CS1073 Lab 7 - Fall 2012

Due: Friday, Nov. 30, 2012 by 4:00 PM in the appropriate assignment bin & via Desire2Learn.

The purpose of this lab exercise is to give you some practice with partially filled arrays of objects.

Note that you are provided with a test driver class, **LendingFacilityTestDriver**, in Desire2Learn.

AV Lending Facility Classes

A friend of yours is the superintendent of an upscale apartment complex in Fredericton. This building houses a gym, hair salon, and other amenities. Recently, the owners have added a new audio-visual (AV) lending facility to the building; they plan to soon begin lending out Blu-rays, DVDs, CDs, etc. to tenants. On your friend's recommendation, the owners have hired you to develop software to support their new AV lending facility. You have decided to begin by writing three classes, named **LendingItem**, **CardHolder**, and **JuniorCardHolder**.

The **CardHolder** class represents a tenant who has a card that allows them to sign items out of the AV lending facility. You must record the full name of each cardholder (e.g. "Sally Smith"), along with their apartment number (e.g. 152), and their phone number (e.g. "454-1234"). Each person is also automatically assigned a membership number when they receive their card. These membership numbers are assigned in ascending (increasing) order, starting at the number 1000. Once assigned, each tenant will retain the same membership number (it will not change from year to year).

For each cardholder, we need to keep track of what AV items they currently have signed out. A **LendingItem** is any AV item that is available at this facility. We keep a brief description of each item (e.g. "The Little Mermaid - DVD"). We also record the original price of the item (e.g. 24.95), and whether or not it is restricted (i.e. whether or not it is to be borrowed by adults only). Once these values are initialized, they cannot be changed. Three accessor methods must be included in the **LendingItem** class to retrieve the information when needed.

Mutator methods must be provided in the **CardHolder** class to allow the cardholder to sign out AV items that they wish to use and to return items that they have finished using. The owners of the building have decided that return dates will not be assigned to items when they are signed out; a cardholder may take as long as he or she needs to watch the movie or listen to the music. However, each cardholder can have at most 7 items signed out at any given time. The methods for signing out and returning items both return a boolean value to indicate whether the transaction was successful. When an item is successfully returned, the array of currently signed out items must be adjusted so the signed out items are always stored in contiguous elements at the beginning of the array. It is not necessary to maintain the signed out items in any particular order.

The methods for signing out and returning an item both receive a **LendingItem** object as their only parameter. When returning an item, search through the array to find the item provided, and if found, remove it from the array. Two **LendingItem** objects are considered to be equal if their description, price, and restricted status are all the same.

Four accessor methods should be provided in the **CardHolder** class to retrieve the person's name, apartment number, phone number, and membership number. An accessor method should also be provided to retrieve a ***copy*** of the list of items that a cardholder currently has in their possession. This list is to be returned as an array, and this array will always be full. Since the list of items for a given **CardHolder** can vary between 0 and 7 at any point in time, the length of the array returned by this accessor method will vary between 0 and 7.

The building owners have noted that they wish to handle underage tenants (i.e. children living in the building) a bit differently than other tenants. They note that the general information (name, apartment number, and phone number) is still important, and each **JuniorCardHolder** still receives a membership number. However, for junior cardholders, we must also record the name of their guardian (e.g. "Mr. John Smith"), and be able to access this information when required. Perhaps most importantly, junior cardholders are not permitted to sign out any material that is restricted.

The items signed out by a cardholder (including junior cardholders) may change over time. A person's phone number may also change. However, all other cardholder information, once set, should remain fixed.

Write the complete **LendingItem**, **CardHolder**, and **JuniorCardHolder** classes. For full marks, you must use inheritance. Also note: Data structures other than arrays (e.g. Vectors, ArrayLists, Linked Lists, etc.) are **not** permitted in this assignment (as they are not covered until CS1083).

Test your classes by using the **LendingFacilityTestDriver** class that is provided. ***Do not to change anything in this class***. For full marks you must make your classes compatible with this class, and all test cases must complete successfully.

What to hand in to the assignment bin:

- The source code for your three classes (**LendingItem**, **CardHolder** and **JuniorCardHolder**)
- Output of the **LendingFacilityTestDriver** class
- The completed Pair Programming Worksheet

What to hand in to Desre2Learn:

- A .zip archive containing the .java files for your three classes (**LendingItem**, **CardHolder** and **JuniorCardHolder**). Name your .zip file in the following way: *YourName-lab7.zip* For example: *JohnSmith-lab7.zip*
    - Aside: You only need to submit one electronic copy per group; just make sure that someone from the group does this. All group members' names should be included in your javadoc comments (using @author tags).

End of Lab 7

Maintained by Natalie Webber & Andrew McAllister