# ***WEEK 2***

## OBJECTIVES

* Understand database terminology
* Build an SQL database
* Insert some common data types into the database
* List various data base tools
* Compare and explain the different database structures
* Explain a simple relational database structure

### What is a database?

* Structured set of data held in a computer
  + Usually made of tables with rows and columns
  + We need to structure tables to contain the right type of information so that we can query it
  + Relational Databases contain connected Data
  + The tables should be relatable!
  + What categories of data might you find in each table
* Types of Data bases
  + 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, Vertiva etc
    - Used for Data Analytics and business intelligence Digital Age of Internet Of Things

### Relational Databases

* One to One
  + Each row a in Table A is linked to 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 relationg table.
  + This allows frequently used information to be saved only once in a table and refeferneced 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 third table called mapping or link table is required in order to implement such a relationahip. For example, Customers can purchase many Products.

### Primary Key

* The primary Key uniquely identifies each record in the tables
* Most tables should have a primary key
* Ach table can have more than one column which is part of its primary Key(composite Key) e.g. Order number + order line
* It can eiterhb an attribute that is gurenteed to be unique ( such as National Insurance number) or it can be generated by the DBMS.
* The DBMS will enforce the uniqueness of the Primary Key, not allowing repeated records to exist.

### Forgien Key

* Natural Relationships exist between tables in most databases structues, forging keys are used to create solid relationships
* Forgin keys ensure that the row of information in table A coreesponds to the correct row of information in Table B
* The constraint is used to prevent actions that would destoroy links between tables.
* It prevents invalid data from being being inserted into the forgein key colomn, because ot hass sto be one of the values contained in t
* There is no uniqueness Constraint for forgien keys.
* A rw cannot be deleted form a refernce table if it is in use in a forgein key.

### Designing a Database

* Entity Relationship Diagrams

|  |
| --- |
| Publisher |
| PubID |
|  |
|  |

### Database Tools

* Access (Microsoft)
* SQL Server Editions
* PostgreSQL
* SQLite
* Redis
* MySQL
* mongoDB
* Oracle

### DML, DDL, DCL and TCL

* DML: Data Manipulation Language
  + SELECT
  + IINSERT
  + UPDATE
  + DELETE
* DDL: Data Definition Language
  + CREATE
  + ALTER
  + DROP
  + TRUNCATE
* DCL: Data Control Language
  + GRANT
  + REVOKE
* TCL: Transaction Control Language
  + COMMIT
  + ROLLBACK
  + SAVEPOINT

### Creating Your Own Database

* Right click on Databases, Select New database
* Or go to script line on Microsoft SQL and type : ‘CREATE DATABASE my\_db;’
* ALTER TABLE film\_table
  + ADD trailer\_link VARCHAR(128);

### Data Types PART(1)

* VARCHAR
  + Adapatable to deiiferent lengths of charatcerrs. Records max size
* CHARACTER or CHAR
  + Data must be of a fixed length. Fixed amount of space used.
* INT
  + Holds a whole number/interger value ( see also bignt, smallint and tinyint) positive or negative.
* DATE or TIME or DATEIME
  + Stores Date, Time or both date and time.
* DECEIMAL or NUMERIC
  + Fixed precision and scales (digits to right of decimal place) numbers
* BINARY
  + Use to store binary data such as an image or file
* FLOAT
  + Scientific use (very large number)
* BIT
  + Equivalent to binary (0,1 or NULL)