Data Structures and Algorithms (CSE2001) Lab-2

KHAN MOHD OWAIS RAZA (20BCD7138)

Q.1] Write a program to implement stack operations using arrays

```
/**
Name: KHAN MOHD OWAIS RAZA
Class: 20BCD7138
Course: Data Structures & Algorithms
Code: CSE2001
Slot: L19+L20
**/
/* Lab-2 */
/* Q.1] Program to implement stack operations using arrays */
import  java.io.*;
class Question1{
static int max=10,i,top,ch,item;
static int a[]=new int[10];
Question1(){
top=-1;
}
public static void main(String args[])throws IOException{
while((boolean)true){
System.out.println("Select operation: \n[1] Push \n[2] Pop \n[3] Display \n[4] Exit
  \n");
try{
BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
ch=Integer.parseInt(br.readLine());
}
catch(Exception e) {}
if(ch==4) break;
else{
switch(ch){
case 1: push();
break;
case 2:
```

```
pop();
break;
case 3: display();
break;
}}
}}
static void push(){
if(top==max) System.out.println("Stack is full");
else try{
BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
System.out.println("Enter the element:");
item=Integer.parseInt(br.readLine());
a[++top]=item;
}
catch(Exception e) {}
}
static void pop(){
if(top==-1) System.out.println("Stack is empty !!");
else top--;
System.out.println("Popped item:"+a[top]);
}
static void display(){
System.out.println("Elements in stack are:");
for(i=top; i>0; i--)
System.out.println(a[i]);
}}
```

Output:-

```
Windows PowerShell
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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Users\Digital-Library>  & 'C:\Program Files\Java\jdk1.8.0_191\bin\java.exe'
bin' 'Question1'
Select operation:
[1] Push
[2] Pop
[3] Display
[4] Exit

1
Enter the element:
10
Select operation:
[1] Push
[2] Pop
[3] Display
[4] Exit

1
Enter the element:
20
Select operation:
[1] Push
[2] Pop
[3] Display
[4] Exit

3
Elements in stack are:
20
10
Select operation:
[1] Push
[2] Pop
[3] Display
[4] Exit

4
PS C:\Users\Digital-Library>
```

Q.2] Write a program to implement queue operations using arrays

```
/**
Name: KHAN MOHD OWAIS RAZA
Class: 20BCD7138
Course: Data Structures & Algorithms
Code: CSE2001
Slot: L19+L20
**/
/* Lab-2 */
/* Q.2] Program to implement queue operations using arrays */
import java.io.*;
class Question2{
static int i,front,rear,item,max=5,ch;
static int a[]=new int[5];
Question2(){
front=-1;
rear=-1;
}
public static void main(String args[])throws IOException{
while((boolean)true){
try{
System.out.println("Select Operation: \n[1] Insert \n[2] Delete \n[3] Display
  \n[4] Exit \n");
BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
ch=Integer.parseInt(br.readLine());
}
catch(Exception e){}
if(ch==4) break;
else{
switch(ch){
case 1: insert();
break;
case 2: delete();
break;
case 3: display();
break;
```

```
}}
}}
static void insert(){
if(rear>=max){
System.out.println("Queue is full!!");
}
else{
try{
BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
System.out.println("Enter the element: ");
item=Integer.parseInt(br.readLine());
}
catch(Exception e){}
rear=rear+1;
a[rear]=item;
}}
static void delete(){
if(front==-1){
System.out.println("Queue is empty!!");
}
else{
front=front+1;
item=a[front];
System.out.println("Deleted Item: "+item);
}}
static void display(){
System.out.println("Elements in the Queue are:");
for(int i=front+1; i<=rear; i++){
System.out.println(a[i]);
}}}
```

Output :-

```
Windows PowerShell
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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Users\Digital-Library>  & 'C:\Program Files\Java\jdk1.8.0_191\bin\java.exe'
bin' 'Question2'
Select Operation:
[1] Insert
[2] Delete
[3] Display
[4] Exit

1
Enter the element:
10
Select Operation:
[1] Insert
[2] Delete
[3] Display
[4] Exit

20
Select Operation:
[1] Insert
[2] Delete
[3] Display
[4] Exit

30
Select Operation:
[1] Insert
[2] Delete
[3] Display
[4] Exit

2
Deleted Item: 10
Select Operation:
[1] Insert
[2] Delete
[3] Display
[4] Exit
4
PS C:\Users\Digital-Library>
```

Q.3] Write a program to evaluate postfix expression

```
/**
Name: KHAN MOHD OWAIS RAZA
Class: 20BCD7138
Course: Data Structures & Algorithms
Code: CSE2001
Slot: L19+L20
**/
/* Lab-2 */
/* Q.3] Program to evaluate postfix expression */
import java.util.Scanner;
import java.util.Stack;
public class Question3{
static int evaluatePostfix(String exp){
Stack<Integer> stack=new Stack<>();
for(int i=0;i<exp.length();i++){
char c=exp.charAt(i);
if(Character.isDigit(c)) stack.push(c - '0');
else{
int X = stack.pop();
int Y = stack.pop();
switch(c){
case '+':
stack.push(X+Y);
break;
case '-':
stack.push(X-Y);
break;
case '/':
stack.push(X/Y);
break;
case '*':
stack.push(X*Y);
break;
}}}
return stack.pop();
```

```
}
public static void main(String[] args){
String exp = "326*+3-";
System.out.println("Evaluation of postfix expression: "+evaluatePostfix(exp));
}}
```

Output:-

```
Windows PowerShell
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PS C:\Users\Digital-Library>  & 'C:\Program Files\Java\jdk1.8.0_191\bin\java.exe'

Evaluation of postfix expression: -12
PS C:\Users\Digital-Library>
```