

CS3431 Homework 1 (B term, 2012)

Homework Out: Tuesday, Oct. 30, 2012 (in class)

Homework Due: Monday, Nov 5th, 2012 at 3:00 pm (in class)

Homework Submit: In hardcopy at start of class.

Homework Points: A maximum of 50 pts.

Reminder: This homework is to be done by each student individually, and not in teams.

Problem 1: My All Times Favorite Sports Management System [25 pts]

1. Your task is to develop a conceptual design for the ice breaker hockey league described below.
2. Make sure to follow the design guidelines discussed in class.
3. Do remember to indicate all key and cardinality constraints, as appropriate.
4. Indicate any additional assumptions you make, beyond those noted down in the description. Indicate any information that is redundant in the description.
5. Indicate if there is any information (constraints or other concepts) listed in the description that cannot be modeled by the ER model.

We want to design a database for the hockey sports league. We want to keep track of the teams and games of the league. A team has a name, a home rink, and a level. Each team has exactly one coach. To avoid conflicts and keep everyone focussed on one or two teams only, no one should be coach of 2 or more teams. Coaches like players each have a name, a foto, and a unique registered hockey league identifier (that is assigned to them once they pay the registration and insurance fees for the league). Teams can have different numbers of players, but must have at least 12 and can have at most 20 players. No player should be in two teams. A player may have the skills to play multiple positions, such as defense, center, forward, etc. For a game to be meaningful, exactly two teams have to be participating in each game. No team can be scheduled to play against itself. There is no limit on how many games a team is involved in. We want to keep track of the players from a given team that actually participated in a given game (as opposed to being sick and or out for other reasons) and the position they played in that game. In a given game, a player can only hold one single position for the whole game. In addition, we want to record the date when the game took place, the location of the rink where it took place, and the final score of the game, i.e., who won and who lost. Not all players of a team are required to participate in each game. However, to participate in a game for a particular team, the player has to be a registered member of the team.

Problem 2: Design Airplane Information Management System [25pts]

Design ER schema for the FAA information management system whose requirements are listed below, following the same instructions as for problem 1.

- Airplane models are identified by a unique model number (e.g., DC10, etc.). Each model also has a capacity and a weight.
- Every airplane is of a specific airplane model. Every airplane has a unique registration number, a date when it was build, and a date when last serviced.
- The airport employs different types of employees, including technicians, cleaning staff, and flight traffic controllers. You need to store the name, SSN, address, and salary of each employee.
- Flight traffic controllers must have an annual medical examination and a bi-annual eye examination. For each traffic controller, you must store the date of their most recent general exam and the data of their most recent eye exam, each with the respective score for their exams.
- A traffic controller cannot also work as a technician, or vice versa.
- The Federal Aviation Administration (FAA) has developed several classes of tests for determining if the airplanes are still airworthy. Such tests are identified by an FAA testtype number, a name, a minimum required score to be still considered safe. For each FAA testing class, there is an assigned set of airplane models for which that particular type of test is applicable.
- A technician is being trained in performing certain (at least one and possibly multiple) tests on particular airplane models. His or her expertise may overlap with that of other technicians
- The FAA requires the airport to keep track of each time an airplane is tested by a given technician. For each testing event, the information that needs to be maintained includes the date, the testing type undertaken, the number of hours the technicians has spend doing the test, the technician who undertook the test, and the final score the airplane received on the test.
- The FAA regulation requires that tests on a plane must be conducted only by a technician who has been trained to conduct this particular test on that plane's model.
- The airport must assure that at any time, all airplanes have a recent (less than 12 months old) testing result with its assigned score being above the required minimum score. Tests can be repeated an arbitrary number of times.