Kafrelsheikh University

Faculty of Computers and Information

Department of Information systems

Final Exam of
Advanced Database (IS411)
2020/2019 (First Term)
Date: 29/ 12 / 2019 – Time:3 hrs

Q1) Define the following terms: *superclass of a subclass, superclass/subclass relationship, specialization, generalization, data warehouse, Temporal databases, spatial database and category.* (8 point)

Q2) Draw an EER schema diagram for this art museum. Assume that the following requirements were collected: (12 points)

- The museum has a collection of ART_OBJECTS. Each ART_OBJECT has a unique Id_no, an Artist (if known), a Year (when it was created, if known), a Title, and a Description. The art objects are categorized in several ways, as discussed below.
- ART_OBJECTS are categorized based on their type. There are three main types—PAINTING, SCULPTURE, and STATUE—plus another type called OTHER to accommodate objects that do not fall into one of the three main types.
- A PAINTING has a Paint_type (oil, watercolor, etc.), material on which it is Drawn_on (paper, canvas, wood, etc.), and Style (modern, abstract, etc.).
- A SCULPTURE or A STATUE has a Material from which it was created (wood, stone, etc.), Height, Weight, and Style.
- An art object in the OTHER category has a Type (print, photo, etc.) and Style.
- ART_OBJECTs are categorized as either PERMANENT_COLLECTION (objects that are owned by the museum) and BORROWED. Information captured about objects in the PERMANENT_COLLECTION includes Date_acquired, Status (on display, on loan, or stored), and Cost. Informationcaptured about BORROWED objects includes the Collection from which it was borrowed, Date_borrowed, and Date_returned.
- Information describing the country or culture of Origin (Italian, Egyptian, American, Indian, and so forth) and Epoch (Renaissance, Modern, Ancient, and so forth) is captured for each ART_OBJECT.
- The museum keeps track of ARTIST information, if known: Name, DateBorn (if known), Date_died (if not living), Country_of_origin, Epoch, Main_style, and Description. The Name is assumed to be unique.
- Different EXHIBITIONS occur, each having a Name, Start_date, and End_date. EXHIBITIONS are related to all the art objects that were on display during the exhibition.
- Information is kept on other COLLECTIONS with which the museum interacts; this information includes Name (unique), Type (museum, personal, etc.), Description, Address, Phone, and current Contact_person.

Q3) (20 points)

A) Consider the following bank database schema:

branch (*branch name, branch city, assets*)
customer (*customer name, customer street, customer city*)
loan (*loan number, branch name, amount*)
borrower (*customer name, loan number*)
account (*account number, branch name, balance*)
depositor (*customer name, account number*)

Write an SQL trigger to carry out the following action: On delete of an account, for each owner of the account, check if the owner has any remaining accounts, and if she does not, delete her from the *depositor* relation. (5 points)

B) Consider an employee database with two relations

employee (employee name, street, city)

works (employee name, company name, salary)

where the primary keys are underlined. Write a query to find companies whose employees earn a higher salary, on average, than the average salary at "First Bank Corporation". (5 points)

C) Consider the relational schema

part(part id, name, cost)

subpart(part id, subpart id, count)

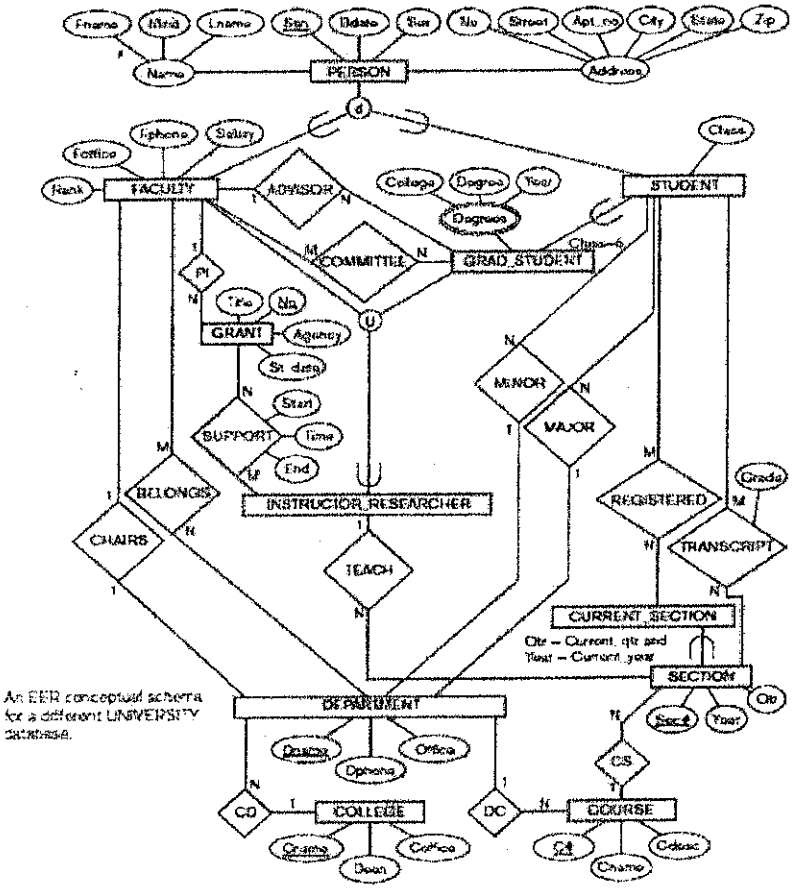
A tuple (p1, p2, 3) in the subpart relation denotes that the part with part-id p_2 is a direct subpart of the part with part-id p_1, and p_1 has 3 copies of p_2. Note that p_2 may itself have further subparts. Write a recursive SQL query that outputs the names of all subparts of the part with part-id "P-100". (5 points)

D) Consider the relational schema:

Instructor(Instructor_name, address, city, dept_name)

Create a SQL function that, given the name of a department, returns the count of the number of instructors in that department. And then use that function in a query that returns names of all departments with more than 12 instructors. (5 points)

Q5) Map the EER diagrams in the following figures into relational schemas: (20 points)



An EER conceptual schema for a different UNIVERSITY database.

With My Best wishes
Dr. Ahmed Elashry

Kafrelsheikh University
Faculty of computers and information
4th level CS & IT Exam
Date: 5 /1/2020

Subject:
Computer Vision
Time allowed: 3 hrs.

Question 1:

[1.1] What is a fundamental difference between the field of computer vision and the field of image processing?

[1.2] Draw block diagram of digital camera sensor?

[1.3] The opposite table shows the intensity distribution of a 3-bit image (L=8) of size 64 x 64 (MN =4096). Perform histogram equalization to transform it into a histogram equalized image. where r_k is the kth intensity value and n_k is the number of pixels in the image with intensity r_k

r_k	n_k
$r_0 = 0$	790
$r_1 = 1$	1023
$r_2 = 2$	850
$r_3 = 3$	656
$r_4 = 4$	329
$r_5 = 5$	245
$r_6 = 6$	122
$r_7 = 7$	81

Question 2:

[2.1] Describe how (pixel-wise) region-growing techniques might be used in a attempt to segment homogeneous objects in gray-scale or color images.

[2.2] Dilation and Erosion are two primitive operators, which may be used to define other morphological operations. Explain how Dilation and Erosion are performed?

[2.3] Let I be a 3×4 image with pixel values

$$I = \begin{bmatrix} 2 & 5 & 5 & 1 \\ 1 & 3 & 3 & 5 \\ 2 & 2 & 5 & 1 \end{bmatrix}$$

a) Find the values of $M(2,2)$ and $M(2,3)$ of the 3×4 image M obtained by median-filtering of I with a 3×3 neighborhood.

b) Use right finite differences (first derivative) to compute the magnitude G of the gradient of the image I in the previous question.

Question 3: Choose the correct answer

[3.1] Write down the steps and formulas for applying OTSU Automatic thresholding on gray scale image?

[3.2] What are the main steps of the Canny edge detector? Describe each step.

[3.3] Given the following feature vectors, with two classes:

$$\text{Class 1: } \left\{F_1 = \begin{bmatrix}5\\8\\6\end{bmatrix} F_2 = \begin{bmatrix}7\\6\\1\end{bmatrix} F_3 = \begin{bmatrix}6\\7\\2\end{bmatrix}\right\} \text{ Class 2: } \left\{F_1 = \begin{bmatrix}1\\8\\7\end{bmatrix} F_2 = \begin{bmatrix}3\\6\\8\end{bmatrix} F_3 = \begin{bmatrix}2\\7\\6\end{bmatrix}\right\}$$

Using the Nearest Neighbor classification method with K = 3, and the absolute value distance metric, classify the following unknown sample vector as Class 1 or Class 2:

$$F = \begin{bmatrix}4\\6\\9\end{bmatrix}$$

with my best wishes Dr: Reda M. Hussien