**Database:**

**SQL lite is database management used for storing data and used in Skype behind the scene , application anywhere where you need to store data there’s probably a database management system running in the background for handling things for you**

**A database is essentially an organized collection of interrelated data where you trying to model or capture some aspect of the real world**

**Flat files** : **store our DB as csv files that we manage ourselves in our application code**

**Flat file problems** :

* **Data integrity**
* **Implementation**
* **Durability**
* **Redundancy**

***That’s way we need to build database management system so we don’t have to handle all of this complexity or all of these different types of problems***

**Database management system :**

**Is a software that allows applications to store , retrieve and analyze information that is stores in database**

**Relational model:**

**Database abstraction to avoid this maintenance :**

**-store data in simple data structure**

**-Access data through high level language , DBMS figure out best strategy**

**-physical storage left up to the DBMS implementation**

**Relational model is a type of data model**

**Data model:**

**A data model is a collection of concepts for description the data in database .**

**- A schema is a description of a particular collection of data using a given data model .**

**- Schema defines exactly what where going to store in the database**

**\*You can represent the other data model using the relational model\***

**\*No SQL data model it covers kind of this key value , stores Graph database management systems , document databases and kind of a broader column family databases \***

***RELATIONAL MODEL:***

**Structure: The definition of the database's relations and their contents.**

**Integrity: Ensure the database's contents satisfy constraints.**

**Manipulation: Programming interface for accessing and modifying a database's contents**

**Table = relation**

**Tuples = records = rows**

**\*Tuples and records represent individual data entry in a table\***

**A tuple is a set of attribute values in the relation.**

**-Values are atomic/scalar.**

**-The special value NULL is a member of every domain ( it used to signify that we don’t know what a particular value is ).**

**\*n-ary Relation=Table with n columns\***

**Every relation should have ‎Primary Key that uniquely identifies a single tuple**

**A foreign key specifies that an attribute from one relation has to map to a tuple in another relation.**

**RELATIONAL ALGEBRA: SELECT**

**Choose a subset of the tuples from a relation that satisfies a selection predicate.**

**- Predicate acts as a filter to retain only tuples that fulfill its qualifying requirement.**

**-Can combine multiple predicates using conjunctions/disjunction.**

**RELATIONAL ALGEBRA: PROJECTION**

**Generate a relation with tuples that contains only the specified attributes.**

**-Can rearrange attributes' ordering.**

**-Can manipulate the values.**

**RELATIONAL ALGEBRA: UNION**

**Generate a relation that contains all tuples that appear in either only one or both input relations.**

**RELATIONAL ALGEBRA: INTERSECTION**

**Generate a relation that contains only the tuples that appear in both of the input relations.**

**RELATIONAL ALGEBRA: DIFFERENCE**

**Generate a relation that contains only the tuples that appear in the first and not the second of the input relations.**

**RELATIONAL ALGEBRA: PRODUCT**

**Generate a relation that contains all possible combinations of tuples from the input relations.**

**RELATIONAL ALGEBRA: JOIN**

**Generate a relation that contains all tuples that are a combination of two tuples (one from each input relation) with a common value(s) for one or more attributes.**

**RELATIONAL MODEL: QUERIES**

**The relational model is independent of any query language implementation.**

**SQL is the de facto standard**