

IMPLEMENTING DIFFERENT SET OPERATIONS

PROBLEM STATEMENT

1. An input a list of strings as a Universe.
2. Then takes another input a number of sets (that are subsets of the universe)
3. Then ask the user about the operations they want to perform (3 required features to be implemented in this assignment):
 - Union of two sets
 - Intersection of two sets
 - Complement of a set

USED DATA STRUCTURES

- Character Array
- String Array

PSEUDOCODE

Scan the universe set

Put them in an array

Calculate the size

Make a string array called numbers to know which element is in which

Scan the number of subsets

if zero catch error

Scan each subset

if element doesn't exist in universe catch error

Order the elements in order of universe

Using the numbers of each set we add in the numbers array the value of it in the corresponding position

Print out the options that the user can choose from and scan it

Union:

choosing the two sets that the user wants to union

checking in the numbers array for each cell that contain the name of either one of the 2 sets for the union

print

Intersection:

Choosing 2 sets

checking the numbers array to see if each element in it have the same value

if same value then this element are in both sets

print

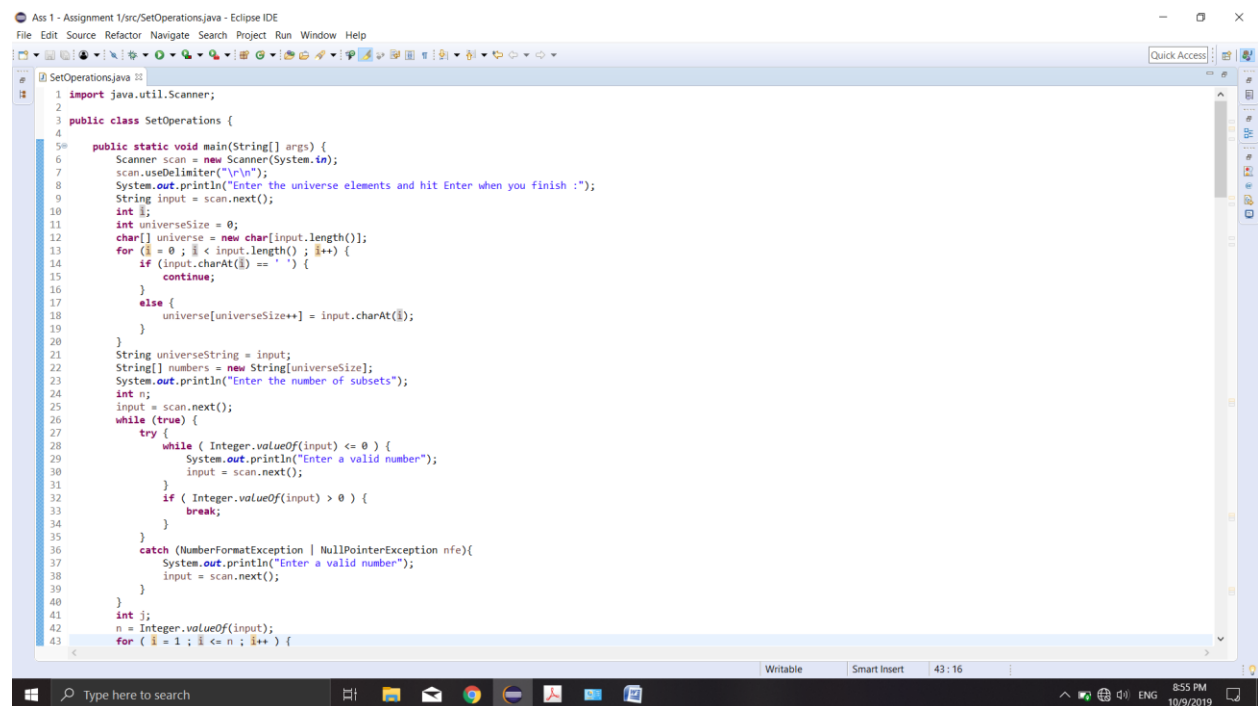
Complement:

choosing the set

checking the universe array and the numbers array

if the numbers array element is in the universe we skip it and only print the ones that are not in the selected array

CODE SNIPPETS



```
1 import java.util.Scanner;
2
3 public class SetOperations {
4
5     public static void main(String[] args) {
6         Scanner scan = new Scanner(System.in);
7         scan.useDelimiter("\n");
8         System.out.println("Enter the universe elements and hit Enter when you finish :");
9         String input = scan.next();
10        int i;
11        int universeSize = 0;
12        char[] universe = new char[input.length()];
13        for (i = 0; i < input.length(); i++) {
14            if (input.charAt(i) == ' ') {
15                continue;
16            }
17            else {
18                universe[universeSize++] = input.charAt(i);
19            }
20        }
21        String universeString = input;
22        String[] numbers = new String[universeSize];
23        System.out.println("Enter the number of subsets");
24        int n;
25        input = scan.next();
26        while (true) {
27            try {
28                while (Integer.valueOf(input) <= 0) {
29                    System.out.println("Enter a valid number");
30                    input = scan.next();
31                }
32                if (Integer.valueOf(input) > 0) {
33                    break;
34                }
35            } catch (NumberFormatException | NullPointerException nfe) {
36                System.out.println("Enter a valid number");
37                input = scan.next();
38            }
39        }
40        int j;
41        n = Integer.valueOf(input);
42        for (j = 1; j <= n; j++) {
```

```
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SetOperations.java
44     j = 0 ;
45     while (j < input.length()) {
46         System.out.println("Enter elements of the subset number " + j + " :");
47         input = scan.next();
48         for ( i = 0 ; i < input.length() ; i++) {
49             if (input.charAt(i) == ' ') {
50                 continue;
51             }
52             else if (!universeString.contains(String.valueOf(input.charAt(i)))) {
53                 System.out.println("Please enter valid elements that exist in universe");
54                 break;
55             }
56             else {
57                 boolean found = false;
58                 for (int k = 0 ; k < universeSize ; k++) {
59                     if (input.charAt(i) == universe[k]) {
60                         if (numbers[k] == null) {
61                             numbers[k] = String.valueOf(i);
62                         }
63                         else {
64                             numbers[k] += i;
65                         }
66                         numbers[k] += " ";
67                         found = true;
68                     }
69                     if (found) {
70                         break;
71                     }
72                 }
73             }
74         }
75     }
76 }
77 while (true) {
78     System.out.println();
79     System.out.println("Choose the number of the operation :");
80     System.out.println("1-Union of two sets");
81     System.out.println("2-Intersection of two sets");
82     System.out.println("3-Complement of a set");
83     System.out.println("4-Exit");
84     System.out.println("-----");
85     input = scan.next();
86     int choice;
```

```
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SetOperations.java
87 while ((input.equals("1") && !input.equals("2") && !input.equals("3") && !input.equals("4"))) {
88     System.out.println("Please choose a valid choice.");
89     input = scan.next();
90 }
91 choice = Character.getNumericValue(input.charAt(0));
92 if (choice == 1) {
93     String set1, set2;
94     boolean phi = true;
95     System.out.println("The number of first set is");
96     set1 = scan.next();
97     while (true) {
98         try {
99             while ((Integer.valueOf(set1) > n) || (Integer.valueOf(set1) <= 0)) {
100                 System.out.println("Enter a valid number");
101                 set1 = scan.next();
102             }
103             if ((Integer.valueOf(set1) <= n) && (Integer.valueOf(set1) > 0)) {
104                 break;
105             }
106         }
107         catch (NumberFormatException | NullPointerException nfe){
108             System.out.println("Enter a valid number");
109             set1 = scan.next();
110         }
111     }
112     System.out.println("The number of second set is");
113     set2 = scan.next();
114     while (true) {
115         try {
116             while ((Integer.valueOf(set2) > n) || (Integer.valueOf(set2) <= 0)) {
117                 System.out.println("Enter a valid number");
118                 set2 = scan.next();
119             }
120             if ((Integer.valueOf(set2) <= n) && (Integer.valueOf(set2) > 0)) {
121                 break;
122             }
123         }
124         catch (NumberFormatException | NullPointerException nfe){
125             System.out.println("Enter a valid number");
126             set2 = scan.next();
127         }
128     }
129 }
```

```
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129 }
130 }
131 System.out.println("The union of set " + set1 + " and " + set2 + " is");
132 System.out.println();
133 for (i = 0; i < numbers.length; i++) {
134     if ((numbers[i] != null) && (numbers[i].contains(set1) || numbers[i].contains(set2))) {
135         System.out.print(String.valueOf(universe[i]) + " ");
136         phi = false;
137     }
138 }
139 if (phi) {
140     System.out.println("null");
141 }
142 }
143 else if (choice == 2) {
144     String set1, set2;
145     boolean phi = true;
146     System.out.println("The number of first set is");
147     set1 = scan.next();
148     while (true) {
149         try {
150             while ((Integer.valueOf(set1) > n) || (Integer.valueOf(set1) <= 0)) {
151                 System.out.println("Enter a valid number");
152                 set1 = scan.next();
153             }
154             if ((Integer.valueOf(set1) <= n) && (Integer.valueOf(set1) > 0)) {
155                 break;
156             }
157         }
158         catch (NumberFormatException | NullPointerException nfe) {
159             System.out.println("Enter a valid number");
160             set1 = scan.next();
161         }
162     }
163     System.out.println("The number of second set is");
164     set2 = scan.next();
165     while (true) {
166         try {
167             while ((Integer.valueOf(set2) > n) || (Integer.valueOf(set2) <= 0)) {
168                 System.out.println("Enter a valid number");
169                 set2 = scan.next();
170             }
171         }
172     }
173     set2 = scan.next();
174     if ((Integer.valueOf(set2) <= n) && (Integer.valueOf(set2) > 0)) {
175         break;
176     }
177     catch (NumberFormatException | NullPointerException nfe) {
178         System.out.println("Enter a valid number");
179         set2 = scan.next();
180     }
181 }
182 System.out.println("The intersection of set " + set1 + " and " + set2 + " is");
183 System.out.println();
184 for (i = 0; i < numbers.length; i++) {
185     if ((numbers[i] != null) && (numbers[i].contains(set1) && numbers[i].contains(set2))) {
186         System.out.print(String.valueOf(universe[i]) + " ");
187         phi = false;
188     }
189 }
190 if (phi) {
191     System.out.println("null");
192 }
193 }
194 else if (choice == 3) {
195     String set;
196     boolean phi = true;
197     System.out.println("The number of the set is");
198     set = scan.next();
199     while (true) {
200         try {
201             while ((Integer.valueOf(set) > n) || (Integer.valueOf(set) <= 0)) {
202                 System.out.println("Enter a valid number");
203                 set = scan.next();
204             }
205             if ((Integer.valueOf(set) <= n) && (Integer.valueOf(set) > 0)) {
206                 break;
207             }
208         }
209         catch (NumberFormatException | NullPointerException nfe) {
210             System.out.println("Enter a valid number");
211             set = scan.next();
212         }
213     }
214     set = scan.next();
215     if ((Integer.valueOf(set) <= n) && (Integer.valueOf(set) > 0)) {
216         break;
217     }
218     catch (NumberFormatException | NullPointerException nfe) {
219         System.out.println("Enter a valid number");
220         set = scan.next();
221     }
222 }
```

```
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171 set2 = scan.next();
172 if ((Integer.valueOf(set2) <= n) && (Integer.valueOf(set2) > 0)) {
173     break;
174 }
175 }
176 catch (NumberFormatException | NullPointerException nfe) {
177     System.out.println("Enter a valid number");
178     set2 = scan.next();
179 }
180 }
181 System.out.println("The intersection of set " + set1 + " and " + set2 + " is");
182 System.out.println();
183 for (i = 0; i < numbers.length; i++) {
184     if ((numbers[i] != null) && (numbers[i].contains(set1) && numbers[i].contains(set2))) {
185         System.out.print(String.valueOf(universe[i]) + " ");
186         phi = false;
187     }
188 }
189 if (phi) {
190     System.out.println("null");
191 }
192 }
193 }
194 else if (choice == 3) {
195     String set;
196     boolean phi = true;
197     System.out.println("The number of the set is");
198     set = scan.next();
199     while (true) {
200         try {
201             while ((Integer.valueOf(set) > n) || (Integer.valueOf(set) <= 0)) {
202                 System.out.println("Enter a valid number");
203                 set = scan.next();
204             }
205             if ((Integer.valueOf(set) <= n) && (Integer.valueOf(set) > 0)) {
206                 break;
207             }
208         }
209         catch (NumberFormatException | NullPointerException nfe) {
210             System.out.println("Enter a valid number");
211             set = scan.next();
212         }
213     }
214     set = scan.next();
215     if ((Integer.valueOf(set) <= n) && (Integer.valueOf(set) > 0)) {
216         break;
217     }
218     catch (NumberFormatException | NullPointerException nfe) {
219         System.out.println("Enter a valid number");
220         set = scan.next();
221     }
222 }
```

```
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194     else if (choice == 3) {
195         String set;
196         boolean phi = true;
197         System.out.println("The number of the set is");
198         set = scan.next();
199         while (true) {
200             try {
201                 while ( (Integer.valueOf(set) > n) || (Integer.valueOf(set) <= 0) ) {
202                     System.out.println("Enter a valid number");
203                     set = scan.next();
204                 }
205                 if ( (Integer.valueOf(set) <= n) && (Integer.valueOf(set) > 0) ) {
206                     break;
207                 }
208             }
209             catch (NumberFormatException | NullPointerException nfe){
210                 System.out.println("Enter a valid number");
211                 set = scan.next();
212             }
213         }
214         System.out.println("The complement of set " + set + " is");
215         System.out.println();
216         for (i = 0; i < numbers.length; i++) {
217             if (numbers[i] == null || !numbers[i].contains(set)) {
218                 System.out.print(String.valueOf(universe[i]) + " ");
219                 phi = false;
220             }
221         }
222         if (phi) {
223             System.out.println("null");
224         }
225     }
226     else if (choice == 4) {
227         System.out.println();
228         System.out.println("Thank you");
229         System.out.println("=====");
230         break;
231     }
232 }
233 scan.close();
234 }
235 }
236 }
```

SAMPLE RUNS

```
Ass 1 - Assignment 1/src/SetOperations.java - Eclipse IDE
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<terminated> SetOperations [Java Application] C:\Program Files\Java\jdk-11.0.2\bin\javaw.exe (Oct 9, 2019, 9:03:13 PM)

Enter the universe elements and hit Enter when you finish :
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
Enter the number of subsets
4
Enter elements of the subset number 1 :
A E I O U
Enter elements of the subset number 2 :
S P I D E R
Enter elements of the subset number 3 :
A Z B Y C X
Enter elements of the subset number 4 :
X Y Z

Choose the number of the operation :
1-Union of two sets
2-Intersection of two sets
3-Complement of a set
4-Exit
-----
1
The number of first set is
1
The number of second set is
4
The union of set 1 and 4 is
A E I O U X Y Z
Choose the number of the operation :
1-Union of two sets
2-Intersection of two sets
3-Complement of a set
4-Exit
-----
1
The number of first set is
1
The number of second set is
2
The union of set 1 and 2 is
A D E I O P R S U
Choose the number of the operation :
```

```
Ass 1 - Assignment 1/src/SetOperations.java - Eclipse IDE
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Choose the number of the operation :
1-Union of two sets
2-Intersection of two sets
3-Complement of a set
4-Exit
-----
1
The number of first set is
3
The number of second set is
4
The union of set 3 and 4 is

A B C X Y Z
Choose the number of the operation :
1-Union of two sets
2-Intersection of two sets
3-Complement of a set
4-Exit
-----
2
The number of first set is
1
The number of second set is
4
The intersection of set 1 and 4 is
null

Choose the number of the operation :
1-Union of two sets
2-Intersection of two sets
3-Complement of a set
4-Exit
-----
2
The number of first set is
1
The number of second set is
3
The intersection of set 1 and 3 is
```

```
Ass 1 - Assignment 1/src/SetOperations.java - Eclipse IDE
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Choose the number of the operation :
1-Union of two sets
2-Intersection of two sets
3-Complement of a set
4-Exit
-----
2
The number of first set is
1
The number of second set is
3
The intersection of set 1 and 3 is

A
Choose the number of the operation :
1-Union of two sets
2-Intersection of two sets
3-Complement of a set
4-Exit
-----
2
The number of first set is
1
The number of second set is
2
The intersection of set 1 and 2 is

E I
Choose the number of the operation :
1-Union of two sets
2-Intersection of two sets
3-Complement of a set
4-Exit
-----
3
The number of the set is
1
The complement of set 1 is

B C D F G H J K L M N P Q R S T V W X Y Z
Choose the number of the operation :
```

```
Ass 1 - Assignment 1/src/SetOperations.java - Eclipse IDE
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<terminated> SetOperations [Java Application] C:\Program Files\Java\jdk-11.0.2\bin\javaw.exe (Oct 9, 2019, 9:03:13 PM)

3
The number of the set is
1
The complement of set 1 is
B C D F G H J K L M N P Q R S T V W X Y Z
Choose the number of the operation :
1-Union of two sets
2-Intersection of two sets
3-Complement of a set
4-Exit
-----
3
The number of the set is
4
The complement of set 4 is
A B C D E F G H I J K L M N O P Q R S T U V W
Choose the number of the operation :
1-Union of two sets
2-Intersection of two sets
3-Complement of a set
4-Exit
-----
3
The number of the set is
3
The complement of set 3 is
D E F G H I J K L M N O P Q R S T U V W
Choose the number of the operation :
1-Union of two sets
2-Intersection of two sets
3-Complement of a set
4-Exit
-----
4
Thank you
=====
```

TEAM

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