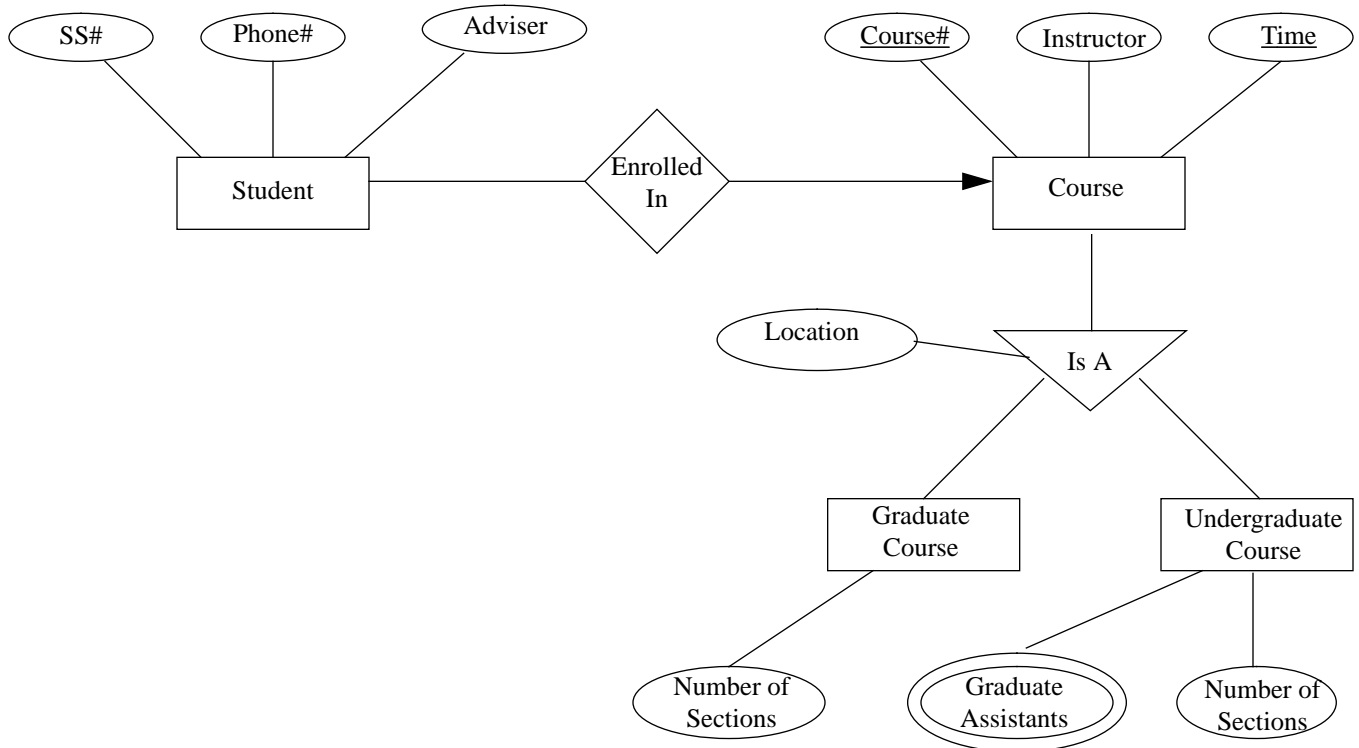


Comprehensive Exam
Databases
Spring 2001

1) (25 points) Consider the following ER diagram for representing information associated with faculty and courses at some university such as FIT. Note that the diagram contains several modeling errors.



Based on the traditional university setting, such as that at FIT, identify four errors in the above diagram. For each error be sure to provide a brief explanation.

2) (30 points) Consider the following collection of relation schemes.

employee(employee-name, street, city)
works(employee-name, company-name, salary)
company(company-name, city)
manages(employee-name, manager-name)

Give an SQL statement for each of the following.

(a) A list of manager names, and for each manager a count of the number of employees that they manage.

(b) As declared above, each employee works for exactly one company (This is indicated by the fact that *employee-name* is a candidate key for *works*). Give an SQL statement that lists all employee who do not work for First Bank Corporation.

(c) Now suppose that each employee can work for more than one company. Furthermore, suppose that in order to support this the schema for *works* is changed so that *employee-name* and *company-name* both collectively form the primary key. Does your answer to part (b) apply in this case as well (yes or no)? If not, then give an SQL query that does.

3) (30 points)

(a) Consider the following relational scheme and functional dependencies.

patient(ss#, name, address)

ss# -> name

ss# -> address

Is this relational scheme in (circle all that apply):

(a) 1NF

(c) 3NF

(b) 2NF

(d) BCNF

(b) Now consider the following relational scheme and functional dependencies.

doctor(dss#, name, office#)

dss# -> name

dss# -> office#

office# -> dss#

office# -> name

Is this relational scheme in (circle all that apply):

(a) 1NF

(c) 3NF

(b) 2NF

(d) BCNF

(c) Now consider the following relational scheme and functional dependencies.

doctor(dss#, patient-list)

dss# -> patient-list

Is this relational scheme in (circle all that apply):

(a) 1NF

(c) 3NF

(b) 2NF

(d) BCNF

(d) Now consider the following relational scheme and functional dependencies.

visitation(ss#, policy#, date-admitted, time-admitted, diagnosis)

ss#,date-admitted,time-admitted \rightarrow diagnosis

policy#,date-admitted,time-admitted \rightarrow diagnosis

ss# \rightarrow policy#

policy# \rightarrow ss#

Is this relational scheme in (circle all that apply):

(a) 1NF

(c) 3NF

(b) 2NF

(d) BCNF

4) (15 points) Let R be a relational scheme, and let F be a set of functional dependencies for R . Formally define what is meant by a *loss-less join decomposition*.