

## **Assignment #2 – ER Diagrams**

### **Due: Wednesday, 07/11/12, 11:59pm**

Answer the following questions from your *Fundamentals of Database Systems* book:

1. (10 pts) Consider the relation CLASS(Course#, Univ\_Section#, InstructorName, Semester, BuildingCode, Room#, TimePeriod, Weekdays, CreditHours). This represents classes taught in a university with unique Univ\_Section#. Give what you think should be various candidate keys and write in your own words under what constraints each candidate key would be valid.
  
2. (30) Consider the following set of requirements for a library database that is used to keep track of books, CD's, and DVD's. They are considered collectively as assets, and each asset is assigned a unique asset id.
  - a. Besides the asset id, the library tracks the title, publisher, and year of publication for each asset. Additional information is also recorded, which includes the authors and number of pages of a book, and the artists of a CD.
  - b. An asset can have multiple copies that share the same asset id. A patron can only borrow copies.
  - c. The library keeps track of each patron's name, library id, current address and phone, and the copies of assets that they have borrowed.
  - d. For each transaction, the library records the date on which an asset was borrowed and the date when it becomes overdue. In addition, a patron cannot borrow more than one copy of the same asset. Past transactions are NOT maintained.
  - e. The library also keeps track of the location for books, CD's, and DVD's that are in the library. Each location has a location id.

Design an ER diagram for this application. Specify key attributes of each entity type, and key and participation constraints on each relationship type. Note any unspecified requirements, and make appropriate assumptions to make the specification complete.

3. (30 pts) Consider the following set of requirements for a UNIVERSITY database that is used to keep track of students' transcripts. This is similar but not identical to the database shown in Figure 1.2 from Assignment #1:

(a) The university keeps track of each student's name, student number, social security number, current address and phone, permanent address and phone, birthdate, sex, class (freshman, sophomore, ..., graduate), major department, minor department (if any), and degree program (B.A., B.S., ..., Ph.D.). Some user applications need to refer to the city, state, and zip of the student's permanent address, and to the student's last name. Both social security number and student number have unique values for each student.

(b) Each department is described by a name, department code, office number, office phone, and college. Both name and code have unique values for each department.

(c) Each course has a course name, description, course number, number of semester hours, level, and offering department. The value of course number is unique for each course.

(d) Each section has an instructor, semester, year, course, and section number. The section number distinguishes different sections of the same course that are taught during the same semester/year; its values are 1, 2, 3, ..., up to the number of sections taught during each semester.

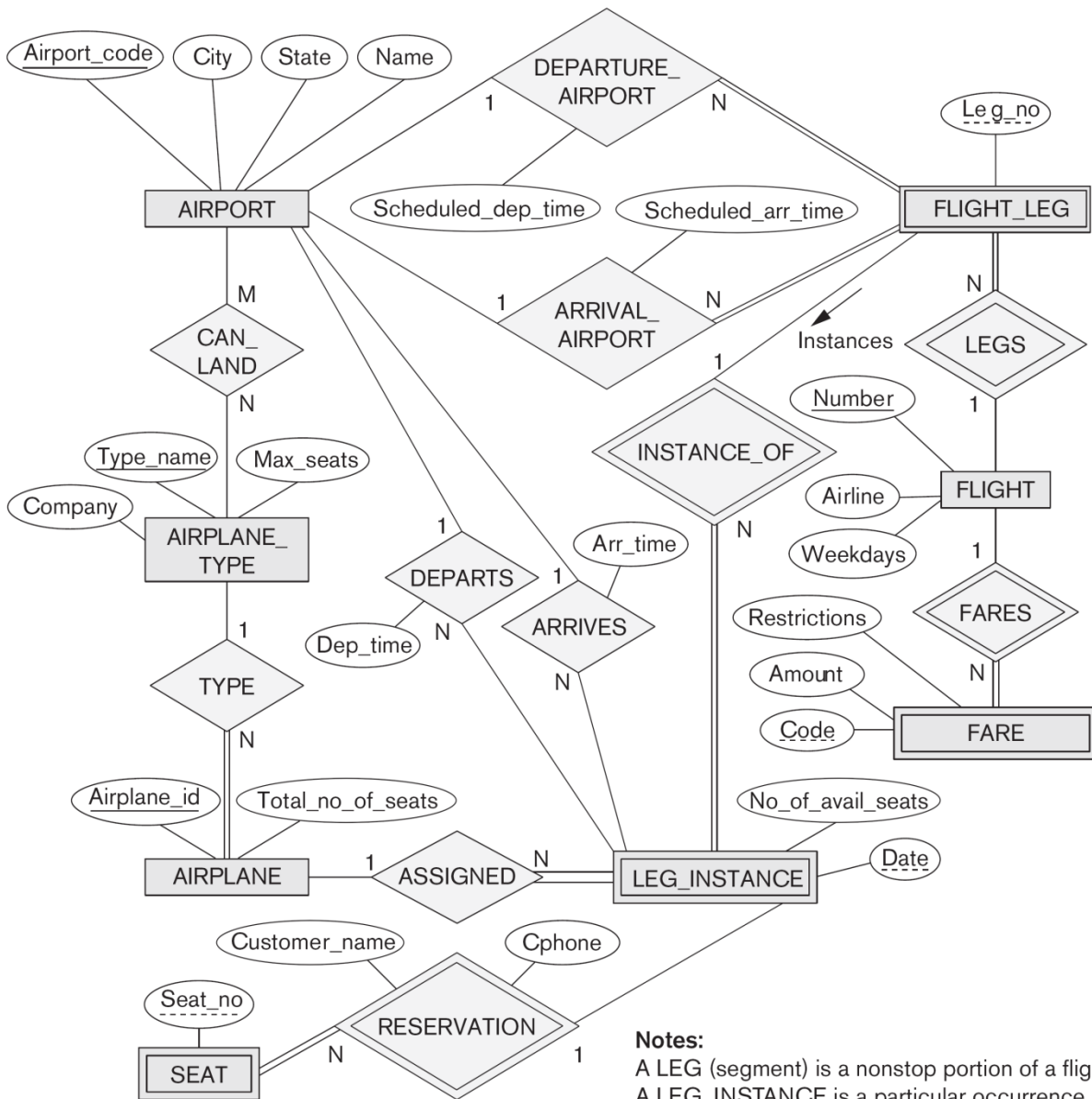
(e) A grade report has a student, section, letter grade, and numeric grade (0, 1, 2, 3, 4 for F, D, C, B, A, respectively).

Design an ER schema for this application, and draw an ER diagram for that schema. Specify key attributes of each entity type and structural constraints on each relationship type. Note any unspecified requirements, and make appropriate assumptions to make the specification complete.

4. (30 pts) Consider the ER diagram of Figure 7.20, which shows a simplified schema for an airline reservations system. Extract from the ER diagram the requirements and constraints that resulted in this schema. Try to be as precise as possible in your requirements and constraints specification.

**Figure 7.20**

An ER diagram for an AIRLINE database schema.



**Notes:**

A LEG (segment) is a nonstop portion of a flight.  
A LEG\_INSTANCE is a particular occurrence of a LEG on a particular date.