

Relational Databases

CSC 342 - Web Technologies

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

Some Types of Databases

- Document
- Key-Value
- Object
- Graph
- Relational

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