

**CS-317 Data Management and Information Processing  
Spring 2003**

**Midterm Preparation Material**

**Note: I have put up these solutions because a few students had sent me mail that they wanted answers to some of the questions at the back of the book to cross check their own solutions. I hope this will help you all in your preparation. I am (at this point) not aware of the questions on the midterm. So do NOT use this as a template for the midterm. This is just to help you understand the material better.**

**Exercise 2.4**

*What is meant by discovery in data modeling? What resources are available to developers in discovering information requirements?*

Discovery of application requirements usually involves interviews with members of the organization and the collection and analysis of current documents and computer systems. From this information, developers will describe the objects and operations that must be included in the system. An important part of discovery is determining the vocabulary that is used to describe the objects and operations. This terminology must be incorporated into the design by the developers. Adopting the user's vocabulary shows a respect for the enterprise that often makes it much easier for users to adopt the final system. In addition, it facilitates the communication between users and developers—a crucial factor in the system's ultimate success

**Exercise 2.5**

*Define the terms conceptual model, logical model, physical model, and external model*

*Conceptual model:* A precise definition of the data requirements of a system that is understandable to both users and developers of a database. This model includes detailed descriptions of data types, relationships, and constraints and is often represented as an ER model, ER diagram, or object-oriented model.

*Logical model:* The definition of the information content of a system in a manner that can be used to create a database.

*Physical model:* The definition of the information content of a system in physical terms.

*External model:* A definition of a user's or application's view of the information content of a system.

**Exercise 4.1**

*Describe the difference between a conceptual model and a logical model.*

*Purpose:* a conceptual model is intended to accurately represent the information requirements of a system in a way that is understandable to both users and developers. A logical model is a developer's tool that can be used to create a database.

*Contents and representation:* A conceptual model is typically represented with an ER diagram. A logical model is typically represented by a relational schema. The relational schema can be used to create a database.

#### **Exercise 4.5**

*Why is there no such thing as a weak relation schema?*

By definition, a relation schema has a key and a weak entity class has no key.

#### **Exercise 5.4**

*What does it mean to violate a constraint on the contents of a database?*

A constraint is violated if there are one or more entities whose attribute values do not satisfy the constraint.

#### **Exercise 5.15**

*Suppose  $A \rightarrow \{B, C, D\}$ ,  $\{A, E\} \rightarrow \{G, H\}$ ,  $E \rightarrow F$ , and  $F \rightarrow E$ .*

*a. Which sets of attributes are the keys of R?*

$\{A, E\}$ ,  $\{A, F\}$

*b. Identify and eliminate any 2NF violations.*

$A \rightarrow \{B, C, D\}$  is a 2NF violation

The revised schema is

R12:  $(A, E, F, G, H)$ ,  $\{A, F\}$  is also a key

R13:  $(A, B, C, D)$

*c. Identify and eliminate any 3NF violations.*

No 3NF violations