

DATA BASES INTRODUCTION

DataBase Foundations

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- 1 Software Components and Applications
- 2 Glossary
- 3 DataBase Classification
- 4 MER Diagrams
 - Study Case: Spotify



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

HISTORY OF DATA

19,000 BC



The **Ishango bone** holds the first evidence of data collection and storage.

1600s



John Graunt introduces the **concept of data analysis** in 1663.

1800s



Herman Hollerith designs a **machine that helped complete the US census** in 1890.

1900s



Fritz Pfleumer invents the **magnetic tape** which later inspired the invention of floppy disks and hard disk drives.

1990s



Sir Tim Berners-Lee invents the **World Wide Web**.



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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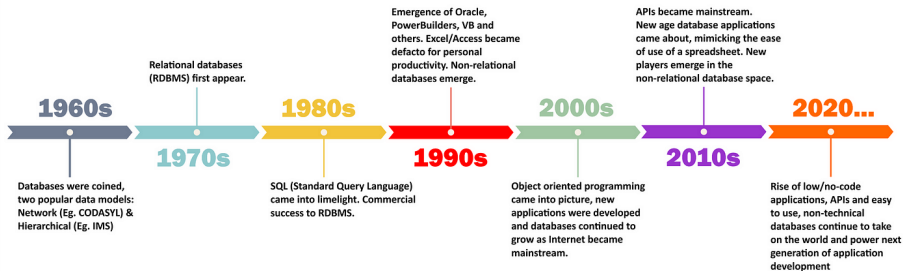
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History of DataBases

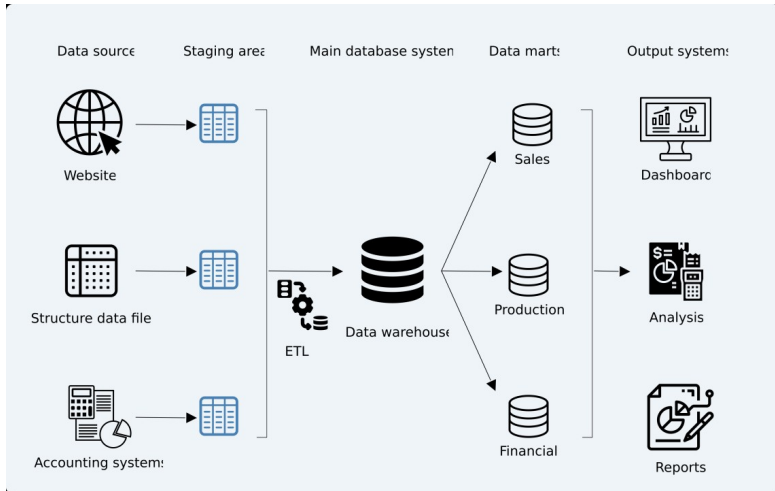
History of Databases (1960-2020)



stackby.com



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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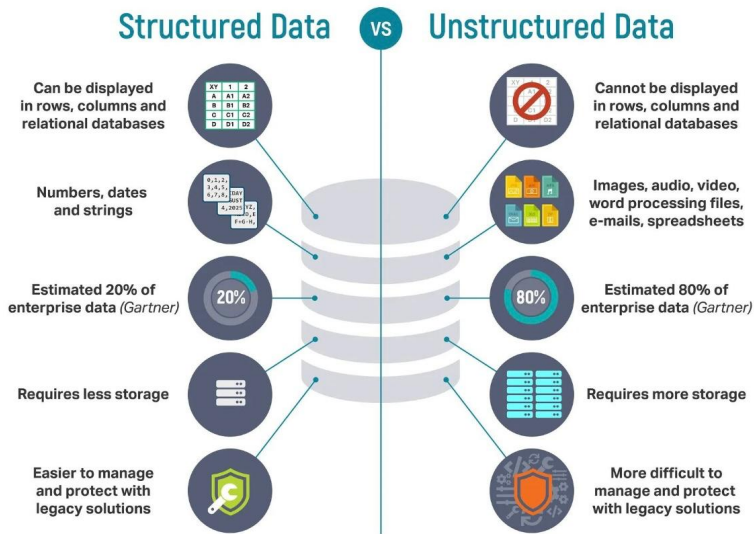


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Structured and Unstructured Data



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**.



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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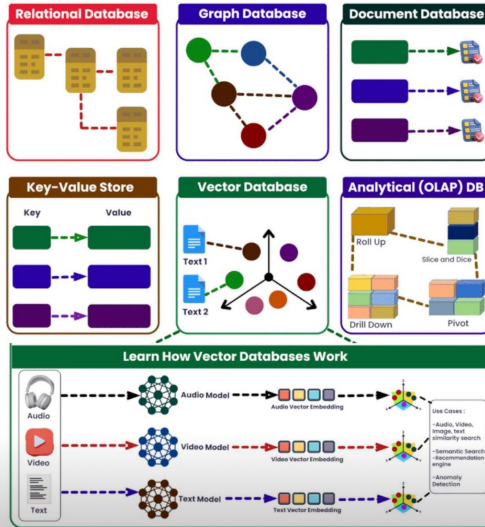
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Types of Database

How Many Types of Database Do You Know?



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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



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>

