

Database Systems
CmpE 226 **Project 1** **Spring 2003**

1. Design an MLP /PReSTO constraint database with at least 6 constraint tables. The constraint tables should use the full power of linear constraints. (For example, the equality constraint $x = 1$ does not use the full power of linear constraints. So don't use only equality constraints in your database.) The tables should contain a reasonable number of constraint tuples, not too few and not too many. Below are some suggested project topics to help you start thinking about your own project. Each team must select a unique project and write a description of one page to two pages that contain the problem description, brief description of the entities, and their attributes. Submit your project description electronically for approval in one week – Due date is March 11, 2003. Submission format is **TeamName-ps1.doc**. If your team name is Alpha then your project description file is **Alpha-ps1.doc**.
 - (a) Temperature and blood pressure recordings of patients in a hospital. Approximate the temperature and blood pressure curves as piecewise linear functions of time.
 - (b) The DOW and NASDA stock indices and other key market indices for several decades. Approximate the indices as piecewise linear functions of time. (That is, we don't need 3650 pieces of data for each index. Use at most 100 pieces in a piecewise linear function to approximate them.) Use database queries to try to find some interesting relationships among the indices. For example, one index may tend to follow the average of some other indices with a certain time delay.)
 - (c) A campus map. Include the area of the buildings. Also show how the buildings changed over time, i.e., when they were built or expanded in space.
 - (d) A parking lot. Show the parking lot and how cars are entering and leaving the parking lot.
 - (e) A passenger airplane flight scheduler. Include reservations, capacity check for the airplanes.
 - (f) A freight train scheduler. Include stops of the train in cities and amount of carried items loaded on and off at each stop. Include needed amount of items (use several different items) at each city. Find a shipment schedule that meets all needs.
 - (g) Find a product category that you are interested in (besides crops). Express a linear programming problem based on the basic resources that each product needs and the total amount of resources available. Beside the basic linear programming problem include specific details and complications. For example, 1000 units of resources are available but not more than 500 must be used for product type A. Find other restrictions and variations of the basic linear programming problem.
2. Create an ERD (or a UML -- **class diagram**) for your project. Have at least five 1:1 and 1:M relationships. M:M relationships are not allowed. **Try** at least one parallel relationship type. **Try** fully and partly optional, inclusive, and exclusive relationships and conditions wherever applicable. Name at least 2 to 5+ attributes per entity. As

you prepare the diagrams, you may add additional entities. **(Note for more flexible requirements: consider any statement starts with Try – optional requirements.)**

3. Find at least 3 iconic queries or sequence of iconic queries. Explain what they mean and write them down in the style of the examples in the MLPQ system manual. **(Iconic queries are shown in Figure 1 MLPQ Graphical Interface in the MLPQ Specifications, such as Intersection, Union, Difference, Max, Min, etc.)**
4. Find at least 3 SQL queries of each of the following kind: **Basic, Aggregation, Sets, and Nested.** (That is, a total of 12 queries.)
5. Run your queries on the MLPQ/PReSTO system. Save the output relations.
6. Turn in the database and the queries in hard copy as well as using the hand in program.
7. Be prepared to demonstrate your work if asked by the TA or the instructor.

Note: You can download the executable file `mlpq_nt.exe` and some sample `.txt` files for the MLPQ/PReSTO system from: <http://www.engr.sjsu.edu/~fayad> by clicking on the “MLPQ/PReSTO system ” link.