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 $2500/day).

* Each musician that records at Notown has an SSN, a name, an address, and a phone number. Poorly paid musicians do not have cell phones, often share the same address, and no address has more than one phone number.
* Each instrument used in songs recorded at Notown has a unique identiﬁcation number, a name (e.g., guitar, synthesizer, ﬂute) and a musical key (e.g., C, B-ﬂat, E-ﬂat).
* Each album recorded on the Notown label has a unique identiﬁcation number, 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 a conceptual schema for Notown and draw an UML diagram for your schema. Be sure to indicate all key and cardinality constraints and any assumptions you make. Identify any constraints you are unable to capture in the ER diagram and brieﬂy explain why you could not express them. Once you have created the diagram, create the necessary SQL CREATE TABLE commands necessary to support it.

2) The Computer Science Department frequent ﬂiers have been complaining to Dane County Airport oﬃcials about the poor organization at the airport. As a result, the oﬃcials decided that all information related to the airport should be organized using a DBMS, and you have been hired to design the database. Your ﬁrst task is to organize the information about all the airplanes stationed and maintained at the airport. The relevant information is as follows:

* Every airplane has a registration number, and each airplane is of a speciﬁc model.
* The airport accommodates a number of airplane models, and each model is identiﬁed by a model number (e.g., DC-10) and has a capacity and a weight.
* A number of technicians work at the airport. You need to store the name, SSN, address, phone number, and salary of each technician.
* Each technician is an expert on one or more plane model(s), and his or her expertise may overlap with that of other technicians. This information about technicians must also be recorded.
* Traﬃc controllers must have an annual medical examination. For each traﬃc controller, you must store the date of the most recent exam.
* All airport employees (including technicians) belong to a union. You must store the union membership number of each employee. You can assume that each employee is uniquely identiﬁed by a social security number.

Design a conceptual schema for the airport and draw an UML diagram for your schema. Be sure to indicate all key and cardinality constraints and any assumptions you make. Once you have created the diagram, create the necessary SQL CREATE TABLE commands necessary to support it.