Assignment #4

Practice with Object-oriented analysis & design, and GRASP

CS 4354 Summer II 2015
Instructor: Jill Seaman

Due: at the beginning of class **Monday, 7/27/2015**
Submit a "hard copy" (probably hand-written, optionally computer-generated) only.
Do this assignment with your partner and submit one copy with both names on it.

Problem Domain:

- The problem domain is a library management system.
- Books are checked out, checked in and reserved (put on hold) by library members.
- Students may check out books for 4 weeks, and faculty for 3 months.
- Library members are fined $0.25 per day that the books are overdue to a maximum of $5.00 per overdue item.
- The library also has other resources that can be checked out, including music CDs, software and videos. These resources may only be checked out for one week at a time. However, the overdue fines are the same as they are for books.
- Members may have no more than 10 resources checked out to them at any point in time.
- Members may not check out any additional resources if they have any unpaid fines.
- Any checkable library resource may be renewed as long as no other library member has requested it.
- Library members can browse the catalog of resources to determine their status e.g. on the shelf, reference, out on loan, reserved etc.
- Library members and resources are identified by ID numbers, and the library maintains a list of valid ID numbers for each category.
- Any operation that has potential to modify data in the system must be performed by one of the library staff on behalf of the library member.

1 Identify at least five primary use cases and related actors implied by the Problem Domain description (I have 9). Draw the results in a UML use case diagram.

2A Write the textual description for the **checkout resources** use case, including Participating Actors, Flow of Events, Exceptional Flow of Events, and Entry and Exit Conditions.

2B Identify the entity, boundary (optional), and control objects from your use case. Be sure to establish a control object for the use case.

2C Draw a class diagram capturing the (Entity) classes involved in the checkout resources use case. Include attributes and associations.

2D Draw a sequence diagram that describes the checkout resources use case (do not include the exceptional events). The actor may interact directly with the Control Object. Use the GRASP patterns to determine which class should receive (and send) certain messages (mainly, which class should provide a given operation) in the sequence. THEN add your operations to the class diagram from part C. Then give an explanation of how you applied the GRASPatterns (see the last slide in the GRASP lecture).

Hint: The tricky part of checkout resources is determining the due date for the loan of the resource. The objects involved must collaborate to determine this.

For question 2 (and 3), you may submit one use case description, one final class diagram, and one final sequence diagram.

3A-D Repeat steps 2A through 2D with another one of your use cases. It should involve at least 2 entity objects and the sequence diagram should have 3 or more messages. Explain the GRASP patterns used to determine the target of each message.