



Study Summary for Midterm (Not guaranteed to be all-inclusive)

What is a database? (Ch.1)

Definition of database: collection of data stored in a standardized format designed to be shared by multiple users.

DBMS: Software package that facilitates the creation, organization, and management of databases. Often includes tools for querying, security, handling multiple users. Oracle used in this course.

Database Life Cycle: Understand its importance. Creating a database goes through various phases:

- Requirements Collection & Analysis [E.g., highline University, text]
- Conceptual Modeling [Chen's notation, Crow's feet]
- Logical Modeling [Relational data model]
- Physical Modeling [After midterm]
- Application Design [After midterm]

Introduction to Conceptual Modeling

Role of modeling in the database design process.

Describe the main objectives of data modeling.

Understand how to read and interpret a conceptual model using the Entity-Relationship's Chen and Crow's Feet notations. See examples in lecture notes.

Rules for creating a conceptual model.

Database Concepts

Database design -- how the database structure will be used to store and manage end-user data

Database modeling -- general process of creating a specific data model

Problem domain -- clearly defined area within the real-world environment, with well-defined scope and boundaries, for which one wants to create a database

- Data is an important asset in any organization. Data is often considered a defensible source of competitive advantage; however, advantages based on capabilities and data that others can acquire will be short-lived.
 - Why is this so? Competitors can copy what your company is doing with its data management and use.
- Why must you ensure data consistency? Data integrity? Data updates?
 - Data supports decision making; must be correct.

See Chapter#1 for some basic introduction to data management.

Conceptual Modeling

Conceptual modeling -- process to extract abstract concepts from the real world so we can figure out what data to store in a database. The conceptual model is a representation used of the real world application.

Modeling concepts:

- Key, primary, candidate, surrogate, component
- Attributes
- Unary, binary, ternary and n-ary relationships
- Relationship attributes
- Mapping ratios
 - One to one 1:1
 - One to many 1:N
 - Many to many N:M
- Mix/max cardinalities – finer detail than mapping ratios.
 - Know how they appear in both the Crow's feet notation and the Chen notation.
 - Understand the difference and significance of optional versus mandatory participation in relationships.

Conceptual Model

- Entities: represent concepts in the real world.
- Attributes: characteristics/properties of an entity.
- Relationships: associations between entity types.
- Entity-relationship diagram (know how to draw using correct, consistent notation)
- Crown's feet diagram (know how to draw using correct notation)
- Finer detail in min/max cardinalities (make sure you know how to place them correctly for both Chen and Crow's Feet notations.)
- Degree of a relationship is the number of entities in the relationship.
- Many-to-many relationships can have relationship attributes. Understand the difference in representation for Chen's notation versus Crow's Feet.
- See in-class examples (both notations).

Terminology and concepts

Entity, relationship, attribute, abstraction, instance, instantiation, occurrence, association, mapping ratios, identifiers, key (primary, composite, candidate), min/max cardinalities, optional participation, mandatory participation and others.

Role of business rules

Help standardize company's view of data
 Communication between users and designers
 Allows designer to understand the nature, role, and scope of the data
 Allows designer to understand business processes
 Allows designer to capture appropriate relationships in design.

Database Use

Know progression from data to wisdom and the implications for designing information systems, in general, and databases, specifically.

Understand the role of data in decision making. Why is it important? Why do we still require human judgment? What, specially, does it mean for managers?

Relational model

- Understand basic relational terminology
 - Figure 3-3 from text.
 - You do not need to understand concepts related to normalization
 - Understand that we are moving from a conceptual model (entity relationship model represented by either the Chen notation or Crow's Feet notation) to a logical model (relational model).
 - There are specific rules for translating a conceptual model into a relational model. They are used to create a relational model that is "good."
- Understand characteristics of relations
 - Figure 3-4 in text.
- Domain integrity constraint

Data Warehouses and Data Mining

- Know the difference between query processing, OLTP and OLAP

- Understand how / why data represented or considered as an OLAP cube to handle the multi-dimensional aspects of it. Think of each piece of data as represented as one piece of a (multi-valued) cube.
- Appreciate that data is input from multiple sources into a data warehouse.
- Data mining applications in: customer segmentation, marketing and promotion targeting, market basket analysis, collaborative filtering, customer churn, fraud detection, financial modeling, and hiring and promotion.
- Separate example (may be after midterm) on market segmentation. This is the matrix of customers, which are categorized based on their status as customers. The managerial implications are that this helps you know whether you should put resources into trying to retain a certain type of customer.

Looking towards progressing the course.

Finish designing, implementing, and using a database as well as contemporary issues from the brief presentations.