Introduction to Relational Databases

CSC 242, Web Programming

Database Overview

- A **database** is a collection of related data organized in a way that supports easily processing the data

- A Database Management System (DBMS) is software that provides the ability to create and manipulate a database

- Examples of DBMSs: MySQL, PostgreSQL, MongoDB, Microsoft SQL Server, SQLite

Relational Databases

- A relational database models data as relations

- A relation is organized as a table of columns and rows

- Each column is also called an attribute

- Each row is also called a record

- Each row includes a unique key to identify that row

Database Languages

- Data definition language: defines the data types and relationships among them

- Data manipulation language: performs operations such as inserting, updating, or deleting data.

- Query language: performs information retrieval

SQL

- The Structured Query Language (SQL) combines the roles of all database languages into a single language for relational databases

- SQL is a *declarative* programming language

- A declarative programming language describes *what* computation should be performed not *how* to compute it

Relational Database Normalization

- Normalization is a systematic approach to organizing relational database tables to eliminate data redundancy and data manipulation anomalies

- Types of anomalies:
    - Update Anomaly
    - Insertion Anomaly
    - Deletions Anomaly