

## Project 1 – CMSC 201 – Spring 2013

**Objective:** This project will give you a chance to learn about strings, lists, functions, file I/O, top-down design, dictionaries, and classes.

**Note:** This project will take a long time to complete. Please get started early.

**Description:** You are going to write a program to keep track of the inventory of a bookstore. The program will allow the user to load the inventory of the bookstore into the memory from a file, to view the inventory in alphabetical order by author, to add a book to the inventory, change the quantity of books in the inventory, and calculate the total value of the inventory.

### Rules:

1. The pseudo code for your main function is given below:

```
def main():  
    # print a greeting  
  
    Inventory = {}  
  
    # call readDatabase(Inventory) to fill the dictionary with data from file  
  
    # Loop until the user wants to quit  
  
        #display the menu by calling printMenu()  
  
        #If the user types 1, call displayInventory(Inventory)  
  
        #If the user types 2, call addBook(Inventory)  
  
        #If the user types 3, call changeQty(Inventory)  
  
        #If the user types 4 call, calculateTotal(Inventory)  
  
        #If the user types 5, print Thank you message and quit the program  
  
        #If the user types anything else, report error
```

Your main function should simply be an implementation of the pseudo code given above.

2. You can only have one dictionary in your entire program. This is the `Inventory` dictionary seen above in the pseudo code for main. The key to the dictionary will be the author's name. The value will be a list of books (i.e. book objects) written by the author. A pictorial example is seen below:

***The Inventory Dictionary***

Key	Value
.....	.....
Shakespeare, William	→
.....	.....

***A list of book objects***

Romeo And Juliet	Macbeth	Hamlet
5	3	10
5.99	7.99	6.99
0	1	2

3. You must implement the functions below and you cannot change the parameter lists . You may define other functions in addition to the ones given below, but they should not be called from main. All your variables must be local to a function. You may use global variables only if you intend for them to be constant (i.e. to avoid magic numbers).

Function Header	Description of what the function should do
<code>readDatabase(Inventory)</code>	This function should ask the user for the file that has the input, read the content of the file (see section below about the structure of the input file), and make entries into the <code>Inventory</code> dictionary.
<code>printMenu()</code>	This function should print the menu (see the sample run for the content of the menu) and return the user's choice.
<code>displayInventory(Inventory)</code>	This function should display the inventory. The authors should display in alphabetical order and the books by each author should also be in alphabetical order.
<code>addBook(Inventory)</code>	This function should ask the user for the author's name, the title of the book, the qty, and the price. The new book should be added to the <code>Inventory</code> . Make sure the qty is an int and the price is a float. If the book was already in the <code>Inventory</code> , it should not be re-added.
<code>changeQty(Inventory)</code>	This function should ask the user for the name of the author and the title of the book that needs to have its qty updated. Only if a valid qty is entered and the book is already actually part of the inventory, will the qty be updated. Error messages will display otherwise.
<code>calculateTotal(Inventory)</code>	This function will calculate and print the total value of the inventory

### Structure of the input file

A record is defined as : `lastName$firstName$title$qty$price`

You can assume that the text file has one record per line, all the fields (i.e. `lastName`, `firstName`, etc.) are present, all the fields are separated by a `$`, and that the `qty` and the `price` can be converted to numbers. You cannot assume that the file will be in alphabetical order.

Below is the file used in the sample run. Create this file and test your program to see if the output matches the sample.

### **Content of database.txt**

Shakespeare\$William\$Romeo And Juliet\$5\$5.99  
Shakespeare\$William\$Macbeth\$3\$7.99  
Dickens\$Charles\$Hard Times\$7\$27.00  
Austin\$Jane\$Sense And Sensibility\$2\$4.95  
Dickens\$Charles\$David Copperfield\$4\$26.00  
Austin\$Jane\$Emma\$3\$5.95  
Hawthorne\$Nathaniel\$The Scarlet Letter\$6\$18.00  
Shakespeare\$William\$Hamlet\$10\$6.99  
Chaucer\$Geoffrey\$The Canterbury Tales\$4\$20.00  
Dickens\$Charles\$Great Expectations\$2\$25.00

### **The Book Class**

Your program needs to design a book class, so that you can make book objects. Recall that your dictionary will use the author's name as the key and the value will be a list of book objects (i.e. books written by the author). The book class should have the following member variables: title, qty, and price. The book class should have the following methods: a constructor, get functions to get the member variables, set functions to set the qty and the price, and a `displayInfo` function that will display the values of the member variables of the book object. If you need to access or modify the title, qty, or price of a book, you should use the appropriate method in your code. Place the class definition in its own file called `Book.py`.

**Sample run** (user input is shown in bold and explanation in text box is not part of the program's output)

Welcome to the bookstore program!

Enter the name of the file: **database.txt**

-----

Enter 1 to display the inventory

Enter 2 to add a book

Enter 3 to change the qty on hand

Enter 4 to view the total amount

Enter 5 to exit

Enter your choice: **1**

The Author is: Austin, Jane

Title: Emma, Qty: 3, Price: \$5.95

Title: Sense And Sensibility, Qty: 2, Price: \$4.95

The Author is: Chaucer, Geoffrey

Title: The Canterbury Tales, Qty: 4, Price: \$20.00

The Author is: Dickens, Charles

Title: David Copperfield, Qty: 4, Price: \$26.00

Title: Great Expectations, Qty: 2, Price: \$25.00

Title: Hard Times, Qty: 7, Price: \$27.00

The Author is: Hawthorne, Nathaniel

Title: The Scarlet Letter, Qty: 6, Price: \$18.00

The Author is: Shakespeare, William

Title: Hamlet, Qty: 10, Price: \$6.99

Title: Macbeth, Qty: 3, Price: \$7.99

Title: Romeo And Juliet, Qty: 5, Price: \$5.99

-----

*Notice how the authors display in alphabetical order and the books are also in alphabetical order*

Enter 1 to display the inventory  
Enter 2 to add a book  
Enter 3 to change the qty on hand  
Enter 4 to view the total amount  
Enter 5 to exit

Enter your choice: **2**  
Enter the author's last name: **auSTIn**  
Enter the author's first name: **JaNE**  
Enter the title: **eMMa**

This book is already in the Inventory and cannot be added again

-----

Enter 1 to display the inventory  
Enter 2 to add a book  
Enter 3 to change the qty on hand  
Enter 4 to view the total amount  
Enter 5 to exit

Enter your choice: **2**  
Enter the author's last name: **aUstIn**  
Enter the author's first name: **jANe**  
Enter the title: **persUasION**  
Enter the qty: **5**  
Enter the price: **hello**  
Invalid input for price.  
Enter the price: **7.95**

*Notice how the menu keeps displaying*

*Emma by Jane Austin is already in the Inventory. Notice how the user can type the name and title using any combination of lower and upper case letters*

*Although Jane Austin is already in the Inventory, her book Persuasion is not and therefore it is added. Notice how the qty and the price are validated*

-----

Enter 1 to display the inventory

Enter 2 to add a book

Enter 3 to change the qty on hand

Enter 4 to view the total amount

Enter 5 to exit

Enter your choice: 1

The Author is: Austin, Jane

Title: Emma, Qty: 3, Price: \$5.95

Title: Persuasion, Qty: 5, Price: \$7.95

Title: Sense And Sensibility, Qty: 2, Price: \$4.95

The Author is: Chaucer, Geoffrey

Title: The Canterbury Tales, Qty: 4, Price: \$20.00

The Author is: Dickens, Charles

Title: David Copperfield, Qty: 4, Price: \$26.00

Title: Great Expectations, Qty: 2, Price: \$25.00

Title: Hard Times, Qty: 7, Price: \$27.00

The Author is: Hawthorne, Nathaniel

Title: The Scarlet Letter, Qty: 6, Price: \$18.00

The Author is: Shakespeare, William

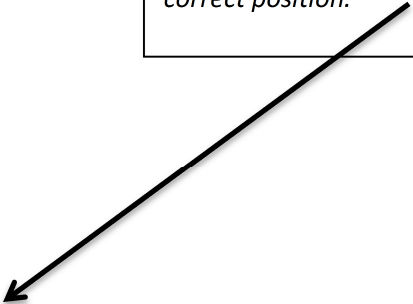
Title: Hamlet, Qty: 10, Price: \$6.99

Title: Macbeth, Qty: 3, Price: \$7.99

Title: Romeo And Juliet, Qty: 5, Price: \$5.99

-----

Notice how the new entry is in the correct position.



Enter 1 to display the inventory  
Enter 2 to add a book  
Enter 3 to change the qty on hand  
Enter 4 to view the total amount  
Enter 5 to exit  
Enter your choice: **2**  
Enter the author's last name: **BRONTE**  
Enter the author's first name: **emILy**  
Enter the title: **wuTHERING HEights**  
Enter the qty: **5.75**  
Invalid input for qty.  
Enter the qty: **hello**  
Invalid input for qty.  
Enter the qty: **5**  
Enter the price: **[1,2,3]**  
Invalid input for price.  
Enter the price: **5.50**

*Here, a new author and book is being added. Notice the user can type the name and title using any combination of lower and upper case letters. The qty and price are validated.*

-----  
Enter 1 to display the inventory  
Enter 2 to add a book  
Enter 3 to change the qty on hand  
Enter 4 to view the total amount  
Enter 5 to exit  
Enter your choice: **3**  
Enter the author's last name: **steINbeck**  
Enter the author's first name: **JOHN**  
No such author in your database. So you cannot change qty

*We currently don't have any books by John Steinbeck in our inventory, so it does not make sense to change the qty of any of his books.*

-----  
Enter 1 to display the inventory  
Enter 2 to add a book  
Enter 3 to change the qty on hand  
Enter 4 to view the total amount  
Enter 5 to exit  
Enter your choice: **shaKEsPeare**  
Invalid choice

*Shakespeare is not a valid choice. It should be a number from 1 to 5.*

-----  
Enter 1 to display the inventory  
Enter 2 to add a book  
Enter 3 to change the qty on hand  
Enter 4 to view the total amount  
Enter 5 to exit  
Enter your choice: **3**  
Enter the author's last name: **shakeSPeaRe**  
Enter the author's first name: **WillLiaM**  
Enter the title: **much Ado AbouT Nothing**  
No book with the title Much Ado About Nothing by Shakespeare, William in inventory

*Although the inventory does contain plays by William Shakespeare, we don't have any copies of Much Ado About Nothing. Notice how the error message displays (only the first letter in each word is capitalized)*



-----

Enter 1 to display the inventory

Enter 2 to add a book

Enter 3 to change the qty on hand

Enter 4 to view the total amount

Enter 5 to exit

Enter your choice: **3**

Enter the author's last name: **shakeSpeaRE**

Enter the author's first name: **wiLLIAM**

Enter the title: **macBethH**

Enter the new qty: **(4,5,6)**

Invalid input for the new qty.

Enter the new qty: **8**

Qty has been updated from 3 to 8

*We are able to change the qty of  
Macbeth from 3 to 8.*

-----  
Enter 1 to display the inventory  
Enter 2 to add a book  
Enter 3 to change the qty on hand  
Enter 4 to view the total amount  
Enter 5 to exit  
Enter your choice: 1  
The Author is: Austin, Jane  
    Title: Emma, Qty: 3, Price: \$5.95  
    Title: Persuasion, Qty: 5, Price: \$7.95  
    Title: Sense And Sensibility, Qty: 2, Price: \$4.95  
The Author is: Bronte, Emily  
    Title: Wuthering Heights, Qty: 5, Price: \$5.50  
The Author is: Chaucer, Geoffrey  
    Title: The Canterbury Tales, Qty: 4, Price: \$20.00  
The Author is: Dickens, Charles  
    Title: David Copperfield, Qty: 4, Price: \$26.00  
    Title: Great Expectations, Qty: 2, Price: \$25.00  
    Title: Hard Times, Qty: 7, Price: \$27.00  
The Author is: Hawthorne, Nathaniel  
    Title: The Scarlet Letter, Qty: 6, Price: \$18.00  
The Author is: Shakespeare, William  
    Title: Hamlet, Qty: 10, Price: \$6.99  
    Title: Macbeth, Qty: 8, Price: \$7.99  
    Title: Romeo And Juliet, Qty: 5, Price: \$5.99  
-----

*Notice the changes. Emily Bronte is added and displayed in correct alphabetical order. The qty of Macbeth has been updated.*



```
Enter 1 to display the inventory
Enter 2 to add a book
Enter 3 to change the qty on hand
Enter 4 to view the total amount
Enter 5 to exit
```

```
Enter your choice: 4
```

```
The total value of the inventory is $789.77
```

*Total value at this point in time is displayed with 2 digits after the decimal place.*

```
-----
Enter 1 to display the inventory
Enter 2 to add a book
Enter 3 to change the qty on hand
Enter 4 to view the total amount
Enter your choice: 5
```

```
Thank you for using this program
```

*Ending the program*

When you've finished your project, use the submit command to submit the files. You must be logged into your account and you must be in the same directory as the file you're trying to submit.

At the Linux prompt, type

```
submit cs201 Proj1 proj1.py
```

```
submit cs201 Proj1 Book.py
```

After entering the submit command shown above, you should get a confirmation that submit worked correctly:

```
Submitting proj1.py...OK
```

```
Submitting Book.py...OK
```

If not, check your spelling and that you have included each of the required parts and try again.

You can check your submission by entering:

```
submitls cs201 Proj1
```

You should see the name of the files that you just submitted, in this case proj1.py and Book.py

Note: You don't need to submit the input text file, just submit your code!