



INTRODUCCIÓN A LAS BASES DE DATOS (BD) Y LOS SISTEMAS GESTORES DE BD (SGBD)

Ingeniería de Sistemas
Bases de Datos I
ETITC - 2024-I



Escuela Tecnológica
Instituto Técnico Central
Establecimiento Público de Educación Superior
1

CONTENIDO

Definición BD

Historia y Evolución de las BD

Tipos de Datos

Tipos, Elementos, y Aplicaciones de las BD

Sistemas gestores de BD (SGBD – DBMS)

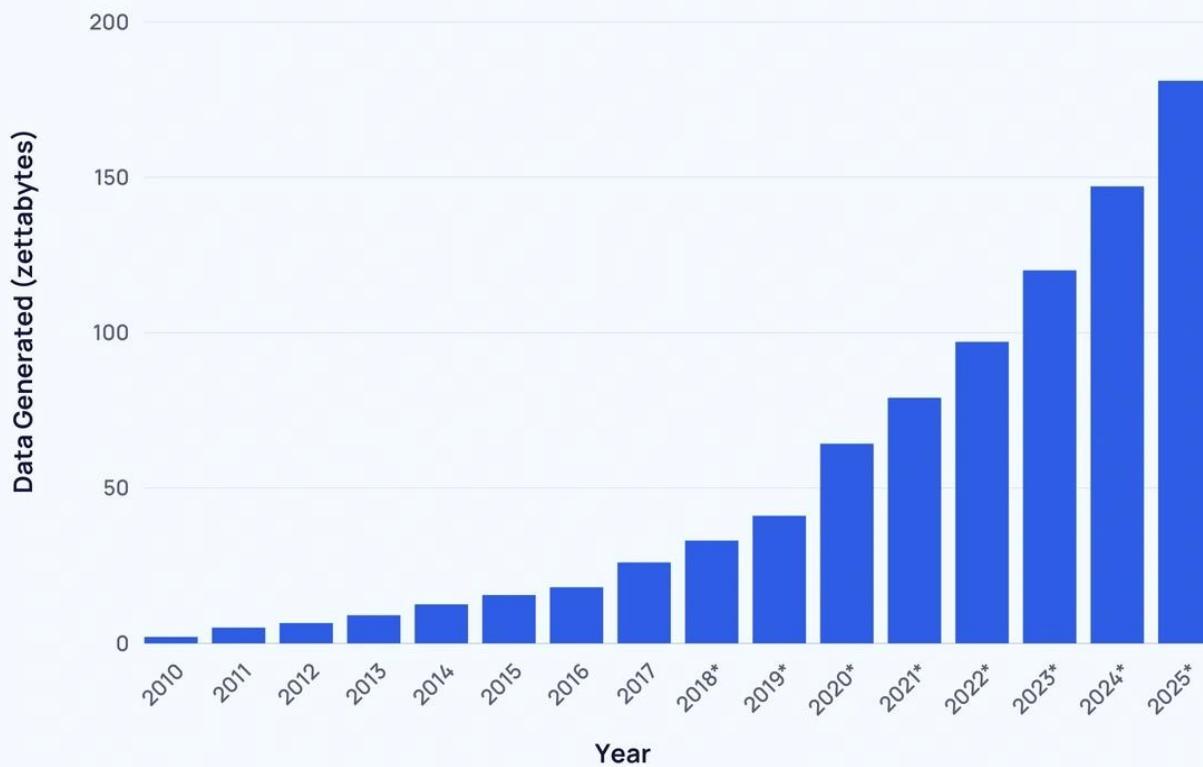
Elementos de los SGBD

El Rol de las BD en la Industria



BASES DE DATOS (BD) DATABASES (DB)

Global Data Generated Annually



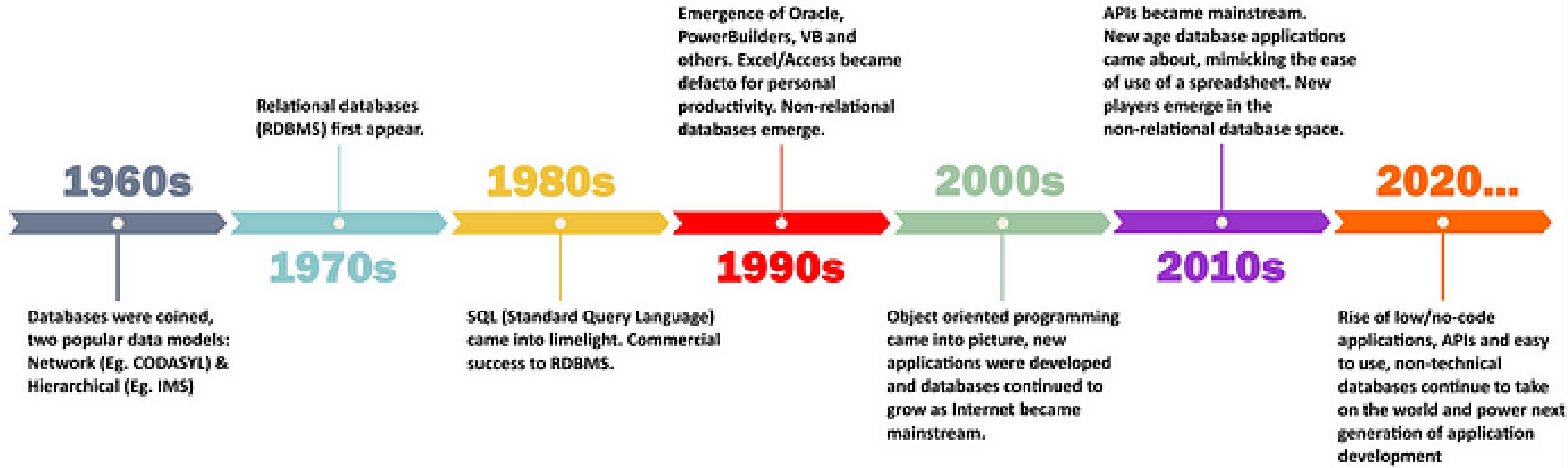
[Amount of Data Created Daily \(2024\)](#)

Colección de **datos** relacionados y organizados que típicamente son digitales.

Propiedades:

- Representa aspectos del mundo real, llamado miniuniverso, si este tiene cambio la base de datos debe reflejarlo.
- Colección lógica y coherente de data con un significado inherente.
- Es diseñada, construida, y poblada con un uso específico.

History of Databases (1960-2020)

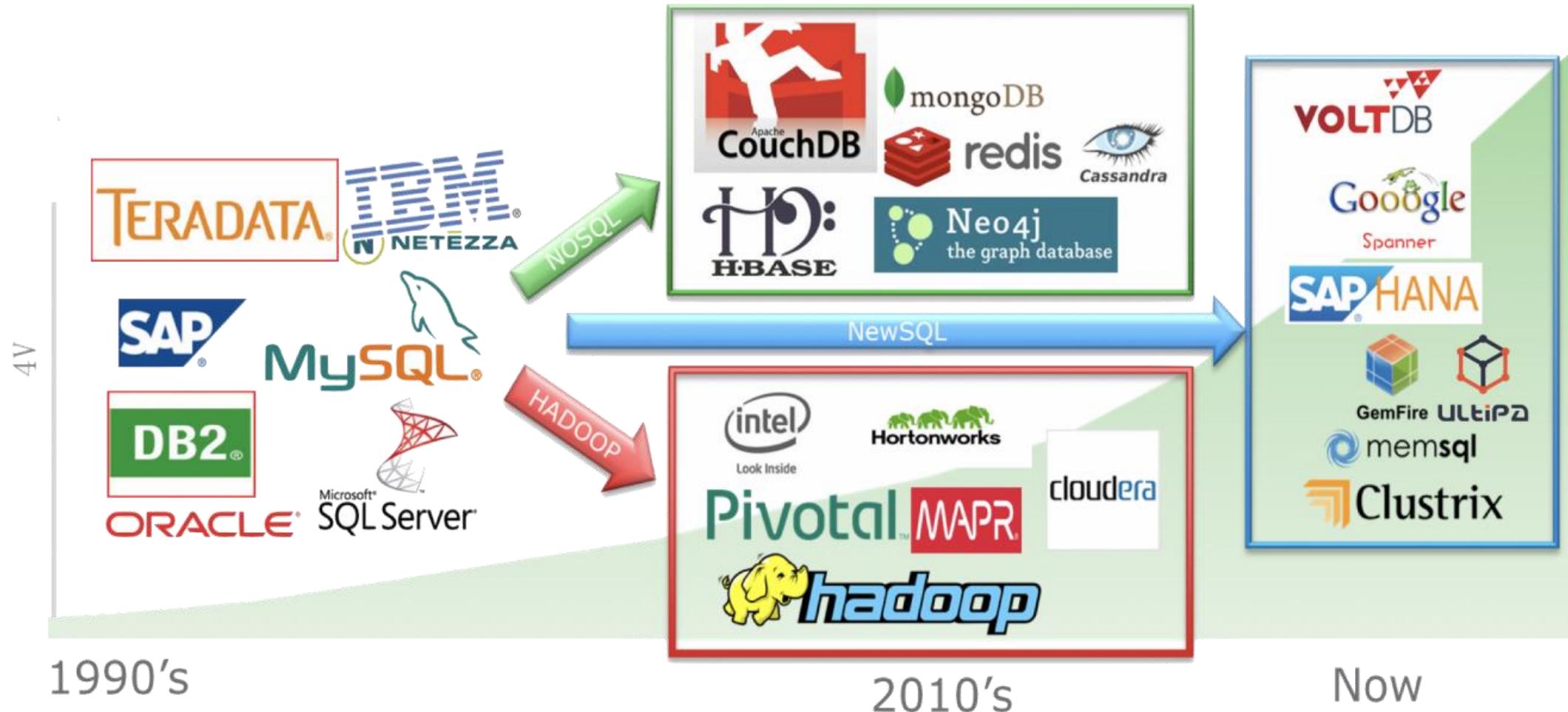


[Infogram: EVOLUTION OF DATABASES](#)

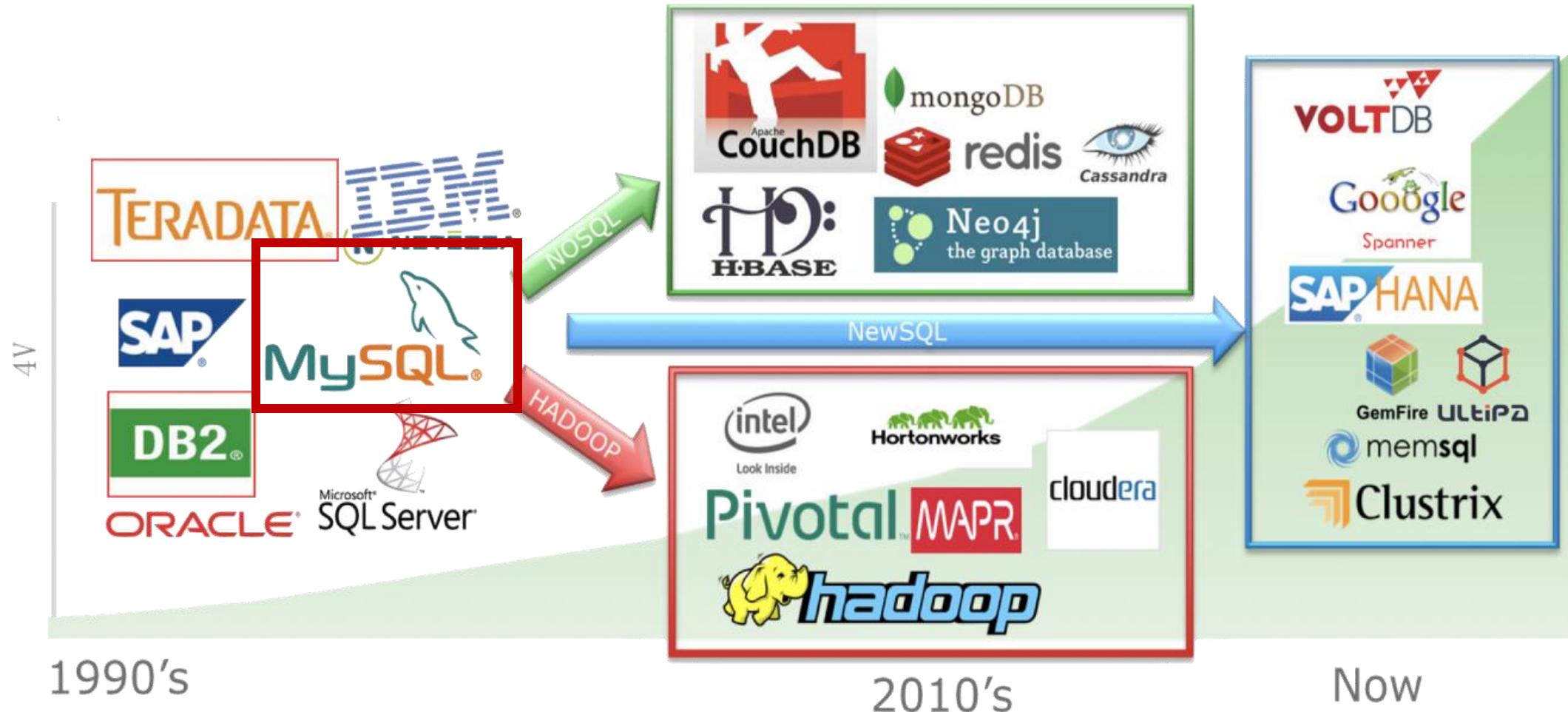
stackby.com

LÍNEA DE TIEMPO DE LAS BASES DE DATOS

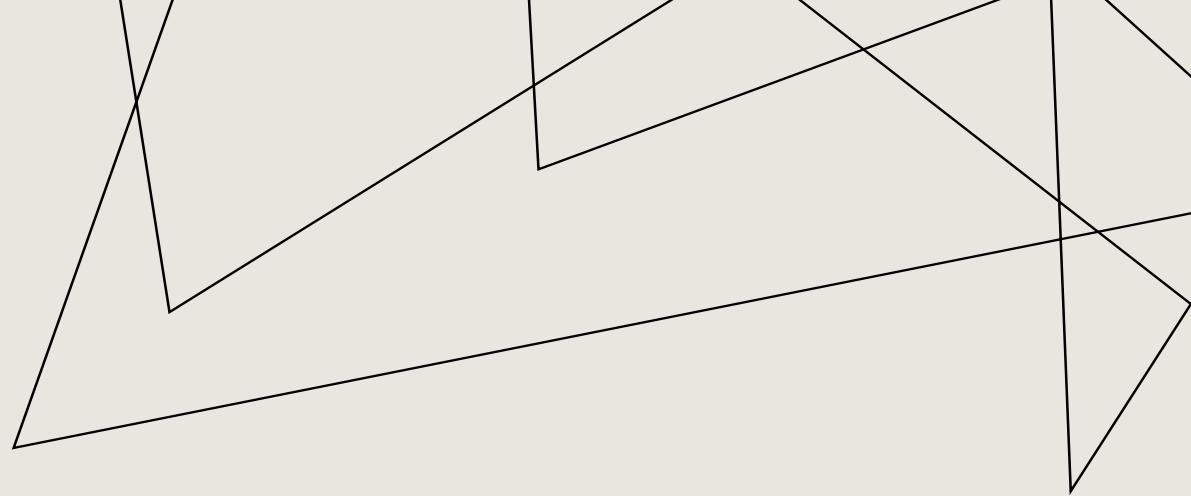
EVOLUCIÓN DE LOS DATOS



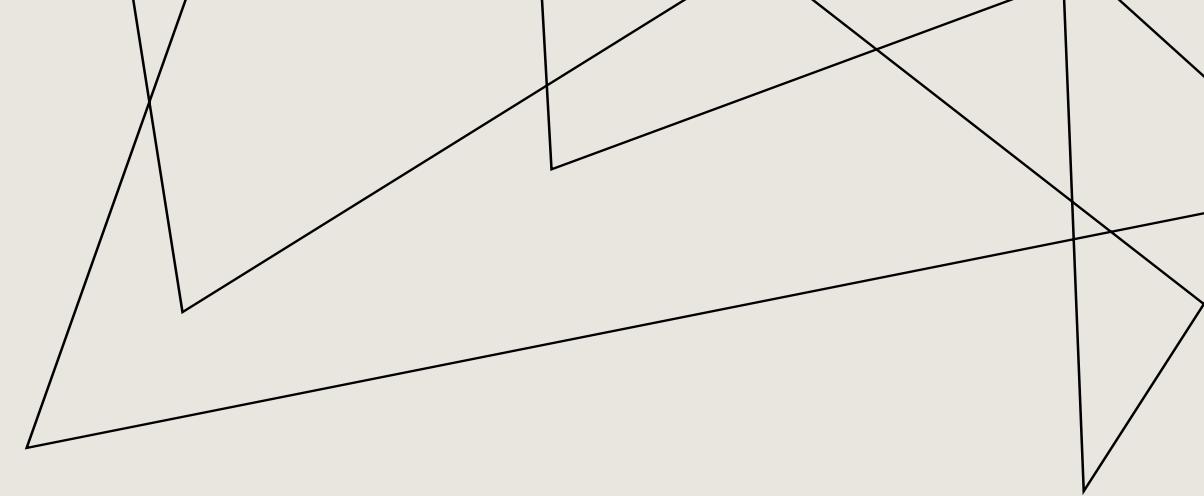
EVOLUCIÓN DE LOS DATOS



BASES DE DATOS



BASES DE DATOS



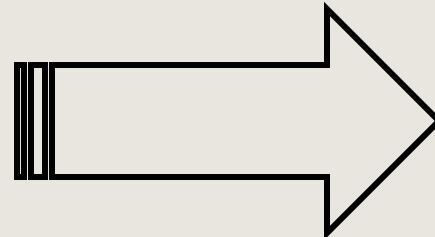
BASES DE DATOS



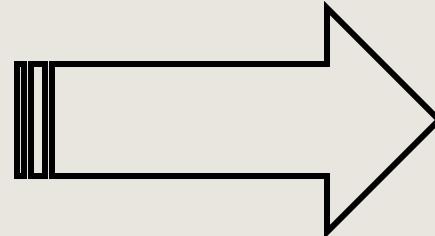
A screenshot of Microsoft Excel showing a data table in the main window and a 'Valores duplicados' (Duplicates) dialog box in the foreground. The data table contains the following information:

1	Xataka
2	Genbeta
3	VidaExtra
4	Xataka Android
5	Xataka Móvil
6	Magnet
7	
8	
9	
10	
11	

The 'Valores duplicados' dialog box shows that the value '1' appears twice in the range B2:B7. The user has selected the 'Duplicados' (Duplicates) option and chosen a format of 'Relleno rojo claro con texto rojo oscuro' (Light red fill with dark red text). Buttons for 'Aceptar' (Accept) and 'Cancelar' (Cancel) are at the bottom.



BASES DE DATOS



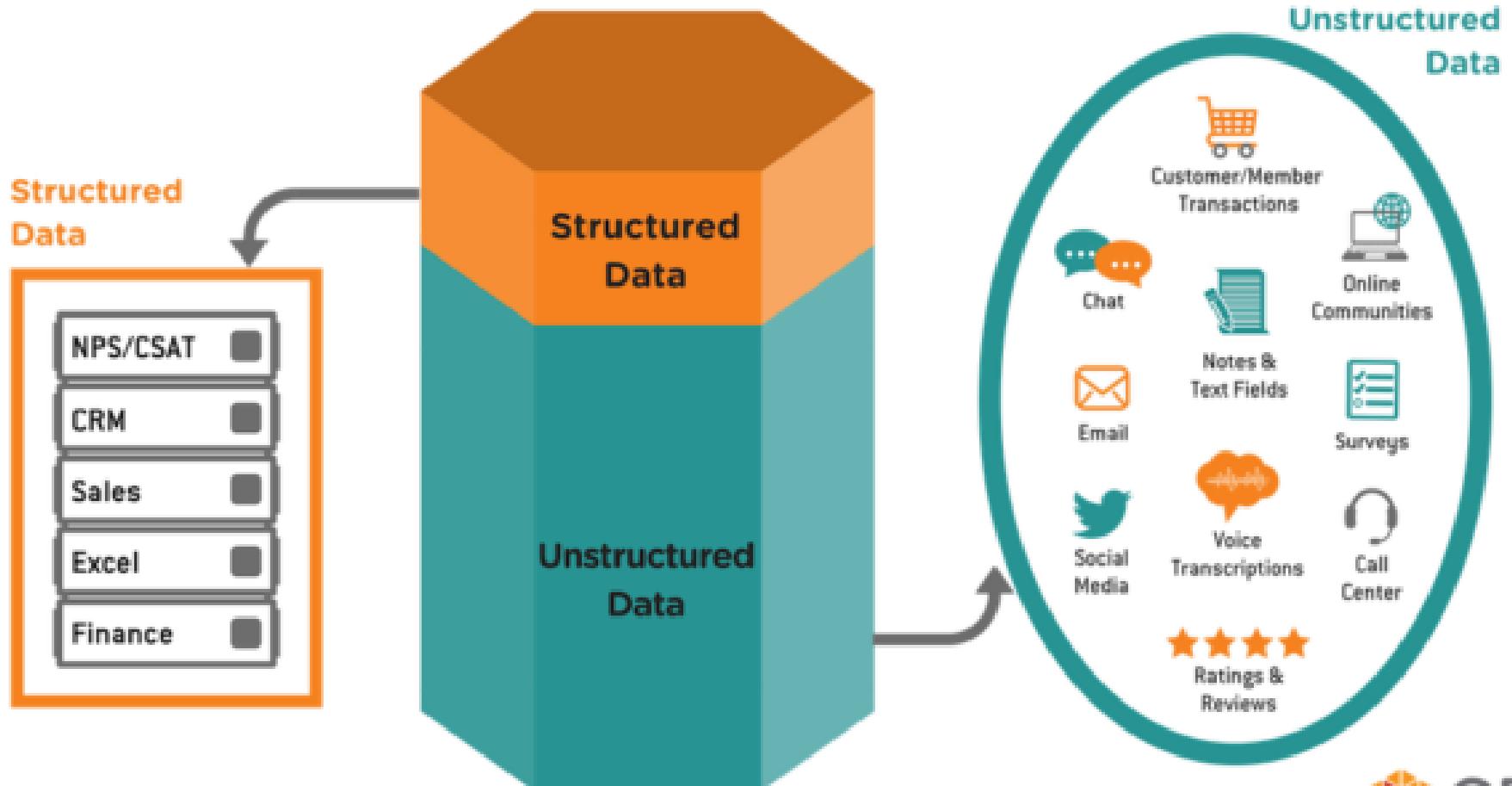
ESTRUCTURADO VS NO ESTRUCTURADO



[Structured vs
Unstructured
Data.](#)

TIPOS DE DATOS

What's Hiding in Your Unstructured Data?



Source: Graphic adapted from January 2018 CXPA Presentation "The Why Behind the What," Jim Kitterman

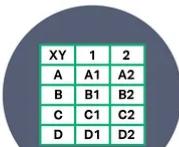
TIPOS DE DATOS

Structured Data

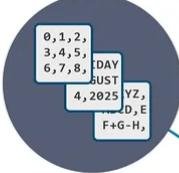
vs

Unstructured Data

Can be displayed
in rows, columns and
relational databases



Numbers, dates
and strings

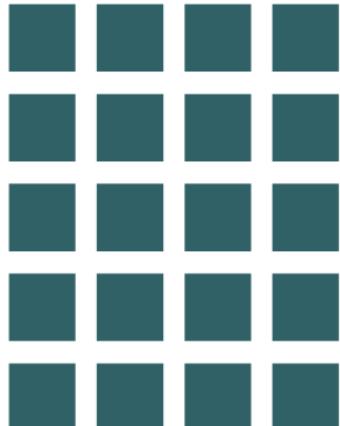


TIPOS DE DATOS

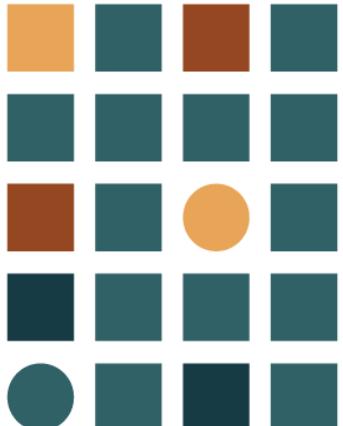
[Structured Data vs. Unstructured Data – What's The Difference?](#)

STRUCTURED, UNSTRUCTURED AND SEMI-STRUCTURED

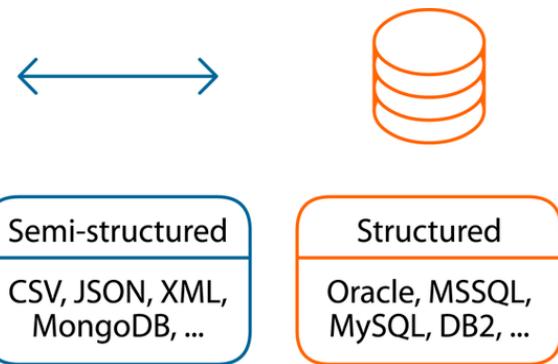
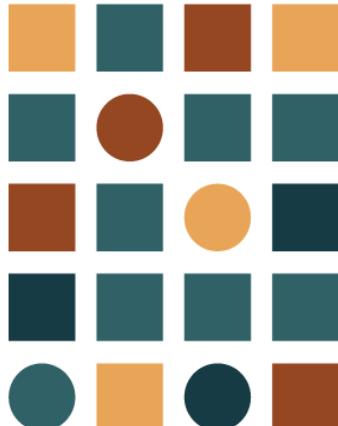
Structured Data



Semi-structured Data



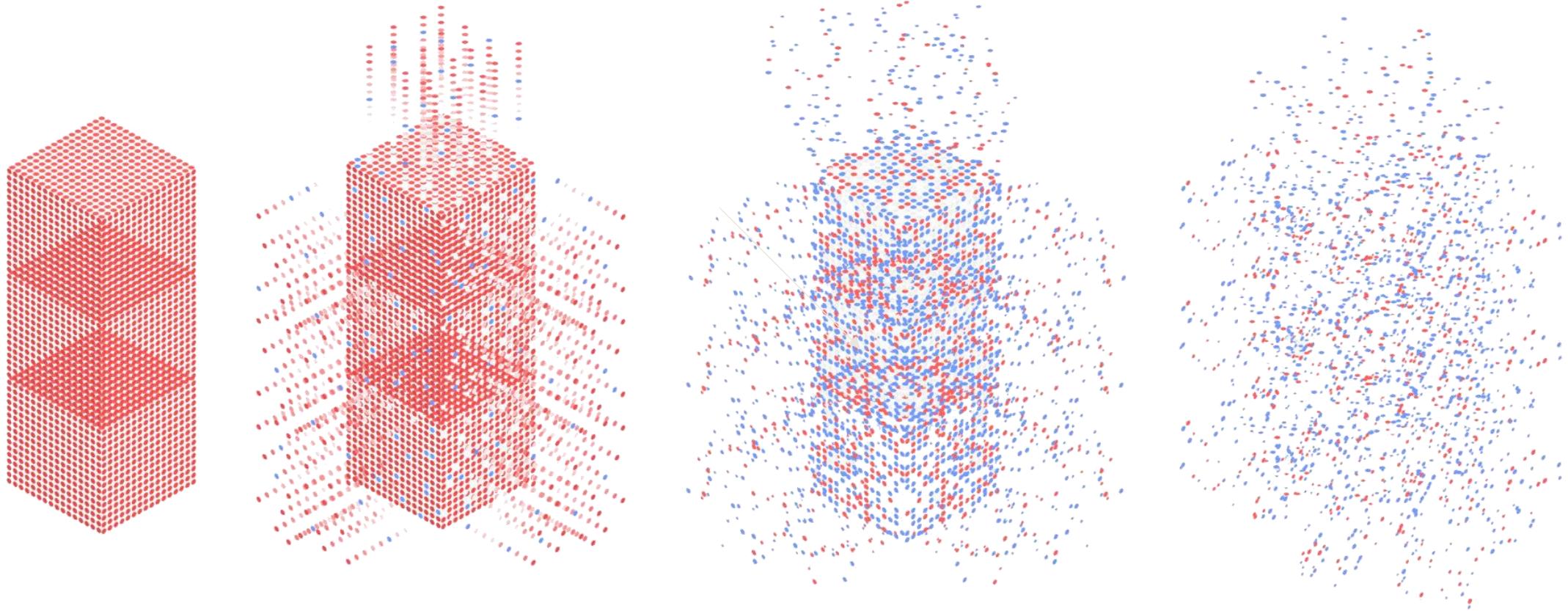
Unstructured Data



[Steam computing paradigm:](#)
[Cross-layer solutions over cloud, fog, and edge computing](#)

TIPOS DE DATOS

¿ Se puede pasar de
NOSQL a SQL y viceversa ?



[Structured Data vs. Unstructured Data – What's The Difference?](#)

TIPOS DE DATOS

Structured data

24_1_BASES DE DATOS I_T...					
Nombre / Apellido(s)	Dirección de correo	Mi primer base de datos	Motores de BD	De conjunto de datos a un...	De conjunto de datos a un...
DB DAVID ALEXANDER BORDA LEON	dabordal@itc.edu.co	-	-	-	-
JB JHON ALEJANDRO BUITRAGO SALAZAR	jabuitragosa@itc.edu.co	-	-	-	-
AM ALEXIS DUWAN DIAZ MORA	addiazm@itc.edu.co	-	-	-	-
OD OLIVER SNEIDER DIAZ SANTOS	osdiazs@itc.edu.co	-	-	-	-
CE CRISTIAN CAMILO ESCOBAR LEON	ccescobar@itc.edu.co	-	-	-	-
JE JUAN DAVID ESPINEL PENA	jdespinelp@itc.edu.co	-	-	-	-
JE JERONIMO ESTRADA DUQUE	jestrada@itc.edu.co	-	-	-	-

DATOSABIERTOS BOGOTÁ

Búsqueda de conjunto de

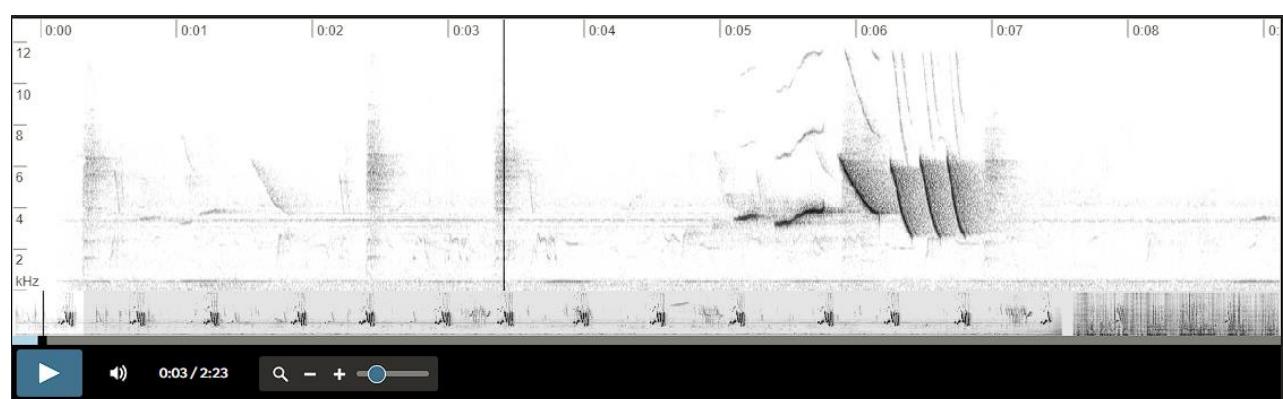
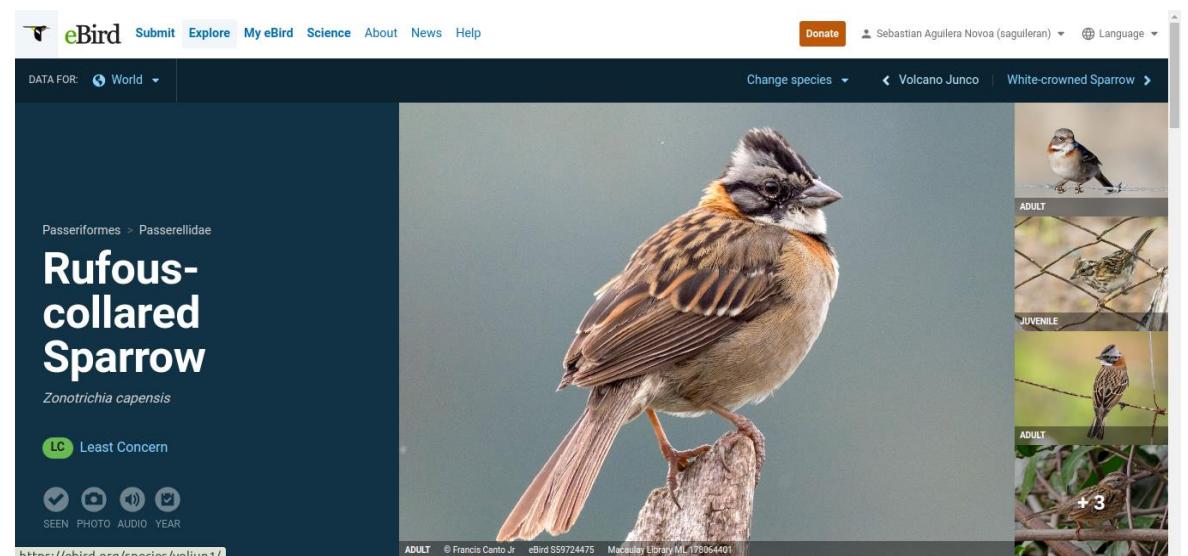
INICIO DE SESIÓN PARA ENTIDADES

| Datos | Entidades | Temáticas | Acerca de | Ayuda | BOGOTÁ |

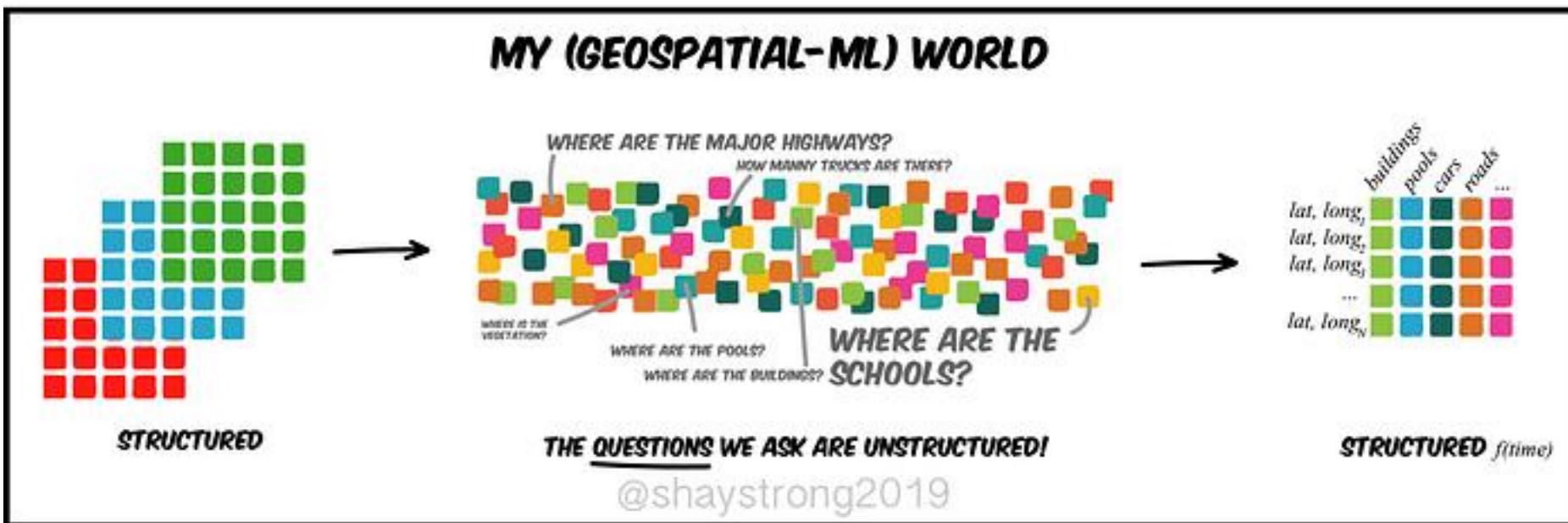
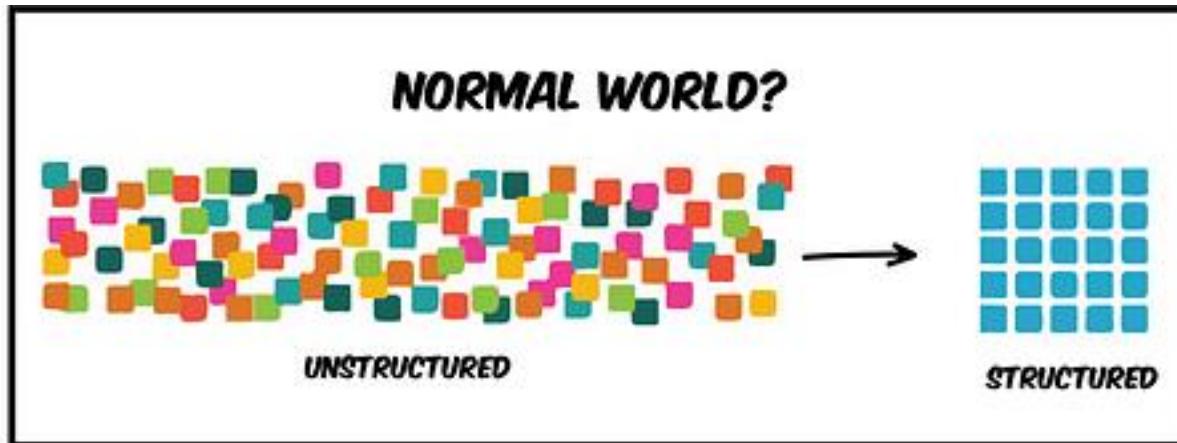
Ej: ambiente

Agricultura y Desarrollo Rural	Ambiente y Desarrollo Sostenible	Archivos Públicos	Ciencia Tecnología e Innovación
Comercio, Industria y Turismo	Cultura	Deporte y Recreación	Economía y Finanzas
Educación	Estadísticas Nacionales	Función Pública	Gastos Gubernamentales
Hacienda y Crédito Público	Inclusión Social y Reconciliación	Justicia y Derecho	Mapas Nacionales
Minas y Energía	Ordenamiento Territorial	Organismos de Control	Participación ciudadana
Presupuestos Gubernamentales	Resultados Electorales	Salud y Protección Social	Seguridad y Defensa
Mujer	Trabajo	Transporte	Vivienda, Ciudad y Territorio

Unstructured data: [Rufous-collared Sparrow – eBird library](#)



TIPOS DE DATOS: EJEMPLO



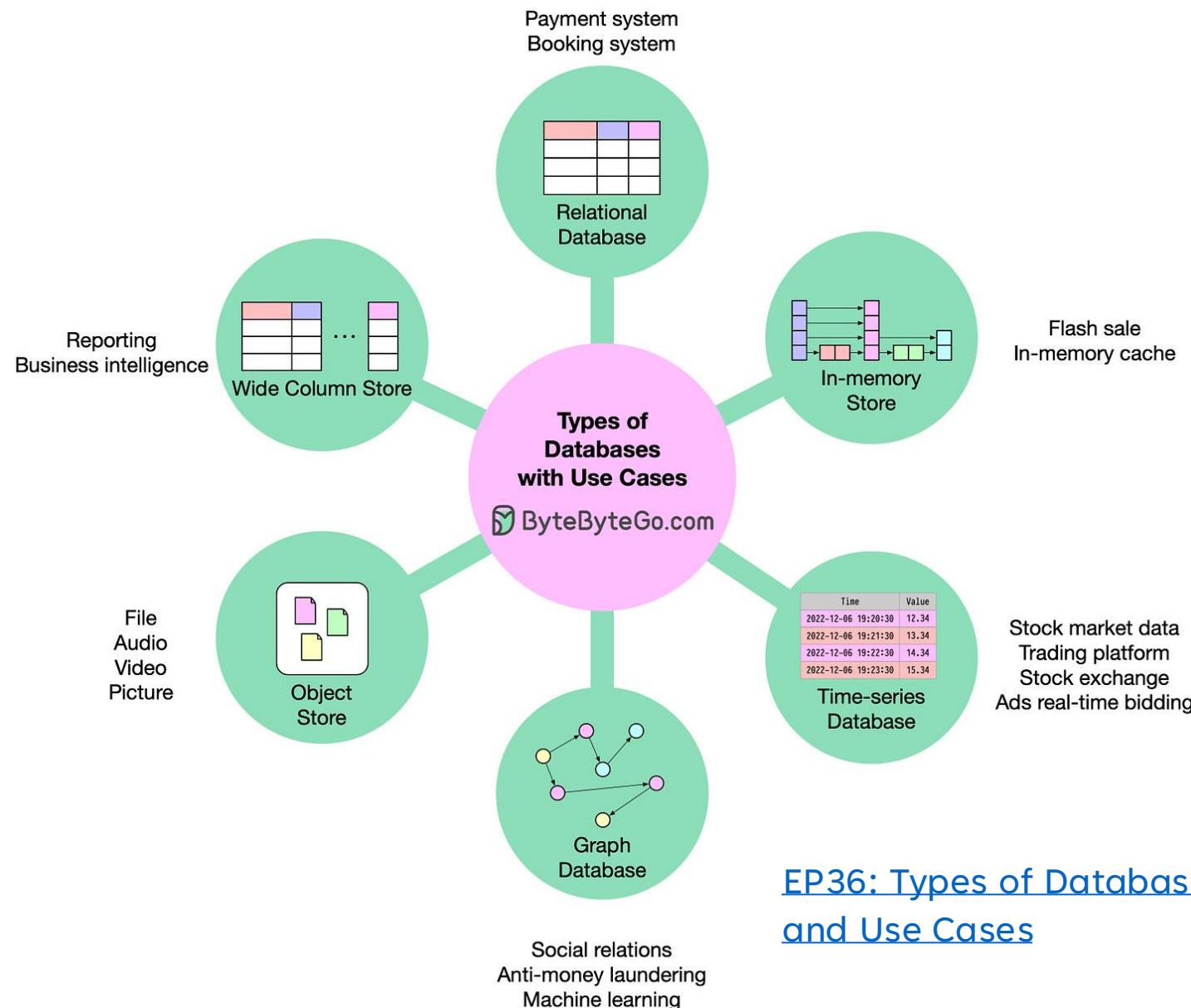
TIPOS DE DATOS



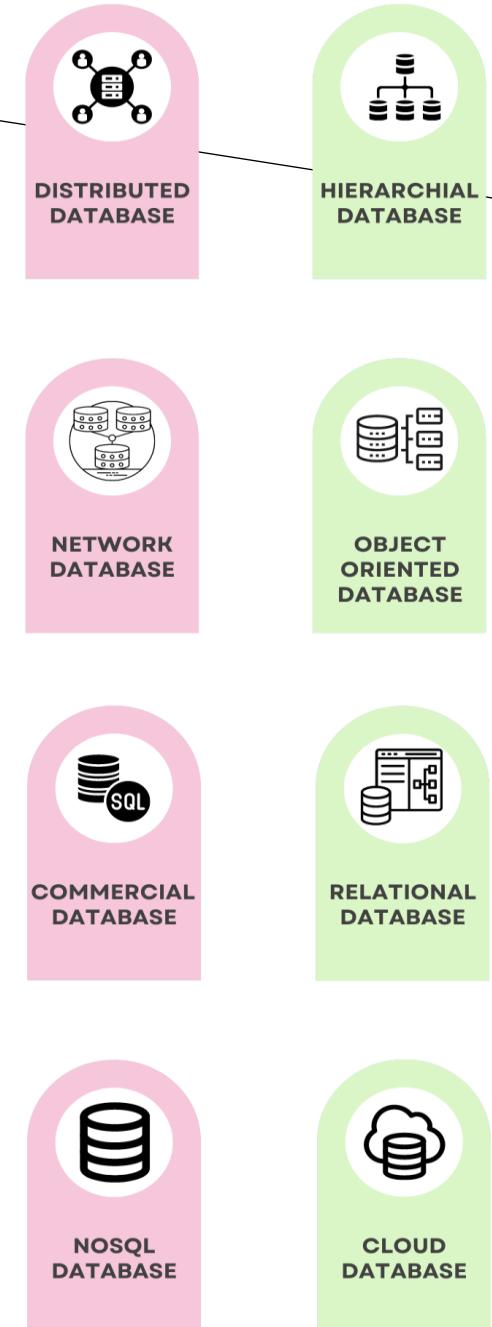
 Evitar que tus datos se desmadren



TIPOS DE BASES DE DATOS



[EP36: Types of Databases and Use Cases](#)

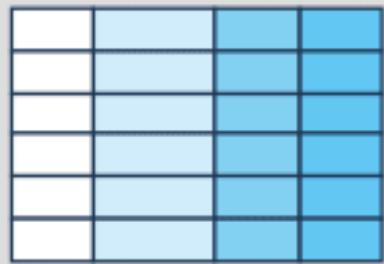


[Databases Types](#)

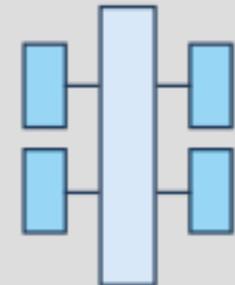
TIPOS DE BASES DE DATOS

SQL

Relational

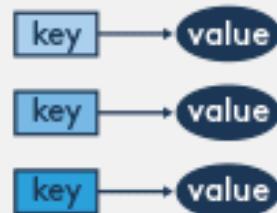


Analytical (OLAP)

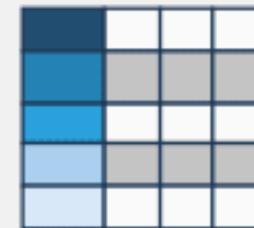


NoSQL

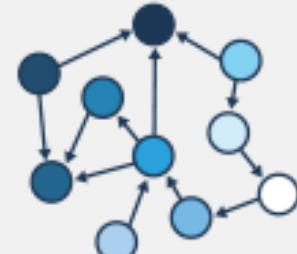
Key-Value



Column-Family



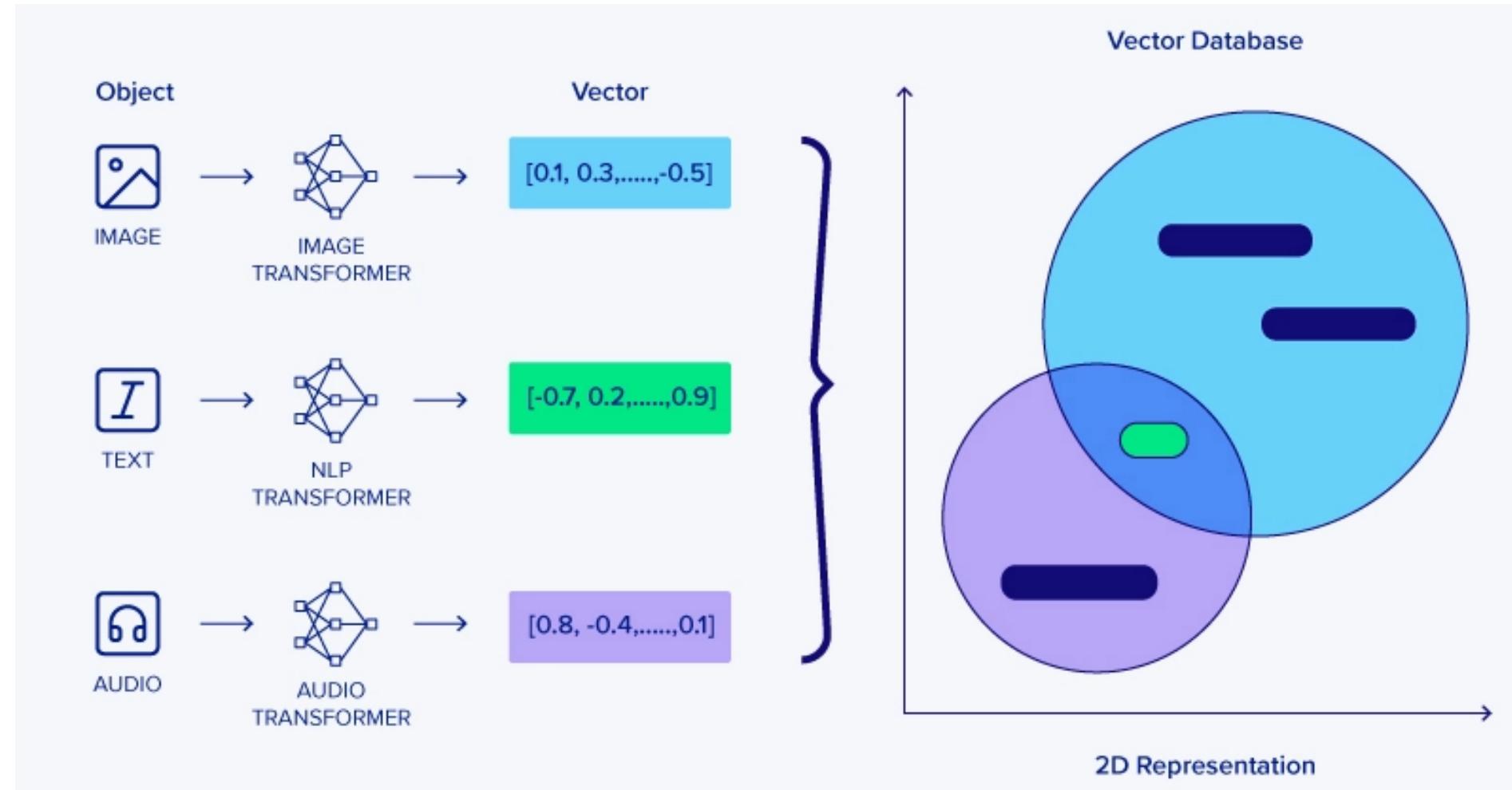
Graph



Document

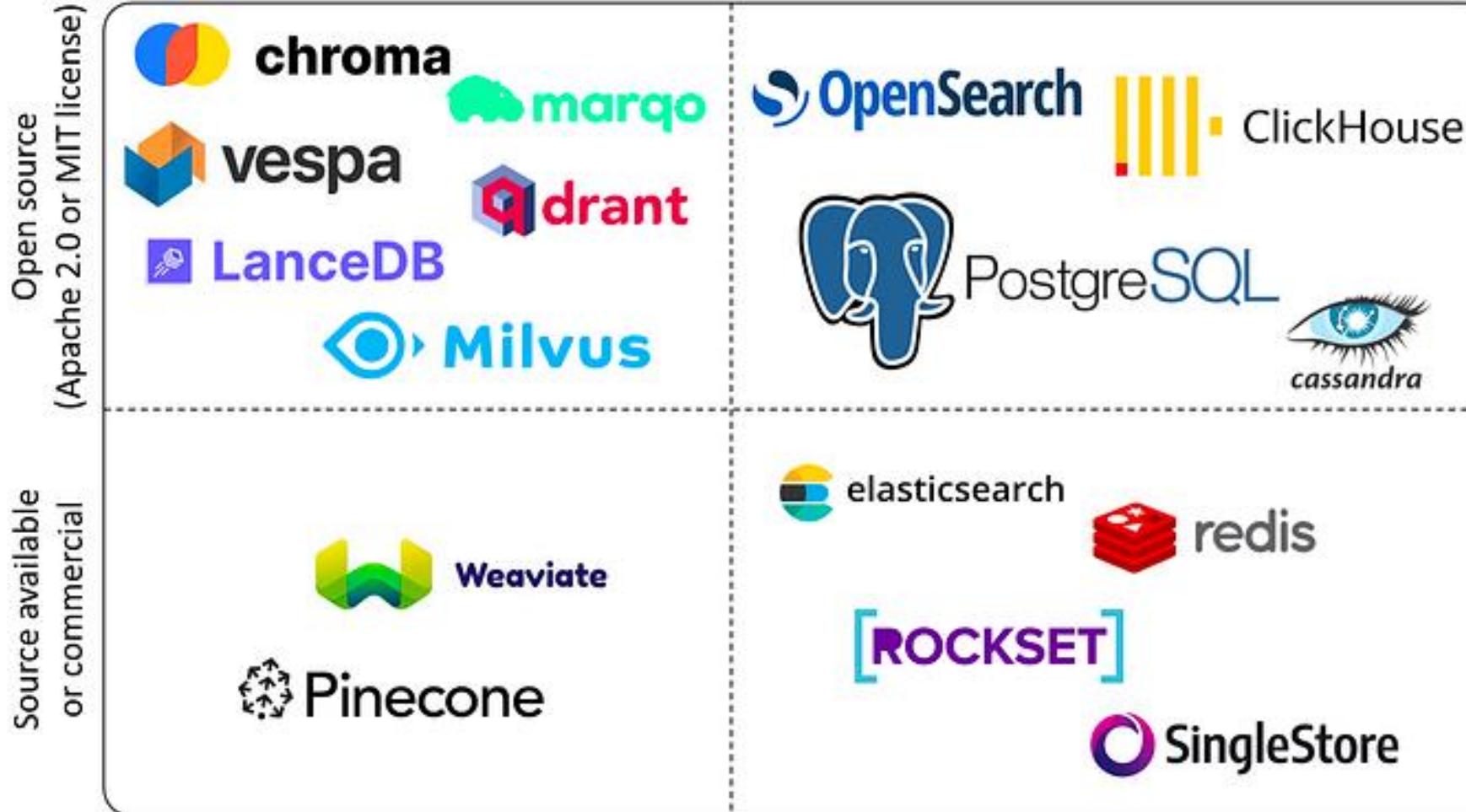


BASE DE DATOS VECTORIALES

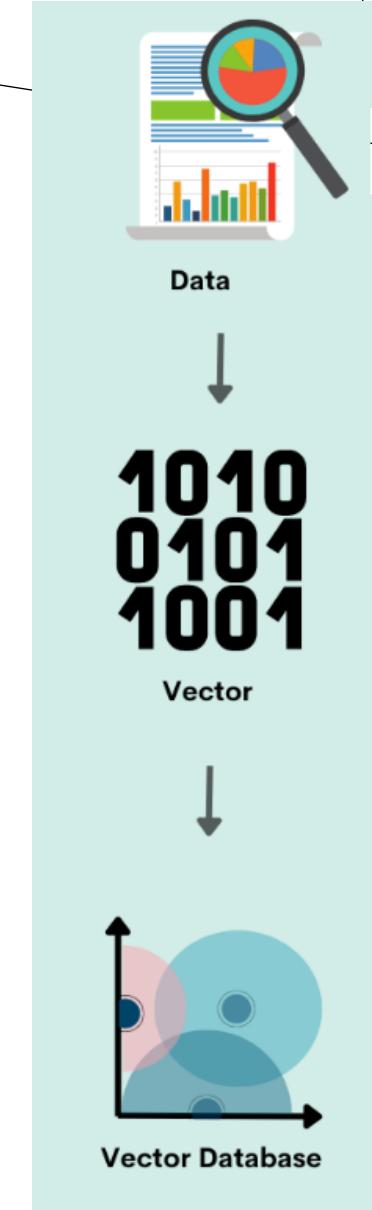


[Vector Database for LLMs, Generative AI, and Deep Learning](#)

BASE DE DATOS VECTORIALES



[Why You Shouldn't Invest In Vector Databases?](#)



Optimize Data Processing
with Vector Databases

ELEMENTOS DE LAS BASES DE DATOS

FILAS Y COLUMNAS

Table

	Country	Product	Sales
Row 1	India	Chocolate	1000
Row 2	India	Ice-cream	2000
Row 3	Germany	Chocolate	4000
Row 4	US	Noodle	500

Row Store

Row 1	India
Row 2	Chocolate
Row 3	1000
Row 4	India
Row 5	Ice-cream
Row 6	2000
Row 7	Germany
Row 8	Chocolate
Row 9	4000
Row 10	US
Row 11	Noodle
Row 12	500

Column Store

Country	India
Product	India
Sales	Germany
Country	US
Product	Chocolate
Sales	Chocolate
Country	Ice-cream
Product	Ice-cream
Sales	Chocolate
Country	Noodle
Product	Noodle
Sales	1000
Country	2000
Product	4000
Sales	500

Row-oriented

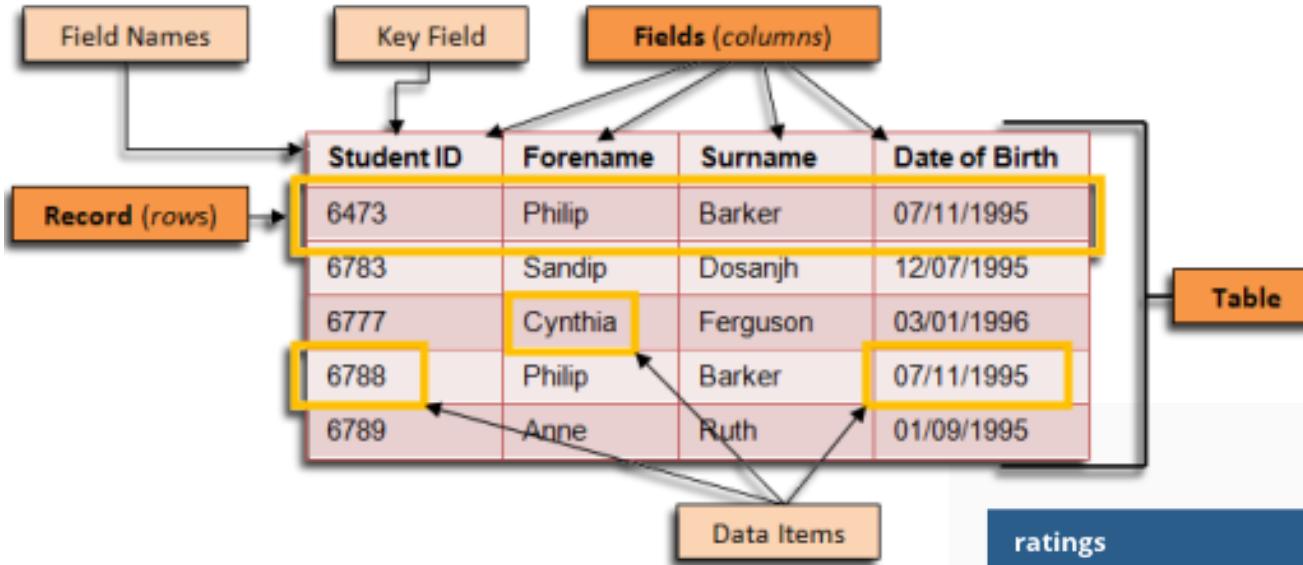
ID	Name	Grade	GPA
001	John	Senior	4.00
002	Karen	Freshman	3.67
003	Bill	Junior	3.33

Column-oriented

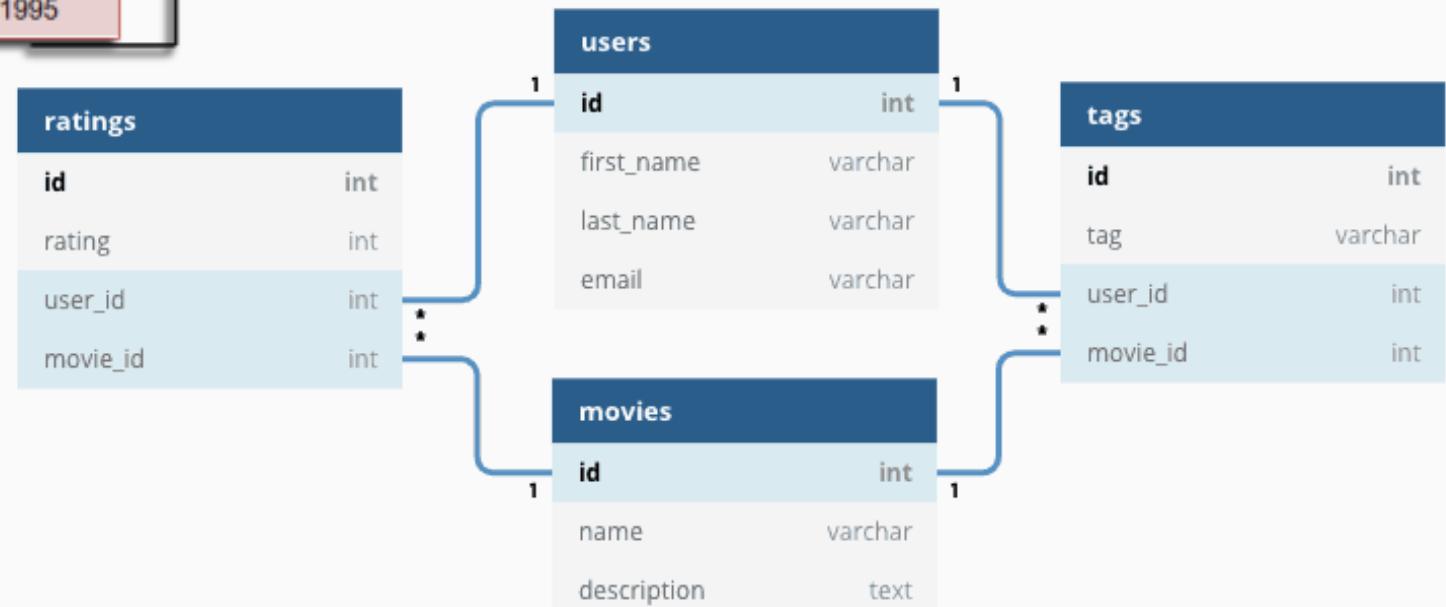
Name	ID	Grade	ID	GPA	ID
John	001	Senior	001	4.00	001
Karen	002	Freshman	002	3.67	002
Bill	003	Junior	003	3.33	003

ELEMENTOS DE LAS BASES DE DATOS

TABLAS Y RELACIONES



- Tablas de subconjuntos
 - Tabla de datos
 - Tablas de unión
 - Tablas de validación



ELEMENTOS DE LAS BASES DE DATOS

TIPOS DE DATOS Y LLAVES (KEYS)

Programming Data Types



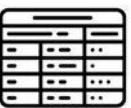
Integer



Real



Character



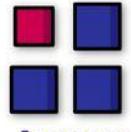
String



Boolean



Date/Time



Arrays



2D Arrays

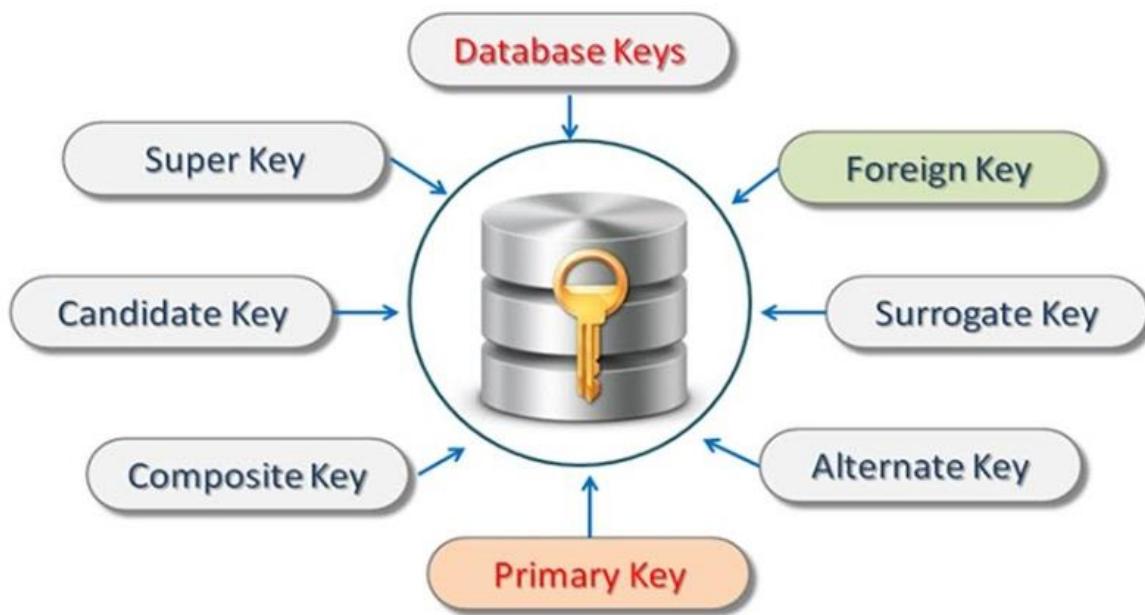
 Follow for more
@developer_camp

ID	Name	Course
2041	Tom	Java
2204	John	C++
2043	Alice	Python
2032	Bob	Oracle

Student Details

ID	Marks
2041	65
2204	55
2043	73
2032	62

Student Marks

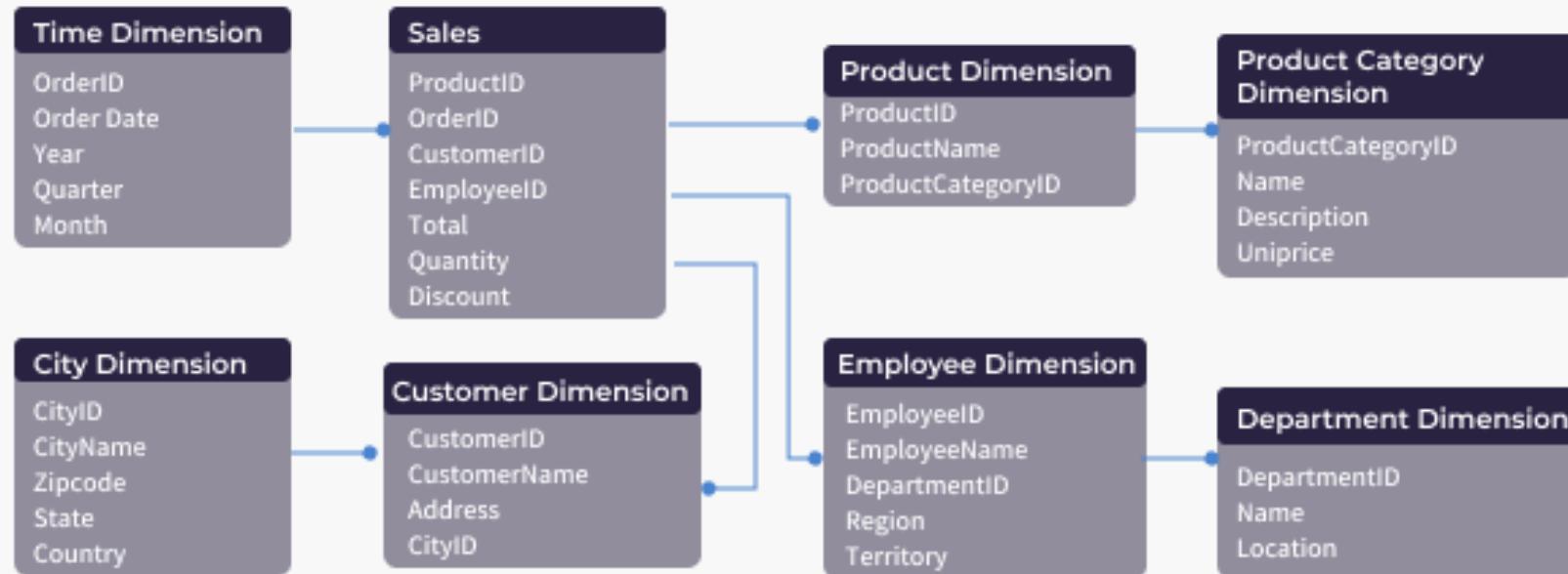


ELEMENTOS DE LAS BASES DE DATOS

ESQUEMA

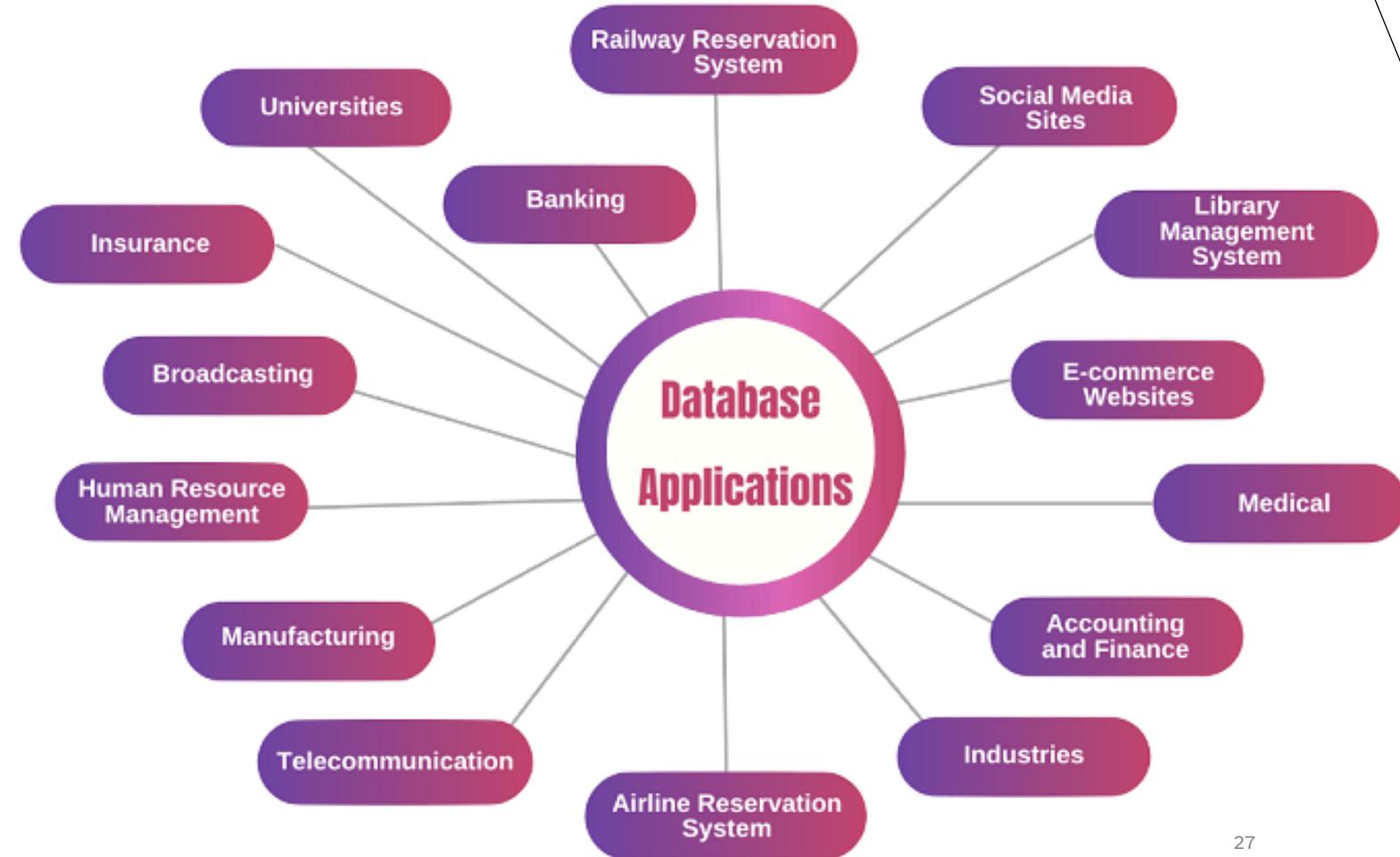
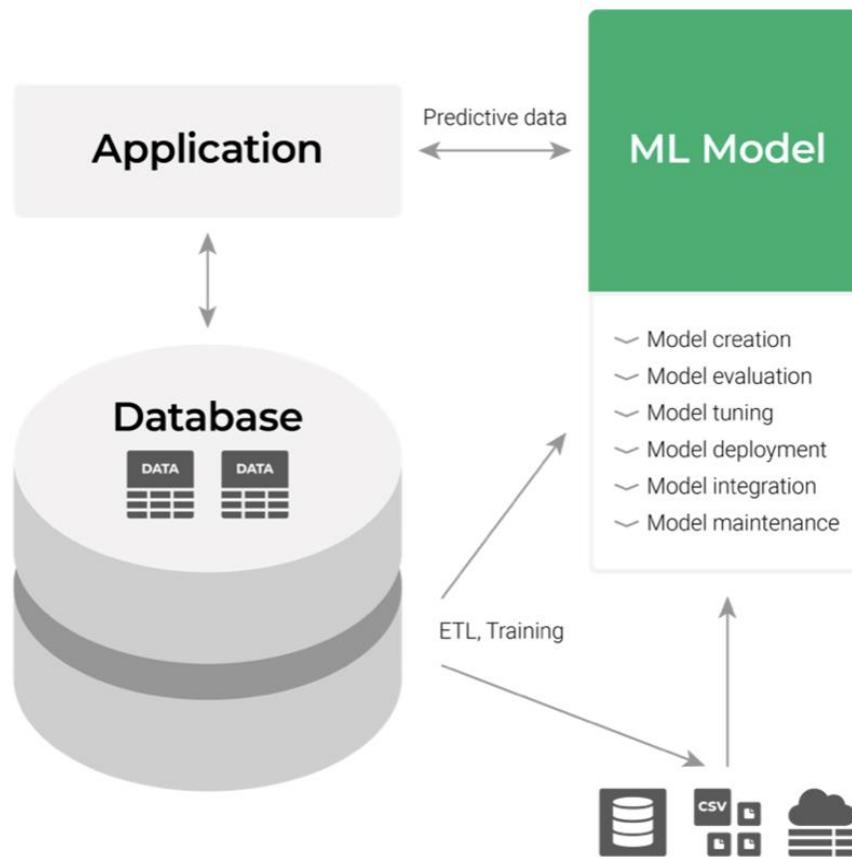


Database Schema Design



APLICACIONES DE LAS BD

[Database Applications](#)



[Self-Service Machine Learning with Intelligent Databases](#)



SISTEMAS DE GESTIÓN DE BASES DE DATOS (SGBD)

DATABASE MANAGEMENT SYSTEM (DBMS)

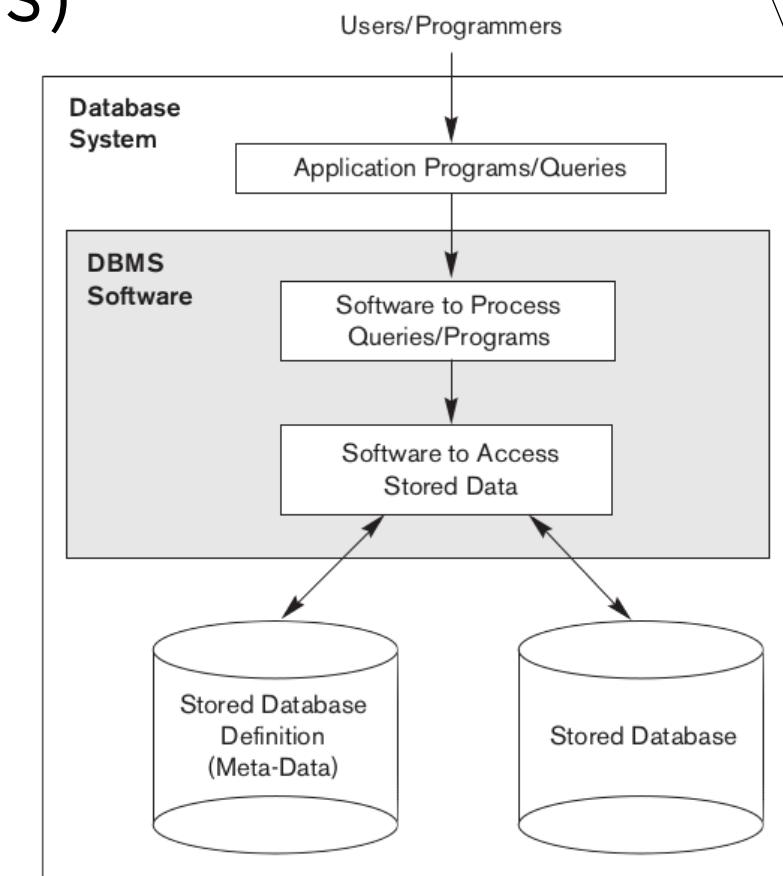
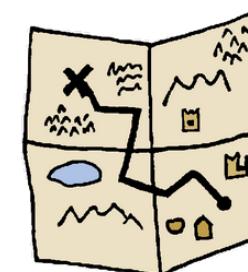
Sistema computarizado (software) de propósito general/específico que permite crear y mantener bases de datos.

Su objetivo es facilitar el proceso de definir, construir, manipular (editar y consultar), proteger, y compartir bases de datos para varios usuarios.

DATA



METADATA



SISTEMAS DE GESTIÓN DE BASES DE DATOS (SGBD)

WHAT IS
DATABASE
&
DATABASE
MANAGEMENT SYSTEM

DB

The graphic features a central title 'WHAT IS DATABASE & DATABASE MANAGEMENT SYSTEM' in white and yellow text. To the right is a stylized illustration of a server rack with five grey horizontal slots, each containing a green dot and a small vertical bar. Next to it is a large, blue, cylindrical object with horizontal bands and the letters 'DB' written on it. The background is a solid blue color with white diagonal lines and a dotted pattern in the corners.

¿BASE DE DATOS = SISTEMA DE GESTION DE BASES DATOS?

Base de datos



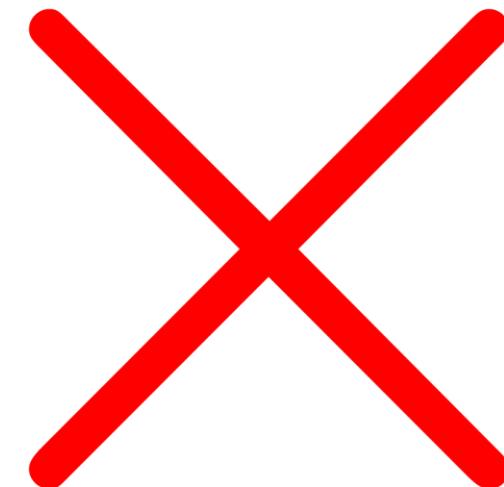
Usuario / App

¿BASE DE DATOS = SISTEMA DE GESTION DE BASES DATOS?

Base de datos

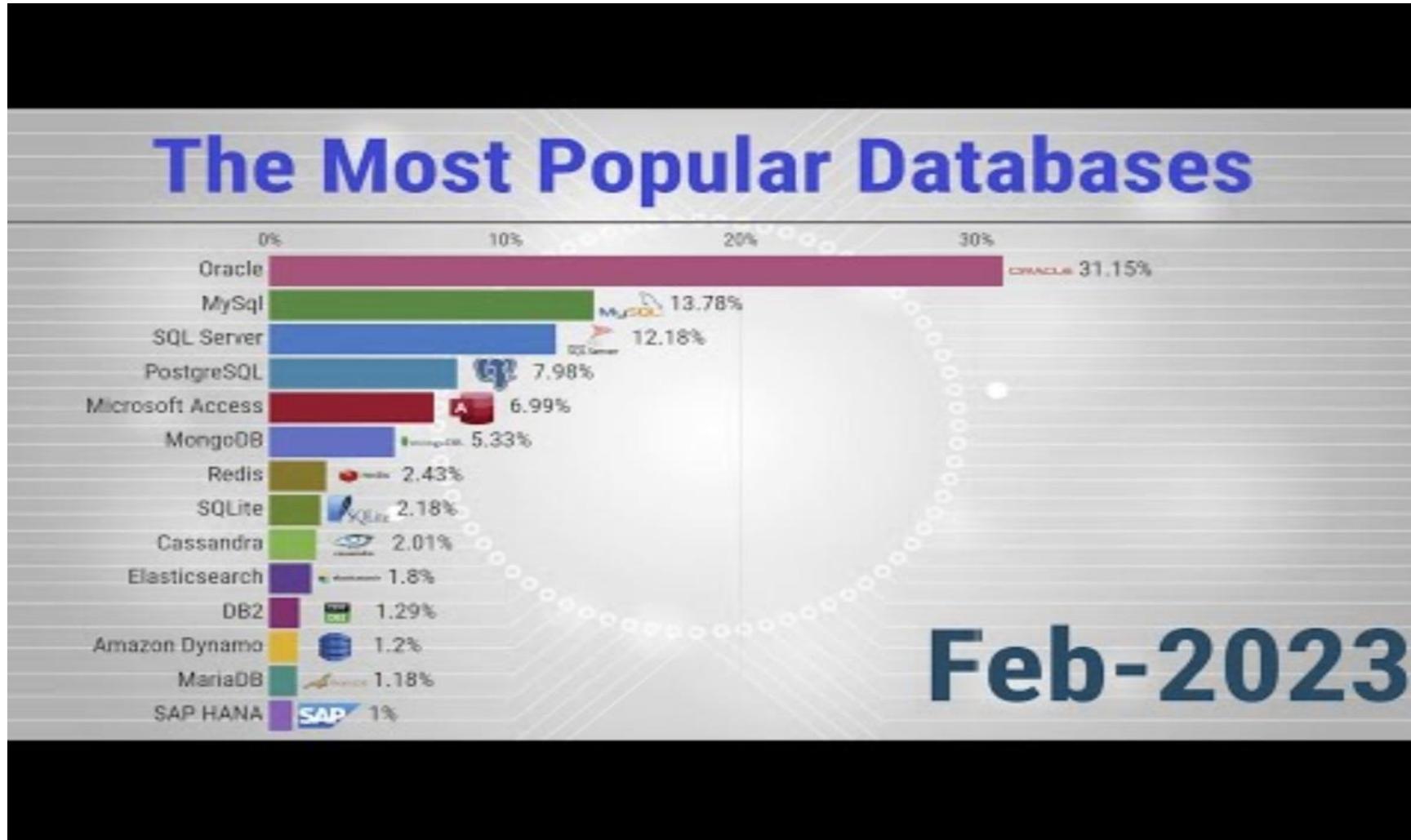


Usuario / App



NO

BASES DE DATOS MÁS POPULARES



POPULAR SGBD 2023 - 2024



Amazon Aurora



Amazon DocumentDB



Amazon RDS



Amazon Redshift



Amazon DynamoDB



Amazon Timestream



Amazon Neptune

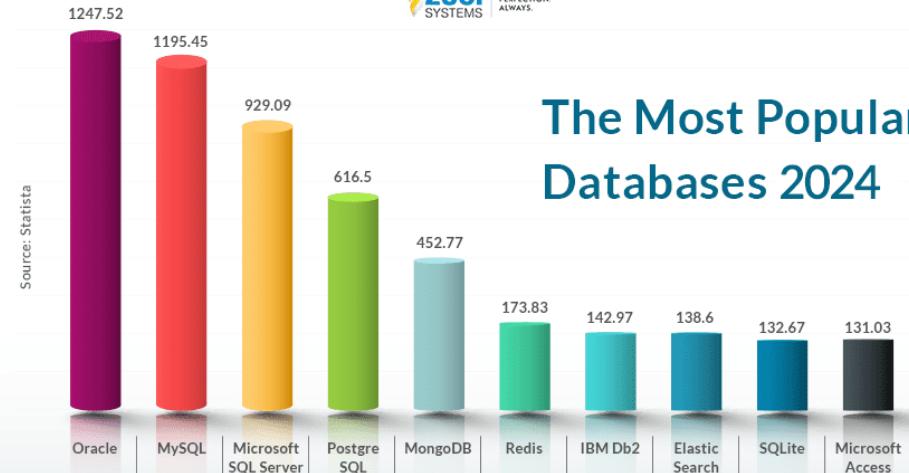


Amazon QLDB

[AWS Cloud Databases](#)

ZUCI SYSTEMS PERFECTION. ALWAYS.

The Most Popular Databases 2024



PostgreSQL

amazon
DynamoDBOrientDB
Community Edition

[10 Most Popular Databases To Use In 2024](#)



SQLite



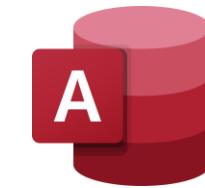
MySQL



redis



elasticsearch



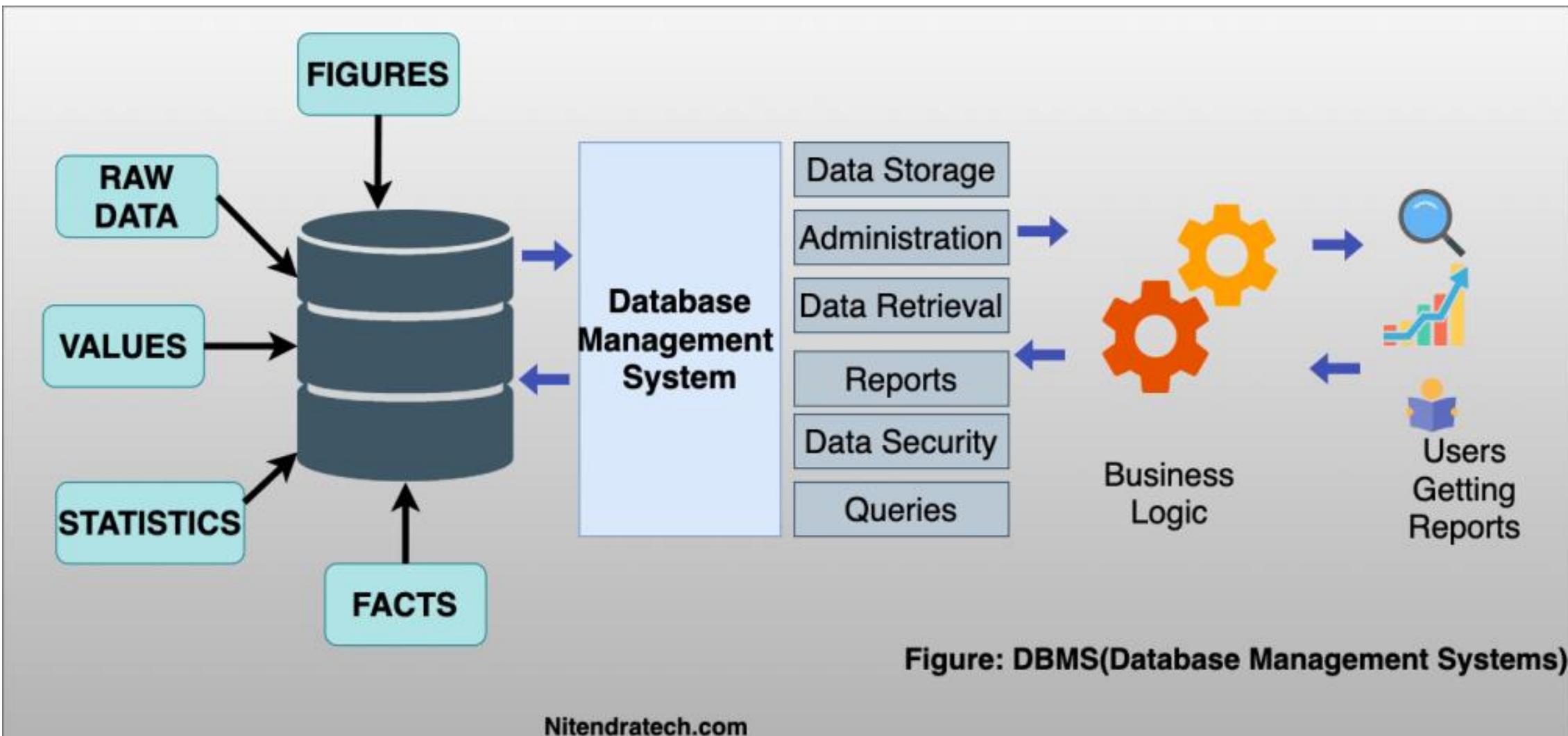
cassandra

Microsoft
SQL Server

Azure SQL

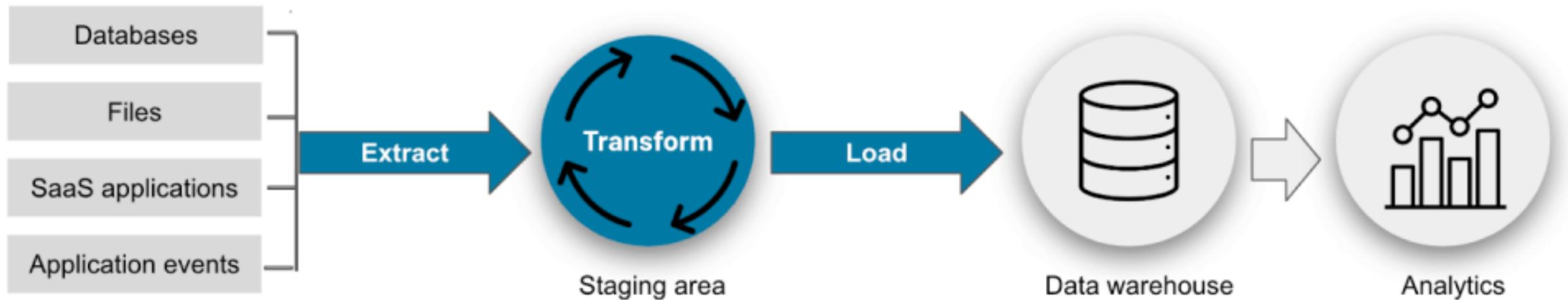
[Top 15 Databases To Use in 2023 For Web Applications](#)

SISTEMA DE GESTION DE BASES DATOS



ROL DE LAS BD EN LA INDUSTRIA

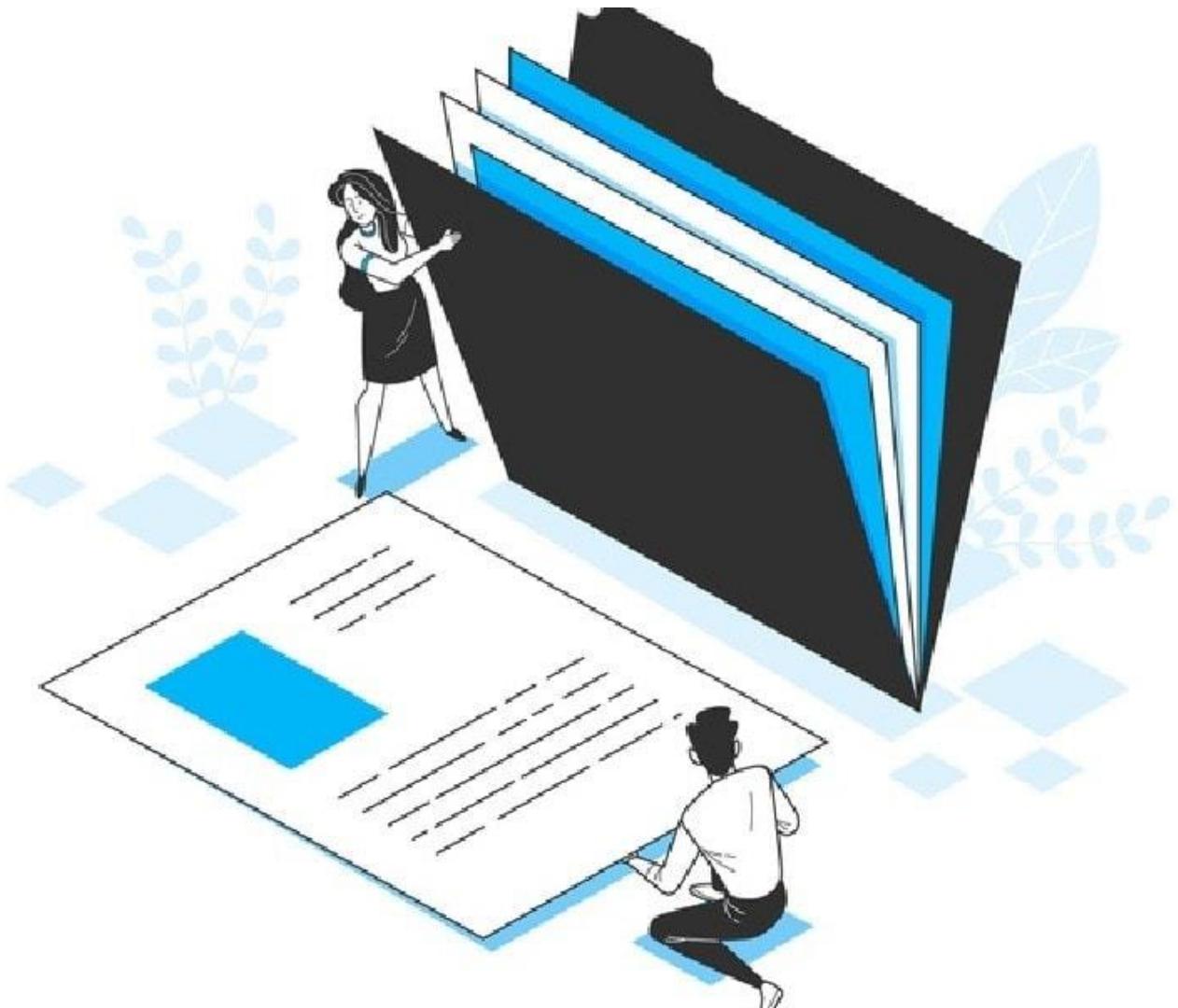
HOW ETL WORKS



[What Is ETL and How It Works?](#)

REFERENCIAS

- [Types of Databases: Relational vs. Columnar vs. Document vs. Graph vs. Vector vs. Key-value & more](#)
- [Structured Vs Unstructured Data | @TechcanvassAcademy](#)
- [How To Choose The Right Database?](#)
- [How do NoSQL databases work? Simply Explained!](#)





GRACIAS

Sebastián Aguilera Novoa

sagüleran@itc.edu.co