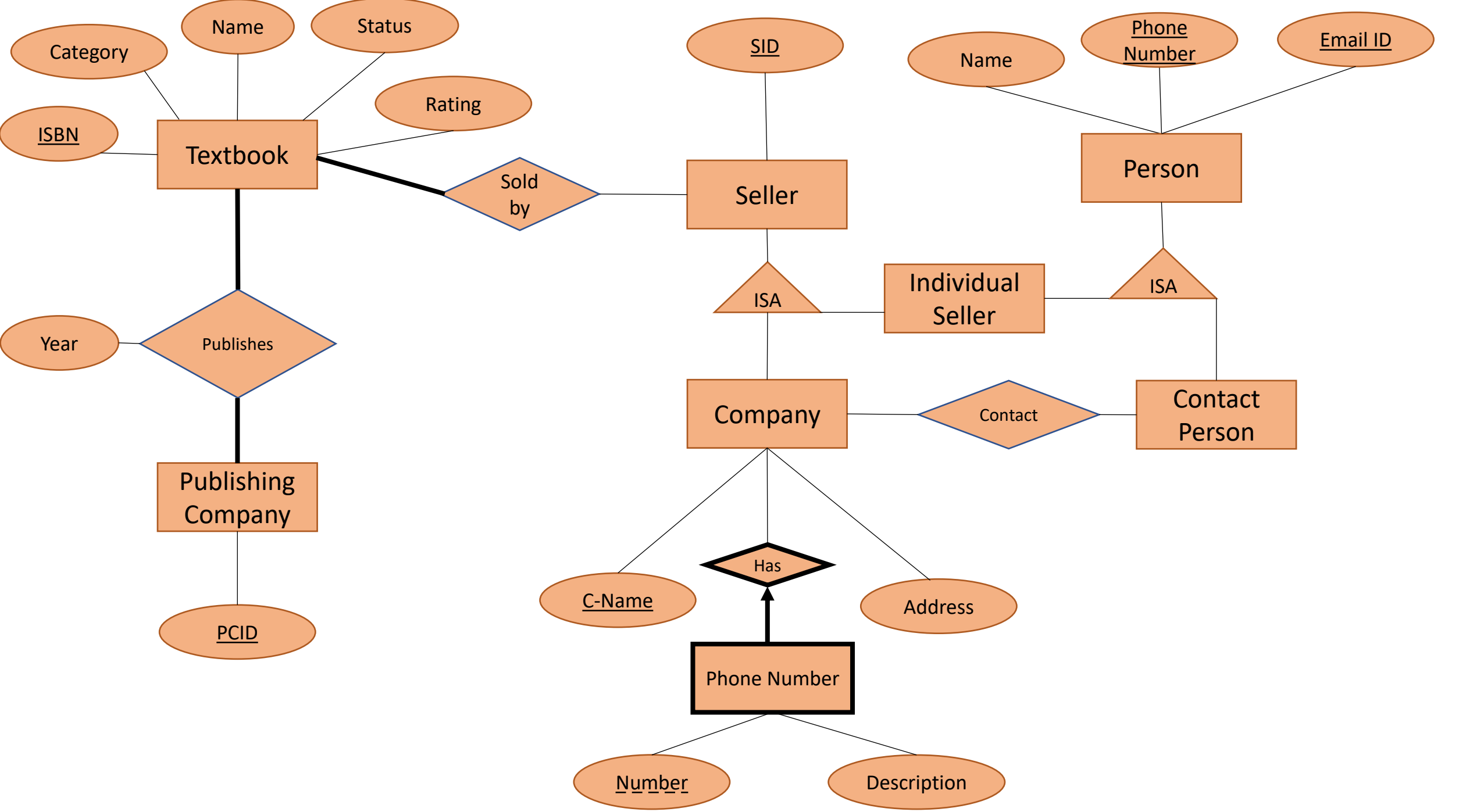


CS 550 Assignment 1  
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## Problem 1.

In this exercise, you will design a small database for used textbooks, as might be used by an on-line trading site like Amazon. The database will store textbooks for sale. Each textbook has an ISBN, a category (e.g., Math) it belongs to, a name. In addition, status descriptions about the books are maintained. Each book is required to have one such description so that the system can rate it fairly. Each textbook is published by a company in the publishing year. Each publisher has to have published at least some textbooks. Each textbook has one or more sellers, which may be either companies (corporation sellers) or individuals (individual sellers). For each company, the database maintains a name of the company, its address, its Phone Numbers (could be more than one Phone Number, each with a number and a description), and its contact person (who is an individual with all the related information for individuals, see next sentence). For each person, the database keeps a name, a Phone Number and an email address. A contact person whose company sells a book cannot be selling the same book as an “individual seller” at the same time (he/she may sell other books as an individual seller). You are required to draw the ER diagram only for above description following the convention of the textbook.

- Draw an ER-diagram for the database, identifying the following:
- (i) all the entity sets;
- (ii) all the relationship sets and their multiplicity;
- (iii) the primary key for each entity set (and weak entity set, if any) and each relationship set.



(i)

Entity Sets	Primary Keys
Textbook	ISBN
Publishing Company	PCID
Seller	SID
Company	SID,C-Name
Individual seller	SID, Phone Number, Email ID
Phone Number(Weak entity)	C-Name, Number
Person	Phone Number, Email ID
Contact Person	SID,C-Name, Phone Number, Email ID

(ii),(iii)

Relationship sets	Primary key	Cardinality
Publishes	ISBN, PCID	Many to Many
Sold by	ISBN, SID	Many to Many
Contact	C-Name, Phone Number, Email ID	One to Many(One company has more than one contact person)
Has	SID,C-Name, Number	One to Many(One company has more than one Phone Number)

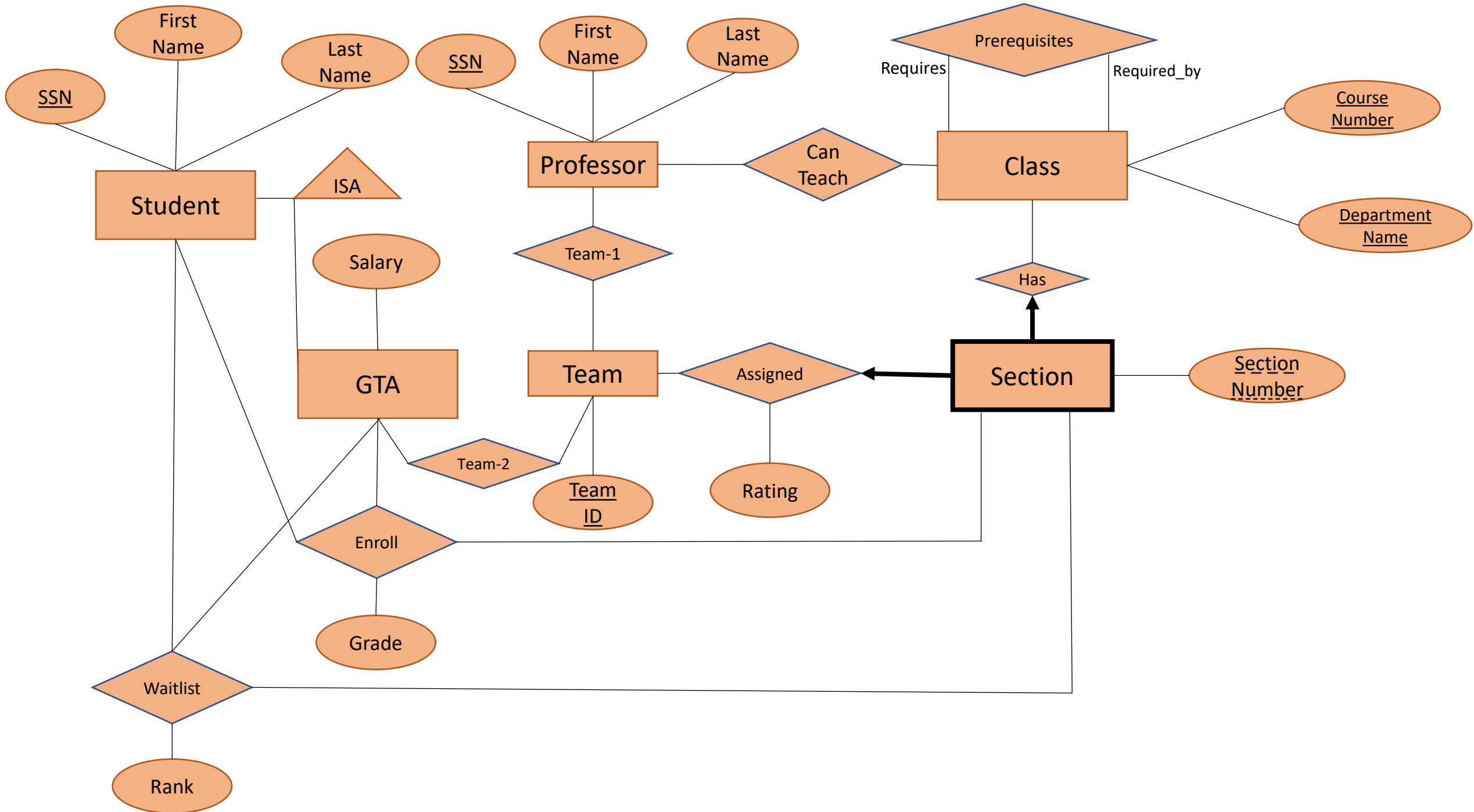
Indicate which properties in the problem description (if any) are NOT reflected by your design. For each of these properties you give (again, if any), use as an example situation that is allowed by your ERD, but this situation contradicts the property in the description.

Properties Not reflected in the ER diagram:-

- A contact person whose company sells a book cannot sell the same book as an “Individual seller”.
- Example:- In our ER-diagram a user can be a contact person for a company, and an individual seller allowing him to sell books from both. There is no rule in the ER-diagram to prevent such cases.

## Problem 2.

George Mason University (GMU) has decided to consolidate the functionality of three small overlapping database systems, which support applications for 1) teaching (e.g., instructor assignment and evaluation), for 2) registration (e.g., online course status, waiting lists), and for 3) student records (e.g., transcript generation). The resulting new system will support the following enterprise description: Professors and GTAs are assigned to teach the sections of each class being offered in a semester. At the end of the semester, they get a "team rating" (professors and GTAs together get one rating per section, rating is not done on individual). To support the assignment of professors to sections, a record is kept of which class each professor can teach. Classes can have one or more prerequisite classes. Students can take several sections each semester and receive a grade for taking each section. Students may end up waiting for some sections and receive a "rank" (determining the order they will be admitted if other students drop). However, no more than 10 students can wait on a class at the same time. Note that GTAs are students, however they differ in that they have a salary. All people (e.g., students, professors) are uniquely identified by their social security number. All classes are identified by Department Name (e.g., "INFS") and course number (e.g., "614"). Sections of classes are distinguished by their section number (e.g., "02").





1. Draw an ER-diagram for the database, identifying the following:
  - (i) all the entity sets;
  - (ii) all the relationship sets and their multiplicity;
  - (iii) the primary key for each entity set (and weak entity set, if any) and each relationship set. Invent more attribute(s) for the entity sets if you like.

(i)

Entity Set	Primary Keys
Student	SSN
GTA	SSN
Professor	SSN
Team	Team ID
Section(Weak entity)	Section Number, Department Name, Course Number
Class	Department Name, Course Number

(ii),(iii)

Relationship sets	Primary Keys	Cardinality
Enroll	SSN, Section Number, Department Name, Course Number	Many to Many
Waitlist	SSN, Section Number, Department Name, Course Number	Many to Many
Team-1	SSN, Team ID	Many to Many
Team-2	SSN, Team ID	Many to Many
Assigned	Team ID, Section Number, Department Name , Course Number	Many to One(each section has only one team and one team can be assigned to multiple sections)
Pre-requisites	Department Name, Course Number, Prerequisite Department Name, Prerequisite Course Number	Many to Many
Has(Section has)	Section Number, Department Name, Course Number	One to Many(One class has many sections but each section has only one class)
Can teach	SSN, Department Name, Course Number	Many to Many

2. Indicate (what and why) feature(s)/property(s) (if any) in the above description that are NOT captured by your ER-diagram;

Properties not captured in the ER-diagram:-

- As Numerical constraints cannot be reflected our ER diagram does not represent the property “No more than 10 students can wait on a class at the same time”.

3. Give 2 examples of the types of reports that can be obtained from the database, and state the involved entity sets and/or relationship sets. Each report example must involve at least two entity/relationship sets; (For example, a report can be “List all the GTAs who have NOT taken all the prerequisite classes for the classes that are assigned to teach”.)

Report Example-1:

- List all the professors who can teach the class in CS department with Course Number 550
- Entities:- Professor, Class
- Relationship sets:- Can teach

Report Example -2:

- List the team of GTAs and Professors assigned to teach classes from CS department
- Entities:- GTA, Professor, Team, Class
- Relationship sets: Team-1, Team-2, Assigned, Has(Section has)