week2

- **CMU Lecture 2**
- **Database Design (2h → 4h)**
- **SQL - Full Course for Beginners (1h → 2h)**

[1] Intro to Database Systems

- Data Manipulation Language (DML) is a type of SQL (Structured Query Language) used to manage and manipulate data stored in a database. It includes commands such as SELECT, INSERT, UPDATE, and DELETE, which allow you to query the database, add new data, modify existing data, and delete data, respectively.
- Data Definition Language (DDL) is another type of SQL used to define the structure of a database, including the tables, columns, and constraints. It includes commands such as CREATE, ALTER, and DROP, which allow you to create new tables, modify existing tables, and delete tables, respectively.
- Data Control Language (DCL) is used to manage access to a database, including granting and revoking permissions to users and roles. It includes commands such as GRANT and REVOKE, which allow you to grant access privileges to a user or role, and revoke access privileges, respectively.

- SQL basic syntax
  - Aggregations
    - Functions that return a single value from a bag of tuples.
  - Group BY
    - is a clause in SQL that is used in conjunction with aggregations to group the data in a table based on one or more columns. For example, you can use a Group By clause to group data by year, or by department, and then perform an aggregation on each group to calculate the total sales for each group.

[2] Database Design

- A database is a collection of organized data stored and accessed electronically.
- There are broadly seven types of keys in DBMS. All these types of keys in SQL must be implemented appropriately for the relevant database to negate redundancy. Correct identification will lead to database accuracy, improving results in a limited time. Let’s explore these DBMS keys to learn more about what are keys in SQL.

  1. Primary Key
     - A unique identifier for each record in a table. It is used to enforce the integrity of the data and prevent duplicate records. A table can only have one primary key and it cannot contain null values.
  2. Candidate Key
     - A set of one or more columns that can be used as the primary key for a table. A table can have multiple candidate keys, but only one can be selected as the primary key.
  3. Super Key
     - A super key is a set of one or more columns that can uniquely identify a record in a table. A super key may include more columns than the primary key, but it still must be unique for each record.
  4. Foreign Key
     - is a column or set of columns in a table that refers to the primary key of another table. The foreign key is used to enforce referential integrity, which means that data cannot be entered into the foreign key column if it does not match a value in the referenced primary key.
  5. Composite Key
     - A composite key is a primary key made up of two or more columns. This type of key is used when a single column is not enough to uniquely identify a record in a table.
  6. Alternate Key

- is a candidate key that is not selected as the primary key. An alternate key can still be used to enforce uniqueness in a table.

7. Unique Key
    - A unique key is a set of one or more columns that must contain unique values for each record in a table. A unique key is similar to a primary key, but a table can have multiple unique keys.