

Week 2: Monday - SQL Notes

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🕒 Created	@Jun 22, 2020 12:16 PM
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What is a database?

What is a database?

A structured set of data held in a computer, especially one that is accessible in various ways.

Its good to divide names into structures with labels. This makes it easier to process.

Terminology

- **Column** — Database tables are composed of individual columns corresponding to the attributes of the object.
- **Row** — A row consists of one set of attributes corresponding to one instance that a table describes. Also known as Records or Tuples. 
- **Table** — A table is a predefined format of rows and columns that define an entity. Also known as a File.
- **DBMS** — A DataBase Management System allows a computer to perform database functions of storing, retrieving, adding, deleting and modifying data.

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Types of Database

- **Flat-file Database**
 - Stores everything in one Table. Good for small numbers of records related to a single topic.
- **Relational Database**
 - Gives you the ability to separate masses of data into numerous tables.
 - They are linked to each other through the use of keys.
- **Big Data**
 - MongoDB, Vertica etc.
 - Used for Data Analytics and Business Intelligence
 - Digital Age and Internet of Things

Relationship Types

- **One to One**

- Each row in Table A is linked to no more than one row in Table B. This is an attribute of the relationship not the tables. A student may have one row in the Contact Info table.

- **One to Many**

- Each row in the table can be related to many rows in the relating table.
- This allows frequently used information to be saved only once in a table and referenced many times in all other tables.

- **Many to Many**

- One or more rows in a table can be related to 0,1 or many rows in another table.
- A 3rd table called a mapping or link table is required in order to implement such a relationship. For example Customers can purchase many Products.

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Primary Key Constraints

- A Primary Key must be unique
- Must always have an entry
 - cannot be blank or Null
- The value must never change
- Each table may have a maximum of one Primary Key

Foreign Key

- Natural relationships exist between tables in most database structures, foreign keys are used to create solid relationships.
- Foreign keys ensure that the row of information in Table A corresponds to the correct row of information in Table B.
- The constraint is used to prevent actions that would destroy links between tables.
- It prevents invalid data from being inserted into the foreign key column, because it has to be one of the values contained in the table it points to.
- There is no Uniqueness Constraint for Foreign Keys.
- A table can have any number of Foreign Keys.
- A row cannot be deleted from a reference table if it is in use via a foreign key.