## INTRODUCTION TO JAVA PROGRAMMING PROJECT 5 USER-DEFINED METHODS AND CLASSES CHAPTER 6

Use the Eclipse Java IDE to create a library program. You will create 2 classes, Patron and Book. Use the supplied Tester program (available with this project description on Blackboard) to exercise your 2 classes. You should not need to alter the functionality of the Tester program.

Patrons of a library can borrow up to 3 books. A patron, therefore, has a name and up to 3 borrowed books. A book must have an author and a title. Below are some of the behaviors of the Book and Patron classes:

- The client can only instantiate a book with the title and author specified.
- The client can examine but not modify a book's title and author.
- The client can ask a patron whether it has borrowed a given book (identified by title).
- The client can tell a patron to return a given book (identified by title).
- The client can tell a patron to borrow a given book.

The Book class should have 2 String instance variables to store the book title and book author. The Book class should have a constructor that requires 2 String arguments be specified, the title and author. The Book class will not have a default constructor because the title and author need to be specified to create a new book. The Book class will have 2 accessor methods, getTitle() to return the book title and getAuthor() to return the book author. Also, there should be a toString() method that returns a String with the book title and author along with identifying text.

The Patron class should have 4 instance variables, one String and three Book references. The Patron class should have 2 overloaded constructors, one that is the default constructor and one that requires one argument to specify the patron's name. The constructors should set the patron's name to either an empty string or the specified string, respectively. The constructors should set all the Book references to null. The Patron class should have 3 mutator methods, setName() to set the patron's name, borrowBook() to specify a Book object to check out to the Patron, and returnBook() to specify the book title to search for and remove from the check out list. The Patron class should have 3 accessor methods, getName() to return the patron's name, hasBorrowed() to search for the specified book title, and toString() to display the book titles and authors of all the borrowed books. When a book is borrowed, the patron looks for a Book reference variable that is null. If a null variable is found, it is reset to the new book and the method returns true. If no null is found, the method returns false. Similar considerations apply to the methods to return a book and to check if a book has already been borrowed.

For this project, begin by downloading the Tester.java file from Blackboard (located with the project description) to your computer (i.e., your Desktop). Open Eclipse and create a new Java project. Then add a new class and call it "Patron". Then add another new class and call it "Book". To add the Tester class, click File, then Import. Under General, select File System, then click Next. In the From Directory, Browse to the directory containing your Tester.java (i.e., Desktop). Click the checkbox in front of Tester.java. Click Browse for the Into folder and select the src directory. Click Finish to add Tester.java. Add the required functionality to the

Patron and Book classes. Run the main() method in the Tester class to debug your program. Compare your output to the sample output shown below.

Hint: Examine the Tester program closely for clues about what your method signatures should look like. Remember that your method signatures must have the same number and type of formal parameters to match those actual parameters in the method calls in Tester. Also, the return data type can be determined from those same method calls in Tester.

Hint: When comparing 2 String objects in Java, be sure to use the "equals" method for String objects to determine whether the characters in both strings are equivalent.

```
******************************
Please enter the title for John Doe's first book: Call of the Wild
Please enter the author for John Doe's first book: Jack London
Patron Name: John Doe
Book #1
Book Title: Call of the Wild
Book Author: Jack London
Total books borrowed: 1
Please enter the title for John Doe's second book: A Tale of Two Cities
Please enter the author for John Doe's second book: Charles Dickens
Patron Name: John Doe
Book #1
Book Title: Call of the Wild
Book Author: Jack London
Book #2
Book Title: A Tale of Two Cities
Book Author: Charles Dickens
Total books borrowed: 2
Please enter the title for John Doe's third book: The House of Seven Gables
Please enter the author for John Doe's third book: Nathaniel Hawthorne
Patron Name: John Doe
Book #1
Book Title: Call of the Wild
Book Author: Jack London
Book Title: A Tale of Two Cities
Book Author: Charles Dickens
Book #3
Book Title: The House of Seven Gables
Book Author: Nathaniel Hawthorne
Total books borrowed: 3
Please enter the title for John Doe's fourth book: The Cat in the Hat
Please enter the author for John Doe's fourth book: Dr. Seuss
Book 4 for John Doe failed.
This message should print since 3 books max can be borrowed.
Please enter the title to return from John Doe's borrowed list: A Tale of Two
Cities
A Tale of Two Cities has been returned.
John Doe's fourth book successfully checked out.
```

Patron Name: John Doe

Book #1

Book Title: Call of the Wild

Book Author: Jack London

Book #2

Book Title: The Cat in the Hat

Book Author: Dr. Seuss

Book #3

Book Title: The House of Seven Gables

Book Author: Nathaniel Hawthorne

Total books borrowed: 3

Please enter your name: Betty Roe

Patron Name: Betty Roe Total books borrowed: 0

## Once completed.

- Take a screenshot of the application running. Use ALT-PRTSCREEN to take a screenshot of the window and not your whole screen. Too hard to read if you take a screenshot of your whole desktop and I will grade as if the item was not included.
- In any project that contains multiple windows or error messages that you are to program, please include screenshots of those as well.
- Add these screenshot(s) to a Word (or OpenOffice) document.
- After the screenshot for the appropriate exercise, include the code you wrote to accomplish the project.