

***DATA STRUCTURE AND  
ALGORITHMS  
HOMEWORK 06 REPORT  
SHEET***

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# ***PART02***

***UML:***

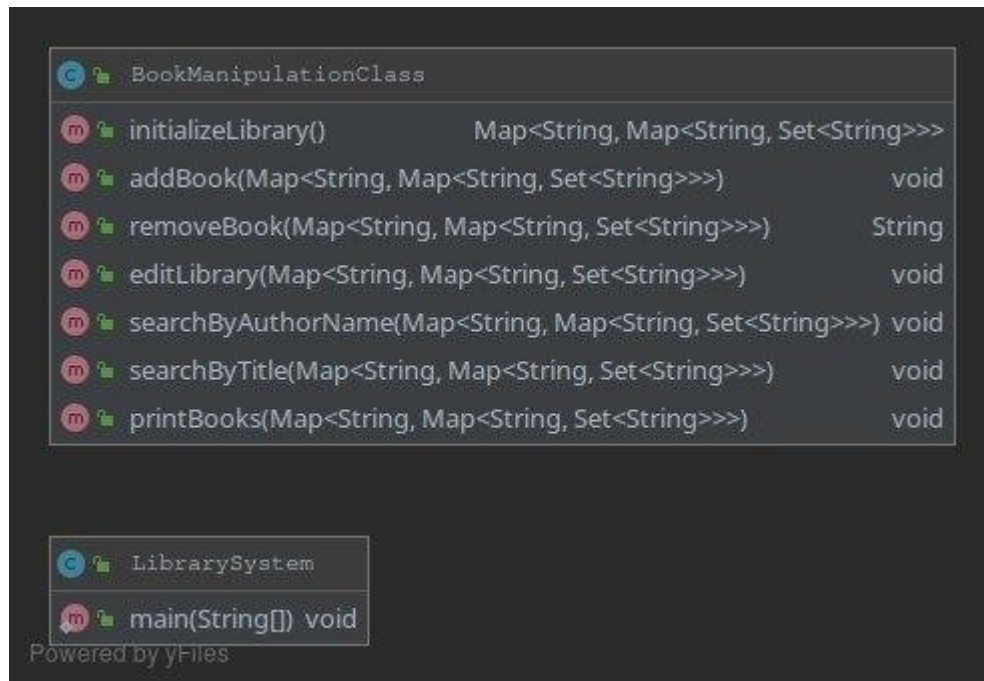
***COMMAND LINE:***

***PROBLEM SOLUTION APPROACH:***

***TEST CASES:***

# PART03

## UML:



## COMMAND LINE:

```
part03 - LibrarySystem.java

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

part03 \src\ part03Package LibrarySystem \main

LibrarySystem.java x BookManipulationClass.java x
40 Set<String> bookLocationSet4 = new HashSet<>();
41 bookLocationSet4.add("c2s2");
42 bookNameMap1.put("the dead", bookLocationSet4);
43 authorMap.put("jumer", bookNameMap1);
44
45 Set<String> bookLocationSet5 = new HashSet<>();
46 bookLocationSet5.add("c3s2");
47 bookNameMap1.put("3 Idiots", bookLocationSet5);
48 authorMap.put("jumer", bookNameMap1);
49
50 Map<String, Set<String>> bookNameMap2 = new HashMap<>();
51 Set<String> bookLocationSet6 = new HashSet<>();
52 bookLocationSet6.add("c1s3");
53 bookNameMap2.put("IT", bookLocationSet6);
54 authorMap.put("david", bookNameMap2);
55
56 Set<String> bookLocationSet8 = new HashSet<>();
57 bookLocationSet8.add("c2s1");
58 bookNameMap2.put("math", bookLocationSet8);
59 authorMap.put("david", bookNameMap2);
60
61 Set<String> bookLocationSet9 = new HashSet<>();
62 bookLocationSet9.add("c3s3");
63 bookNameMap2.put("history", bookLocationSet9);
64 authorMap.put("david", bookNameMap2);
65 //=====
66 manipulate.printBooks(authorMap);
67 System.out.println("===== LIBRARY AUTOMATION SYSTEM =====");
68 do {
69     System.out.println("=====");
70     System.out.println("1 For Administrator Menu >> ");
71     System.out.println("2 For User Menu >>>");
72     System.out.println("3 For Exiting Program >>>");
73
74     System.out.print("Enter Your Selection: ");
75     selection = myObj.nextLine(); // Read user input
76
77     if (selection.equals("1")) {
78         boolean isPassed = false;
```

Run: LibrarySystem x

```
/home/ashraf/.jdk/openjdk-14.0.1/bin/java -javaagent:/snap/intellij-idea-community/226/lib/ide
Author Name: jumer
Book's List:
Book Name: [computer science] Location(s): [c1s2]
Book Name: [the dead] Location(s): [c2s2]
Book Name: [3 Idiots] Location(s): [c3s2]
=====
Author Name: david
Book's List:
Book Name: [IT] Location(s): [c1s3]
Book Name: [math] Location(s): [c2s3]
Book Name: [history] Location(s): [c3s3]
=====
Author Name: ali
Book's List:
Book Name: [the will] Location(s): [c3s1]
Book Name: [the passion] Location(s): [c2s1]
Book Name: [the message] Location(s): [c1s1]
=====
===== LIBRARY AUTOMATION SYSTEM =====
=====
1 For Administrator Menu >>
2 For User Menu >>
3 For Exiting Program >>
Enter Your Selection: 3
Exiting System...

Process finished with exit code 0
```

Build completed successfully in 2s 36 ms (moments ago)

```
part03 - LibrarySystem.java
File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
part03 src part03Package LibrarySystem main
LibrarySystem.java BookManipulationClass.java
87 System.out.println();
88 System.out.println("*****");
89 System.out.println("Admin Menu");
90 System.out.println("*****");
91
92 System.out.println("1 For Adding New Book :");
93 System.out.println("2 For Removing A Book :");
94 System.out.println("3 For Edit Information :");
95 System.out.println("4 For Search By Author Name :");
96 System.out.println("5 For Search By Book Name :");
97
98 System.out.print("Your Selection: ");
99 selection = myObj.nextLine();
100
101 if(selection.equals("1")){
102     manipulate.addBook(authorMap);
103     System.out.println("Recent Library Content >>> ");
104     manipulate.printBooks(authorMap);
105 }
106 else if(selection.equals("2")){
107     manipulate.removeBook(authorMap);
108     System.out.println("Recent Library Content >>> ");
109     manipulate.printBooks(authorMap);
110 }
111 else if(selection.equals("3")){
112     manipulate.editLibrary(authorMap);
113     System.out.println("Recent Library Content >>> ");
114     manipulate.printBooks(authorMap);
115 }
116 else if(selection.equals("4")){
117     manipulate.searchByAuthorName(authorMap);
118 }
119 else if(selection.equals("5")){
120     manipulate.searchByTitle(authorMap);
121 }
122 else{
123     System.out.println("Wrong Input !!!");
124 }
125 isCorrect = false;
126
127 3: Git 5: TODO 0: Messages
128 Build completed successfully in 1 s 730 ms (a minute ago) 69:23 LF UTF-8 AWS: No credentials selected 4spaces master Event Log
```

```
Run: LibrarySystem
1 For Adding New Book :
2 For Removing A Book :
3 For Edit Information :
4 For Search By Author Name :
5 For Search By Book Name :
Your Selection:
Enter Book Name: the two men
Enter Book Author: mohammad ashraf yasar
Enter Book Location: 342
Recent Library Content >>>
Author Name: Junner
Book's List:
Book Name: [computer science] Location(s): [c1s2]
Book Name: [the dead] Location(s): [c2s2]
Book Name: [3 idiots] Location(s): [c3s2]
*****
Author Name: mohammad ashraf yasar
Book's List:
Book Name: [the two men] Location(s): [c7s7]
*****
Author Name: david
Book's List:
Book Name: [IT] Location(s): [c1s3]
Book Name: [math] Location(s): [c2s3]
Book Name: [history] Location(s): [c3s3]
*****
Author Name: ali
Book's List:
Book Name: [the will] Location(s): [c3s1]
Book Name: [the passion] Location(s): [c2s1]
Book Name: [the message] Location(s): [c1s1]
*****
1 For Administrator Menu >>
2 For User Menu >>
3 For Exiting Program >>
Enter Your Selection:
```

```
part03 - LibrarySystem.java
File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
part03 src part03Package LibrarySystem main
LibrarySystem.java BookManipulationClass.java
80 SET<String> bookLocationSet4 = new HashSet<>();
81 bookLocationSet4.add("c2s2");
82 bookNameMap1.put("the dead", bookLocationSet4);
83 authorMap.put("junner", bookNameMap1);
84
85 Set<String> bookLocationSet5 = new HashSet<>();
86 bookLocationSet5.add("c3s2");
87 bookNameMap1.put("3 Idiots", bookLocationSet5);
88 authorMap.put("junner", bookNameMap1);
89
90 Map<String, Set<String>> bookNameMap2 = new HashMap<>();
91 Set<String> bookLocationSet6 = new HashSet<>();
92 bookLocationSet6.add("c1s3");
93 bookNameMap2.put("IT", bookLocationSet6);
94 authorMap.put("david", bookNameMap2);
95
96 Set<String> bookLocationSet8 = new HashSet<>();
97 bookLocationSet8.add("c2s3");
98 bookNameMap2.put("math", bookLocationSet8);
99 authorMap.put("david", bookNameMap2);
100
101 Set<String> bookLocationSet9 = new HashSet<>();
102 bookLocationSet9.add("c3s3");
103 bookNameMap2.put("history", bookLocationSet9);
104 authorMap.put("david", bookNameMap2);
105
106 //***** LIBRARY AUTOMATION SYSTEM *****
107 manipulate.printBooks(authorMap);
108 System.out.println("***** LIBRARY AUTOMATION SYSTEM *****");
109 do {
110     System.out.println("*****");
111     System.out.println("1 For Administrator Menu >> ");
112     System.out.println("2 For User Menu >>");
113     System.out.println("3 For Exiting Program >>");
114
115     System.out.print("Enter Your Selection: ");
116     selection = myObj.nextLine(); // Read user input
117
118     if(selection.equals("1")) {
119         boolean isPassed = false;
120
121 SET<String> bookLocationSet4 = new HashSet<>();
122 bookLocationSet4.add("c2s2");
123 bookNameMap1.put("the dead", bookLocationSet4);
124 authorMap.put("junner", bookNameMap1);
125
126 Set<String> bookLocationSet5 = new HashSet<>();
127 bookLocationSet5.add("c3s2");
128 bookNameMap1.put("3 Idiots", bookLocationSet5);
129 authorMap.put("junner", bookNameMap1);
130
131 Map<String, Set<String>> bookNameMap2 = new HashMap<>();
132 Set<String> bookLocationSet6 = new HashSet<>();
133 bookLocationSet6.add("c1s3");
134 bookNameMap2.put("IT", bookLocationSet6);
135 authorMap.put("david", bookNameMap2);
136
137 Set<String> bookLocationSet8 = new HashSet<>();
138 bookLocationSet8.add("c2s3");
139 bookNameMap2.put("math", bookLocationSet8);
140 authorMap.put("david", bookNameMap2);
141
137 3: Git 5: TODO 0: Messages
138 Plugin updates available: Plugin: Scala // Update // Plugin Settings... // Ignore This Update (57 minutes ago) 39:17 LF UTF-8 AWS: No credentials selected 4spaces master Event Log
```

```
Run: LibrarySystem
Author Name: Junner
Book's List:
Book Name: [computer science] Location(s): [c1s2]
Book Name: [the dead] Location(s): [c2s2]
Book Name: [3 idiots] Location(s): [c3s2]
*****
Author Name: david
Book's List:
Book Name: [IT] Location(s): [c1s3]
Book Name: [math] Location(s): [c2s3]
Book Name: [history] Location(s): [c3s3]
*****
Author Name: ali
Book's List:
Book Name: [the will] Location(s): [c3s1]
Book Name: [the passion] Location(s): [c2s1]
Book Name: [the message] Location(s): [c1s1]
*****
**** LIBRARY AUTOMATION SYSTEM ****
*****
1 For Administrator Menu >>
2 For User Menu >>
3 For Exiting Program >>
Enter Your Selection: 1
Admin Password Please: 342
Admin Password Please: 342
Admin Password Please: 342
*****
Admin Menu
*****
1 For Adding New Book :
2 For Removing A Book :
3 For Edit Information :
4 For Search By Author Name :
5 For Search By Book Name :
Your Selection: |
```

```
part03 - LibrarySystem.java

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
part03 / src / part03Package LibrarySystem / main
LibrarySystem.java BookManipulationClass.java

89 System.out.println();
90 System.out.println("*****");
91 System.out.println("Admin Menu");
92 System.out.println("*****");
93
94 System.out.println("1 For Adding New Book :");
95 System.out.println("2 For Removing A Book :");
96 System.out.println("3 For Edit Information :");
97 System.out.println("4 For Search By Author Name :");
98 System.out.println("5 For Search By Book Name :");
99
100 System.out.print("Your Selection: ");
101 selection = myObj.nextLine();
102
103 if (selection.equals("1")){
104     manipulate.addBook(authorMap);
105     System.out.println("Recent Library Content >>> ");
106     manipulate.printBooks(authorMap);
107 }
108 else if (selection.equals("2")){
109     manipulate.removeBook(authorMap);
110     System.out.println("Recent Library Content >>> ");
111     manipulate.printBooks(authorMap);
112 }
113 else if (selection.equals("3")){
114     manipulate.editLibrary(authorMap);
115     System.out.println("Recent Library Content >>> ");
116     manipulate.printBooks(authorMap);
117 }
118 else if (selection.equals("4")){
119     manipulate.searchByAuthorName(authorMap);
120 }
121 else if (selection.equals("5")){
122     manipulate.searchByTitle(authorMap);
123 }
124 else{
125     System.out.println("Wrong Input !!!");
126 }
127 isCorrect = false;
128
129 Build completed successfully in 1 s 730 ms (2 minutes ago)

Run: LibrarySystem
2 For Removing A Book :
3 For Edit Information :
4 For Search By Author Name :
5 For Search By Book Name :
Your Selection: 1
Enter Book Name: the joker
Enter Book Author: ali
Enter Book Location: 999
Recent Library Content >>>
Author Name: juner
Book's List:
Book Name: [computer science] Location(s): [c1s2]
Book Name: [the dead] Location(s): [c2s2]
Book Name: [3 idiots] Location(s): [c3s2]
*****
Author Name: mohammad ashraf yawar
Book's List:
Book Name: [the two man] Location(s): [c7s7]
*****
Author Name: david
Book's List:
Book Name: [IT] Location(s): [c1s3]
Book Name: [math] Location(s): [c2s3]
Book Name: [history] Location(s): [c3s3]
*****
Author Name: ali
Book's List:
Book Name: [the joker] Location(s): [c9s9]
Book Name: [the will] Location(s): [c3s1]
Book Name: [the passion] Location(s): [c2s1]
Book Name: [the message] Location(s): [c1s1]
*****
1 For Administrator Menu >>
2 For User Menu >>
3 For Exiting Program >>
Enter Your Selection: |
```

```
part03 - LibrarySystem.java

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
part03 / src / part03Package LibrarySystem / main
LibrarySystem.java BookManipulationClass.java

89 System.out.println();
90 System.out.println("*****");
91 System.out.println("Admin Menu");
92 System.out.println("*****");
93
94 System.out.println("1 For Adding New Book :");
95 System.out.println("2 For Removing A Book :");
96 System.out.println("3 For Edit Information :");
97 System.out.println("4 For Search By Author Name :");
98 System.out.println("5 For Search By Book Name :");
99
100 System.out.print("Your Selection: ");
101 selection = myObj.nextLine();
102
103 if (selection.equals("1")){
104     manipulate.addBook(authorMap);
105     System.out.println("Recent Library Content >>> ");
106     manipulate.printBooks(authorMap);
107 }
108 else if (selection.equals("2")){
109     manipulate.removeBook(authorMap);
110     System.out.println("Recent Library Content >>> ");
111     manipulate.printBooks(authorMap);
112 }
113 else if (selection.equals("3")){
114     manipulate.editLibrary(authorMap);
115     System.out.println("Recent Library Content >>> ");
116     manipulate.printBooks(authorMap);
117 }
118 else if (selection.equals("4")){
119     manipulate.searchByAuthorName(authorMap);
120 }
121 else if (selection.equals("5")){
122     manipulate.searchByTitle(authorMap);
123 }
124 else{
125     System.out.println("Wrong Input !!!");
126 }
127 isCorrect = false;
128
129 Build completed successfully in 1 s 730 ms (3 minutes ago)

Run: LibrarySystem
1 For Adding New Book :
2 For Removing A Book :
3 For Edit Information :
4 For Search By Author Name :
5 For Search By Book Name :
Your Selection: 2
Enter Book Name To Be Removed: the will
Enter Author Name Of The Book To Be Removed: ali
Recent Library Content >>>
Author Name: juner
Book's List:
Book Name: [computer science] Location(s): [c1s2]
Book Name: [the dead] Location(s): [c2s2]
Book Name: [3 idiots] Location(s): [c3s2]
*****
Author Name: mohammad ashraf yawar
Book's List:
Book Name: [the two man] Location(s): [c7s7]
*****
Author Name: david
Book's List:
Book Name: [IT] Location(s): [c1s3]
Book Name: [math] Location(s): [c2s3]
Book Name: [history] Location(s): [c3s3]
*****
Author Name: ali
Book's List:
Book Name: [the joker] Location(s): [c9s9]
Book Name: [the passion] Location(s): [c2s1]
Book Name: [the message] Location(s): [c1s1]
*****
1 For Administrator Menu >>
2 For User Menu >>
3 For Exiting Program >>
Enter Your Selection: |
```

part03 - LibrarySystem.java

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

part03 / src / part03Package LibrarySystem / main

LibrarySystem.java BookManipulationClass.java

```
89 System.out.println();
90 System.out.println("*****");
91 System.out.println("Admin Menu");
92 System.out.println("*****");
93
94 System.out.println("1 For Adding New Book :");
95 System.out.println("2 For Removing A Book :");
96 System.out.println("3 For Edit Information :");
97 System.out.println("4 For Search By Author Name :");
98 System.out.println("5 For Search By Book Name :");
99
100 System.out.print("Your Selection: ");
101 selection = myObj.nextLine();
102
103 if (selection.equals("1")){
104     manipulate.addBook(authorMap);
105     System.out.println("Recent Library Content >>> ");
106     manipulate.printBooks(authorMap);
107 }
108 else if (selection.equals("2")){
109     manipulate.removeBook(authorMap);
110     System.out.println("Recent Library Content >>> ");
111     manipulate.printBooks(authorMap);
112 }
113 else if (selection.equals("3")){
114     manipulate.editLibrary(authorMap);
115     System.out.println("Recent Library Content >>> ");
116     manipulate.printBooks(authorMap);
117 }
118 else if (selection.equals("4")){
119     manipulate.searchByAuthorName(authorMap);
120 }
121 else if (selection.equals("5")){
122     manipulate.searchByTitle(authorMap);
123 }else{
124     System.out.println("Wrong Input !!!!");
125 }
126
127 isCorrect = false;
```

Run: LibrarySystem

```
1 For Adding New Book :
2 For Removing A Book :
3 For Edit Information :
4 For Search By Author Name :
5 For Search By Book Name :
Your Selection: 3
Enter Book Name To Be Removed:the edit
Enter Author Name Of The Book To Be Removed :ali
Cannot Remove !!!!
Recent Library Content >>>
Author Name: Jumer
Book's List:
Book Name: [computer science] Location(s): [c1s2]
Book Name: [the dead] Location(s): [c2s2]
Book Name: [3 idiots] Location(s): [c3s2]
*****
Author Name: mohammad ashraf yawar
Book's List:
Book Name: [the two man] Location(s): [c7s7]
*****
Author Name: david
Book's List:
Book Name: [IT] Location(s): [c1s3]
Book Name: [math] Location(s): [c2s3]
Book Name: [history] Location(s): [c3s3]
*****
Author Name: ali
Book's List:
Book Name: [the joker] Location(s): [c9s9]
Book Name: [the passion] Location(s): [c2s1]
Book Name: [the message] Location(s): [c1s1]
*****
1 For Administrator Menu >>
2 For User Menu >>
3 For Exiting Program >>
Enter Your Selection: |
```

Build completed successfully in 1 s 730 ms (4 minutes ago)

198.23 LF UTF-8 AWS: No credentials selected 4 spaces master

part03 - LibrarySystem.java

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

part03 / src / part03Package LibrarySystem / main

LibrarySystem.java BookManipulationClass.java

```
89 System.out.println();
90 System.out.println("*****");
91 System.out.println("Admin Menu");
92 System.out.println("*****");
93
94 System.out.println("1 For Adding New Book :");
95 System.out.println("2 For Removing A Book :");
96 System.out.println("3 For Edit Information :");
97 System.out.println("4 For Search By Author Name :");
98 System.out.println("5 For Search By Book Name :");
99
100 System.out.print("Your Selection: ");
101 selection = myObj.nextLine();
102
103 if (selection.equals("1")){
104     manipulate.addBook(authorMap);
105     System.out.println("Recent Library Content >>> ");
106     manipulate.printBooks(authorMap);
107 }
108 else if (selection.equals("2")){
109     manipulate.removeBook(authorMap);
110     System.out.println("Recent Library Content >>> ");
111     manipulate.printBooks(authorMap);
112 }
113 else if (selection.equals("3")){
114     manipulate.editLibrary(authorMap);
115     System.out.println("Recent Library Content >>> ");
116     manipulate.printBooks(authorMap);
117 }
118 else if (selection.equals("4")){
119     manipulate.searchByAuthorName(authorMap);
120 }
121 else if (selection.equals("5")){
122     manipulate.searchByTitle(authorMap);
123 }else{
124     System.out.println("Wrong Input !!!!");
125 }
126
127 isCorrect = false;
```

Run: LibrarySystem

```
3 For Edit Information :
4 For Search By Author Name :
5 For Search By Book Name :
Your Selection: 3
Change Book Location :
Enter Book Name :the joker
Enter Author Name :ali
Old Location :c1s3
Enter New Location :c1s5
Recent Library Content >>>
Author Name: Jumer
Book's List:
Book Name: [computer science] Location(s): [c1s2]
Book Name: [the dead] Location(s): [c2s2]
Book Name: [3 idiots] Location(s): [c3s2]
*****
Author Name: mohammad ashraf yawar
Book's List:
Book Name: [the two man] Location(s): [c7s7]
*****
Author Name: david
Book's List:
Book Name: [IT] Location(s): [c1s3]
Book Name: [math] Location(s): [c2s3]
Book Name: [history] Location(s): [c3s3]
*****
Author Name: ali
Book's List:
Book Name: [the joker] Location(s): [c1s5]
Book Name: [the passion] Location(s): [c2s1]
Book Name: [the message] Location(s): [c1s1]
*****
1 For Administrator Menu >>
2 For User Menu >>
3 For Exiting Program >>
Enter Your Selection: |
```

Build completed successfully in 1 s 730 ms (5 minutes ago)

243.23 LF UTF-8 AWS: No credentials selected 4 spaces master



part03 - LibrarySystem.java

```
File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
part03 / src / part03Package LibrarySystem main
LibrarySystem.java BookManipulationClass.java
87 System.out.println();
88 System.out.println("*****");
89 System.out.println("Admin Menu");
90 System.out.println("*****");
91
92 System.out.println("1 For Adding New Book :");
93 System.out.println("2 For Removing A Book :");
94 System.out.println("3 For Edit Information :");
95 System.out.println("4 For Search By Author Name :");
96 System.out.println("5 For Search By Book Name :");
97
98 System.out.print("Your Selection: ");
99 selection = myObj.nextLine();
100
101 if (selection.equals("1")){
102     manipulate.addBook(authorMap);
103     System.out.println("Recent Library Content >>> ");
104     manipulate.printBooks(authorMap);
105 }
106 else if (selection.equals("2")){
107     manipulate.removeBook(authorMap);
108     System.out.println("Recent Library Content >>> ");
109     manipulate.printBooks(authorMap);
110 }
111 else if (selection.equals("3")){
112     manipulate.editLibrary(authorMap);
113     System.out.println("Recent Library Content >>> ");
114     manipulate.printBooks(authorMap);
115 }
116 else if (selection.equals("4")){
117     manipulate.searchByAuthorName(authorMap);
118 }
119 else if (selection.equals("5")){
120     manipulate.searchByTitle(authorMap);
121 }
122 else{
123     System.out.println("Wrong Input !!!");
124 }
125
126 isCorrect = false;
127
128 Build completed successfully in 1 s 730 ms (6 minutes ago)
```

Run: LibrarySystem

```
4 For Search By Author Name :
5 For Search By Book Name :
Your Selection: 3
Change Book Location :
Enter Book Name : math
Enter Author Name : david
Old Location : IT
Enter New Location : math
Could Not Edit !!!
Recent Library Content >>>
Author Name: Junner
Book's List:
Book Name: [computer science] Location(s): [c1s2]
Book Name: [the dead] Location(s): [c2s2]
Book Name: [3 idiots] Location(s): [c3s2]
*****
Author Name: mohammad ashraf yasar
Book's List:
Book Name: [the two man] Location(s): [c7s7]
*****
Author Name: david
Book's List:
Book Name: [IT] Location(s): [c1s3]
Book Name: [math] Location(s): [c2s3]
Book Name: [history] Location(s): [c3s3]
*****
Author Name: all
Book's List:
Book Name: [the joker] Location(s): [c11s5]
Book Name: [the passion] Location(s): [c2s1]
Book Name: [the message] Location(s): [c1s1]
*****
1 For Administrator Menu >>
2 For User Menu >>
3 For Exiting Program >>
Enter Your Selection: |
```

part03 - BookManipulationClass.java

```
File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
part03 / src / part03Package BookManipulationClass editLibrary
LibrarySystem.java BookManipulationClass.java
67 System.out.print("Old Location :");
68 String oldLocation = myObj.nextLine();
69 System.out.print("Enter New Location :");
70 String newLocation = myObj.nextLine();
71 try {
72     for (Map.Entry<String, Map<String, Set<String>>> vals : authorMap.entrySet()) {
73         if (vals.getKey().equals(authorName)) {
74             Map<String, Set<String>> tempMap = vals.getValue();
75             for (Map.Entry<String, Set<String>> inner : tempMap.entrySet()) {
76                 if (inner.getKey().equals(bookName)) {
77                     for (String st : inner.getValue()) {
78                         if (st.equals(oldLocation)) {
79                             inner.getValue().remove(st);
80                             inner.getValue().add(newLocation);
81                             edited = true;
82                         }
83                     }
84                 }
85             }
86         }
87     }
88 }
89 if (!edited) {
90     System.out.println("Could Not Edit !!!");
91 }
92 catch (NullPointerException np){
93     System.out.println("Null Pointer Exception !!!");
94 }
95
96 public void searchByAuthorName(Map<String, Map<String, Set<String>>> authorMap){...}
97 public void searchByTitle(Map<String, Map<String, Set<String>>> authorMap){...}
98 public void printBooks(Map<String, Map<String, Set<String>>> libraryBooks){...}
99
100 Build completed successfully in 1 s 730 ms (7 minutes ago)
```

Run: LibrarySystem

```
*****
Author Name: all
Book's List:
Book Name: [the joker] Location(s): [c11s5]
Book Name: [the passion] Location(s): [c2s1]
Book Name: [the message] Location(s): [c1s1]
*****
1 For Administrator Menu >>
2 For User Menu >>
3 For Exiting Program >>
Enter Your Selection: 3
Admin Password Please: 1234
*****
Admin Menu
*****
1 For Adding New Book :
2 For Removing A Book :
3 For Edit Information :
4 For Search By Author Name :
5 For Search By Book Name :
Your Selection:
Enter Author Name : math
MR/MS david's Books Are >>
1: IT
2: math
3: history
Enter Book Name To Show its Location(s) On The Library.
IT
Book Name: IT
Location(s) [c1s3]
*****
1 For Administrator Menu >>
2 For User Menu >>
3 For Exiting Program >>
Enter Your Selection: |
```

```
part03 - BookManipulationClass.java
File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
part03 src part03Package BookManipulationClass searchByAuthorName
LibrarySystem.java BookManipulationClass.java
package part03Package;
import java.util.*;
public class BookManipulationClass {
    public void addBook(Map<String, Map<String, Set<String>>> authorMap){...}
    public String removeBook(Map<String, Map<String, Set<String>>> authorMap){...}
    public void editLibrary(Map<String, Map<String, Set<String>>> authorMap){...}
    public void searchByAuthorName(Map<String, Map<String, Set<String>>> authorMap){
        int counter = 1;
        Scanner myObj = new Scanner(System.in); // Create a Scanner object
        String authorName = null;
        try{
            System.out.print("Enter Author Name :");
            authorName = myObj.nextLine();
            Map<String, Set<String>> tm = authorMap.get(authorName);
            System.out.println("MR/MS "+authorName+" 's Books Are >>");
            for (Map.Entry<String, Set<String>> vals : tm.entrySet()) {
                System.out.println(counter + ": " + vals.getKey());
                ++counter;
            }
            System.out.println("Enter Book Name To Show its Location(s) On The Library.");
            String st = myObj.nextLine();
            System.out.println("Book Name: "+st);
            System.out.println("Location(s) "+authorMap.get(authorName).get(st).toString());
        }catch (NullPointerException np){
            System.out.println("Trying To Access illegal area !!!");
        }
    }
    public void searchByTitle(Map<String, Map<String, Set<String>>> authorMap){...}
    public void printBooks(Map<String, Map<String, Set<String>>> libraryBooks){...}
}
Run: LibrarySystem
Author Name: david
Book's List:
Book Name: [IT] Location(s): [c1s3]
Book Name: [math] Location(s): [c2s3]
Book Name: [history] Location(s): [c3s3]
Author Name: ali
Book's List:
Book Name: [the will] Location(s): [c3s1]
Book Name: [the passion] Location(s): [c2s1]
Book Name: [the message] Location(s): [c1s1]
***** LIBRARY AUTOMATION SYSTEM *****
1 For Administrator Menu >>
2 For User Menu >>
3 For Exiting Program >>
Enter Your Selection: 1
Admin Password Please: 1234
*****
Admin Menu
*****
1 For Adding New Book :
2 For Removing A Book :
3 For Edit Information :
4 For Search By Author Name :
5 For Search By Book Name :
Your Selection: 4
Enter Author Name : ashraf
MR/MS ashraf's Books Are >>
Trying To Access illegal area !!!
*****
1 For Administrator Menu >>
2 For User Menu >>
3 For Exiting Program >>
Enter Your Selection: 1
Event Log
Build completed successfully in 1 s 621 ms (moments ago) 117.63 LF UTF-8 AWS: No credentials selected 4spaces P master
```

```
part03 - BookManipulationClass.java
File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
part03 src part03Package BookManipulationClass searchByAuthorName
LibrarySystem.java BookManipulationClass.java
package part03Package;
import java.util.*;
public class BookManipulationClass {
    public void addBook(Map<String, Map<String, Set<String>>> authorMap){...}
    public String removeBook(Map<String, Map<String, Set<String>>> authorMap){...}
    public void editLibrary(Map<String, Map<String, Set<String>>> authorMap){...}
    public void searchByAuthorName(Map<String, Map<String, Set<String>>> authorMap){
        int counter = 1;
        Scanner myObj = new Scanner(System.in); // Create a Scanner object
        String authorName = null;
        try{
            System.out.print("Enter Author Name :");
            authorName = myObj.nextLine();
            Map<String, Set<String>> tm = authorMap.get(authorName);
            System.out.println("MR/MS "+authorName+" 's Books Are >>");
            for (Map.Entry<String, Set<String>> vals : tm.entrySet()) {
                System.out.println(counter + ": " + vals.getKey());
                ++counter;
            }
            System.out.println("Enter Book Name To Show its Location(s) On The Library.");
            String st = myObj.nextLine();
            System.out.println("Book Name: "+st);
            System.out.println("Location(s) "+authorMap.get(authorName).get(st).toString());
        }catch (NullPointerException np){
            System.out.println("Trying To Access illegal area !!!");
        }
    }
    public void searchByTitle(Map<String, Map<String, Set<String>>> authorMap){...}
    public void printBooks(Map<String, Map<String, Set<String>>> libraryBooks){...}
}
Run: LibrarySystem
*****
Admin Menu
*****
1 For Adding New Book :
2 For Removing A Book :
3 For Edit Information :
4 For Search By Author Name :
5 For Search By Book Name :
Your Selection: 4
Enter Author Name : ashraf
MR/MS ashraf's Books Are >>
Trying To Access illegal area !!!
*****
1 For Administrator Menu >>
2 For User Menu >>
3 For Exiting Program >>
Enter Your Selection: 1
Admin Password Please: 1234
*****
Admin Menu
*****
1 For Adding New Book :
2 For Removing A Book :
3 For Edit Information :
4 For Search By Author Name :
5 For Search By Book Name :
Your Selection: 5
Enter Book title : history
Book Name: history
Book Author: david
Book Location(s): [c3s3]
*****
1 For Administrator Menu >>
2 For User Menu >>
3 For Exiting Program >>
Enter Your Selection: 1
Event Log
Build completed successfully in 1 s 621 ms (2 minutes ago) 65.23 LF UTF-8 AWS: No credentials selected 4spaces P master
```



```
part03 - BookManipulationClass.java
File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
part03 \src\ part03Package BookManipulationClass searchByAuthorName
LibrarySystem.java BookManipulationClass.java
package part03Package;

import java.util.*;

public class BookManipulationClass {

    public void addBook(Map<String, Map<String, Set<String>>> authorMap){...}
    public String removeBook(Map<String, Map<String, Set<String>>> authorMap){...}
    public void editLibrary(Map<String, Map<String, Set<String>>> authorMap){...}
    public void searchByAuthorName(Map<String, Map<String, Set<String>>> authorMap){

        int counter = 1;
        Scanner myObj = new Scanner(System.in); // Create a Scanner object
        String authorName = null;
        try{
            System.out.print("Enter Author Name :");
            authorName = myObj.nextLine();
            Map<String, Set<String>> tm = authorMap.get(authorName);
            System.out.println("MR/MS "+authorName+" 's Books Are >>");

            for (Map.Entry<String, Set<String>> vals : tm.entrySet()) {
                System.out.println(counter + " : " + vals.getKey());
                ++counter;
            }

            System.out.println("Enter Book Name To Show its Location(s) On The Library.");
            String st = myObj.nextLine();
            System.out.println("Book Name: " + st);
            System.out.println("Location(s) "+authorMap.get(authorName).get(st).toString());
        }catch (NullPointerException np){
            System.out.println("Trying To Access illegal area !!!");
        }
    }

    public void searchByTitle(Map<String, Map<String, Set<String>>> authorMap){...}
    public void printBooks(Map<String, Map<String, Set<String>>> libraryBooks){...}
}

Run: LibrarySystem
Admin Password Please: 1234
*****
Admin Menu
*****
1 For Adding New Book :
2 For Removing A Book :
3 For Edit Information :
4 For Search By Author Name :
5 For Search By Book Name :
Your Selection:
Enter Book title : history
Book Name: history
Book Author: david
Book Location(s): [c3s3]
*****
1 For Administrator Menu >>
2 For User Menu >>
3 For Exiting Program >>
Enter Your Selection: 1
Admin Password Please: 1234
*****
Admin Menu
*****
1 For Adding New Book :
2 For Removing A Book :
3 For Edit Information :
4 For Search By Author Name :
5 For Search By Book Name :
Your Selection:
Enter Book title :
Could Not Find The Book !!!
*****
1 For Administrator Menu >>
2 For User Menu >>
3 For Exiting Program >>
Enter Your Selection: |

Build completed successfully in 1 s 621 ms (2 minutes ago)
83:23 LF UTF-8 AWS: No credentials selected 4 spaces master
```

```
part03 - BookManipulationClass.java
File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
part03 \src\ part03Package BookManipulationClass searchByAuthorName
LibrarySystem.java BookManipulationClass.java
package part03Package;

import java.util.*;

public class BookManipulationClass {

    public void addBook(Map<String, Map<String, Set<String>>> authorMap){...}
    public String removeBook(Map<String, Map<String, Set<String>>> authorMap){...}
    public void editLibrary(Map<String, Map<String, Set<String>>> authorMap){...}
    public void searchByAuthorName(Map<String, Map<String, Set<String>>> authorMap){

        int counter = 1;
        Scanner myObj = new Scanner(System.in); // Create a Scanner object
        String authorName = null;
        try{
            System.out.print("Enter Author Name :");
            authorName = myObj.nextLine();
            Map<String, Set<String>> tm = authorMap.get(authorName);
            System.out.println("MR/MS "+authorName+" 's Books Are >>");

            for (Map.Entry<String, Set<String>> vals : tm.entrySet()) {
                System.out.println(counter + " : " + vals.getKey());
                ++counter;
            }

            System.out.println("Enter Book Name To Show its Location(s) On The Library.");
            String st = myObj.nextLine();
            System.out.println("Book Name: " + st);
            System.out.println("Location(s) "+authorMap.get(authorName).get(st).toString());
        }catch (NullPointerException np){
            System.out.println("Trying To Access illegal area !!!");
        }
    }

    public void searchByTitle(Map<String, Map<String, Set<String>>> authorMap){...}
    public void printBooks(Map<String, Map<String, Set<String>>> libraryBooks){...}
}

Run: LibrarySystem
Book's List:
Book Name: [IT] Location(s): [c1s3]
Book Name: [math] Location(s): [c2s3]
Book Name: [history] Location(s): [c3s3]
*****
Author Name: ali
Book's List:
Book Name: [the will] Location(s): [c3s1]
Book Name: [the passion] Location(s): [c2s1]
Book Name: [the message] Location(s): [c1s1]
*****
===== LIBRARY AUTOMATION SYSTEM =====
*****
1 For Administrator Menu >>
2 For User Menu >>
3 For Exiting Program >>
Enter Your Selection: 2
*****
User Menu
*****
1 For Browse Book By Author Name :
2 For Browse Book By Book Title :
Your Selection:
Enter Author Name : jumer
MR/MS jumer's Books Are >>
1: computer science
2: the dead
3: 3 idiots
Enter Book Name To Show its Location(s) On The Library.
the dead
Book Name: the dead
Location(s) [c2s2]
*****
1 For Administrator Menu >>
2 For User Menu >>
3 For Exiting Program >>
Enter Your Selection: |

Build completed successfully in 1 s 819 ms (a minute ago)
46:23 LF UTF-8 AWS: No credentials selected 4 spaces master
```

The screenshot shows an IDE with two main panels. The left panel displays the source code for `BookManipulationClass.java`. The code includes methods for adding, removing, editing, and searching books, as well as a menu-driven interface. The right panel shows the output of the program, which includes a list of books, a search result for 'david', and a menu for the 'Library Automation System'.

```
part03 - BookManipulationClass.java
File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
part03 src part03Package BookManipulationClass searchByAuthorName
LibrarySystem.java BookManipulationClass.java
package part03Package;

import java.util.*;

public class BookManipulationClass {

    public void addBook(Map<String, Map<String, Set<String>>> authorMap){...}
    public String removeBook(Map<String, Map<String, Set<String>>> authorMap){...}
    public void editLibrary(Map<String, Map<String, Set<String>>> authorMap){...}
    public void searchByAuthorName(Map<String, Map<String, Set<String>>> authorMap){

        int counter = 1;
        Scanner myObj = new Scanner(System.in); // Create a Scanner object
        String authorName = null;
        try{
            System.out.print("Enter Author Name :");
            authorName = myObj.nextLine();
            Map<String, Set<String>> tm = authorMap.get(authorName);
            System.out.println("HI/NS "+authorName+"'s Books Are >>");

            for (Map.Entry<String, Set<String>> vals : tm.entrySet()) {
                System.out.println(counter + " : " + vals.getKey());
                ++counter;
            }

            System.out.println("Enter Book Name To Show its Location(s) On The Library.");
            String st = myObj.nextLine();
            System.out.println("Book Name: " + st);
            System.out.println("location(s) " + authorMap.get(authorName).get(st).toString());
        } catch (NullPointerException np){
            System.out.println("Trying To Access illegal area !!!");
        }
    }

    public void searchByTitle(Map<String, Map<String, Set<String>>> authorMap){...}
    public void printBooks(Map<String, Map<String, Set<String>>> libraryBooks){...}
}

Run: LibrarySystem
Book Name: [computer science] Location(s): [c1s2]
Book Name: [the dead] Location(s): [c2s2]
Book Name: [3 idiots] Location(s): [c3s2]
*****
Author Name: david
Book's List:
Book Name: [IT] Location(s): [c1s3]
Book Name: [math] Location(s): [c2s3]
Book Name: [history] Location(s): [c3s3]
*****
Author Name: ali
Book's List:
Book Name: [the will] Location(s): [c3s1]
Book Name: [the passion] Location(s): [c2s1]
Book Name: [the message] Location(s): [c1s1]
*****
**** LIBRARY AUTOMATION SYSTEM ****
*****
1 For Administrator Menu >>
2 For User Menu >>
3 For Exiting Program >>
Enter Your Selection: 2
*****
User Menu
*****
1 For Browse Book By Author Name :
2 For Browse Book By Book Title :
Your Selection: 2
Enter Book title : 3 idiots
Book Name: 3 idiots
Book Author: juner
Book Location(s): [c3s2]
*****
1 For Administrator Menu >>
2 For User Menu >>
3 For Exiting Program >>
Enter Your Selection:
```

## PROBLEM SOLUTION APPROACH:

→ we are asked to implement this project using maps and set data structure

→ let's think of a library automation system where users can browse books and shows their desired books by entering simply the book name and author name and the other hand admin of the system who can access to change the books location in a library and change the information about any books he/she wants to.

→ I have used typical menu format to start the system any time we run.

→ I have entered some books with their related author names and locations. So we assume that we have some books in our library to directly access add or remove them just after we start our program.

→ admin can add remove and change any books title location or author names and also admin can display the whole books in library.

→ users can only browse the books by their author names or book titles and users are kind of in RED ONLY mode of the system opposite to admins who are in READ AND WRITE mode.

→ *BookManipulate Class handles all the overhead works of system like adding books removing books printing books and even changing books location.*

→ *we have all the methods checked for any possible exception occurrence.*

## **TEST CASES:**

<b>Test Case ID</b>	<b>Test Scenarios</b>	<b>Test Data</b>	<b>Expected Results</b>	<b>Actual Result</b>	<b>Pass/Fail</b>
T01	Confirm admin password	input	1453	1453	Pass
T02	Confirm admin password	input	1453	Any number other than 1453	Fail
T03	Add new book	Manipulate.addBook(authorMap)	Book title author name,location	If all correct add the book to library list	Pass
T04	Add new book	Manipulate.addBook(authorMap)	Book title author name,location	If any one not correct do not add to library	fail
T05	Remove Book	Manipulate.removeBook(authorMap)	Book name ,book author name	If all correct then remove the book from library list	Pass
T06	Remove Book	Manipulate.remove(authorMap)	Book name,book Author name	If any not correct	Fail
T07	Edit books	Manipulate.editLibrary(authorMap)	Book name, author name,old location,new location	If all correct /if nor	Pass/fail
T08	Search for a book	Manipulate.searchByAuthorName(authorMap)	Author name,book selection	If all correct/if any one not correct	Pass/fail
T09	Search for a book	Manipulate.searchByTitle(authorMap)	Take book title	if book title book author and book locations is found	Pass

T10	Search for a book	Manipulate.searchByTitle(authorMap)	Take book title	if any from book title book author and book locations is not found	Fail
T11	Print library content	Manipulate.printBook(author)	Take library map		pass

# ***PART04***

***UML:***

***COMMAND LINE:***

***PROBLEM SOLUTION APPROACH:***

***TEST CASES:***