

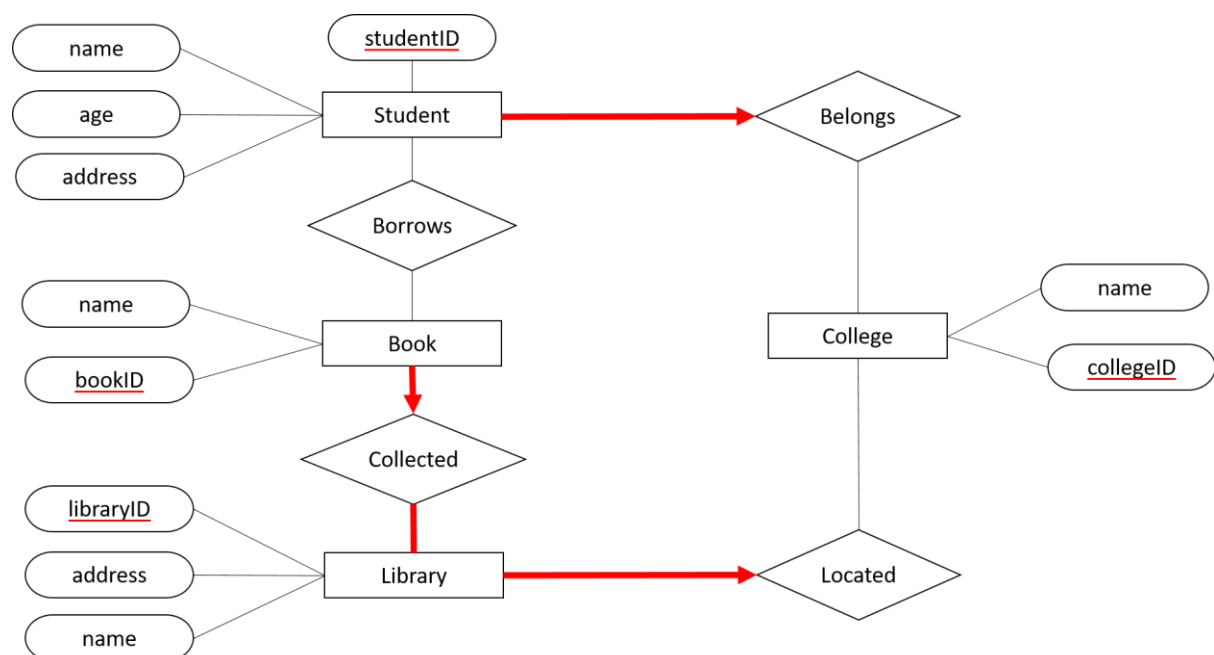
Student Name: _____

Student ID: _____

CSCI3170 Introduction to Database Systems Assignment 1(Fall 2019)

Please answer all the questions below and hand in your answer to the submission box at the 10/F of SHB **on or before 10th October 2019 4:00pm**

1. Consider the following ER-diagram and assumptions.



- Every library has a unique libraryID.
- Every student has a unique studentID.
- Every book has a unique bookID.
- Every college has a unique collegeID.
- Every student can be identified by his/her name, age and address together.
- A student is belonged to exactly one college.
- A library collects at least one book.
- A book is collected by exactly one library.
- A library is located at exactly one college.

a) (5 marks) List all the superkey(s) of "Student".

Ans:

{studentID},

{studentID, name}, {studentID, age}, {studentID, address},

{studentID, age, address}, {studentID, age, name}, {studentID, name, address},

{studentID, age, name, address},

{age, name, address},

- b) (2 marks) List all candidate key(s) of "Student".

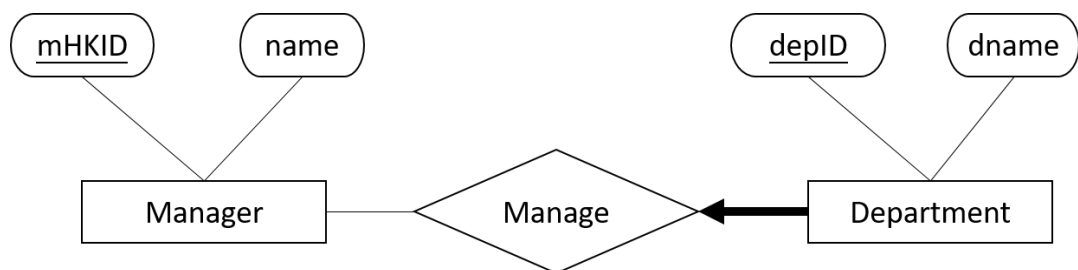
Ans:

{studentID},

{age, name, address}

- c) (9 marks) Assume that studentID is a primary key, complete the ER-diagram by adding all missing constraints (weak entity, key constraints, participation constraints and relationship constraints).

2. Consider the following ER-diagram and relational schemas.



Schema 1

Manager (mHKID, name)

Department (depID, dname)

Manage (mHKID, depID)

Schema 2

Manager (mHKID, name)

Department (depID, dname, mHKID)

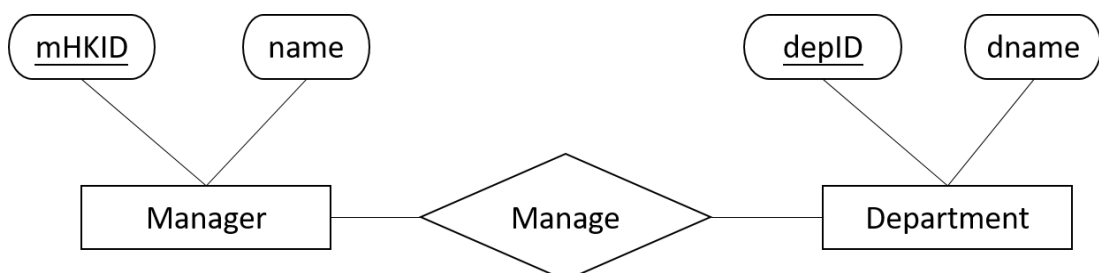
- a) (5 marks) Explain why schema 2 is more appropriate to represent the ER-diagram.

Ans:

Schema 2 can represent the total participation of "Department";

Schema 2 can represent the one-to-many relationship between "Manager" and "Department".

- b) (5 marks) Which schema is more appropriate if the ER-diagram is modified as follows?
Please explain your answer.

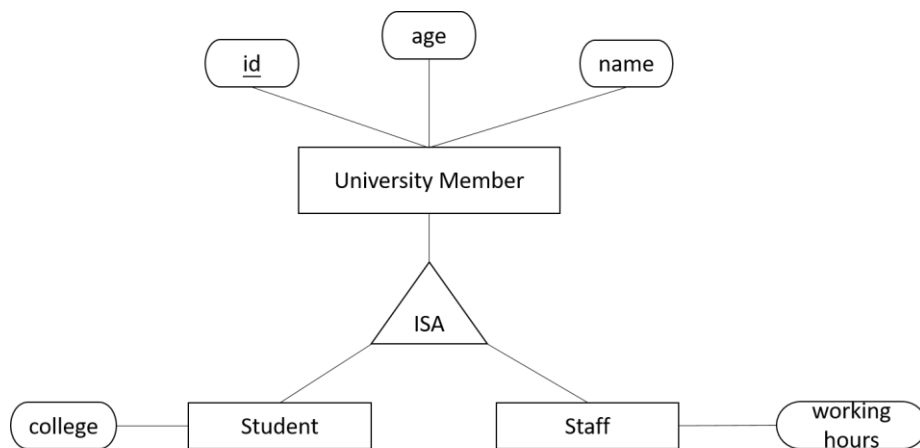


Ans:

Schema 1 is more appropriate as there is a many-to-many relationship between "Manager" and "Department". For schema 2, a Department is restricted to be managed by only one Manager, i.e. an instance of "Department" cannot participate in more than one relationship.

3. Translate the following ER-diagrams into relational schemas.

a) (6 marks) Diagram 1



Ans:

Student (id, age, name, college)

Staff (id, age, name, working hours)

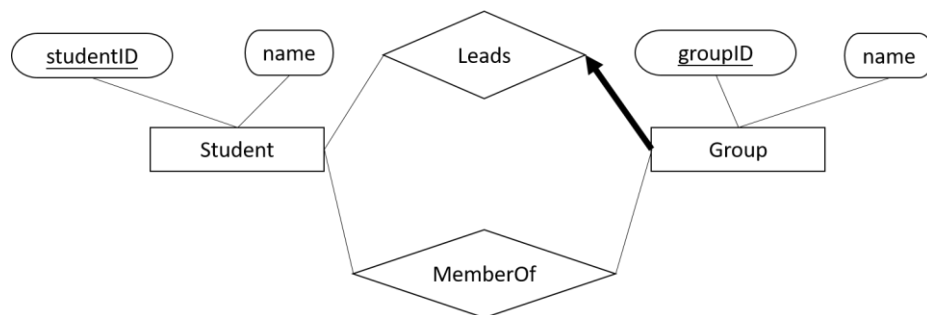
Or

University Member (id, age, name)

Student (id, college)

Staff (id, working hours)

b) (6 marks) Diagram 2



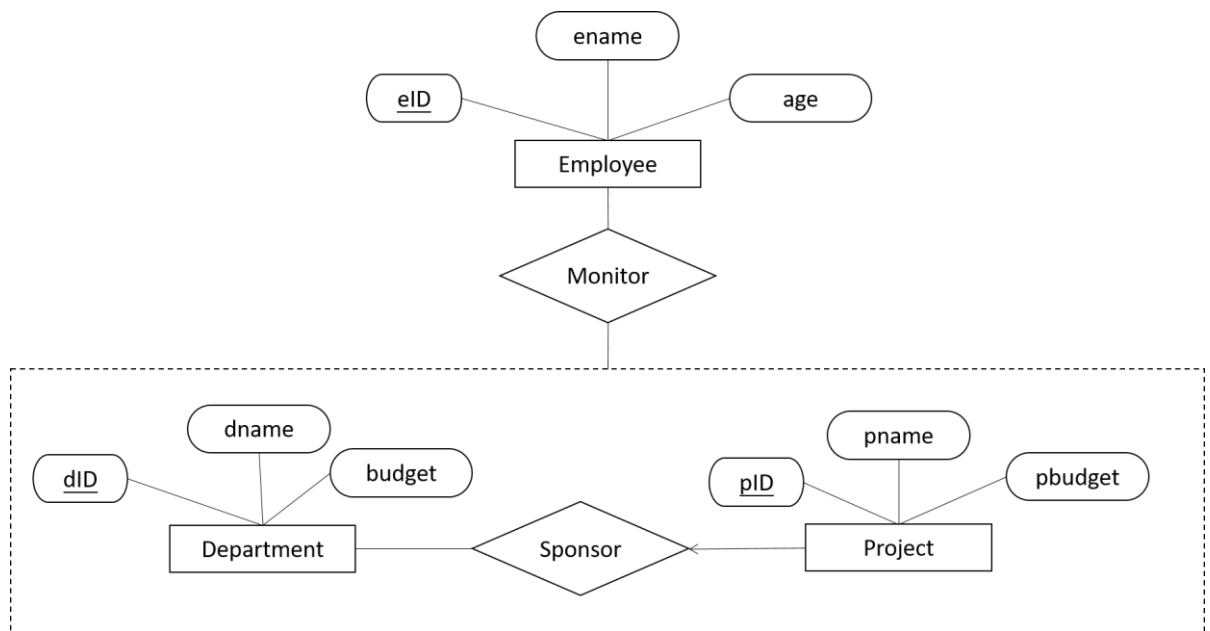
Ans:

Student (studentID, name)

Group (groupID, name, studentID)

MemberOf (groupID, studentID)

c) (8 marks) Diagram 2



Ans:

Project (pID, pname, pbudget)

Department (dID, dname, budget)

Employee (eID, ename, age)

Sponsor (pID, dID)

Monitor (eID, pID)