In this assignment, you will learn how to use Design Patterns. You are to develop a program that implements a portion of the Pedestrian Backup Assist (PBA) system in an object-oriented language of your choice. The development of the system will be much easier if you carefully develop the design. You should use the UML artifacts that you have created thus far for PBA, including the class diagram as your starting point. Then create a design-level class diagram that incorporates the design patterns as enumerated below. As stated in lecture, it is likely that you will need to make several iterations of the design model (e.g., class diagram) before all the necessary information is captured. At that point, you may start coding your system according to your design model. There should be traceability between your code and the design model. The following Design Patterns need to be included in your final implementation. You are free to choose a partner to work on this assignment (one team will be allowed to be of size 3).

1. Use two of the Gamma design patterns to implement a portion of the PBA system. One should be behavioral and one should be structural or creational.

2. Use two domain-specific design patterns identified through research of the literature to implement additional features related to those that were implemented in Problem 1. Indicate what type of design pattern each is (i.e., creational, structural, or behavioral).

Extra Credit: Additional pattern

If you are able to identify other useful design patterns (e.g., security patterns, fault tolerance, timing, etc.) that would be appropriate for the implementation of the system, you will receive extra credit for each additional pattern beyond the four assigned patterns. Note that your pattern should be a different design pattern from the above listed patterns.
Assignment Deliverables

The deliverables for this assignment include the following:

1. Complete list of requirements for your system. If you have augmented the requirements for clarification, be sure to indicate clearly how you have changed the requirements.

1. Class diagram for the modified PBA system including data dictionary. Be sure to include a prose description of the class diagram. In this description, clearly indicate any changes that you have made to the class diagram, in addition to revisions made for including the design patterns.

2. All files for testing your program, including the makefile for compiling and running your program. You must also include a README file describing how to use your program.

2. A written report on your work and result.

(A dropbox will be created for you to deposit your deliverables.)

Project Report

Your project report will include the following sections (in the order specified):

1. Names of the group members.
2. A brief description of the design patterns implemented. Your description should include the potential benefits of including a design pattern at a particular location of your implementation.
3. Class Diagram of the PBA system created by a UML editing tool. The class diagram should identify the design patterns implemented. This can be done by attaching an explanatory note (manually or by program) in the Class Diagram. Some data dictionary to clarify the role of each class must be included.
4. Any assumptions you made about the interpretation of specifications (according to Homework Assignments 2, 3, and 4) that might have been unclear.