

**Assignment Group: 14**

**Program:** Automotive Software Engineering (Master)

**Subject:** Software Engineering and Programming Basics W18/19

**Date:** 09/12/2018

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## Code:

### BookBean.java

---

```
package beans;

/*
 * This class is simply a bean/pojo class which has fields and a constructor to handle the class books in the libraries
 */

public class BookBean {

    private String bookName;
    private ContributorBean contributor;
    private String authorName;
    private int publishYear;
    private boolean physicallyPresent;

    public void setBookName(String bookName) {
        this.bookName = bookName;
    }

    public String getContributorName() {
        return contributor.getContributorName();
    }

    public String getAuthorName() {
        return authorName;
    }

    public void setAuthorName(String authorName) {
        this.authorName = authorName;
    }

    public int getPublishYear() {
        return publishYear;
    }

    public void setPublishYear(int publishYear) {
        this.publishYear = publishYear;
    }

    /*
     * This constructor with all the fields is used for the books to be put in the library and for the simulation purpose, it
     * also contains logging for the user to see on the console when there's a book created
     */
    public BookBean(String bookName, ContributorBean contributor, String authorName,
                    int publishYear, boolean physicallyPresent) {
        this.bookName = bookName;
        this.contributor = contributor;
        this.physicallyPresent = physicallyPresent;
        this.authorName = authorName;
        this.publishYear = publishYear;
        System.out.println("A new book " +
            "[" + bookName + "] contributed by the [" + contributor.getContributorName() + "]");
    }

    public String getBookName() {
        return bookName;
    }

    public boolean isPhysicallyPresent() {
        return physicallyPresent;
    }

    public void setPhysicallyPresent(boolean physicallyPresent) {
        this.physicallyPresent = physicallyPresent;
    }
}
```

---

## ClientBean.java

```
package beans;

import java.util.ArrayList;

/*
 * This class serves the purpose of the client functionality
 */

public class ClientBean {

    private String clientName;

    private ArrayList<BookBean> booksRent = new ArrayList<>();

    /*
     * This method takes care of the renting a book to the client also verifying if the book is physically present and books rented are not more than 19
     */

    public void rentBook(BookBean book) {
        if (book.isPhysicallyPresent()) {
            if (booksRent.size() < 19) {
                booksRent.add(book);
                System.out.println("Book [" + book.getBookName() + "] is rented by the client [" + clientName + "]);");
            } else {
                System.out.println("Book rented limit is over, please return to continue the renting of books");
            }
        } else {
            System.out.println("Book [" + book.getBookName() + "] is physically not available, please check later");
        }
    }

    /*
     * This method takes care of the creating a new client
     */
    public ClientBean(String clientName) {
        this.clientName = clientName;
        System.out.println("A new client [" + clientName + "] has joined the library");
    }

    /*
     * This method returns all the books rented by the client
     */

    public ArrayList<BookBean> getBooksRent() {
        System.out.println("all available books rented");
        return booksRent;
    }

}
```

## ContributorBean.java

```
package beans;

import java.util.ArrayList;

//This class is used for the contributors, each contributor can have many books
public class ContributorBean {
    private String contributorName;
    private ArrayList<BookBean> booksContributed = new ArrayList<>();

    public ContributorBean(String contributorName) {
        this.contributorName = contributorName;
    }

    public String getContributorName() {
        return contributorName;
    }

    public ArrayList<BookBean> getBooksContributed() {
        return booksContributed;
    }

}
```

## LibraryBean.java

```
package beans;

import java.util.ArrayList;
import java.util.Calendar;

/*
 * This class takes care of the library functionality
 */

public class LibraryBean {

    private ArrayList<BookBean> allBooks = new ArrayList<>();

    /*
     * This method is used get all the books in the library
     */
    public ArrayList<BookBean> getAllBooks() {
        System.out.println("Books available in library are : ");
        for (BookBean book : this.allBooks) {
            System.out.println("Book named --> " + "[" + book.getBookName() + "]");
        }
        return allBooks;
    }

    /*
     * This method is used add a new book in the library
     */
    public void addBook(BookBean book) {
        allBooks.add(book);
    }

    /*
     * This method is used to remove a book from the library
     */
    public void removeBook(BookBean book) {
        allBooks.add(book);
    }

    /*
     * This method is used to remove a book from the library
     */
    public void removeBook(BookBean book) {
        allBooks.add(book);
    }

    /*
     * This method is used for searching books by the name from the library
     */
    public ArrayList<BookBean> searchBooksByName(String name) {
        ArrayList<BookBean> result = new ArrayList<>();
        for (BookBean book : this.allBooks) {
            if (book.getBookName().equals(name)) {
                result.add(book);
            }
        }
        if (result.size() > 0) {
            System.out.println("Books found by name are : ");
            for (BookBean book : result) {
                System.out.println(book.getBookName());
            }
        } else {
            System.out.println("No books available with this name");
        }
        return result;
    }

    /*
     * This method is used for searching books by the contributor from the library
     */
    public ArrayList<BookBean> searchBooksByContributor(String contributor) {
        ArrayList<BookBean> result = new ArrayList<>();
        for (BookBean book : this.allBooks) {
            if (book.getContributorName().equals(contributor)) {
                result.add(book);
            }
        }
        if (result.size() > 0) {
            System.out.println("Books found by contributor name are : ");
            for (BookBean book : result) {
                System.out.println(book.getBookName());
            }
        } else {
            System.out.println("No books available with this contributor name");
        }
        return result;
    }
}
```

```

/*
 * This method is used for searching books by the author from the library
 */

public ArrayList<BookBean> searchBooksByAuthor(String author) {
    ArrayList<BookBean> result = new ArrayList<>();
    for (BookBean book : this.allBooks) {
        if (book.getAuthorName().equals(author)) {
            result.add(book);
        }
    }
    if (result.size() > 0) {
        System.out.println("Books found by author name are : ");
        for (BookBean book : result) {
            System.out.println(book.getBookName());
        }
    } else {
        System.out.println("No books available with this author name");
    }
    return result;
}

/*
 * This method is used for searching books by the age of the books calculated by the publication year from the library
 */

public ArrayList<BookBean> searchBooksByAge(int age) {
    ArrayList<BookBean> result = new ArrayList<>();
    for (BookBean book : this.allBooks) {
        if ((Calendar.getInstance().get(Calendar.YEAR) - book.getPublishYear()) == age) {
            result.add(book);
        }
    }
    if (result.size() > 0) {
        System.out.println("Books found by age are : ");
        for (BookBean book : result) {
            System.out.println(book.getBookName());
        }
    } else {
        System.out.println("No books available with this age");
    }
    return result;
}
}

```

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## SimulationMethods.java

```

package simulator;

import beans.BookBean;
import beans.ClientBean;
import beans.ContributorBean;
import beans.LibraryBean;

import java.util.ArrayList;
import java.util.Iterator;

/*
 *
 * This class simulates the library behavior as per the requirements of the assignments
 *
 */
public class SimulationMethods {

    LibraryBean library = new LibraryBean();

    /*
     *
     * This method adds 3 books to the library, those books are contributed by a member
     *
     */

    public ArrayList<BookBean> addBooksInLibaray() {

        library.addBook(new BookBean("Book of Life",
            new ContributorBean("Adam"),
            "Peterson Jack", 1970, true));
        library.addBook(new BookBean("Book of Science", new ContributorBean("Edith"),
            "Peterson Adam", 1972, true));
        library.addBook(new BookBean("Book of Creativity", new ContributorBean("Stephen"),
            "Peterson John", 1974,
            true));
        return library.getAllBooks();
    }
}

```

```

/*
 *
 * This method adds 2 clients to the system with different names
 *
 */
public ArrayList<ClientBean> clients() {
    ArrayList<ClientBean> clients = new ArrayList<>();
    clients.add(new ClientBean("Anna"));
    clients.add(new ClientBean("Katja"));
    return clients;
}

/*
 *
 * This method rents the books to the clients and each book that is rented
 * gets removed from the library and is no more physically present in the library
 * first we rent all books for a client and then when second client tries to rent a book
 * it is not given because there are no more physical books present in the library
 * so it throws an Exception, which I handled so that program behaves accordingly
 */
public void rentBooksToClients(ArrayList<ClientBean> clients, ArrayList<BookBean> books) throws Exception {
    //client assignment creation
    ClientBean firstClient = clients.get(0);
    ClientBean secondClient = clients.get(1);

    //renting all books for one client
    for (Iterator<BookBean> iterator = books.iterator(); iterator.hasNext(); ) {
        BookBean book = iterator.next();
        firstClient.rentBook(book);
        iterator.remove(); //once book is rented, we remove it from library
        book.setPhysicallyPresent(false);
    }

    //renting book zero for second client, we can rent any book, since no books are available it must throw a Exception which is handled
    secondClient.rentBook(books.get(0));
}
}

```

## Main.java

```

import beans.BookBean;
import beans.LibraryBean;
import simulator.SimulationMethods;

/*
 * This class performs the simulation task
 */
public class Main {
    public static void main(String[] args) {
        //Main Task, The Simulation
        SimulationMethods simulation = new SimulationMethods();
        try {
            /*
             * Perform the simulations, clients method generates the clients, addBooksInLibrary method contributes books in the library,
             * rentBooksToClients method checks the necessary conditions for the books to be rented to the clients and once conditions meet
             * books are rented to the clients and their physical availability is changed to the false
             */
            simulation.rentBooksToClients(simulation.clients(), simulation.addBooksInLibrary());
        } catch (Exception ex) {
            /*
             * In case there are no books and we try to rent a book to clients than an exception is thrown which is handled here,
             * showing the correct message for the user
             */
            System.out.println("Library has no physical book available, please come later");
        }

        //Subsidiary task to check the functionality of searchingFunctions
        //This can be done in the main task too, since we are not asked to do so,
        //that's why we are doing it in the end, to show the working of it
        LibraryBean libraryBean = new LibraryBean();

        //Adding books in the library
        for (BookBean book : simulation.addBooksInLibrary()) {
            libraryBean.addBook(book);
        }

        //Searching Books by the names
        System.out.println("\n-----NOW BOOK SEARCH BY NAME-----");
        libraryBean.searchBooksByName("Book of Life");
        System.out.print("\n");

        //Searching Books by the Age (Today - Publication Year)
        System.out.println("-----NOW BOOK SEARCH BY AGE-----");
        libraryBean.searchBooksByAge(40);
        System.out.print("\n");

        //Searching Books by the Author
        System.out.println("-----NOW BOOK SEARCH BY AUTHOR-----");
        libraryBean.searchBooksByAuthor("Peterson John");
        System.out.print("\n");

        //Searching Books by the Contributor
        System.out.println("-----NOW BOOK SEARCH BY CONTRIBUTOR-----");
        libraryBean.searchBooksByContributor("Edith");
    }
}

```

## Output:

```
/opt/jdk1.8.0_172/bin/java ...
A new client [Anna] has joined the library
A new client [Katja] has joined the library
A new book [Book of Life] contributed by the [Adam]
A new book [Book of Science] contributed by the [Edith]
A new book [Book of Creativity] contributed by the [Stephen]
Books available in library are :
Book named --> [Book of Life]
Book named --> [Book of Science]
Book named --> [Book of Creativity]
Book [Book of Life] is rented by the client [Anna]
Book [Book of Science] is rented by the client [Anna]
Book [Book of Creativity] is rented by the client [Anna]
Library has no physical book available, please come later
A new book [Book of Life] contributed by the [Adam]
A new book [Book of Science] contributed by the [Edith]
A new book [Book of Creativity] contributed by the [Stephen]
Books available in library are :
Book named --> [Book of Life]
Book named --> [Book of Science]
Book named --> [Book of Creativity]

-----NOW BOOK SEARCH BY NAME-----
Books found by name are :
Book of Life

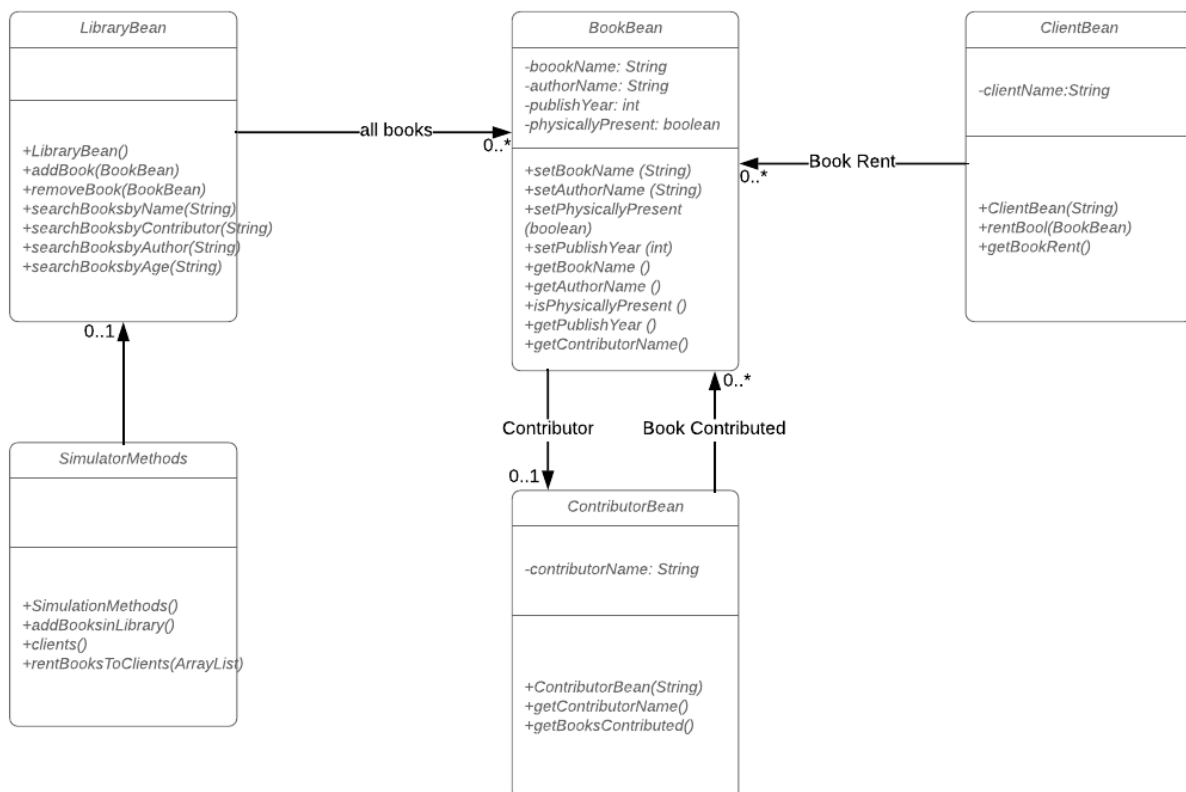
-----NOW BOOK SEARCH BY AGE-----
No books available with this age

-----NOW BOOK SEARCH BY AUTHOR-----
Books found by author name are :
Book of Creativity

-----NOW BOOK SEARCH BY CONTRIBUTOR-----
Books found by contributor name are :
Book of Science
```

## UML Class Diagram (Library)

### CLASS DIAGRAM:



## FINAL STATE MACHINE:

