University of Central Florida
CGS 2545
Database Concepts

DEPARTMENT OF ELECTRICAL ENGINEERING & COMPUTER SCIENCE
COMPUTER SCIENCE DIVISION

Relation Data Model

- Relational data model is the primary data model, which is used widely around the world for data storage and processing.
- This model is simple and it has all the properties and capabilities required to process data with storage efficiency

Relation Data Model

- Concepts
  - **Tables**
    - In relational data model, relations are saved in the format of Tables.
    - This format stores the relation among entities.
    - A table has rows and columns, where rows represents records and columns represent the attributes.
  - **Tuple**
    - A single row of a table, which contains a single record for that relation is called a tuple.

Relation Data Model

- Concepts
  - **Relation instance**
    - A finite set of tuples in the relational database system represents relation instance.
    - Relation instances do not have duplicate tuples.
  - **Relation schema**
    - A relation schema describes the relation name (table name), attributes, and their names.

Relation Data Model

- Concepts
  - **Relation key**
    - Each row has one or more attributes, known as relation key, which can identify the row in the relation (table) uniquely.
  - **Attribute domain**
    - Every attribute has some pre-defined value scope, known as attribute domain.

Relation Data Model

- Constraints
  - Every relation has some conditions that must hold for it to be a valid relation.
  - These conditions are called **Relational Integrity Constraints**.
  - There are three main integrity constraints
    - Key constraints
    - Domain constraints
    - Referential integrity constraints

Relation Data Model

- Key Constraints
  - There must be at least one minimal subset of attributes in the relation, which can identify a tuple uniquely.
  - This minimal subset of attributes is called **key** for that relation.
  - If there are more than one such minimal subsets, these are called ***candidate keys***.
  - Key constraints force that
    - in a relation with a key attribute, no two tuples can have identical values for key attributes.
    - a key attribute can not have NULL values.
  - Key constraints are also referred to as Entity Constraints.

Relation Data Model

- Domain Constraints
  - Attributes have specific values in real-world scenario.
  - For example, age can only be a positive integer.
  - The same constraints have been tried to employ on the attributes of a relation.
  - Every attribute is bound to have a specific range of values.
  - For example, age cannot be less than zero and telephone numbers cannot contain a digit outside 0-9.

Relation Data Model

- Referential integrity Constraints
  - Referential integrity constraints work on the concept of Foreign Keys.
  - A foreign key is a key attribute of a relation that can be referred in other relation.
  - Referential integrity constraint states that if a relation refers to a key attribute of a different or same relation, then that key element must exist.