

```
1 package edu.cpp.quiz1;
2
3 import java.util.List;
4
5 public abstract class Book implements Cloneable {
6     protected String title;
7     protected String author;
8     protected List<String> chapters;
9
10    public Book(String title, String author, List<String> chapters) {
11        this.title = title;
12        this.author = author;
13        this.chapters = chapters;
14    }
15
16    public String getTitle() {
17        return title;
18    }
19
20    public void setTitle(String title) {
21        this.title = title;
22    }
23
24    public String getAuthor() {
25        return author;
26    }
27
28    public void setAuthor(String author) {
29        this.author = author;
30    }
31
32    public List<String> getChapters() {
33        return chapters;
34    }
35
36    public void setChapters(List<String> chapters) {
37        this.chapters = chapters;
38    }
39
40    @Override
41    public String toString() {
42        return "Book{" +
43            "title='" + title + '\'' +
44            ", author='" + author + '\'' +
45            ", chapters=" + chapters +
46            '}';
47    }
48
49    public abstract Book clone();
50 }
51
```

```
1 package edu.cpp.quiz1;
2
3 import java.util.ArrayList;
4 import java.util.List;
5
6 public class BookDeepCopy extends Book {
7
8     public BookDeepCopy(String title, String author, List<String> chapters) {
9         super(title, author, chapters);
10    }
11
12    @Override
13    public BookDeepCopy clone() {
14        List<String> chapters = new ArrayList<>(getChapters());
15        return new BookDeepCopy(getTitle(), getAuthor(), chapters);
16    }
17 }
18
```

```

1 package edu.cpp.quiz1;
2
3 import java.util.ArrayList;
4 import java.util.List;
5
6 public class DeepCopyDriver {
7     public static void main(String[] args) {
8         // Part 3) Create a book with BookDeepCopy and then create a clone of the book.
9         // Modify the chapters of the original book only and show the outputs of both books
10        System.out.println("=====Book Deep Copy=====");
11        List<String> deepChapters = new ArrayList<>();
12        deepChapters.add("Introduction");
13        deepChapters.add("How to write a deep Java program");
14        BookDeepCopy originalDeep = new BookDeepCopy("Deep Copy Book", "Mr Peter",
deepChapters);
15        BookDeepCopy copyDeep = originalDeep.clone();
16        System.out.println("Original: " + originalDeep);
17        System.out.println("Copy:      " + copyDeep);
18
19        System.out.println("-----After modification of original-----");
20        originalDeep.getChapters().add("How to run a deep Java program");
21        originalDeep.getChapters().set(0, "Introduction to deep copy");
22        System.out.println("Original: " + originalDeep);
23        System.out.println("Copy:      " + copyDeep);
24    }
25 }
26

```

```
1 package edu.cpp.quiz1;
2
3 import java.util.List;
4
5 public class BookShallowCopy extends Book {
6
7     public BookShallowCopy(String title, String author, List<String> chapters) {
8         super(title, author, chapters);
9     }
10
11     @Override
12     public BookShallowCopy clone() {
13         return new BookShallowCopy(getTitle(), getAuthor(), getChapters());
14     }
15 }
16
```

```

1 package edu.cpp.quiz1;
2
3 import java.util.ArrayList;
4 import java.util.List;
5
6 public class ShallowCopyDriver {
7     public static void main(String[] args) {
8         // Part 2) Create a book with BookShallowCopy and then create a clone of the book.
9         // Modify the chapters of the original book only and show the outputs of both books
10        System.out.println("=====Book Shallow Copy=====");
11        List<String> shallowChapters = new ArrayList<>();
12        shallowChapters.add("Introduction");
13        shallowChapters.add("How to write a shallow Java program");
14        BookShallowCopy originalShallow = new BookShallowCopy("Shallow Copy Book", "Mr John
15        ", shallowChapters);
16        BookShallowCopy copyShallow = originalShallow.clone();
17        System.out.println("Original: " + originalShallow);
18        System.out.println("Copy:      " + copyShallow);
19
20        System.out.println("-----After modification of original-----");
21        originalShallow.getChapters().add("How to run a shallow Java program");
22        originalShallow.getChapters().set(0, "Introduction to shallow copy");
23        System.out.println("Original: " + originalShallow);
24        System.out.println("Copy:      " + copyShallow);
25    }
26 }

```