**Information Systems Department Faculty of Computers and Information**

**Assiut University Course Name: Databases**

**2nd Year, Spring 2021**

**Prof. Dr. Taysir Hassan May 8, 2021**

**Sheet 2: Entity-Relationship Diagram**

Answer the following problems:

1. **What is the cardinality and existence of each of the following relationships in just the direction given?**

1. Husband to wife

2. Student to degree

3. Child to parent

4. Player to team

5. Student to course

**2**. A lecturer, identified by his or her number, name and room number, is responsible for organizing a number of course modules. Each module has a unique code and also a name and each module can involve a number of lecturers who deliver part of it. A module is composed of a series of lectures and because of economic constraints and common sense, sometimes lectures on a given topic can be part of more than one module. A lecture has a time, room and date and is delivered by a lecturer and a lecturer may deliver more than one lecture. Students, identified by number and name, can attend lectures and a student must be registered for a number of modules. We also store the date on which the student first registered for that module. Finally, a lecturer acts as a tutor for a number of students and each student has only one tutor.

Design and draw an ER diagram that captures the information about this university.

1. Notown Records has decided to store information about musicians who perform on its albums (as well as other company data) in a database. The company has wisely chosen to hire you as a database designer (at your usual consulting fee of $2,500/day).

* Each musician that records at Notown has an SSN, a name, an address, and a phone number. Poorly paid musicians often share the same address, and no address has more than one phone.
* Each instrument that is used in songs recorded at Notown has a name (e.g., guitar, synthesizer, flute) and a musical key (e.g., C, B-flat, E-flat).
* Each album that is recorded on the Notown label has a title, a copyright date, a format (e.g., CD or MC), and an album identifier.
* Each song recorded at Notown has a title and an author.
* Each musician may play several instruments, and a given instrument may be played by several musicians.
* Each album has a number of songs on it, but no song may appear on more than one album.
* Each song is performed by one or more musicians, and a musician may perform a number of songs.
* Each album has exactly one musician who acts as its producer. A musician may produce several albums, of course.

Design an ER model for Notown. Be sure to indicate all key and cardinality constraints and any assumptions that you make.

**4. Draw an ER diagram for each of the following situations. On the diagram be sure to identify the cardinality, existence, and optionality of each relationship.**

A. A company has a number of employees. Each employee may be assigned to one or more projects, or may not be assigned to a project. A project must have at least one employee assigned, and may have several employees assigned.

B. A university has a large number of courses in its catalog. Each course may have one or more other courses as pre-requisites, or may have no prerequisites.

C. A college course may have one or more scheduled sections, or may not have a scheduled section.

D. A hospital patient has a patient history. Each patient has one or more history records (we assume that the initial patient visit is always recorded as an instance of the history). Each patient history record belongs to exactly one patient.

E. A video store may stock more than one copy of a given movie. It is also true that the store may not have a single copy of a particular movie.