# horizontal lineDatabase R&D Exercise

Assignment 3

I confirm that this is my own work and that use of material from other sources, including the Internet, has been properly and fully acknowledged and referenced.

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**Total in points** (100 points total): \_\_\_\_\_

**Professor’s Comments:**

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**3.19 Consider the ER diagram in Figure 3.21, which shows a simplified schema for an airline reservations system. Extract from the ER diagram the requirements and constraints that produced this schema. Try to be as precise as possible in your requirements and constraints specification.**

1. The database is organized into airports (AIRPORT), and each airport has a unique Airport code, City, State, and Name. The database also keeps the AIRPLANE\_TYPE (including unique Type name, Max seats, Company) that AIRPLANE (stores unique Airplane id and the Total number of seats) can land in the AIRPORT.

2. Each FLIGHT (stores a unique Number, Airline, and Weekdays of a flight) has a number of FLIGHT\_LEG and FARE (keeps Code, Amount, and Restrictions). Each AIRPORT has a number of FLIGHT\_LEG, keeping a DEPARTURE\_AIRPORT (stores Scheduled depart time) and ARRIVAL\_AIRPORT (stores Scheduled arrival time).

3. A LEG\_INSTANCE is an INSTANCE\_OF FLIGHT\_LEG, which keeps the Number of available seats and Date. Each AIRPLANE is composed of LEG\_INSTANCE, which stores Depart time and Arrival time from the AIRPORT.

**3.22 A database is being constructed to keep track of the teams and games of a sports league. A team has a number of players, not all of whom participate in each game. It is desired to keep track of the players participating in each game for each team, the positions they played in that game, and the result of the game. Design an ER schema diagram for this application, stating any assumptions you make. Choose your favorite sport (e.g., soccer, baseball, football).**

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The design is for e-sport. Assume each league is composed of many games identified by Game id. Each game has n BO1 for players in the Team to participate. The performance in PARTICIPATE stores information on the performance of each player. LEAGUE is identified by id; Team by Team name; Player by player-id and BO1 by time.

**3.25 Consider the ER diagram in Figure 3.24. Assume that a course may or may not use a textbook, but that a text by definition is a book that is used in some course. A course may not use more than five books. Instructors teach from two to four courses. Supply (min, max) constraints on this diagram. State clearly any additional assumptions you make. If we add the relationship ADOPTS, to indicate the textbook(s) that an instructor uses for a course, should it be a binary relationship between INSTRUCTOR and TEXT, or a ternary relationship among all three entity types? What (min, max) constraints would you put on the relationship? Why?**

Assumption:

1. Each course is taught by one instructor.
2. Each Textbook is used by at least one course.
3. Each Instructor can adopt zero or more textbooks
4. As Each Textbook can be used by some courses, it can be adopted by zero or more instructors.

It should be a binary relationship and constraints are shown below. As the relationship set of ADOPTS is not a set of triple, it is inappropriate to apply as a ternary relationship.

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**3.30 Illustrate the UML diagram for Exercise 3.16. Your UML design should observe the following requirements:**

1. **A student should have the ability to compute his/her GPA and add or drop majors and minors.**
2. **Each department should be able to add or delete courses and hire or terminate faculty.**
3. **Each instructor should be able to assign or change a student’s grade for a course.**

**Note: Some of these functions may be spread over multiple classes.**

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**4.19 Identify all the important concepts represented in the library database case study described below. In particular, identify the abstractions of classification (entity types and relationship types), aggregation, identification, and specialization/generalization. Specify (min, max) cardinality constraints whenever possible. List details that will affect the eventual design but that have no bearing on the conceptual design. List the semantic constraints separately. Draw an EER diagram of the library database.**

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**4.21 Show how the SMALL\_AIRPORT EER schema in Figure 4.12 may be represented in UML notation. (Note: We have not discussed how to represent categories (union types) in UML, so you do not have to map the categories in this and the following question.)**

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**4.26 Which of the following EER diagrams is/are incorrect and why? State clearly any assumptions you make.**

C is incorrect. c has the relationship between E1 and E3, but though they are specialized into subclasses, they do not present their superclass. a is correct. b could be students divided into graduates and undergraduates can be 1 to 1 guidance.