Quiz 1 for CSC 432: Database Management

Spring 1998

June 20, 2000

Instructions

If you finish early, please try to remain seated or move out discreetly so as not to disturb others.

This quiz is closed-book. However, a one-page crib sheet may be used. Crib sheets may not be shared. Collusion or cheating of any form is forbidden. You can be asked to explain your solutions verbally.

There are no trick questions in this quiz. If you think there is some ambiguity, please make and state additional assumptions, but be prepared to justify why those assumptions were necessary. If you are unable to produce a formal answer, give an English description for partial credit.

1 Architecture

1. (16 points) List 2 disadvantages of database systems (other than "higher impact of failure"). Explain why database systems cause these. List 2 corresponding advantages (other than "sharing data"). Argue why these result from using database systems. (Number of words expected: 100–200.)

2. (14 points) Describe the 3-schema architecture in the context of a hospital database. Include 2 views of your choice. (Number of words expected: 150–300.)

2 ER Modeling

Consider the following situation. The entities are Buyer, Property, and Realtor, and the relationships are [Buyer Views Property], [Realtor Shows Property], [Realtor Sells Property], [Realtor Assists Buyer]. The following knowledge is given:

- Each Realtor can assist several Buyers.
- Each Buyer is assisted by one Realtor.

- Each Buyer can view several Properties, all shown by the Realtor who assists them.
- Each Realtor can show several Properties to Buyers they assist.
- Each Realtor shows all and only the properties they sell.
- Each Property is sold by exactly one Realtor.

See the pictures projected on the screen.

1. (15 points) Describe and remove a fan trap from the model [Buyer Views Property]: 1-M; [Realtor Shows Property]: 1-M.
2. (15 points) Describe and remove a chasm trap from the model [Realtor Assists Buyer]: 1-M; [Buyer Views Property]: 1-M.

3 Relational Calculus

Consider the following query on the *Dream Home* database.

> *Given a staff member,* **Sname***, list the names of the owners all of whose properties are managed by* **Sname**.

Assume last names are unique. The input and output for this query are

- *input:* staff member's last name, **Sname**
- *output:* a relation **res(O_LName)**

For example, the query for **Sname** = 'Beech' yields an empty relation, because owners whose properties she manages also deal with other staff.

However, the query for **Sname** = 'Howe' yields

res

O_LName
Keogh

- (40 points) Give a relational calculus expression for the above query.