

TAKEHOME EXAM 1 (CS 6400, Fall 2008)
(Bring to class hardcopy on Sept 18, 2008)

NOTES:

- (1) On the top right corner, write the **last 4 digits of your student ID number, (NO NAMES PLEASE)**
- (2) Treat this as an exam. No collaboration will be acceptable.
- (3) Questions on exam will NOT be entertained by the TAs or the instructor. Please explain any special arguments you have in either question if you need to.

Q1. Conceptual Modeling in EER

A. Draw an enhanced ER (EER) schema diagram that accurately represents the requirements of the following application. Show min-max cardinality constraints (using the notation with double lines for mandatory participation to show min constraint), keys, and generalization/specialization with appropriate constraints.

Neat diagrams drawn manually are acceptable.

You are free to make any reasonable assumptions; they will be judged on the basis of common sense and reasonableness. State them in clear terms separately. make sure every entity type has an identifier attribute.

Notes:

- (i) Only a few representative attributes are mentioned below. If you wish to show additional attributes that are needed, feel free to do so.
- (ii) Use of appropriate constructs like weak entity types and generalization hierarchies is important.
- (iii) You will be judged by accurate representations of requirements using the EER constructs within the limits of all possible notational features.

REQUIREMENTS:

Macy's department stores wishes to create a database to handle its delivery trucks and shipping operations. Typically an order contains multiple items, but the items are picked from a single warehouse. Macy's owns 150 warehouses around the country with a typical warehouse containing around 3000 different items. Warehouses are divided into furniture warehouses, those for garments/clothing, those for household goods, and other warehouses which include all remaining items. It is made sure that an order containing a customer name, customer_address, phone number and shipping address (placed on a specific order-date) would belong to only one type of warehouse by restricting the items that can be included in an order. An order also has a mode of payment recorded in this database but financial details of order transaction are elsewhere. An order could contain any number of items – for each item, the item#s and description is kept on the shipping manifest (a record of each shipment that the truck driver carries). Macy's owns about 2000 trucks and employs 3000 truck-drivers. Trucks have a truck#, capacity, year, last date of maintenance in this database. Other information about trucks and their

maintenance is kept in another database. A truck makes several trips in a month where it would pick a number of orders (shipments) from a single warehouse and deliver them to the respective customers. Upon delivery, the date and time of delivery is recorded and entered in this database. The entire day of deliveries is regarded as one delivery trip. For each delivery trip, the start time and end time as well as the assigned driver is recorded. If the trip meets with any problems such as an accident, or reassignment of original driver, or malfunction of truck etc., this information is also kept and sent to the appropriate shipping supervisor daily. A supervisor typically has responsibility for a number of warehouses in a geographic region.

It is intended to keep the data about all pertinent information mentioned above in a database so that appropriate reports for the truck drivers and supervisors can be created. Also management would eventually track shipment statistics coming out of this database.

NOTES:

- 1) Treat an order as being synonymous with a shipment.
- 2) Add any attributes you need as identifiers of entity types if they are not mentioned above.
- 3) Hint: Regard the delivery-trip as an entity type.

B. Give an example of two semantic integrity constraints . State each constraint in English and explain why it is beyond the notation of the EER modeling.

Q2.

The given EER schema refers to a database maintained about students, faculty and students clubs at Georgia Tech. The mini-world considered here consists of student's relationships with faculty , their involvement in student clubs, the use of buildings on campus as offices, labs and meeting places etc. No other information is included in this database.

Map the given schema into a set of relations using the procedure in the text (Ch.7). Regarding the generalization hierarchy of entity type Student: Please create only one STUDENT relation (Note: this must be strictly observed in your design. Failing to do so will be taken as a mistake).

Using the above information, map the given EER diagram into a set of relations. Make sure that all information is represented correctly and null values are used at a minimum. Use extra attributes only when needed.

If you choose any specific options in mapping that need explanation, please provide such explanation.

DIAGRAM BELOW



