**Assignment - 1**

1. Cardinality ratios often dictate the detailed design of a database. The cardinality ratio depends on the real-world meaning of the entity types involved and is defined by the specific application. For the binary relationships below, suggest cardinality ratios based on meaning of the entity types. Clearly state any assumptions you make.

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|  | **Entity 1** | **Cardinality Ratio** | **Entity 2** |
| 1 | Student |  | Social Security Card |
| 2 | Student |  | Teacher |
| 3 | ClassRoom |  | Wall |
| 4 | Country |  | Current President |
| 5 | Course |  | Text Book |
| 6 | Item (that can be found in an order) |  | Order |
| 7 | Student |  | Class |
| 8 | Class |  | Instructor |
| 9 | Instructor |  | Office |
| 10 | E-bay Auction item |  | E-bay bid |

1. In an educational institute, there are several departments and students belong to one of them. Each department has a unique department number, a name, a location, phone number and is headed by a professor. Professors have a unique employee Id, name, phone number.

We like to keep track of the following details regarding students: name, unique roll number, sex, phone number, date of birth, age and one or more email addresses. Students have a local address consisting of the hostel name and the room number. They also have home address consisting of house number, street, city and PIN. It is assumed that all students reside in the hostels.

A course taught in a semester of the year is called a section. There can be several sections of the same course in a semester; these are identified by the section number. Each section is taught by a different professor and has its own timings and a room to meet. Students enroll for several sections in a semester.

Each course has a name, number of credits and the department that offers it. A course may have other courses as pre-requisites i.e, courses to be completed before it can be enrolled in.

Professors also undertake research projects. These are sponsored by funding agencies and have a specific start date, end date and amount of money given. More than one professor can be involved in a project. Also a professor may be simultaneously working on several projects. A project has a unique projectId.

Design a conceptual schema for the above educational institution and draw an ER diagram for your schema. Be sure to indicate all key and cardinality constraints and any assumptions you make.

1. The Prescriptions-R-X chain of pharmacies has offered to give you a free lifetime supply of medicine if you design its database. Given the rising cost of health care, you agree. Here’s the information that you gather:

* Patients are identified by an SSN, and their names, addresses, and ages must be recorded.
* Doctors are identified by an SSN. For each doctor, the name, specialty, and years of experience must be recorded.
* Each pharmaceutical company is identified by name and has a phone number.
* For each drug, the trade name and formula must be recorded. Each drug is sold by a given pharmaceutical company, and the trade name identifies a drug uniquely from among the products of that company. If a pharmaceutical company is deleted, you need not keep track of its products any longer.
* Each pharmacy has a name, address, and phone number.
* Every patient has a primary physician. Every doctor has at least one patient.
* Each pharmacy sells several drugs and has a price for each. A drug could be sold at several pharmacies, and the price could vary from one pharmacy to another.
* Doctors prescribe drugs for patients. A doctor could prescribe one or more drugs for several patients, and a patient could obtain prescriptions from several doctors.
* Each prescription has a date and a quantity associated with it. You can assume that, if a doctor prescribes the same drug for the same patient more than once, only the last such prescription needs to be stored.
* Pharmaceutical companies have long-term contracts with pharmacies. A pharmaceutical company can contract with several pharmacies, and a pharmacy can contract with several pharmaceutical companies. For each contract, you have to store a start date, an end date, and the text of the contract.
* Pharmacies appoint a supervisor for each contract. There must always be a supervisor for each contract, but the contract supervisor can change over the lifetime of the contract.

Draw an ER diagram that captures the preceding information.