

**Study Summary for Midterm**

**(Not guaranteed to be all-inclusive)**

General comments

Please use the terminology and syntax from class. Many of the lecture notes taken directly from the text, especially on the crow’s feet notation and some of the examples.

For written questions, please be sure to relate your answer to the course material.

The midterm will have a question for which you are required to draw a conceptual model for a database application and answer some additional questions about it. Note that the conceptual model will be included as part of the exam time so please remain aware of the time.

Bring your laptop and pen and paper.

What is a database? (Ch.1)

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

A purpose of a database is to support a decision maker. Other uses include the need to report data on a company’s operation for legal purposes. Data can be used for descriptive reporting and for predictive (trend) analysis. This will be revisited later in the course.

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. Oracle has long been recognized for relational database management.

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

* Requirements Collection & Analysis [E.g., highline University, text]
  + Requirements collection can be difficult because it might be hard for a user to articulate what data they need to be able to obtain from a database to support their decision making.
  + Highline example included examining reports that were being used within the organization which would provide hints on what to include in a database.
* Conceptual Modeling [Chen’s notation, Crow’s feet]
* Logical Modeling [Relational data model]
* Physical Modeling
* Application Design

Conceptual Modeling

* Role of modeling in the database design process.
* Describe the main objectives of data modeling. Abstract from the real world, capture what data is needed in a database.
* Understand that databases can (and should) be used by multiple users? Why? To avoid duplicate efforts, redundancy in data collection, and protection of the raw data.
* 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#1of the text for a basic introduction to data management.

Conceptual Modeling Concepts

* 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 (exist but we did not go over in class so will not be on exam), binary, ternary and n-ary relationships. Focus on class has been binary.
  + 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. It can be a little confusing so study the examples carefully.)
* 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).
* Know how to draw a conceptual model for a given description of an application. Be prepared to answer a question about the model you create.

Terminology and concepts

* Entity, relationship, attribute, abstraction, instance, instantiation, occurrence, association, mapping ratios, identifiers, key (primary, composite, candidate, surrogate), 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?

Understand what queries are.

Relational model

* Understand basic relational terminology
  + 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. The application of the rules depends on the min/max cardinalities of the relationships. The rules are used to create a relational model that is “good.”
* Understand characteristics of relations
* Database integrity: Domain constraint, entity constraint, data constraints

ER-Relational Model

* Translation (transformation) of ER to Relational Model
  + Every entity becomes a separate relation
  + For relationships there are two options:
    - Foreign key: for 1:N relationships
    - Separate relation: with the key of the relation the concatenation of the two keys of the corresponding entities. Relationship attributes become non-key attributes.

SQL

* Understand what a query language is
  + Why are query languages important for data management?
  + Helps us build and retrieve useful information from the database
  + SQL – Structured Query Language, nonprocedural language, tell what to retrieve, not how to do so. Used for data administration, data manipulation and to query a database
* SQL – DDL (data definition language) and DML (data manipulation language)
  + Understand the Create Statement and its usefulness (create the tables)
  + Appreciate how to populate a database. Ensure referential integrity in the data.
* SQL – DML for SQL queries (single table and multiple table)

Progressing the course.

Finish designing, implementing, and using a database. Consider contemporary issues as related to big data, innovation, etc.

Thanks and good luck.