CS1083 Assignment # 4 - Fall 2024

Due: Wednesday, 9 October before 4:30 pm in the Desire2Learn dropbox. (See submission instructions below).

The purpose of this lab is:

- Practice binary search algorithm.
- Implement selection sort.

This assignment is to be done individually. If you have questions, direct them to a tutor/assistant during an extra help session. If your question is not answered during an extra help session, you may contact your course professor.

Background Scenario

The vintage music store from Assignment 3 has been impressed with the work you have done in the past and would like for you to update the system that you developed for them before. See the list of additional requirements below:

Is Sorted

Add a method to your Catalogue class called **`isSorted()`**. This method should return true if the items in the ArrayList are sorted lowest to highest according to your **`compareTo()`** method from last week (all sorting for this assignment should use this order).

Selection Sort

Add a method to your Catalogue class called **`selectSort()`**. This method should perform a selection sort on the ArrayList so that it is sorted. This method should take no parameters and return void. You must write selection sort yourself and cannot use any pre-made tools. Must use **`compareTo()`** to compare. Note: Swapping may be trickier with an ArrayList than simply an array.

Binary Search

Add a method to your Catalogue class called **`searchItemBinary()`**. This method should take an Item as a parameter and search for the Item using binary search. Must use **`compareTo()`** to compare. Return the index of the item if there is a match and -1 otherwise. If the ArrayList is not sorted prior to this, you must sort it first.

Driver

Update your drive to test all your new methods.

Demo Interface

Create a second driver program that creates a sample catalogue that has a few items stored in it already. This demo should have an input loop that reads in integers and allows the user to try to add or remove items to the catalogue.

User Input	Execution
1	Attempt to add a Record to the catalogue
2	Attempt to remove a Record from the catalogue
3	Stop execution.

If the user selects 1 or 2, read in the title, price, artist, and year. Print a success or a failure message.

If at any point, the user inputs "bad" input, the exception should be caught, the program should print an error message reminding the user what proper input would be, and the loop should continue. No additional exceptions should be handled.

See some example output below (user input is highlighted):

```
Select 1 to add, 2 to remove, or 3 to quit:
1
Input title, cost, artist, and year (separated by new line characters)
Title
Title

An error occurred with input
Input 1, 2, or 3 for commands
Costs should be doubles and years should be integers

Select 1 to add, 2 to remove, or 3 to quit:
1
Input title, cost, artist, and year (separated by new line characters)
Title
19.99
Art
1999
Successfully added

Select 1 to add, 2 to remove, or 3 to quit:
2
Input title, cost, artist, and year (separated by new line characters)
Title
Title

An error occurred with input
Input 1, 2, or 3 for commands
```

```
Costs should be doubles and years should be integers

Select 1 to add, 2 to remove, or 3 to quit:
3
```

Your electronic submission (submitted via Desire2Learn) will consist of two files. Name your files YourName-fileName.extension, e.g. JohnSmith-as3.zip, JohnSmith-as3.pdf:

1. A single pdf file containing a listing of the source code for the **`Purchasable`** interface, as well as any other classes you have written. Also include your **driver.**
2. A zip file containing all your Java classes.