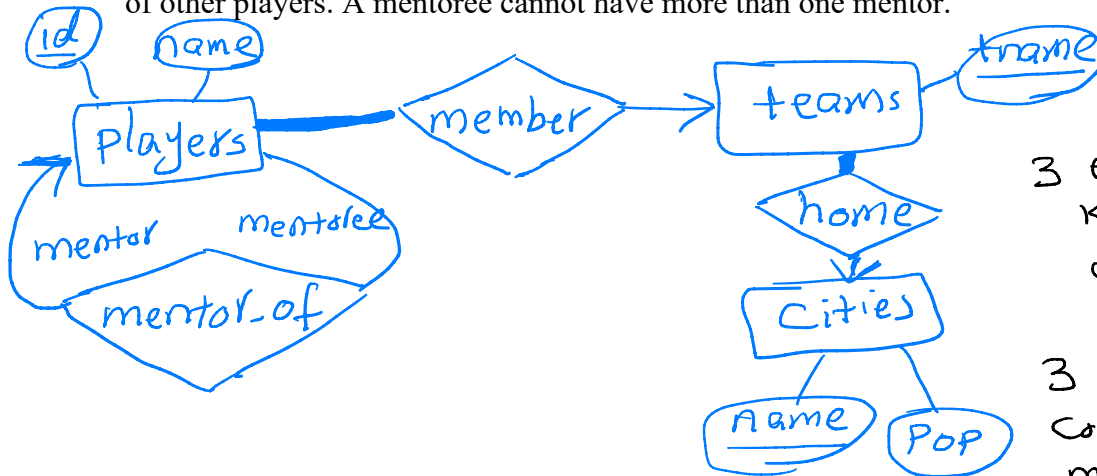


Midterm Exam - Part I (Section A2)

Q1. [9 marks] Draw an ER diagram to model the following scenario. Make sure the keys are identified and all other constraints are captured in your diagram.

Each player has a player id and a name, and each team has a name. Two players cannot have the same id and two teams cannot have the same name. Each city has a name and a population, and each team has a home city. Each player must be a member of a team. Some players are mentors of other players. A mentoree cannot have more than one mentor.



3 entities with keys marked correctly 3 marks

3 rel. with constraints marked correctly 6 marks

Q2. [6 marks] Consider the following tables (as seen in our lectures):

branch (bname, address, city, assets)
 customer(cname, street, city)
 deposit(accno, cname, bname, balance)
 loan(accno, cname, bname, amount)

a) Write a relational algebra query to find the name and the deposit balance of every customer in Edmonton.

$$\pi_{cname, balance} \left(\sigma_{city = 'Edmonton'} \left(\frac{(customer \bowtie deposit)}{1} \right) \right)$$

1 mark 1 mark 1 mark 3 marks

b) Write a relational algebra query to find cities where there is a customer but no branch.

$$\pi_{city} customer - \pi_{city} branch$$

set diff. : 1.5 mark
 rest : 1.5 mark 3 marks

Q3. [6 marks] Mark each statement or equality as either *True* or *False* (no need for an explanation). Tables branch and customer are as described in Question 2.

(a) *True* (b) *False* (c) *False*

2 marks ea

Q4. [3 marks] Consider union compatible relations R and S. Write set intersection $R \cap S$ in terms of other relational algebra operations.

$$R \cap S = R - (R - S) \quad \text{also} = S - (S - R)$$

Q5. [3 marks] Consider the branch table (as described in Question 2) with 3 branches b1, b2, and b3 and assets 8000, null and 15000 respectively. What does the following SQL query return?

select bname from branch
where assets <= 10000 or assets >= 10000;

b1

b3

b1 & b3 are returned 1.5 mark

b2 is not returned 1.5 mark

Q3.

a) $\pi_{bname} \text{ branch} \bowtie \pi_{cname} \text{ customer} =$

$\pi_{bname} \text{ branch} \times \pi_{cname} \text{ customer}$

b) Every SQL table must have a primary key.

c) In an ER diagram, a subtype can have more than one immediate supertype (described using isa between subtypes and immediate supertypes).