

Week 3 Notes

Relational Model and SQL

Data Model

Integrated collection of concepts for - describing data - relationships on the data - constraints on the data - describing finns awesomeness

- It doesn't matter how the data is stored on the disk we always only look at tables or diagramatic representation

Levels of Abstraction

- Conceptual Model
 - ER Diagrams, UML
- Logical Layer
 - Relational data model (simple, record based)
 - Object data model
- Physical level (describes physical storage and implementation details)

Three Schema Architecture

- External or (end user view) | Different roles see different things
- Logical View (Conceptual view / conceptual schema) or community view
- Internal or physical view

Data Independence

- Logical Data Independence | Refers to the immunity of external views to changes in logical schema
- Physical Data Independence | Immunity of **conceptual schema** to changes in the physical **schema**

Relational model

- Is a logical data model
- In the relational model, data are organized into 2-dimensional tables | called relations
 - Each relation has a number of columns and rows
- A relational DB is a collection of relations
- The name of each column is called an **attribute**
- The name of each row in a table is called a **tuple**
- The set of all possible values for a column is called the **domain** for that attribute

Rules for a table

- Every table must have a unique name
- Every column within a table has a unique name

- No duplicate rows in a table
- Each data item in a cell should be an atomic value | Single value
- Each data item in a cell should not consist of multiple components

Attribute Domains

- Atomic values in each cell
- Null can be used if the value is unknown

Relation Schema vs Instance

- Relation Schema | Structure of a table
- Relation Instance | data in the table at any point in time
- Relational DB Scheme | The collection of relational schemas
- Relational DB Instance | The collection of relation instances

Keys in Relations

Superkey

A set of attributes whose values can uniquely identify a row

- A set of attributes in a relation is a superkey iff no two tuples can agree in value on them

Candidate Key (CK):

Is a **minimal superkey** (if you remove any attribute from it it will no longer be a super key)

Primary Key

A selected candidate key

Foreign Key

An attribute or set of attributes within one relation that matches the candidate key of some relation

Integrity Constraints

Entity Integrity

- No **primary key** can be null

Referential Integrity

- FK values must either be NULL or appear in the referenced relation

Domain Constraints

- Specify the possible values an attribute can be

Null-value constraints

- Specify whether Null value is allowed in a certain attribute

General Constraints

- Additional rules specified by the users or DB admins that define or constrain some aspect of the enterprise.

Database Languages and SQL

Database languages

Data Definition Language (DDL)

- Allows the DBA or user to describe the structure and constraints (define the data schema)

Data Manipulation Language (DML)

- Basic data manipulation on data in the database

Data Control Language (DCL)

- Access control

Query Languages

Is used to retrieve data from DB

- Procedural query language
 - Tells the system **what** data is needed and **how** to get it
- Non-procedural (declarative) language
 - Only tells the system **what data** is needed and not how to get it

SQL

SQL can be used as all three types of database languages ^^