CS 490.002: Design Patterns
Homework #1 (50 points)
Due: Thursday, January 29, 2009, 9:00 AM

Answer each of the questions below, demonstrating a full understanding of the concepts involved in each question. While you may discuss the questions with your classmates, your responses must be in your own words and your designs must be your own.

1. (10 points) Technical conferences are frequently overwhelming to attendees, who must determine what events to attend and when to attend them. Many events (e.g., featured speakers, panel discussions, technical courses) are scheduled for specific times on specific days, while other events (e.g., new product exhibitions, poster sessions) are ongoing and attendees may participate at their leisure. In addition, some events (technical demos, birds-of-a-feather discussions) may take place at venues other than the primary conference location, requiring additional travel time between events.

To simplify the conference-attending experience, an on-line system for scheduling the events that an attendee plans to attend, as well as the hotel, air travel, and car rental reservations that might be required, is desired. Use the Builder pattern to construct a detailed UML class diagram for this purpose, keeping in mind that the attendee should be unaware of the complexity associated with constructing a viable schedule.

2. (10 points) In real-time animated scenes of city streets (e.g., Grand Theft Auto IV), the buildings that are being passed are usually generated on the fly, but the style of the buildings (e.g., skyscrapers, tenements, stores) varies according to the virtual neighborhood being traversed. Explain why the Prototype pattern would be more useful than the Factory Method pattern for generating these buildings.

3. (20 points) When a stream of bytes is flowing to or from a network socket, it is frequently desirable to have the Socket class extended to allow outgoing bytes to be encrypted and incoming bytes to be decrypted. Because of legal restrictions on the import and export of encryption software, this new EncryptedSocket class needs to be independent of the classes used to implement the encryption algorithms (DES, RSA, etc.). Explain why the Factory Method Pattern is appropriate for this situation and draw a UML class diagram illustrating its application here.

4. (10 points) In many ways the Abstract Factory pattern and the Builder pattern are opposites, but in some ways they are quite similar. Explain the characteristics that these two creational patterns share, as well as those that make them seem opposite.

This assignment is due on your drop-box by 9 AM on Thursday, January 29, 2009.