DataBases Introduction

DataBase Foundations

Author: Eng. Carlos Andrés Sierra, M.Sc.
cavirguezs@udistrital.edu.co

Lecturer
Computer Engineer
School of Engineering
Universidad Distrital Francisco José de Caldas

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Outline

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Modular Software Components

- **Software Components** are the building blocks of software systems.
- **Modular Software** is a software design technique that emphasizes separating the functionality of a program into independent, interchangeable **modules**.
- **Software Applications** are the final product of software development.
- **Software Development** is the process of creating software applications.

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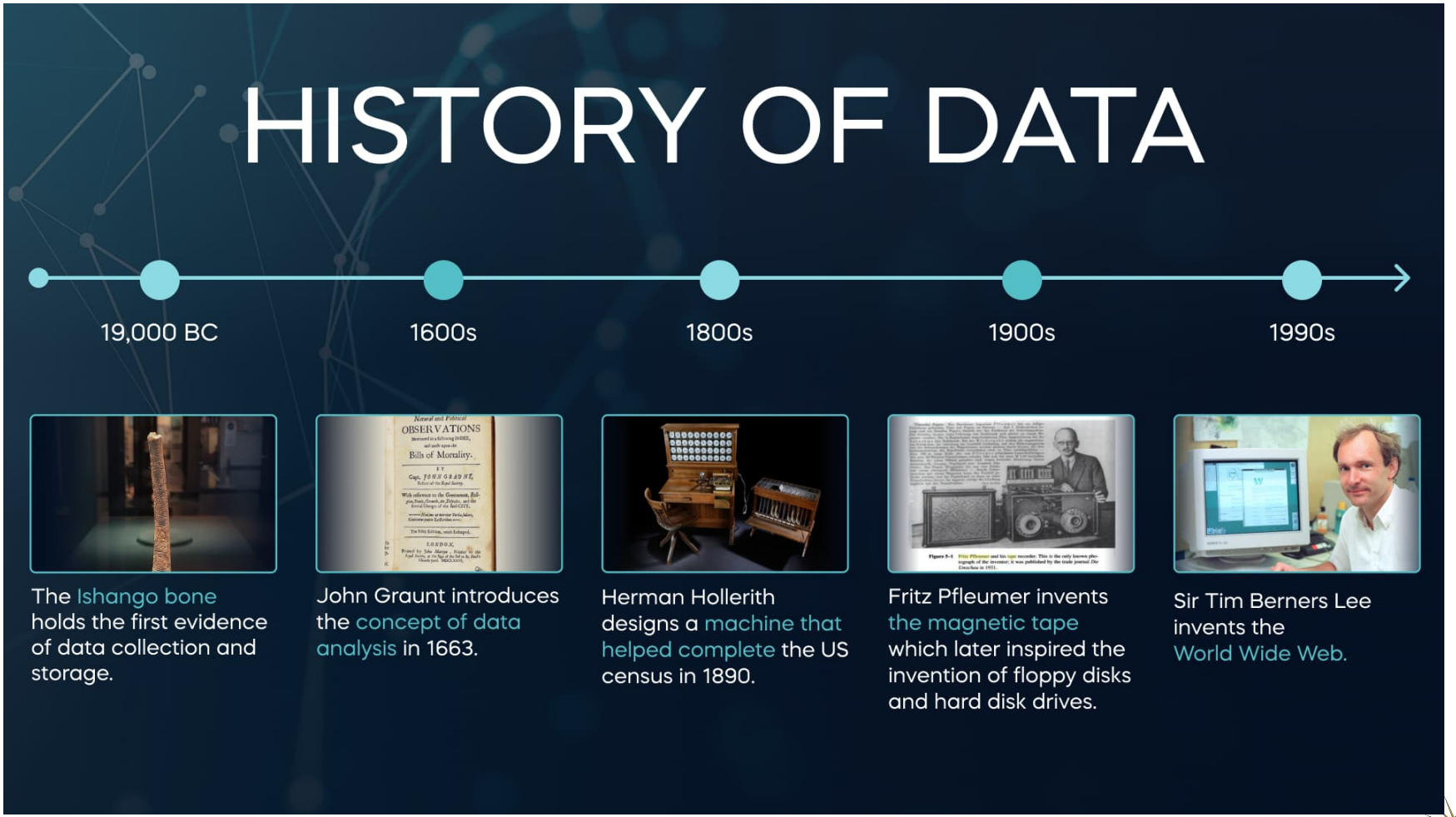
History of Data



Applications

- Software based on **layers** of abstraction and modularity lets implement different database strategies.
- Database Systems are fundamental for **data management**.
- Data analysis, data mining, data visualization, and data interpretation are **applications** of **database systems**.

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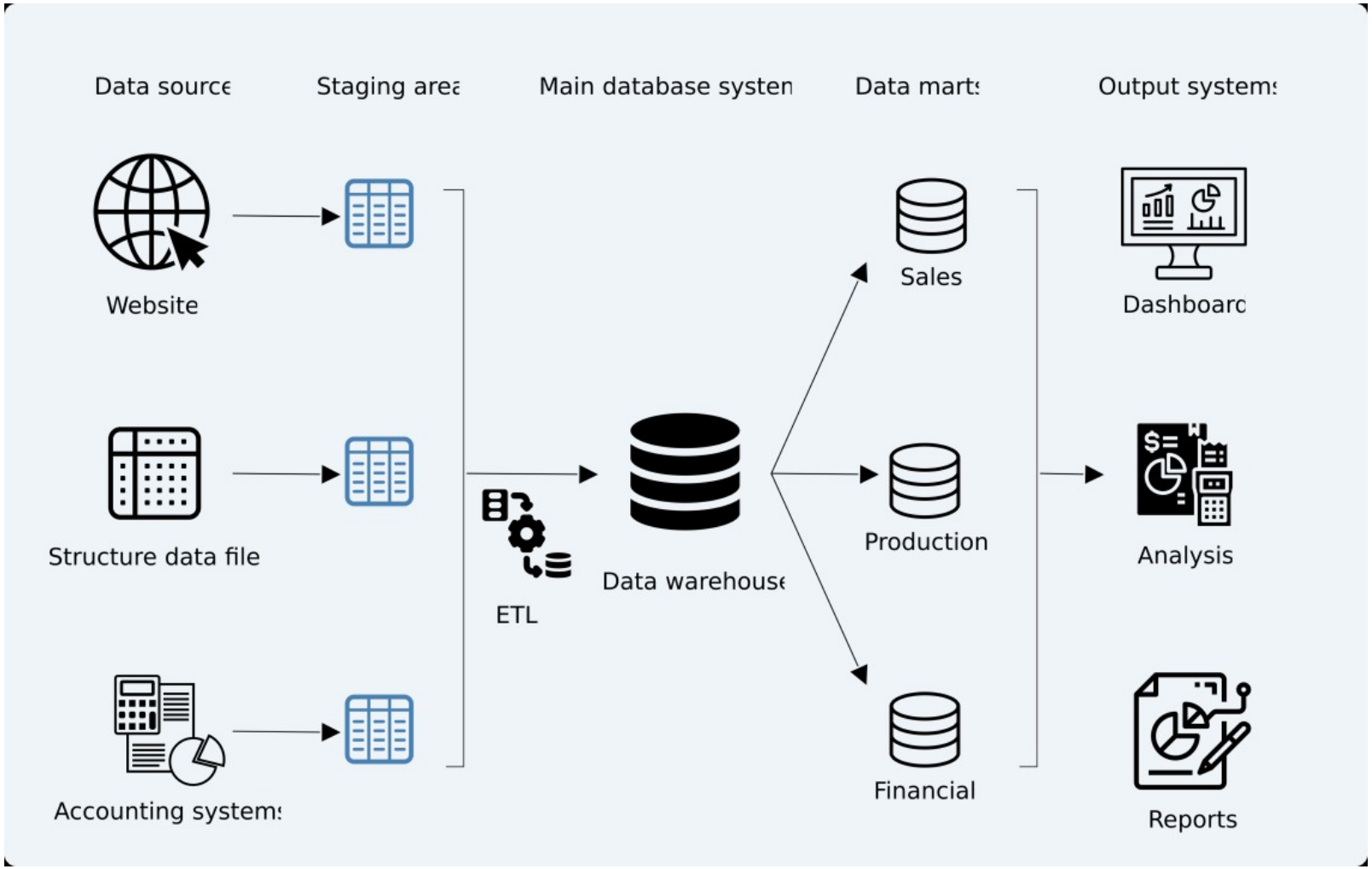
Case of Study: DataBase System



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From Data to Information

- Data: is a set of **values** of **qualitative** or **quantitative** variables.
- Data Management: is the process of **collecting**, **storing**, **processing**, and **analyzing** data.
- Data Analysis: is a process of **inspecting**, **cleansing**, **transforming**, and **modeling** data with the goal of **discovering** useful **information**, informing **conclusions**, and supporting **decision-making**.

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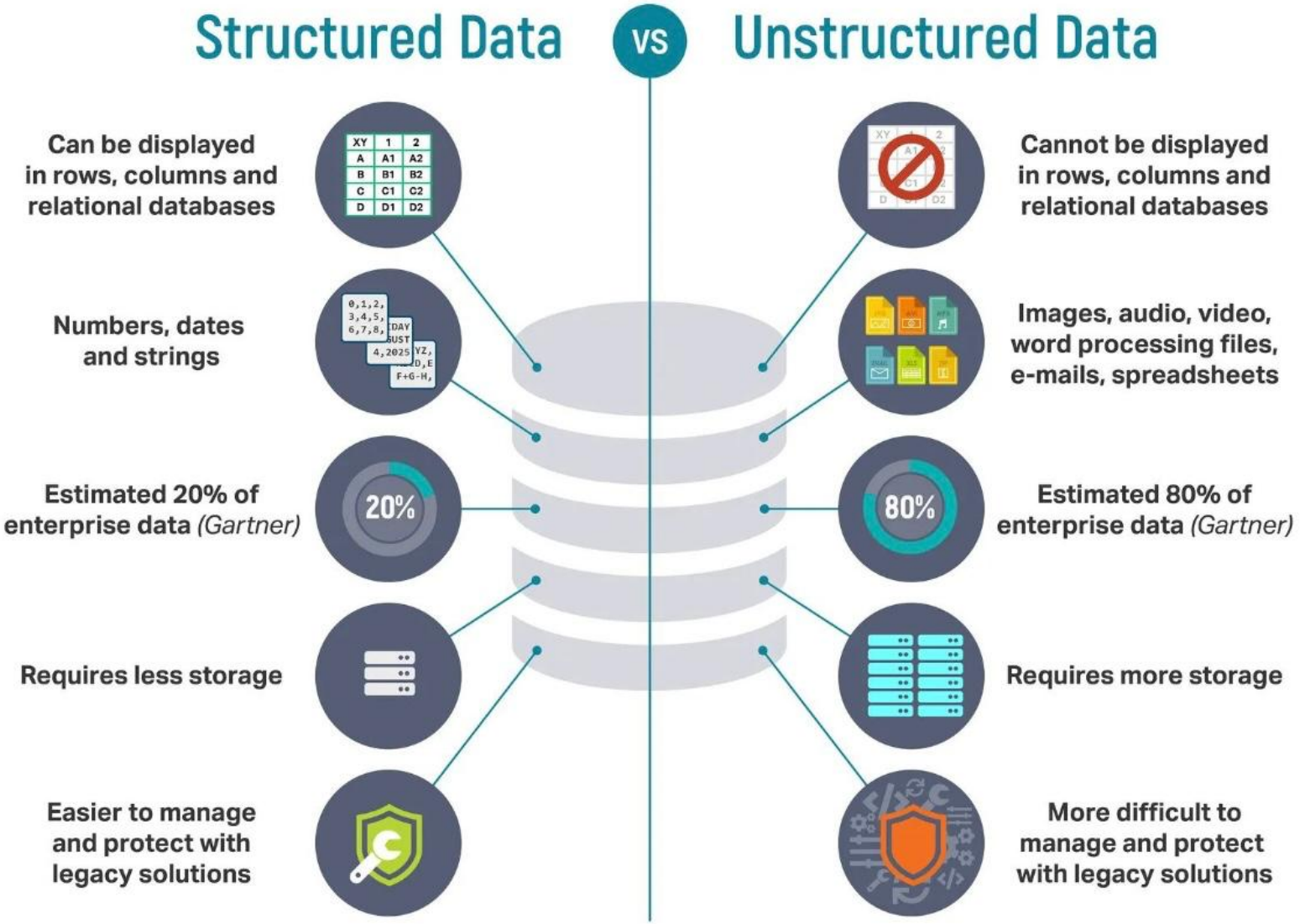
Structured and Unstructured Data



Tables, Columns and Rows

- **Table** is a collection of related data held in a structured format within a database.
- **Column** is a set of data values of a particular simple type, one for each row of the table.
- **Row** is a set of data values of a particular relationship, one for each column of the table.

Key-Value Data Structures

- **Key-Value Data Structures** are a type of data structure that can map keys to values.
- **Key** is a unique identifier for a record in a data fragment. **Value** is the data that is associated with the key.

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Primary and Foreign Keys

- **Primary Key** is a unique identifier for a record in a data set.
- **Foreign Key** is a column or group of columns in a table that links to a primary key in another table.

CRUD Operations

- CRUD is an acronym for **Create**, **Read**, **Update**, and **Delete**.
- Create is the process of **adding** new **records** to a **data set**.
- Read is the process of **retrieving records** from a **data set**.
- Update is the process of **modifying records** in a **data set**.
- Delete is the process of **removing records** from a **data set**.

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DataBase Classification

- DataBase is a collection of **data** that is **organized** so that it can be **easily accessed**, **managed**, and **updated**.
- Relational DataBase is a type of **database** that stores and provides access to **data points** that are **related** to one another.
- NoSQL DataBase is a type of **database** that provides a mechanism for **storage** and **retrieval** of **data** that is **modeled** in **means** other than the **tabular relations** used in **relational databases**.

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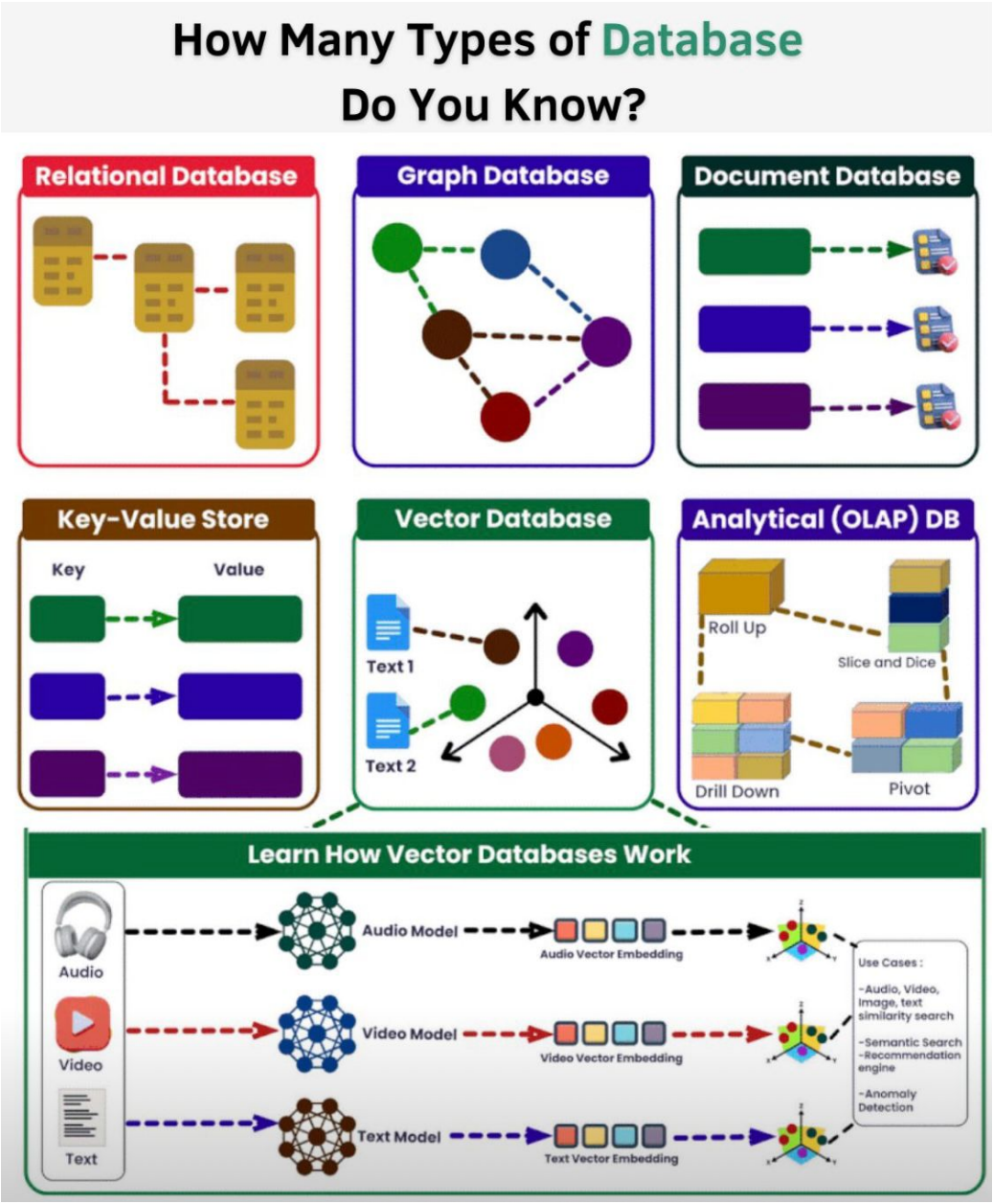
Types of Database



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Entity-Relationship Model

Entity-Relationship Model is a **data model** for **describing** the **data** or **information** aspects of a **business domain** or its **processes**.

Entity Definition

Entity is a **thing** or **object** in the **real world** that is **distinguishable** from other

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Relationship between Entities

Relationship is a **connection** between **entities**. This connection could be **one-to-one**, **one-to-many**, and **many-to-many**.

Creating our own **Espotifai**

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Thanks!

Questions?

Repo: *https://github.com/EngAndres/ud-public/tree/main/courses/databases-foundations*

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