SAIT Southern Alberta Institute of Technology

CPRG 251
Assignment 2 (Module 3)
Spring/Summer 2020

Name: _____

Marks: _____ / 35

D2L Submission Instructions

1) One ZIP file needs to submit to D2L with the following naming convention
   CPRG251_A2_Firstname_Lastname.zip using your first and last name.
   1. If working in a group of two (2), only one team member needs to submit to D2L (both can if you so wish). Both members will receive the same feedback. The file should have the following naming convention: **CPRG251_A2_Lastname of member 1_Lastname of member 2.zip**

2) The ZIP file must contain the following:
   1. The following directory structure:
      - bin/ – Compiled Java files.
      - src/ – Java source code files:
         - sait/bms/application/
         - sait/bms/managers/
         - sait/bms/problemdomain/
      - doc/ – Generated Javadoc files.
      - lib/ – Any third-party libraries. This folder can be empty.
      - res/ – Any resource or data files.
      - test/ – Unit test cases. This folder can be empty.
   2. A text file for the problem with named **Readme.txt** and contain:
      o A project title.
      o What the program does.
      o The date.
      o The author.
      o How to run the program.
   3. A runnable JAR file in the root folder of the ZIP archive.
      a. Use the naming convention: **FirstInitial.Lastname2.jar** (i.e.: J.Blow2.jar).
      b. It is to be built using only Eclipse IDE and JDK 1.8x.

Assignment Instructions

1. You will use only Eclipse IDE.
2. The due date for this assignment is posted in D2L in the assignment submission area and in the provided calendar located in the *Course Information* area**.** Any assignment submitted after the due date will receive a mark of zero, but feedback maybe given.
3. Submissions must be student's original work. Refer to the Academic Misconduct (AC.3.4) policies and procedures.

Problem

The ABC Book Company wants to implement a system to manage their books more efficiently. The system should allow both employees and patrons to checkout, find, and list books. A data file containing a sample list of books is provided. The data file contains a combination of four different types of books: children's books, cookbooks, paperbacks, and periodicals. Each book is uniquely identified using an ISBN and the information for each type of book is described in the formatting section.

The ABC Book Company wants an interactive program that does the following:

1. **Checkout a book.**
   - Allows a patron to checkout a book using its ISBN. If the book is unavailable, the user will be informed and the program will return back to the main menu. Otherwise, if the book is available, the available count will be decremented and the book information will be displayed.
2. **Find books by title.**
   - Allows a patron to enter a search term and the program will display a list of books that have a title matching the search term.
3. **Display books of a specific type.**
   - Allows a patron to view a list of books with a specific type. The user will also enter a format, diet, genre, or frequency (depending on the type of book) and the book list will be narrowed down further.
4. **Produce a list of random books.**
   - Allows a patron to print a list of random books. The list of books can contain any type of book.

Formatting

Each type of book listed below is represented differently in the supplied "books.txt" file. Each line in the file represents a different book and each piece of information for a book is separated by a semi-colon.

Children's Books

Children's books have an ISBN, call number, available, total, title, author(s), and format. The last digit of the ISBN for a children's book is 0 or 1. The format can either be Picture book, Early Readers, or Chapter book.

Each children's book is represented in the "books.txt" file as follows:
```
ISBN;Call number;Available;Total;Title;Authors;Format
```
Example: `9782092530030;813.6;1;14;I Need a New Butt!;Dawn McMillan, Ross Kinnaird;E`

Cookbooks

Cookbooks have an ISBN, call number, available, total, title, publisher, and diet. The last digit of the ISBN for a cookbook is either 2 or 3. The diet is either Diabetic, Vegetarian, Gluten-free, International, or None.

Each cookbook is represented in the "books.txt" file as follows:
```
ISBN;Call number;Available;Total;Title;Publisher;Diet
```
Example: `9787518397792;641.6 DOG;4;5;From Crook to Cook;Snoop Dogg;N`

Paperbacks

Paperbacks have an ISBN, call number, available, total, title, author(s), year of release, and genre. The last digit of the ISBN for a paperback is between 4 and 7. The genre can either be Adventure, Drama, Education, Classic, Fantasy, or Science Fiction.

Each novel is represented in the "books.txt" file as follows:
```
ISBN;Call number;Available;Total;Title;Authors;Year;Genre
```
Example: `9782232375484;822.33 SHA;6;6;Hamlet;William Shakespeare;1602;C`

Periodicals

Periodicals have an ISBN, call number, available, total, title, and frequency. The last digit of the ISBN for a periodical is either 8 or 9. The frequency can either be Daily, Weekly, Monthly, Bimonthly, and Quarterly. A periodical cannot be checked out.

Each periodical is represented in the "books.txt" file as follows:
```
ISBN;Call number;Available;Total;Title;Frequency
```
Example: `9782346146918;050;0;5;Dogster;B`

Details

The *ISBN* or *International Standard Book Number* is a unique 13-digit number assigned to books. The last digit of the ISBN determines the specific type of book. Note that the maximum value for *int* is only 10 digits, therefore a bigger data type is required.

The call number is a sequence of characters (using the Dewey Decimal Formatting System) that patrons use to locate reading material. You are not required to validate the call number.

Given the formatting for the types of books:

- Determine the attributes that are shared between the book types and create a *Book* class containing them. The *Book* class cannot be instantiated and must be a super-class.
- Create the following classes where each one of them is to inherit the *Book* class and be located in the sait.bms.problemdomain package.
  - Cookbook
  - ChildrensBook
  - Paperback
  - Periodical
- Each one of these classes is to have a user-defined constructor that assigns the appropriate attributes.
- Override the *toString()* method in each one of these classes, so that the data is in a human readable form. The attributes should be displayed using vertical headers.

Along with the functionality mentioned above, you will need the following methods in your program:

a) Implement a method that parses the supplied "books.txt" file into a single array list. The array list will be able to contain all *Book* types (cookbooks, children's books, and paperbacks). Use the last digit of the ISBN to determine what a valid type of book needs to be created (see Formatting for more information).
b) Implement a method that allows a patron to checkout a book. The user patron will be prompted to enter the ISBN of a book. If the entered ISBN does not match, the program will inform the patron with an error message. If the ISBN matches, the program checks the book's availability. If there is a book available, the available count will be decremented and the books information will be displayed. Otherwise, the user patron will be informed the book is not available.
c) Implement a method that prompts the user patron to enter a title, performs a case-insensitive search of books that containing the inputted title, and displays them.
d) Implement a method that prompts the user for a type of book and displays all books of that type. Down-casting is required to determine the type of book is what the user specified.
e) Implement a method that prompts a user to enter a number and the program displays that number of random books. The books can be any type. The *Collections.shuffle* method maybe used.
f) Implement and call a method, when the program exits, that takes the books stored in the array list and persists them back to the "books.txt" file in the proper format.

Sample Runs:

An example of checkout books using ISBN (where input is shown in <u>bold underline</u>):

```
Welcome in ABC Book Company: How May We Assist You?
1       Checkout Book
2       Find Books by Title
3       Display Books by Type
4       Produce Random Book List
5       Save & Exit

Enter option: 1
Enter ISBN of book: 9787196778104

The book "The Hobbit" has been checked out.
It can be located using a call number: 823.9
```

An example of find books by title (where input is shown in <u>bold underline</u>):

```
Welcome in ABC Book Company: How May We Assist You?
1       Checkout Book
2       Find Books by Title
3       Display Books by Type
4       Produce Random Book List
5       Save & Exit

Enter option: 2
Enter title to search for: ham
Matching books:
ISBN:          9781784556280
Call Number:   813.54 SEU
Available:     3
Total:         14
Title:         Green Eggs and Ham
Authors:       Dr. Seuss
Format:        Picture Book

ISBN:          9782232375484
Call Number:   822.33 SHA
Available:     6
Total:         6
Title:         Hamlet
Authors:       William Shakespeare
Year:          1602
Genre:         Classic
```

An example of display books by type (where input is shown in <u>bold underline</u>):

```
Welcome in ABC Book Company: How May We Assist You?
1       Checkout Book
2       Find Books by Title
3       Display Books by Type
4       Produce Random Book List
5       Save & Exit

Enter option: 3
#       Type
```

```
1     Children's Books
2     Cookbooks
3     Paperbacks
4     Periodicals

Enter type of book: 4
Enter a frequency (D for Daily, W for Weekly, M for Monthly, B for Biweekly,
or Q for Quarterly): B

Matching books:
ISBN:           9794025081038
Call Number:    050
Available:      0
Total:          5
Title:          MAD
Frequency:      Bi-monthly

ISBN:           9782346146918
Call Number:    050
Available:      0
Total:          5
Title:          Dogster
Frequency:      Bi-monthly
```

An example of produce random book list (where input is shown in <u>bold underline</u>):

```
Welcome in ABC Book Company: How May We Assist You?
1     Checkout Book
2     Find Books by Title
3     Display Books by Type
4     Produce Random Book List
5     Save & Exit

Enter option: 4
Enter number of books: 1

Random books:
ISBN:           9780957220737
Call Number:    823.914 MIL
Available:      0
Total:          10
Title:          Death of a Salesman
Authors:        Arthur Miller
Year:           1949
Genre:          Drama
```

Marking Guide

Follows submission guidelines			
1.	Correct files		
2.	File naming conventions followed		
3.	NO extra files		
Subtotal			/3
ABC Book Management System			
4.	Compile and run		
5.	Runnable JAR file		
6.	Clear instructions		
7.	Proper use of inheritance		
8.	Follow naming conventions		
9.	Menu design		
10.	Validate book types information		
11.	Fill ArrayList with abstract class items		
12.	Use ISBN to populate ArrayList		
13.	Checkout a book		
14.	Find books containing title		
15.	Display books with a specific type		
16.	Produce a list of random books		
17.	Persist changes to data file		
18.	Override toString method		
Subtotal			**/32**
Total			**/35**

Object-Oriented Programming Essentials CPRG 251