Database

Data هي أي حاجة بتتخزن أو أي حاجة ليها قيمة أو أي مجموعة من القيم ونخزن الداتا دي في الـ Database

*Databases* store data, do many operations on it and find relations between them

الفرق بين الـ spreadsheet  والـ database هو ان في spreadsheet بنخزن الداتا بشكل منفصل في اعمدة وصفوف بس للأسف لما نيجي ندور على حاجة معينة الموضوع بيكون صعب وبيكون شبه مستحيل لما الداتا تكون كبيرة جدا فبالتالي مش بنقدر نتعامل معاه بشكل كويس

أما DB بتسهل علينا اننا نوصل لجزء معين وكمان بتخزن عدد مرات الدخول وفيه خاصية إمكانية الوصول لو فيه بيانات معينة مينفعش تكون public وكمان لو فيه بيانات متكررة او لو فيه بيانات مرتبطة ببعض

**Relational database**

عبارة عن combining attributes of real word

**Entity**: is anything we store data about

**Attribute:** is things we store about this entity

يعني لو بنخزن بيانات عن شخص ف الشخص دا entity واسمه وعمره مثلا دي attributes

وبنخزن البيانات دي في جدول يتكون من صفوف وأعمدة

كل صف **row عبارة** عن all attribute values for specific entity

وكل عمود **column** عبارة عن all values for specific attribute type

Database management system DBMS

* used to store, retrieve, and run queries on data.
* Change the way of presented data. (View mechanism)

 there are three schemas:

1. conceptual schema: identify the highest-level relationships between the different entities
2. Logical schema: describes the data as much detail as possible
3. Physical schema: describe how data is to be represented and stored

SQL programming language used to communicate to database

Used to

* Define the database structure 🡪DDL
* manipulate the data within🡪 DML

**Database Design**

Used to separate info over multiple tables rather than having one huge table.

**Data integrity**

the overall accuracy, completeness, and consistency of data .

يعني بنتأكد من البيانات وصحتها وعدم تكرارها وال relationships بينها

* entity integrity “unique entity”

عشان نتأكد من صحة بيانات الـ entity وعدم تكرارها بنخلي فيه حاجة unique  زي ال primary key

* referential integrity

لو فيه relation بين جدولين مثلا فلازم يكون فيه حاجة بت reference على الجدول التاني وبنستخدم الـ foreign key

* domain integrity “the type and the range of what be stored”

يعني مثلا لو فيه attribute اسمه phone number فاكيد لازم يكون أرقام مينفعش نكتب char مثلا ولو انا محدد انه لازم يكونوا عدد معين من الأرقام مينفعش اكتب اكتر من كدا

**atomic value**

لما بنخزن حاجة ف ال database بن حزنهم على هيئة atomic value زي مثلا لو عندنا attributeاسمه address ف ونقسمه لـ city, street and area code

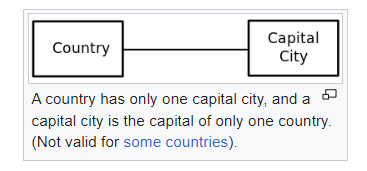
**Entity Relationship Modeling**

بستخدمه عشان اقدر احول الداتا design وشكل مفهوم اقدر اطلع منه relationships مع بعض

**Relationship**

it is an association between tables

* **one to one**

one entity has a connection with one other entity ex. each country has one capital city

* **one to many**

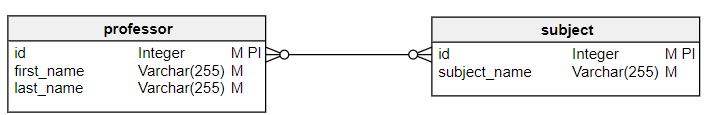
one entity can have a relationship with multiple other entities

ex.one post has many comments , one person can make many comments

* **many to many**

more than one entity have a relationship with more than one other

ex. one or more prof teach many subjects and vice versa



**parent table and child table**

***parent table*** has a primary key and does not inherit anything from the child table

***child table*** has a foreign key and inherit from the parent table.

They’re linked in a way that's described by a *parent–child relationship*. It’s usually used to specify where one table’s value refers to the value in another table (usually a primary key of another table)

**introduction of keys**

keys are the way to identify each record separately and uniquely, i.e. no duplicates.

A key in DBMS is an attribute or a set of attributes that help to uniquely identify a tuple (or row) in a relation (or table). keys should not change and never be empty and must be unique . Keys are also used to establish relationships between the different tables and columns of a relational database. Individual values in a key are called key values.

**lookup table**

A lookup table or LUT maps keys to values because keys are unique and no value appears more than once

it’s known as foreign key constraints

its benefits:

* integrity
* uniqueness
* less work for updating data
* improve functionality
* allows for added complexity

**Super key**

Any numbers of columns that force every row to be unique

**Candidate key**

is at least number of columns needed to force every row to be unique

**Primary key**: uniquely identify the specific row and must contain UNIQUE values {num, string ,any type}, and cannot contain NULL values. And never change

فيه نوعين من الـ primary key

* *Surrogate key* also called a synthetic primary key, is generated  when a new record is inserted into a table automatically by a database والنوع دا ملوش وجود في العالم الحقيقي وملوش دلالة على عكس النوع الثاني زي مثلا ترتيب وترقيم
* *Natural key* is a type of unique key in a database formed of attributes that exist and are used in the external world outside the database. ex. SSN ,ID

**Alternate key**

We didn't choose it but it may be selected as a primary key

**Foreign key**: an attribute that links another database table and refers to the primary key of another table .

دا بيعرفنا ايه الـ relationships اللي بين الجداول

**Composite key**:is a combination of two or more columns in a table that can be used to uniquely identify each row in the table.

 زي first\_name and last\_name واستخدام تاني لما نضيف اتنين foreign keys مع بعض في جدول معين بيكونوا primary key للجدول دا