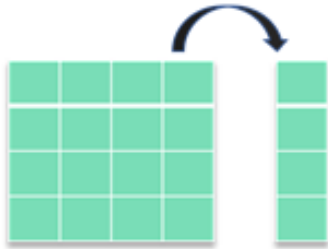
Insert data

Delete data

Update data

a-b
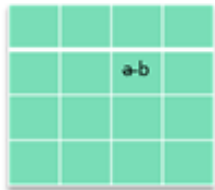
Create table

Create database
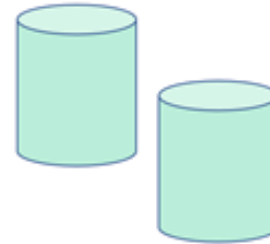
What is in a database?
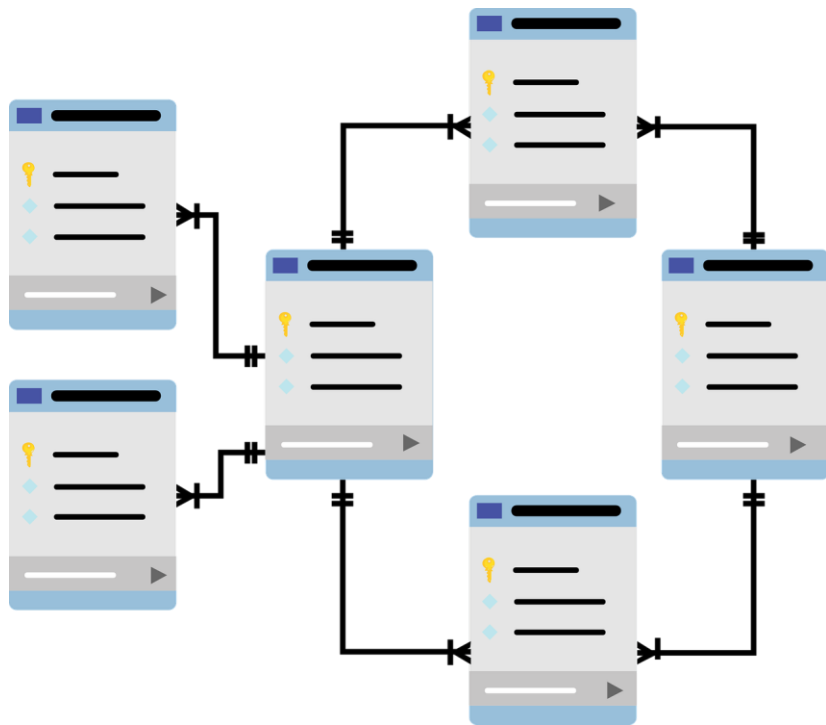
4 SQL Language Elements

SQL Language Rules

1) SQL is **not** case-sensitive language (Except our Strings).

2) SQL syntax looks like English Grammar.
   SELECT name, profit
   FROM Companies
   WHERE location == "USA"
   ORDER BY number_of_employees;

3) A **comma** (;) is placed at the end of completed commands.

4) Generally, **BNF** notation is used
   Keywords => UPPER CASE
   identifiers => LOWER CASE
   Example: DROP TABLE students;

5) Non-numeric expressions are enclosed in single quotes.
   Examples: 'New York', 'John', '2021-02-01'

SQL Language Elements

(SQL Syntax)

SQL Language Elements

`SELECT first_name FROM employees;`

Color coding

Keyword   Identifiers   Terminating Semicolon

Statement

Introduction

- You can retrieve rows from the columns of the table by using SELECT statement.
- SELECT statement is used with FROM keyword.
- The SELECT statement is used to select data from a database.

```
1  SELECT column_name(s) FROM table_name;
2  |
```

SQL

Selecting column /columns/ all columns

SELECT column_name   **FROM**   table_name**;**

column_name(s)

*

SQL

empid numeric	empname character varying	empsurname character varying	gender "char" (1)	region character varying	job character varying	salary numeric	hiredate date
1	Arnold	Miller	M	Central	Manager	3000	2018-02-21
2	Maddie	Cameron	F	West	Manager	3200	2019-06-19
3	Dominik	Holmes	M	East	Manager	3500	2018-07-03
4	Wilson	Casey	M	Central	Salesperson	2500	2018-05-29
5	Vincent	Perry	M	West	Salesperson	2400	2019-09-21
6	Jasmine	Wright	F	East	Salesperson	2000	2018-11-23
7	Belinda	Barrett	F	Central	Salesperson	2300	2018-11-29
8	Tony	Chapman	M	West	Salesperson	2400	2019-07-02
9	Sophia	Warren	F	West	Salesperson	2200	2019-06-25
10	Jack	Fowler	M	East	Salesperson	2500	2018-10-13
11	Rubie	Perkins	F	Central	Salesperson	2900	2018-02-16
12	Ryan	Wells	M	Central	Mechanic	3000	2018-08-08
13	Henry	Perry	M	West	Mechanic	3100	2019-05-22
14	Isabella	West	F	East	Mechanic	3050	2018-05-25

SQL

SELECT empname

FROM employees;

empid numeric	empname character varying	empsurname character varying	gender "char" (1)	region character varying	job character varying	salary numeric	hiredate date
1	Arnold	Miller	M	Central	Manager	3000	2018-02-21
2	Maddie	Cameron	F	West	Manager	3200	2019-06-19
3	Dominik	Holmes	M	East	Manager	3500	2018-07-03
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13	Henry	Perry	M	West	Mechanic	3100	2019-05-22
14	Isabella	West	F	East	Mechanic	3050	2018-05-25

empName character varying 🔒
Arnold
Maddie
Dominik
Wilson
Vincent
Jasmine
Belinda
Tony
Sophia
Jack
Rubie
Ryan
Henry
Isabella

SQL

SELECT empname, empsurname, job
FROM employees**;**

empid numeric	empname character varying	empsurname character varying	gender "char" (1)	region character varying	job character varying	salary numeric	hiredate date
1	Arnold	Miller	M	Central	Manager	3000	2018-02-21
2	Maddie	Cameron	F	West	Manager	3200	2019-06-19
3	Dominik	Holmes	M	East	Manager	3500	2018-07-03
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empName character varying	empSurname character varying	job character varying
Arnold	Miller	Manager
Maddie	Cameron	Manager
Dominik	Holmes	Manager
Wilson	Casey	Salesperson
Vincent	Perry	Salesperson
Jasmine	Wright	Salesperson
Belinda	Barrett	Salesperson
Tony	Chapman	Salesperson
Sophia	Warren	Salesperson
Jack	Fowler	Salesperson
Rubie	Perkins	Salesperson
Ryan	Wells	Mechanic
Henry	Perry	Mechanic
Isabella	West	Mechanic

SQL

To retrieve all of the information from your table, an asterisk

(*) character can be used after the SELECT

SELECT * **FROM** employees;

empid numeric	empname character varying	empsurname character varying	gender "char" (1)	region character varying	job character varying	salary numeric	hiredate date
1	Arnold	Miller	M	Central	Manager	3000	2018-02-21
2	Maddie	Cameron	F	West	Manager	3200	2019-06-19
3	Dominik	Holmes	M	East	Manager	3500	2018-07-03
4	Wilson	Casey	M	Central	Salesperson	2500	2018-05-29
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10	Jack	Fowler	M	East	Salesperson	2500	2018-10-13
11	Rubie	Perkins	F	Central	Salesperson	2900	2018-02-16
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13	Henry	Perry	M	West	Mechanic	3100	2019-05-22
14	Isabella	West	F	East	Mechanic	3050	2018-05-25

Drag your dot to how you are feeling:

Keep going, I understand
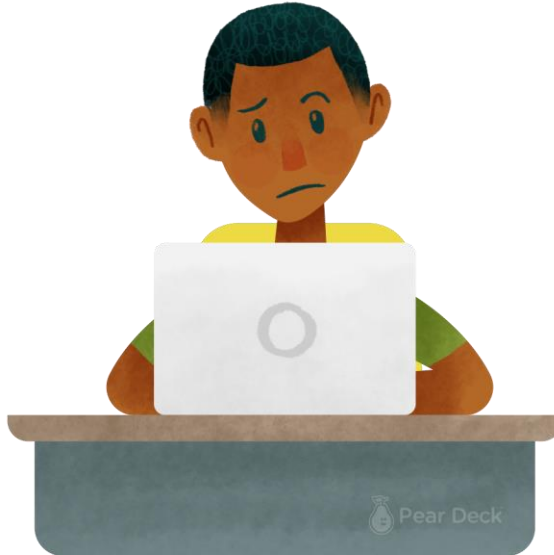
I'm a little confused

Stop, I need help!

THANKS!

Any questions?