**CSIS 2300:**

**Slide 01: Getting Started**

**Why Use a Database?**

* Store data more complicated than simple lists.
* Keep track of data and relations.

**The Problem with Lists:**

* **Modification problems:** redundancy and multiple themes can create modification problems. The figure bellow illustrates a problem the operations update, delete and insert.

Diagram

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* + Updating the advisor requires the update of all advisor’s related fields.
  + Deleting a row cause a student and advisor data lost.
  + Inserting a row ay imply on incomplete data.

**Relational Database:**

* **Relational model** is a methodology used as a solution for database design.
* A **relational database** contains a collection of separate tables.
* A **table** holds data about only one *theme*.
* Each **column**,also knownas fields, in a table *stores a characteristic* common to all rows in a table.
* A **row** in a table, also known as a *record*, has data about an *occurrence*.
* The leading technique for data definition and manipulation is **Structured Query** **Languages** (SQL).
* **SQL** is an international standard for creating, processing, and querying databases and their tables. With SQL you can:
  + Reconstruct lists from their underlying tables.
  + Query for specific data conditions.
  + Perform calculations on data in tables.
  + Insert, Update, and Delete data.

**What is a Database System?**

A **Database system** has four components consisting of:

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1. Users:
   1. Employ a database application to keep track of things.
   2. Use forms to read, enter, and query data.
2. Database application.
   1. Create and process forms.
   2. Process user queries.
   3. Create and process reports.
   4. Execute application logic.
   5. Control application.
3. Database management system (DBMS).
   1. The purpose of a DBMS is to create, process, and administer databases and are licensed from a vendor. The DBMS enforce the **referential integrity constraints** (rules to ensure values of a column in one table are valid when compared to values in another table).
   2. The function of a DBMS is:
      1. Create databases.
      2. Create tables.
      3. Create supporting structures (e.g., indexes).
      4. Read database data.
      5. Modify (insert, update, or delete) database data.
      6. Maintain database structures.
      7. Enforce rules.
      8. Control concurrency.
      9. Provide security.
      10. Perform backup and recovery.
4. Database:
   1. Self-describing collection of related tables, where **self-describing** means a description of the structure of the database is contained with the database itself.
   2. **Metadata** is a data about the structure of the database.

Diagram

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**Personal Database Systems:**

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**Enterprise-Class Database Systems:**

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**Web Database Applications:**

* A **web database application** is an application with a web user interface that is dependent on a database to store the data needed by the application.
* An **Application Programming Interface** (API) is a programming language such as PHP or JavaScript to connect to a DBMS allowing the sending of SQL commands to the DBMS and then to receive them back

**Data Warehouse and Business Intelligence (BI) Systems?**

* **Transactions** are purchases bought online that are recorded in a company’s database, also referred to as an **Online Transaction Processing** (OLTP) database.
* Data analysis is done on an organization’s **Online Analytical Processing** (OLAP) database and is used for research.
* A **Business Intelligence System** consists of tools used to analyze and report on company data.