CSC 242: Introduction to Computer Science II

Assignment 4

See D2L for Due Date

-no points if worked with or "worked alone" not specified.

Reading

Review Chapter 8 in **Introduction to Computing using Python: An Application Development Focus, Second Edition** by Ljubomir Perković.

Logistics

In this class programming assignments may be completed in consultation with up to two other classmates. You must identify the classmates with whom you collaborate in a comment at the top of the assignment, and the number of collaborators on any assignment **may not exceed two other people**. You must also submit a comment in your submission for each assignment that describes in detail how each collaborator contributed to the assignment. If you did not collaborate with anyone on the assignment, you must include a comment that says that. You may not under any circumstances discuss the assignments with classmates other than your identified collaborators. Working so closely with anyone other than your identified collaborators, Mr. Zoko, or lab assistant, so as to produce identical or near identical code is a violation of the Academic Integrity policy. This policy will be strictly enforced.

Please include the following with your assignment submission:

1. A comment at the top of your Python file identifying any classmates with whom you discussed or in any other way collaborated on the assignment. You may work (directly or indirectly) with **no more than two** other people.
2. Add a comment at the top of your Python file that describes for each person what they contributed to the assignment. This must be at least 2-3 sentences and be **very specific and detailed**.

A submission that does not include a list of collaborators and a comment indicating how you collaborated with classmates will earn a 0. If you worked alone, you must put a comment at the top of your file that indicates that or you will also receive a 0. There will be no exceptions to this rule.

Assignment Criteria – Read Carefully!

No template provided. You must write all the class definitions yourself.

Global Point Break down

- 15 points: You must use assert statements and maintain class invariants. The screenshots I provide may not show all the different checks that need to be there.
- 15 points: You must prevent "leaky abstractions". For example, if you use a list in your Library class, it cannot be accessed outside of the Library class. Note: you don't have to provide any custom exceptions for this assignment
- 70 points: Individual problems as listed below.

PROBLEM 1 (15 POINTS):

Let's get warmed up. Implement the Book class.

A Book has the following properties:
name : mandatory property. Must be string with length of at least 1
author : mandatory property. Must be string with length of at least 1
pages : optional property. Defaults to 1. Must be int with value of at least 1
year : optional property. Defaults to 1440, the year the printing press was created. Must be int with value of at least 1440.

Note: The properties of a Book can only be initialized by the constructor! The values of the book can only be obtained using methods.

Make sure the output of each method is exactly as shown on the screenshots. The template is not provided for you. Use the screenshots to infer the methods needed and their behavior.

```
b=Book()
Traceback (most recent call last):
  File "<pyshell#0>", line 1, in <module>
    b=Book()
TypeError: Book.__init__() missing 2 requi
red positional arguments: 'name' and 'auth
or'
b=Book('IT','Stephen King')
b
Book('IT','Stephen King',1,1440)
str(b)
'IT:Stephen King:1:1440'
b.getName()
'IT'
b.getAuthor()
'Stephen King'
b.getYear()
1440
b.getPages()
1
```

```
b=Book('IT','Stephen King',1000,1986)
str(b)
'IT:Stephen King:1000:1986'
b
Book('IT','Stephen King',1000,1986)
b2=eval(repr(b))
b2
Book('IT','Stephen King',1000,1986)
```

PROBLEM 2 (15 POINTS):

Write a class named Library that manages a collection of Book objects. Here are screenshots of the applications behavior.

The constructor takes in an options filename used by the application for part 4. You must specify a default filename.

Initialize a few Books and add them to the Library.

```
l=Library('library.txt')
l.addBook(Book('IT','Stephen King',1000,1986))
l.addBook(Book('Misery','Stephen King',368,1987))
l.addBook(Book('The Stand','Stephen King',1328,1978))
l.addBook(Book('The Hunt for Red October','Tom Clancy',387,1984))
```

```
l.addBook(1)
Traceback (most recent call last):
  File "<pyshell#39>", line 1, in <module>
    l.addBook(1)
  File "C:\Users\azoko.BASEMENT\OneDrive - DePaul University\Documents\
nt 4\CSC242HW4-solution.py", line 52, in addBook
    a[redacted]'Can only add books to the library'
AssertionError: Can only add books to the library
```

```
lst=l.getBooksWithAuthor('Stephen King')
for b in lst:
    print(b)


IT:Stephen King:1000:1986
Misery:Stephen King:368:1987
The Stand:Stephen King:1328:1978
lst=l.getBooksWithAuthor('Tom Clancy')

for b in lst:
    print(b)


The Hunt for Red October:Tom Clancy:387:1984
```

```
l=Library('library.txt')
l.addBook(Book('IT','Stephen King',1000,1986))
l.addBook(Book('Misery','Stephen King',368,1987))
l.addBook(Book('The Stand','Stephen King',1328,1978))
l.addBook(Book('The Hunt for Red October','Tom Clancy',387,1

l.getBooksWrittenInYear(1987)
[Book('Misery','Stephen King',368,1987)]
l.getBooksWrittenInYear(2024)
[]
l.getBooksWrittenInYear('2024')
Traceback (most recent call last):
  File "<pyshell#90>", line 1, in <module>
    l.getBooksWrittenInYear('2024')
  File "C:\Users\azoko.BASEMENT\OneDrive - DePaul University
nt 4\CSC242HW4-solution.py", line 75, in getBooksWrittenInYe
    [redacted] , 'year must be a int'
AssertionError: year must be a int
```

```
l.getBookswithPageCountRange(400,1000)
[Book('IT','Stephen King',1000,1986)]
l.getBookswithPageCountRange(367,390)
[Book('Misery','Stephen King',368,1987), B
ook('The Hunt for Red October','Tom Clancy
',387,1984)]
l.getBookswithPageCountRange(1,2000)
[Book('IT','Stephen King',1000,1986), Book
('Misery','Stephen King',368,1987), Book('
The Stand','Stephen King',1328,1978), Book
('The Hunt for Red October','Tom Clancy',3
87,1984)]
```

```
l.getBooksWithNameContaining('u')
[Book('The Hunt for Red October','Tom Clan
cy',387,1984)]
l.getBooksWithNameContaining('U')
[]
l.getBooksWithNameContaining('Stand')
[Book('The Stand','Stephen King',1328,1978
)]
l.getBooksWithNameContaining('e')
[Book('Misery','Stephen King',368,1987), B
ook('The Stand','Stephen King',1328,1978),
Book('The Hunt for Red October','Tom Clanc
y',387,1984)]
```

PROBLEM 3 (15 POINTS):

Add the three operators whose behaviors are shown below.

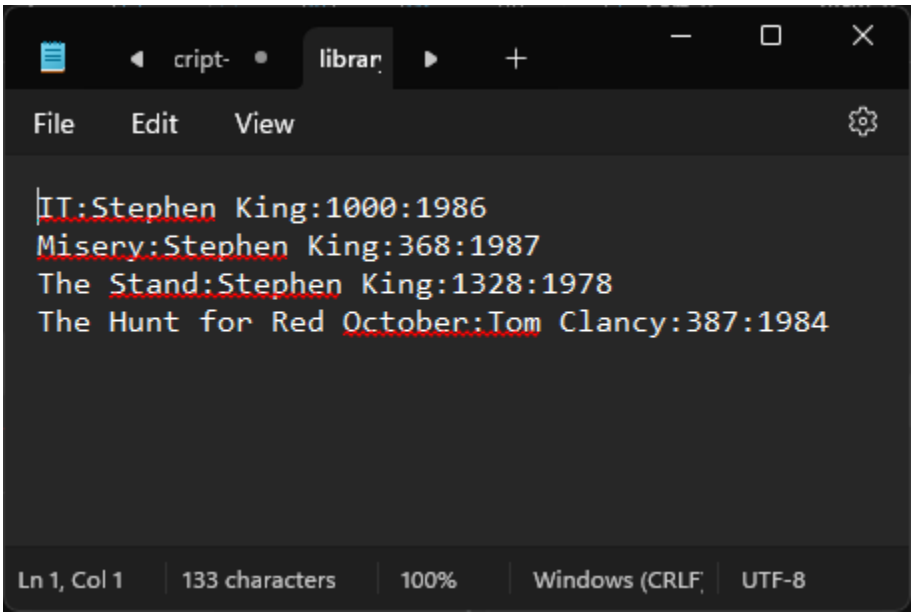
```
len(l)
4
for b in l:
    print(b)


IT:Stephen King:1000:1986
Misery:Stephen King:368:1987
The Stand:Stephen King:1328:1978
The Hunt for Red October:Tom Clancy:387:1984
l[0]
Book('IT','Stephen King',1000,1986)
```

PROBLEM 4 (25 POINTS):

Add methods loadBooks and writeBooksToFile to Library that read and write Books to a file. You need to use the filename passed in via the constructor to Library. Anytime you load Books into the Library, you must clear out any existing Books. The screenshot below reflects using the same data from the screenshots in part 2.

```
l.writeBooksToFile()
True
```

File Contents:



```
l=Library()
l.loadBooks()
True

l=Library()
len(l)
0
l.loadBooks()
True
len(l)
4
for b in l:
    print(b)


IT:Stephen King:1000:1986
Misery:Stephen King:368:1987
The Stand:Stephen King:1328:1978
The Hunt for Red October:Tom Clancy:387:1984
```

Submitting the assignment

You must submit the assignment using the assignment 4 dropbox on the D2L site. Submit a Python file (csc242hw4.py) with your implementation in it and comments describing your collaboration status. Submissions after the deadline listed above will be automatically rejected by the system. See the syllabus for the grading policy.

Grading

The assignment is worth 100 points. Any student who does not submit comments in the Python file describing the contributions of each team member or indicating that he/she worked alone will earn a 0 on the assignment.