Project 1

LibraryTest.java

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Contents

1. Programs

1.1. Author.java

```java
public class Author {

        //attributes of Author class
        String  name;
        String  phone;
        String  street, city, state;
        Integer zipCode;

        // constructor
        Author(String _name, String _city, String _state, String _street, Integer _zipCode, String _phone) {
                name = _name;
                city = _city;
                state = _state;
                street = _street;
                zipCode = _zipCode;
                phone = _phone;
        }

        // override the toString method
        @Override
        public String toString() {
                String author = name + ":" + street + ":" + city + ":" + state + ":" + zipCode + ":" + phone + "\n";
                return author;
        }
}
```

1.2. Book.java

```java
public class Book {

        //attributes of Book class
        String title, genre;
        String price;
        Integer authorIndex;

        // constructor
        Book(String _title, String _genre, String _price, Integer _authorIndex) {
                title = _title;
                genre = _genre;
                price = _price;
                authorIndex = _authorIndex;
        }
```

```java
        // override the toString method
        @Override
        public String toString() {
                String book = title + ":" + genre + ":" + price + ":" + authorIndex + "\n";
                return book;
        }
}
```

1.3. Library.java

```java
import java.util.*;
import java.util.Comparator;

public class Library {

        // instantiate an Author and a Book objects
        public ArrayList<Author> authors;
        public ArrayList<Book> books;

        //constructor
        Library() {
                authors = new ArrayList<Author>();
                books = new ArrayList<Book>();
        }

        private int indexBook;
        private Book b;
        private ArrayList<Book> array = new ArrayList<Book>();

        // search on book title
        // queryTitle is from user input.
        public Book searchTitle(String queryTitle) {
                Iterator<Book> it = books.iterator();
                while (it.hasNext()) {
                        b = it.next();
                        indexBook = b.title.indexOf(queryTitle);
                        if (indexBook != -1){
                                return b;
                        }
                }
                return null;
        }

        // search on book genre
        // queryGenre is from user input.
```

```java
        public ArrayList<Book> searchGenre(String queryGenre) {
                array.clear();
                Iterator<Book> it = books.iterator();
                while (it.hasNext()) {
                        b = it.next();
                        indexBook = b.genre.indexOf(queryGenre);
                        if (indexBook != -1){
                                array.add(b);
                        }
                }
                if (!array.isEmpty()) {
                        return array;
                } else {
                        return null;
                }
        }

        // search on author index
        // queryAuthorIndex is from user input.
        public ArrayList<Book> searchAuthorIndex(int queryAuthorIndex) {
                array.clear();
                Iterator<Book> it = books.iterator();
                while (it.hasNext()) {
                        b = it.next();
                        if (queryAuthorIndex == b.authorIndex){
                                array.add(b);
                        }
                }
                if (!array.isEmpty()) {
                        return array;
                } else {
                        return null;
                }
        }
}
```

1.4. LibraryTest.java

```java
import java.util.*;
import java.awt.*;
import java.awt.event.*;
import javax.swing.*;
import javax.swing.event.*;

public class LibraryTest implements ActionListener {

```

```java
        //declare Swing components as instance variables
        static Library library;
        static JFrame outputFrame;
        static JPanel panel1, panel2, panel3;
        static Container container;
        static JLabel label1, label2, label3;
        static JTextField textField1, textField2, textField3;
        static JButton button1, button2, button3;
        static JTextArea textArea;

        public static void main(String args[]){
                // instantiate a Library object
                library  = new Library();

                // create instances of authors
                library.authors.add(new Author
                        ("Dan Brown", "123 Street", "Concord", "New Hampshire", 3301, "603-123-456"));
                library.authors.add(new Author
                        ("Stephen R. Covey", "456 Street", "Salt Lake City", "Utah", 84101, "385-456-7890"));
                library.authors.add(new Author
                        ("Tina Seelig", "450 Serra Mall", "Stanford", "California", 94305, "650-725-1627"));
                library.authors.add(new Author
                        ("Y. Daniel Liang", "11935 Abercorn Street", "Savannah", "Georgia", 314191997,
                                "912-344-3264"));
                library.authors.add(new Author
                        ("Ray Murphy", "University Road", "Galway", "County Galway, Ireland", 904018,
                                "353-91-493081"));
                library.authors.add(new Author
                        ("Walter Isaacson", "789 Street", "New Orleans", "Louisiana", 70112, "504-789-0123"));

                // create instances of books
                library.books.add(new Book
                        ("The Lost Symbol", "Mystery & Thrillers", "$10", 0));
                library.books.add(new Book
                        ("Angels & Demons", "Mystery & Thrillers", "$16", 0));
                library.books.add(new Book
                        ("The Da Vinci Code", "Mystery & Thrillers", "$10", 0));
                library.books.add(new Book
                        ("Deception Point", "Mystery & Thrillers", "$16", 0));
                library.books.add(new Book
                        ("Digital Fortress", "Mystery & Thrillers", "$9", 0));
                library.books.add(new Book
                        ("The 7 Habits of Highly Effective People", "Business & Investing", "$16", 1));
                library.books.add(new Book
                        ("The 8th Habit: From Effectiveness to Greatness", "Business & Investing", "$16", 1));
                library.books.add(new Book
```

```java
                        ("The 3rd Alternative: Solving Life's Most Difficult Problems",
                                     "Business & Investing", "$16", 1));
            library.books.add(new Book
                    ("What I Wish I Knew When I Was 20", "Business & Investing", "$23", 2));
            library.books.add(new Book
                    ("Introduction to Java Programming, Comprehensive",
                                     "Computers & Technology", "$129", 3));
            library.books.add(new Book
                    ("English Grammar In Use", "Education & Reference", "$36", 4));
            library.books.add(new Book
                    ("Steve Jobs", "Biographies & Memoirs", "$30", 5));

            // instantiate a LibraryTest object that invokes libraryGUI() method
            LibraryTest viewer = new LibraryTest();
            viewer.libraryGUI();
    }

    public void libraryGUI() {

            // instantiate a JFrame object
            outputFrame = new JFrame();
            outputFrame.setSize(1100,300);
            outputFrame.setTitle("LibraryTest");
            outputFrame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);

            container = outputFrame.getContentPane();
            container.setLayout( new FlowLayout() );

            // instantiate a JPanel object
            panel1 = new JPanel();

            // instantiate a JLabel object, add it to container and panel
            label1 = new JLabel( "Title :" );
            container.add( label1 );
            panel1.add(label1);

            textField1 = new JTextField( "", 10 );
            container.add( textField1 );
            panel1.add(textField1);
            //handler is the actionPerformed() below.
            textField1.addActionListener( this );

            button1 = new JButton( "Search on Title" );
            container.add( button1 );
            panel1.add(button1);
            button1.addActionListener( this );
```

```java
        outputFrame.add(panel1);

        panel2 = new JPanel();

        label2 = new JLabel( "Genre :" );
        container.add( label2 );
        panel2.add(label2);

        textField2 = new JTextField( "", 10 );
        container.add( textField2 );
        panel2.add(textField2);
        textField2.addActionListener( this );

        button2 = new JButton( "Search on Genre" );
        container.add( button2 );
        panel2.add(button2);
        button2.addActionListener( this );

        outputFrame.add(panel2);

        panel3 = new JPanel();

        label3 = new JLabel( "Author Index :" );
        container.add( label3 );
        panel3.add(label3);

        textField3 = new JTextField( "", 2 );
        container.add( textField3 );
        panel3.add(textField3);
        textField3.addActionListener( this );

        button3 = new JButton( "Search on author index" );
        container.add( button3 );
        panel3.add(button3);
        button3.addActionListener( this );

        outputFrame.add(panel3);

        //create a textarea, attach a scrollbar, add to container.
        textArea = new JTextArea(10,75);
        container.add( new JScrollPane(textArea));

        outputFrame.setVisible(true);
    }
```

```java
// event handler for JButton, JTextField events.
public void actionPerformed( ActionEvent event ) {

        //access the text
        String queryTitle = textField1.getText();
        String queryGenre = textField2.getText();
        String queryAuthorIndex = textField3.getText();

        if ( event.getSource() == button1 ) {
                textArea.setText(""); // change the text
                if (!queryTitle.equals("")) {
                        Book resultTitle = this.library.searchTitle(queryTitle);
                        if (resultTitle == null) {
                                textArea.append("\"" + queryTitle +
                                                "\" is not found in the library.\n");

                        }
                        else {
                                textArea.append(resultTitle.toString() + "\n");

                        }
                }
                else {
                        textArea.append("Enter a book title.\n");
                }
        }
        else if ( event.getSource() == button2 ) {
                textArea.setText(""); // change the text
                if (!queryGenre.equals("")) {
                        ArrayList<Book> resultGenre = this.library.searchGenre(queryGenre);
                        if (resultGenre == null) {
                                textArea.append("\"" + queryGenre +
                                                "\" is not found in the library.\n");
                        }
                        else {
                                textArea.append(resultGenre.toString() + "\n");

                        }
                }
                else {
                        textArea.append("Enter a book genre.\n");
                }
        }
        else if ( event.getSource() == button3 ) {
                textArea.setText(""); // change the text
                if (!queryAuthorIndex.equals("")) {
```
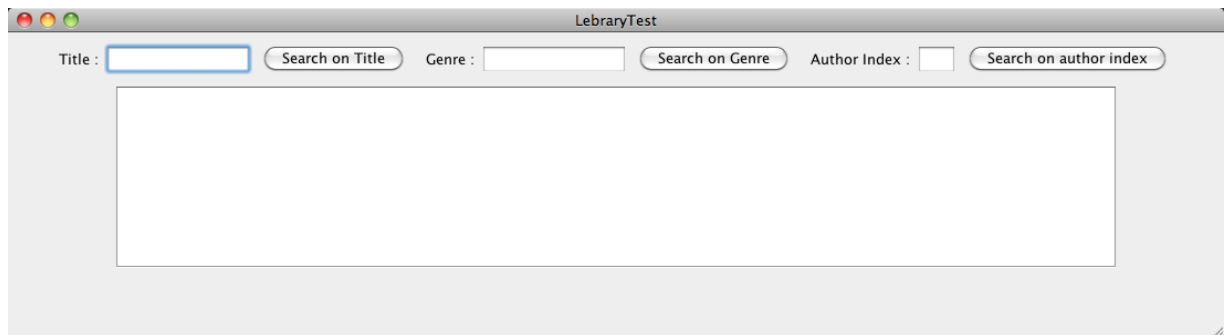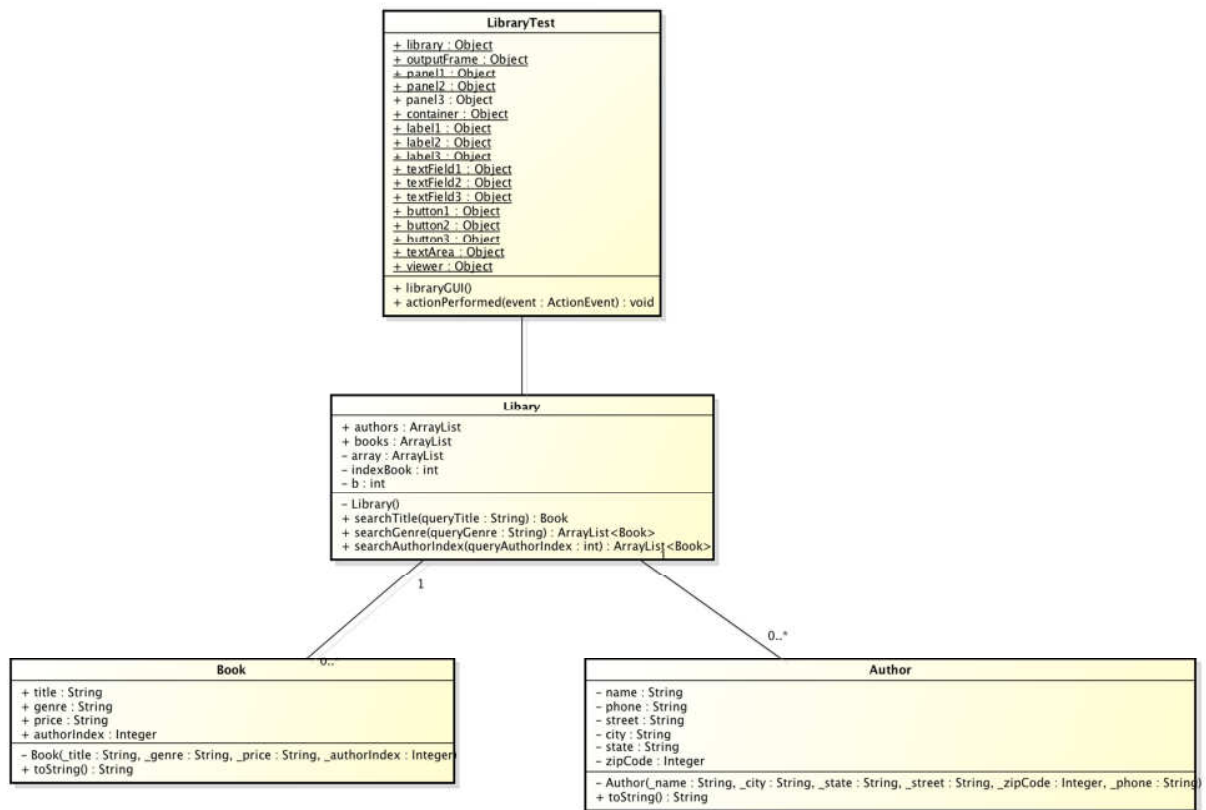
```
                    int queryAuthorIndexInt = Integer.valueOf(queryAuthorIndex);
                    ArrayList<Book> resultAuthorIndex
                    = this.library.searchAuthorIndex(queryAuthorIndexInt);
                    if (resultAuthorIndex == null) {
                            textArea.append("\"" + queryAuthorIndex +
                                        "\" is not found in the library.\n");
                    }
                    else {
                            textArea.append(resultAuthorIndex.toString() + "\n");
                    }
            }
            else {
                    textArea.append("Enter an author index.\n");
            }
        }
    }
}
```

2. Execution Result

3. Class Diagram

LibraryTest
```
+ library : Object
+ outputFrame : Object
+ panel1 : Object
+ panel2 : Object
+ panel3 : Object
+ container : Object
+ label1 : Object
+ label2 : Object
+ label3 : Object
+ textField1 : Object
+ textField2 : Object
+ textField3 : Object
+ button1 : Object
+ button2 : Object
+ button3 : Object
+ textArea : Object
+ viewer : Object

+ libraryGUI()
+ actionPerformed(event : ActionEvent) : void
```

Libary
```
+ authors : ArrayList
+ books : ArrayList
- array : ArrayList
- indexBook : int
- b : int

- Library()
+ searchTitle(queryTitle : String) : Book
+ searchGenre(queryGenre : String) : ArrayList<Book>
+ searchAuthorIndex(queryAuthorIndex : int) : ArrayList<Book>
```

Book
```
+ title : String
+ genre : String
+ price : String
+ authorIndex : Integer
- Book(_title : String, _genre : String, _price : String, _authorIndex : Integer)
+ toString() : String
```

Author
```
- name : String
- phone : String
- street : String
- city : String
- state : String
- zipCode : Integer
- Author(_name : String, _city : String, _state : String, _street : String, _zipCode : Integer, _phone : String)
+ toString() : String
```

4. Operating Instructions & Test Cases

4.1. Search for a book by title

1) Enter your keywords of the book title you want to find in the top left text field.
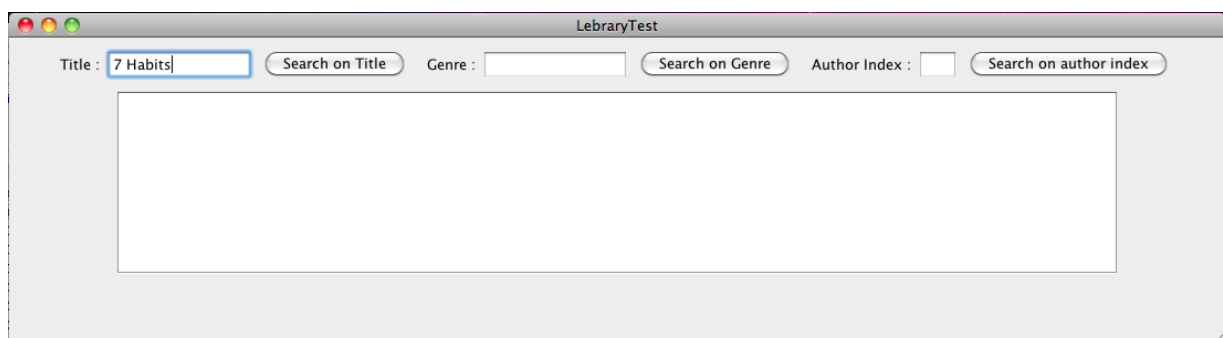
2) Click on "Search on Title" button.
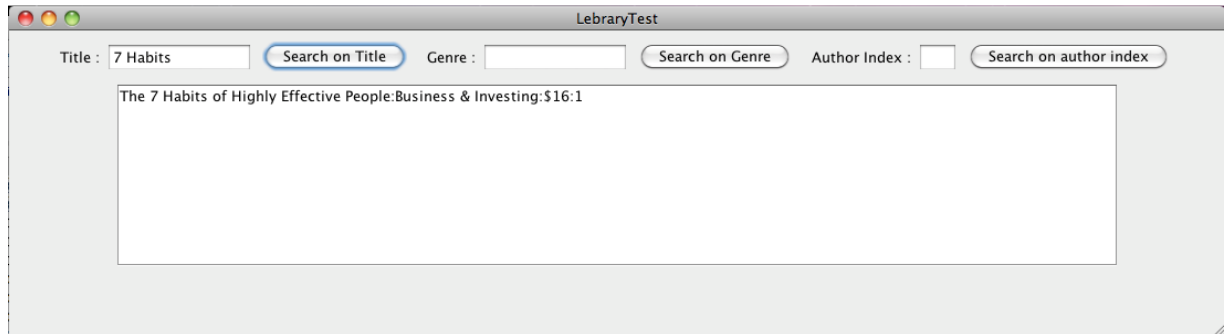
3) When the keyword you entered is not found in the library, you get an error message "*Your search keyword* is not found in the library." in the text area.
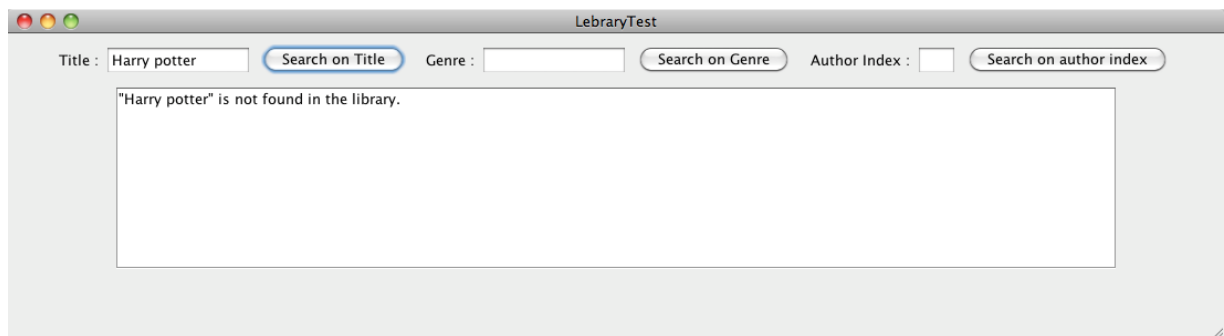
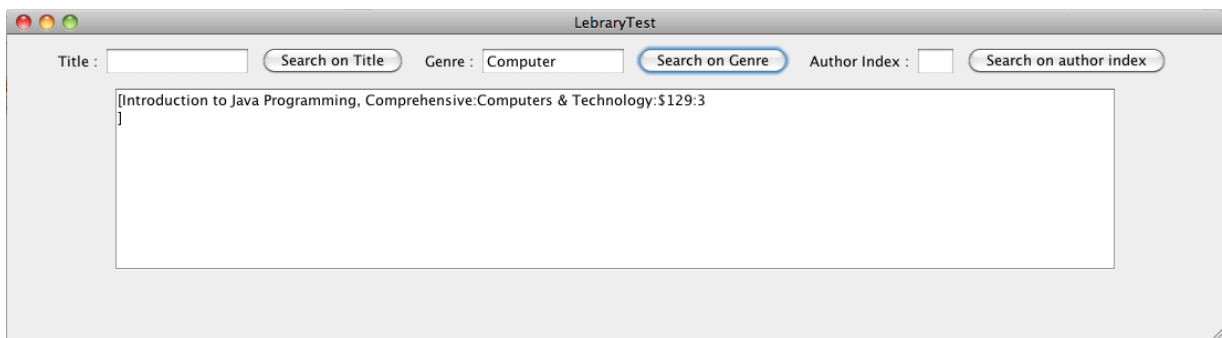4) When you enter a null character, you get an error message "Enter a book title." in the text area.
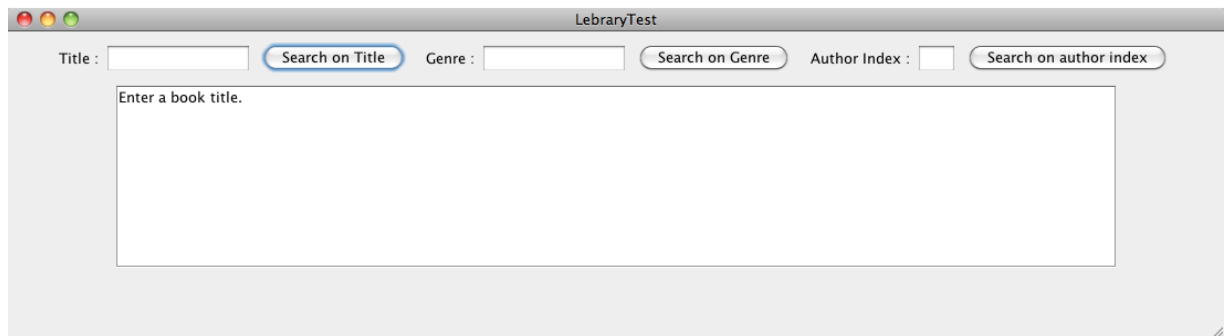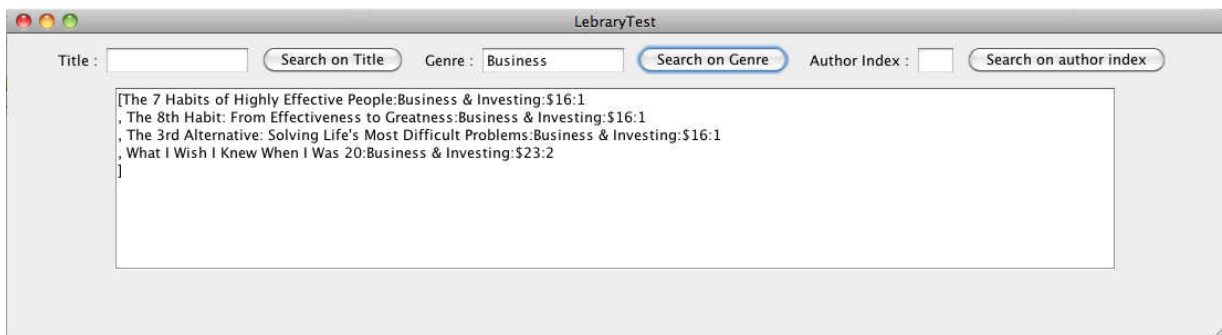

4.2. Search for books by genre
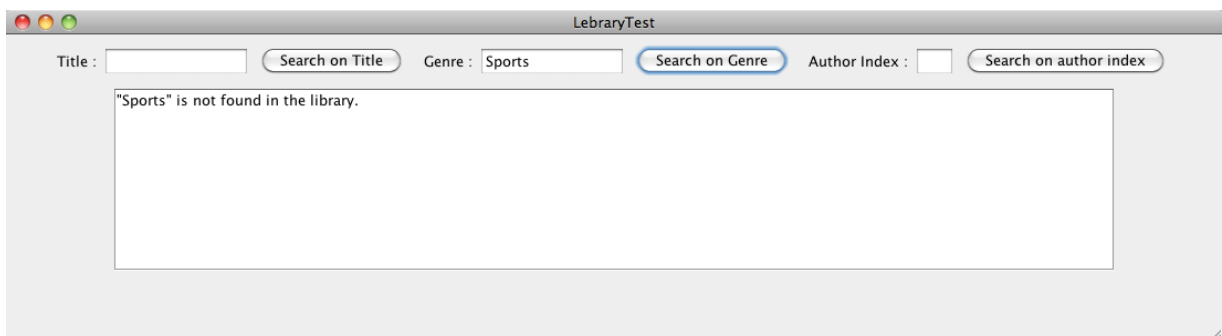1) Enter your keywords of the book genre you want to find in the top center text field.
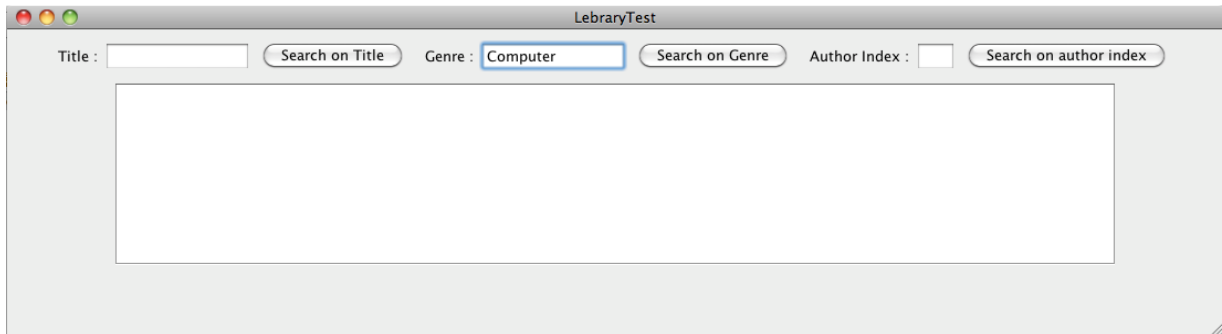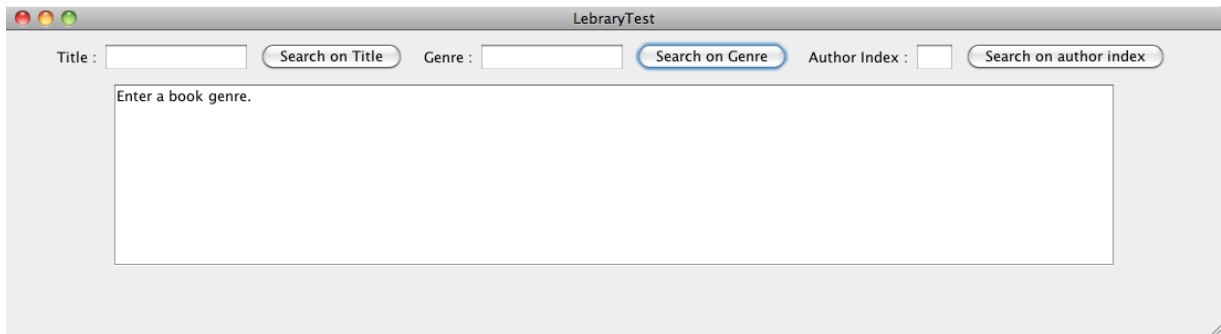
2) Click on "Search on Genre" button.

3) If the keyword you entered matches multiple books, you get all of the books in the text area.

4) When the keyword you entered is not found in the library, you get an error message "*Your search keyword* is not found in the library." in the text area.
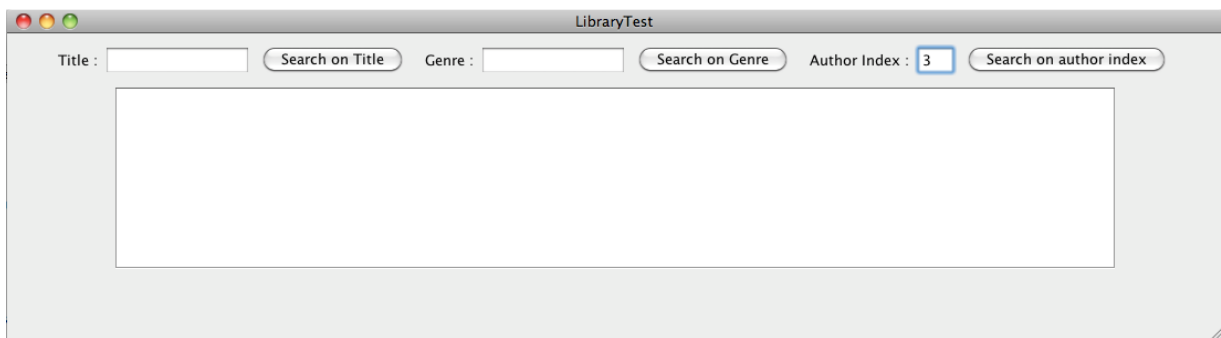
5) When you enter a null character, you get an error message "Enter a book title." in the text area.
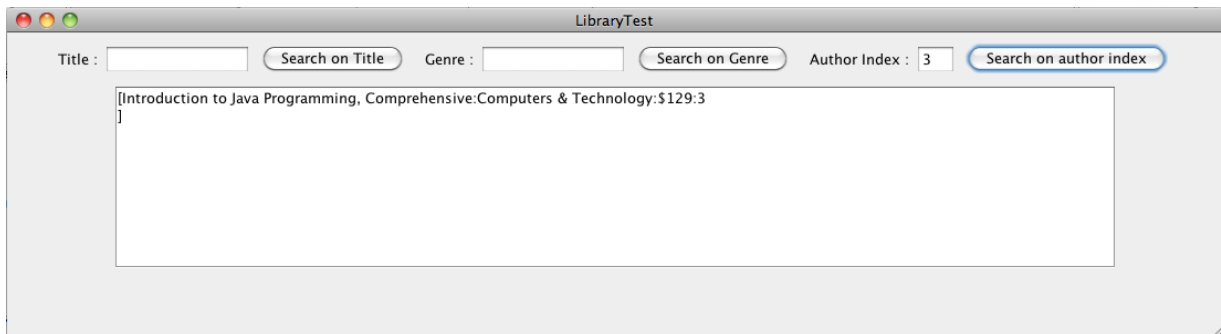

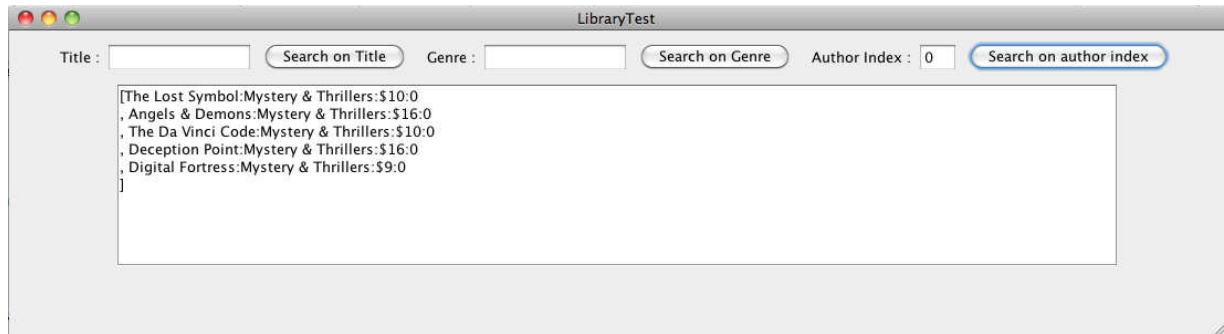4.3. Search for books by author index
1) Enter a number of the author index you want to find in the top center text field.


2) Click on "Search on author index" button.

3) If the number you entered matches multiple books, you get all of the books in the text area.

```
[The Lost Symbol:Mystery & Thrillers:$10:0
, Angels & Demons:Mystery & Thrillers:$16:0
, The Da Vinci Code:Mystery & Thrillers:$10:0
, Deception Point:Mystery & Thrillers:$16:0
, Digital Fortress:Mystery & Thrillers:$9:0
]
```

4) When the number you entered is not found in the library, you get an error message "Your search number is not found in the library." in the text area.

"6" is not found in the library.
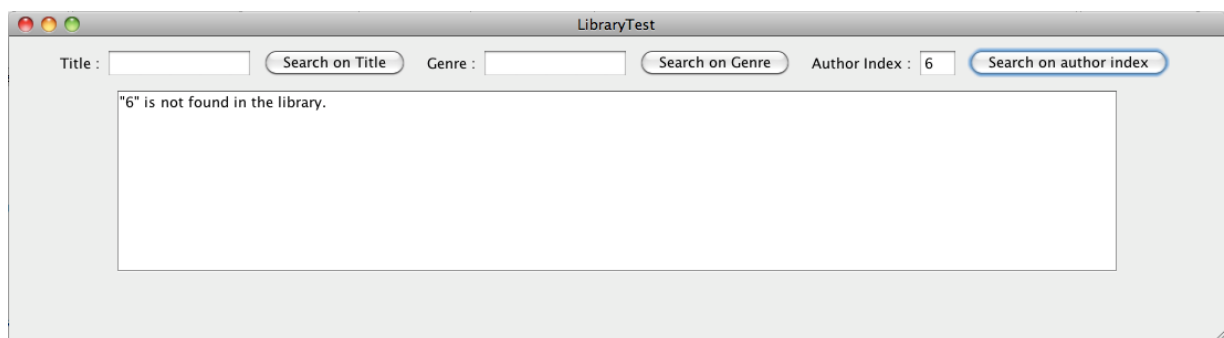
5) When you enter a null character, you get an error message "Enter an author index." in the text area.

Enter an author index.
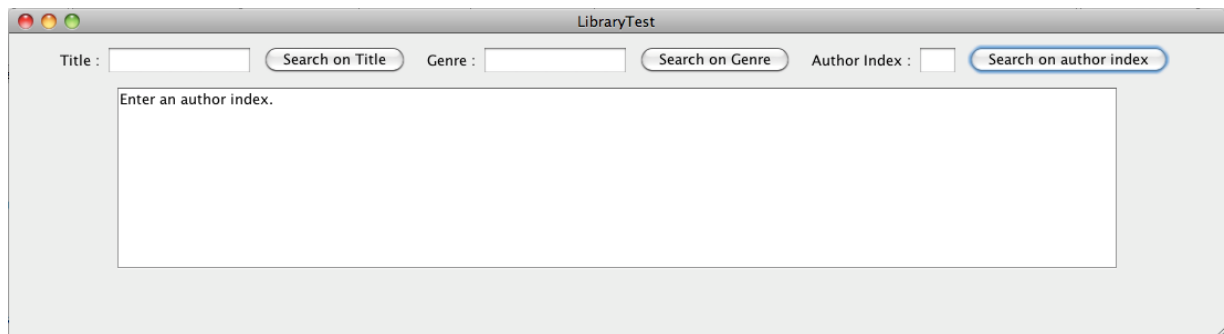
5. Test Data

5.1. Author Table

index	name	street address	city	state	zip	phone
0	Dan Brown	123 Street	Concord	New Hampshire	3301	603-123-456
1	Stephen R. Covey	456 Street	Salt Lake City	Utah	84101	385-456-7890
2	Tina Seelig	450 Serra Mall	Stanford	California	94305	650-725-1627
3	Y. Daniel Liang	11935 Abercorn Street	Savannah	Georgia	314191997	912-344-3264
4	Ray Murphy	University Road	Galway	County Galway, Ireland	904018	353-91-493081
5	Walter Isaacson	789 Street	New Orleans	Louisiana	70112	504-789-0123

5.2. Book Table

index	Title	Genre	price	auth of index
0	The Lost Symbol	Mystery & Thrillers	$10	0
1	Angels & Demons	Mystery & Thrillers	$16	0
2	The Da Vinci Code	Mystery & Thrillers	$10	0
3	Deception Point	Mystery & Thrillers	$16	0
4	Digital Fortress	Mystery & Thrillers	$9	0
5	The 7 Habits of Highly Effective People	Business & Investing	$16	1
6	The 8th Habit: From Effectiveness to Greatness	Business & Investing	$16	1
7	The 3rd Alternative: Solving Life's Most Difficult Problems	Business & Investing	$16	1
8	What I Wish I Knew When I Was 20	Business & Investing	$23	2
9	Introduction to Java Programming, Comprehensive	Computers & Technology	$129	3
10	English Grammar In Use	Education & Reference	$36	4
11	Steve Jobs	Biographies & Memoirs	$30	5