Databases

What is data?

Data **can be any facts or information related to any object**

Data of you...

- Name
- Age
- Height
- Weight

Data of a website...

- Content
- Links
- Images
- Video

What is a database?

A *database* is a organized collection of data

Do you *HAVE* to use a database?

Common Ways to Store Data

- HTML (HyperText Markup Language)
- CSV (Comma Separate Values)
- XML (Extensible Markup Language)
- JSON (JavaScript Object Notation)
- Markdown

Why use a database?

Databases can provide benefits and have advantages over other formats

Database Advantages

- Better scalability
- Easier to update data
- Better Accuracy
- Better Security
- Better Data Integrity

What is a DataBase Management System (DBMS)?

A DBMS is a program or collection of programs that help with the access, manipulation and management of data in a database.

Types of DBMS

- Relational (MySQL, Oracle, SQL Server, SQLite)
- NoSQL (MongoDB, CouchDB, Redis)
- Hierarchical
- Network
- Object-Oriented

Relational Databases

Tables

A *table* is made up of columns and rows

Columns

Movies Table

movie_id	title	year
101	The Wizard of Oz	1939
102	Citizen Kane	1941
103	The Third Man	1949
104	All About Eve	1950

Rows

Movies Table

vie_id	title	year
101	The Wizard of Oz	1939
102	Citizen Kane	1941
103	The Third Man	1949
104	All About Eve	1950

Each column describes one piece of data with a name and data type

Each row is a set data that must adhere to the structure of the columns

A database may contain many tables

Movies Table

movie_id	title	year
101	The Wizard of Oz	1939
102	Citizen Kane	1941
103	The Third Man	1949
104	All About Eve	1950

Genres Table

genre_id	name
101	Drama
102	Family
103	Mystery
104	Adventure

Movies-Genres Table

movie_id	genre_id
101	102
101	104
102	101
102	103

Keys

A *primary key* is a unique identifier for each of a table

Every table must have a primary key

Movies Table

Primary Key

movie_id	title	year
101	The Wizard of Oz	1939
102	Citizen Kane	1941
103	The Third Man	1949
104	All About Eve	1950

Movies Table

movie_id	title	year
101	The Wizard of Oz	1939
102	Citizen Kane	1941
103	The Third Man	1949
104	All About Eve	1950

A *primary key* is typically created as one column in table and uses a value that guaranteed to be unique and unrelated to other values in the row

A *foreign key* is a columns that will store the values of primary keys of a different table

Primary Keys

Movies Table

movie_id	title	year
101	The Wizard of Oz	1939
102	Citizen Kane	1941
103	The Third Man	1949
104	All About Eve	1950

Foreign Keys

Movies-Genres Table

movie_id	genre_id
101	102
101	104
102	101
102	103

The primary and foreign keys are used to define relationship between tables

Relationships

In RDBMS, *relationships* between tables is formally described

A *relationship* is described using primary and foreign keys

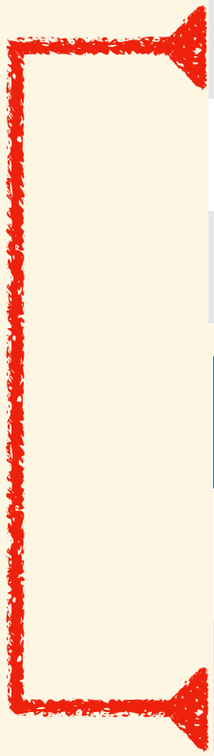
A *relationship* can be describe in one of three different types

Relationship Types

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

Many to Many Relationship

movie_id	title	year
101	The Wizard of Oz	1939
102	Citizen Kane	1941
103	The Third Man	1949
104	All About Eve	1950



genre_id	name
101	Drama
102	Family
103	Mystery
104	Adventure

One to Many Relationship

movie_id	title	year
101	The Wizard of Oz	1939
102	Citizen Kane	1941
103	The Third Man	1949
104	All About Eve	1950

movie_id	genre_id
101	102
101	104
102	101
102	103

One to One Relationship

movie_id	title	year
101	The Wizard of Oz	1939
102	Citizen Kane	1941
103	The Third Man	1949
104	All About Eve	1950

plot
Dorothy Gale is swept away from a farm in Kansas to a magical land of Oz in a tornado and embarks on a quest
Following the death of a publishing tycoon, news reporters scramble to discover the meaning of his final utterance.
Pulp novelist Holly Martins travels to shadowy, postwar Vienna, only to find himself investigating the mysterious
An ingenue insinuates herself into the company of an established but aging stage actress and her circle of

Database Design

Database Design **is the process of determining what tables a database must have and relationship between them**

Database Design **is a crucial step of creating a database**

The process can be done using a modelling software, a drawing app, or pen and paper

https://www.draw.io/