**Lab: Iterators and Comparators**

Problems for exercises and homework for the ["CSharp HYPERLINK "https://softuni.bg/courses/csharp-advanced"Advanced" course @ Software University](https://softuni.bg/courses/csharp-advanced).

You can check your solutions here: <https://judge.softuni.bg/Contests/1489/Iterators-and-Comparators-Lab>

* **Library**

**NOTE**: You need the namespace **IteratorsAndComparators**.

Create a class **Book**, which should have three public properties:

* **string Title**
* **int Year**
* **List<string> Authors**

Authors can be **anonymous, one or many**. A Book should have only **one** **constructor**.

Create a class **Library**, which should store a collection of books and implement the **IEnumerable<Book>** interface.

* **List<Book> books**

A Library could be intilized without books or with any number of books and should have only **one** **constructor**.

**Examples**

|  |
| --- |
| **StartUp.cs** |
| public static void Main()  {  Book bookOne = new Book("Animal Farm", 2003, "George Orwell");  Book bookTwo = new Book("The Documents in the Case", 2002, "Dorothy Sayers", "Robert Eustace");  Book bookThree = new Book("The Documents in the Case", 1930);  Library libraryOne = new Library();  Library libraryTwo = new Library(bookOne, bookTwo, bookThree);  } |

**Solution**





* **Library Iterator**

**NOTE**: You need the namespace **IteratorsAndComparators**.

Extend your solution from the prevoius task. Inside the Library class create a **nested class** **LibraryIterator,** which should implement the **IEnumerator<Book>** interface. Try to implement the bodies of the inherited methods by yourself. You will need two more members:

* **List<Book> books**
* **int currentIndex**

Now you should be able to iterate through a Library in the Main method.

**Examples**

|  |
| --- |
| **Startup.cs** |
| public static void Main()  {  Book bookOne = new Book("Animal Farm", 2003, "George Orwell");  Book bookTwo = new Book("The Documents in the Case", 2002, "Dorothy Sayers", "Robert Eustace");  Book bookThree = new Book("The Documents in the Case", 1930);  Library libraryOne = new Library();  Library libraryTwo = new Library(bookOne, bookTwo, bookThree);  foreach (var book in libraryTwo)  {  Console.WriteLine(book.Title);  }  } |

|  |
| --- |
| **Output** |
| Animal Farm  The Documents in the Case  The Documents in the Case |

**Solution**



* **Comparable Book**

**NOTE**: You need the namespace **IteratorsAndComparators**.

Extend your solution from the prevoius task. Implement the **IComparable<Book>** interface in the existing class **Book**. The comparison between two books should happen in the following order:

* First sort them in **ascending chronological** order (by year)
* If two books are published in the **same year**, sort them **alphabetically**

Override the **ToString()** method in your Book class, so it returns a string in the format:

* **"{title} - {year}"**

Change your **Library** class, so that it stores the books in the correct order.

**Examples**

|  |
| --- |
| **Startup.cs** |
| public static void Main()  {  Book bookOne = new Book("Animal Farm", 2003, "George Orwell");  Book bookTwo = new Book("The Documents in the Case", 2002, "Dorothy Sayers", "Robert Eustace");  Book bookThree = new Book("The Documents in the Case", 1930);  Library libraryOne = new Library();  Library libraryTwo = new Library(bookOne, bookTwo, bookThree);  foreach (var book in libraryTwo)  {  Console.WriteLine(book);  }  } |

**Examples**

|  |
| --- |
| **Output** |
| The Documents in the Case - 1930  The Documents in the Case - 2002  Animal Farm - 2003 |

**Solution**



* **Book Comparator**

**NOTE**: You need the namespace **IteratorsAndComparators**.

Extend your solution from the prevoius task. Create a class **BookComparator,** which should implement the **IComparer<Book>** interface and thus include the following method:

* **int Compare(Book, Book)**

**BookComparator** must **compare** two books by:

* Book title - **alphabetical order**
* Year of publishing a book - **from the newest to the oldest**

Modify your **Library** class once again to implement the **new sorting**.

**Examples**

|  |
| --- |
| **Startup.cs** |
| public static void Main()  {  Book bookOne = new Book("Animal Farm", 2003, "George Orwell");  Book bookTwo = new Book("The Documents in the Case", 2002, "Dorothy Sayers", "Robert Eustace");  Book bookThree = new Book("The Documents in the Case", 1930);  Library library = new Library(bookOne, bookTwo, bookThree);  } |

|  |
| --- |
| **Output** |
| Animal Farm - 2003  The Documents in the Case - 2002  The Documents in the Case - 1930 |

**Solution**

