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2024_28_III_OOPS Using Java Lab

REC_2028_OOPS using Java_Week 9_CY

Attempt : 1
Total Mark : 40
Marks Obtained : 40

Section 1 : Coding

1. Problem Statement

Raman, a computer science teacher, is responsible for registering students for his programming class. To streamline the registration process, he wants to develop a program that stores students' names and allows him to retrieve a student's name based on their index in the list.

Raman has decided to use an ArrayList to store the names of students, as it provides efficient dynamic resizing and indexing.

Write a program that enables Raman to input the names of students and fetch a student's name using the specified index. If the entered index is invalid, the program should return an appropriate message.

Input Format

The first line of input consists of an integer n, representing the number of students to register.

The next n lines of input consist of the names of each student, one by one.

The last line of input is an integer, representing the index (0-indexed) of the element to retrieve.

Output Format

If the index is valid (within the bounds of the ArrayList), print "Element at index [index]: " followed by the element (student name as string).

If the index is invalid, print "Invalid index".

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 5

Alice

Bob

Ankit

Alice

Prajit

2

Output: Element at index 2: Ankit

Answer

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

```
class Main {
```

```
    public static void main(String[] args) {
```

```
        Scanner sc = new Scanner(System.in);
```

```
        int n = sc.nextInt();
```

```
        sc.nextLine();
```

```
        ArrayList<String> students = new ArrayList<>();
```

```
        for (int i = 0; i < n; i++) {
```

```
            students.add(sc.nextLine());
```

```

    }

    int index = sc.nextInt();

    if (index >= 0 && index < students.size()) {
        System.out.println("Element at index " + index + ": " + students.get(index));
    } else {
        System.out.println("Invalid index");
    }

    sc.close();
}
}

```

Status : Correct

Marks : 10/10

2. Problem Statement

Rahul is working on a list manipulation problem where he needs to reverse a specific subarray using a stack. Given an array and two indices l and r , he wants to reverse only the portion of the array from index l to r (both inclusive) while keeping the rest of the array unchanged.

Since Rahul wants to solve this problem efficiently, he decides to use a stack to reverse the subarray in $O(r - l)$ time.

Your task is to help Rahul by implementing this functionality.

Input Format

The first line contains an integer n , the size of the array.

The second line contains n space-separated integers $arr[i]$.

The third line contains two integers l and r , denoting the start and end indices of the subarray to reverse.

Note: The array follows 0-based indexing.

Output Format

The output prints the modified array after reversing the subarray between indices

l and r.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 6

1 2 3 4 5 6

1 4

Output: 1 5 4 3 2 6

Answer

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

```
public class Main {
```

```
    public static void main(String[] args) {  
        Scanner sc = new Scanner(System.in);  
        int n = sc.nextInt();  
        int[] arr = new int[n];  
        for (int i = 0; i < n; i++) arr[i] = sc.nextInt();  
        int l = sc.nextInt();  
        int r = sc.nextInt();  
        Stack<Integer> stack = new Stack<>();  
        for (int i = l; i <= r; i++) stack.push(arr[i]);  
        for (int i = l; i <= r; i++) arr[i] = stack.pop();  
        for (int i = 0; i < n; i++) System.out.print(arr[i] + " ");  
    }
```

```
}
```

Status : Correct

Marks : 10/10

3. Problem Statement

Rahul, a stock trader, wants to analyze the stock prices of a company over several days. For each day, he wants to determine the stock span, which is the number of consecutive days (including the current day) where the stock price is less than or equal to the price on that day.

The stock span helps him understand how long a stock has been continuously increasing or staying the same. You need to help Rahul by computing the stock span for each day using a Stack data structure efficiently.

Example:

Input:

7

100 80 60 70 60 75 85

Output:

1 1 1 2 1 4 6

Explanation:

For each day:

Day 1: Price = 100 Span = 1 (Only this day)
Day 2: Price = 80 Span = 1 (Only this day)
Day 3: Price = 60 Span = 1 (Only this day)
Day 4: Price = 70 Span = 2 (Includes today and previous day)
Day 5: Price = 60 Span = 1 (Only this day)
Day 6: Price = 75 Span = 4 (Includes today and previous three days)
Day 7: Price = 85 Span = 6 (Includes today and previous five days)

Input Format

The first line contains an integer n , the number of days.

The second line contains n space-separated integers $\text{prices}[i]$, where $\text{prices}[i]$ represents the stock price on the i -th day.

Output Format

The output prints n space-separated integers representing the stock span for each day.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 7

100 80 60 70 60 75 85

Output: 1 1 1 2 1 4 6

Answer

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

```
class Main {
```

```
    public static void main(String[] args) {
```

```
        Scanner sc = new Scanner(System.in);
```

```
        int n = sc.nextInt();
```

```
        int[] prices = new int[n];
```

```
        int[] spans = new int[n];
```

```
        for (int i = 0; i < n; i++) {  
            prices[i] = sc.nextInt();  
        }
```

```
        Stack<Integer> stack = new Stack<>();
```

```
        for (int i = 0; i < n; i++) {  
            while (!stack.isEmpty() && prices[stack.peek()] <= prices[i]) {  
                stack.pop();  
            }
```

```
            if (stack.isEmpty()) {  
                spans[i] = i + 1;  
            } else {  
                spans[i] = i - stack.peek();  
            }
```

```
            stack.push(i);
```

```
        }
```

```
        for (int i = 0; i < n; i++) {  
            System.out.print(spans[i]);
```

```
        if (i < n - 1) {  
            System.out.print(" ");  
        }  
    }  
  
    sc.close();  
}
```

Status : Correct

Marks : 10/10

4. Problem Statement

Sanjay is working on a program to merge two sorted linked lists into a single sorted list using Java's LinkedList class from the Collections framework. Given two sorted linked lists, he wants to merge them while maintaining the sorted order.

Write a Java program that:

Reads two sorted linked lists. Merges them into a single sorted linked list. Prints the merged list in ascending order.

Input Format

The first line contains an integer m (the size of the first linked list).

The second line contains m space-separated integers (sorted).

The third line contains an integer n (the size of the second linked list).

The fourth line contains n space-separated integers (sorted).

Output Format

The output prints the merged linked list as space-separated integers.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 2

5 10

3

1 3 8

Output: 1 3 5 8 10

Answer

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

```
class MergeSortedList {
```

```
    public static void main(String[] args) {  
        Scanner sc = new Scanner(System.in);
```

```
        int m = sc.nextInt();  
        LinkedList<Integer> list1 = new LinkedList<>();  
        for (int i = 0; i < m; i++) {  
            list1.add(sc.nextInt());  
        }
```

```
        int n = sc.nextInt();  
        LinkedList<Integer> list2 = new LinkedList<>();  
        for (int i = 0; i < n; i++) {  
            list2.add(sc.nextInt());  
        }
```

```
        LinkedList<Integer> merged = new LinkedList<>();  
        int i = 0, j = 0;
```

```
        while (i < m && j < n) {  
            if (list1.get(i) <= list2.get(j)) {  
                merged.add(list1.get(i));  
                i++;  
            } else {  
                merged.add(list2.get(j));  
                j++;  
            }  
        }
```

```
        while (i < m) {
```



```
merged.add(list1.get(i));  
i++;  
}  
  
while (j < n) {  
    merged.add(list2.get(j));  
    j++;  
}  
  
for (int k = 0; k < merged.size(); k++) {  
    System.out.print(merged.get(k) + " ");  
}  
  
sc.close();  
}  
  
}
```

Status : Correct

Marks : 10/10